for Preparation Click here

NOTICE:

Perform the Reset Memory procedures (A/T initialization) after replacing the automatic transmission assembly, valve body assembly or any of the shift solenoid valves (Click here).

HINT:

Reset Memory cannot be completed by only reconnecting the cable to the negative (-) battery terminal.

CAUTION:

When using compressed air, always aim away from yourself to prevent Automatic Transmission Fluid (ATF) or kerosene from spraying on your face.

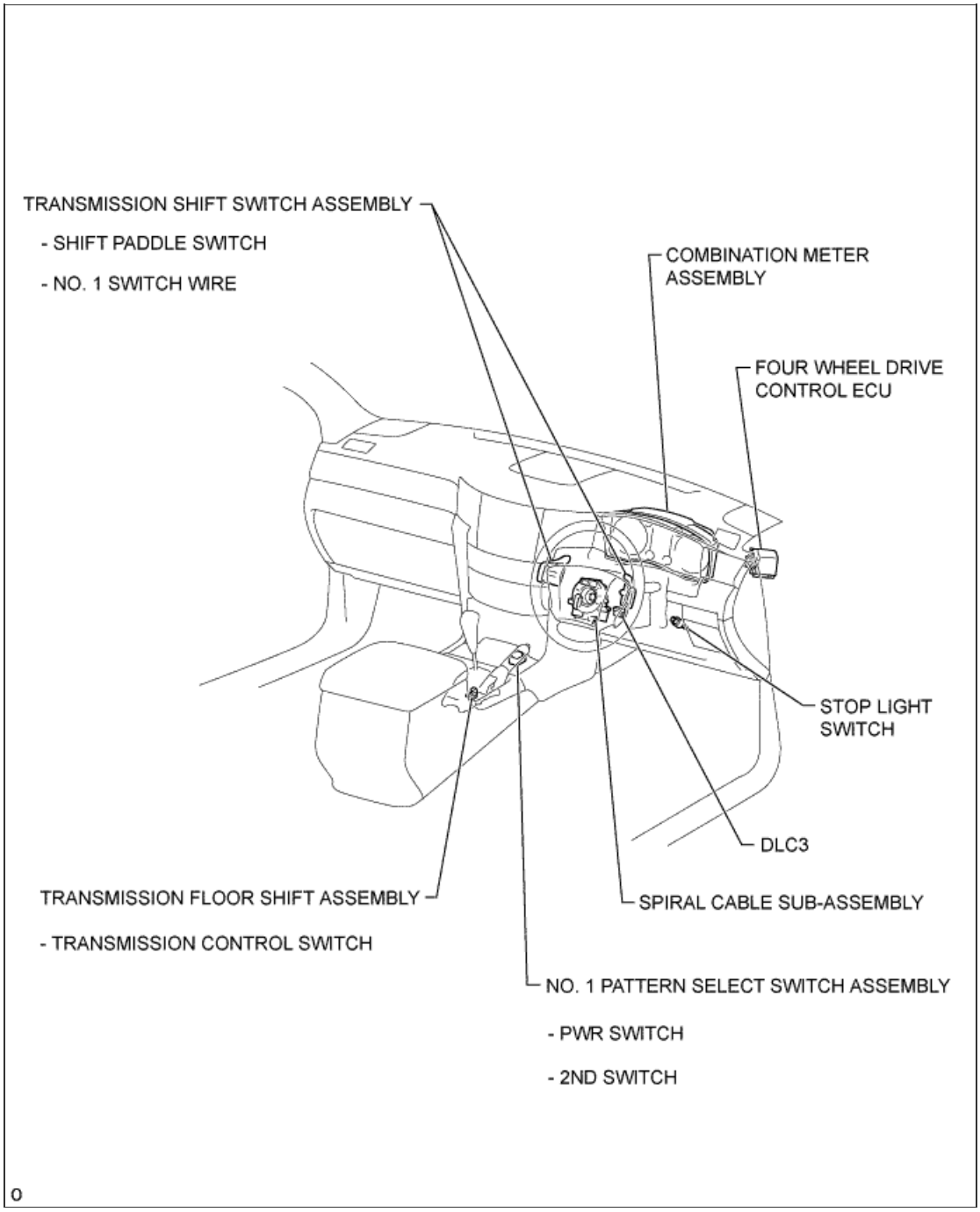
NOTICE:

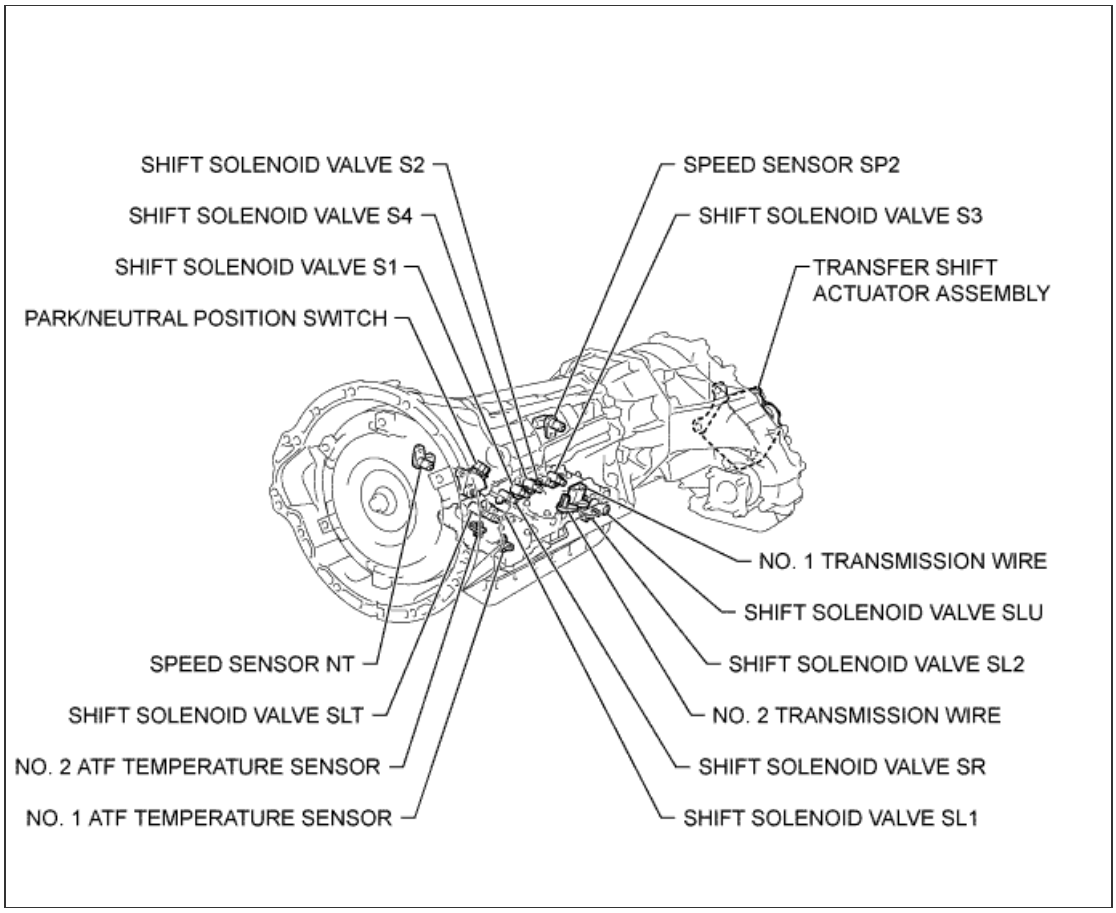
- **The automatic transmission is composed of precision-made parts, necessitating careful inspection before reassembly because even a small nick could cause fluid leakage or affect performance.**
- **The procedures are organized so that you work on only one component group at a time. This will help avoid confusion with similar-looking parts of different sub-assemblies being on your workbench at the same time.**
- **The component groups are inspected and repaired from the converter housing side.**
- **Whenever possible, complete the inspection, repair and reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups.**
- **Use of Toyota Genuine ATF WS is recommended.**
- **All disassembled parts should be washed clean, and compressed air should be blown through any fluid passages and holes.**
- **Dry all parts with compressed air. Never use a cloth.**
- **The recommended ATF or kerosene should be used for cleaning.**
- **After cleaning, the parts should be arranged in the order they were removed for efficient inspection, repairs, and reassembly.**
- **New discs for the brakes and clutches that will be used for replacement must be soaked in ATF for at least 15 minutes before reassembly.**
- **All oil seal rings, clutch discs, clutch plates, rotating parts and sliding surfaces should be coated with ATF prior to reassembly.**
- **All old gaskets and rubber O-rings must be replaced.**
- **Do not apply adhesive cement to gaskets and similar parts.**
- **Make sure that the ends of the snap rings are not aligned with any cutouts. Also make sure that snap rings are correctly installed into the grooves.**
- **If a worn bushing is to be replaced, the sub-assembly containing the bushing must also be replaced.**
- **Check the thrust bearings and races for wear or damage. Replace them if necessary.**
- **Use petroleum jelly to keep parts in place.**
- **When working with FIPG material, perform the following:**
  Using a razor blade and gasket scraper, remove all old FIPG material from the gasket surface.
  Clean all components thoroughly to remove all foreign matter.
  Clean both sealing surfaces with a non-residue solvent.
  Apply FIPG material in a continuous line on the sealing surface.
  Reassemble parts within 10 minutes of applying FIPG material. Failing to do so will require the FIPG material to be removed and reapplied.

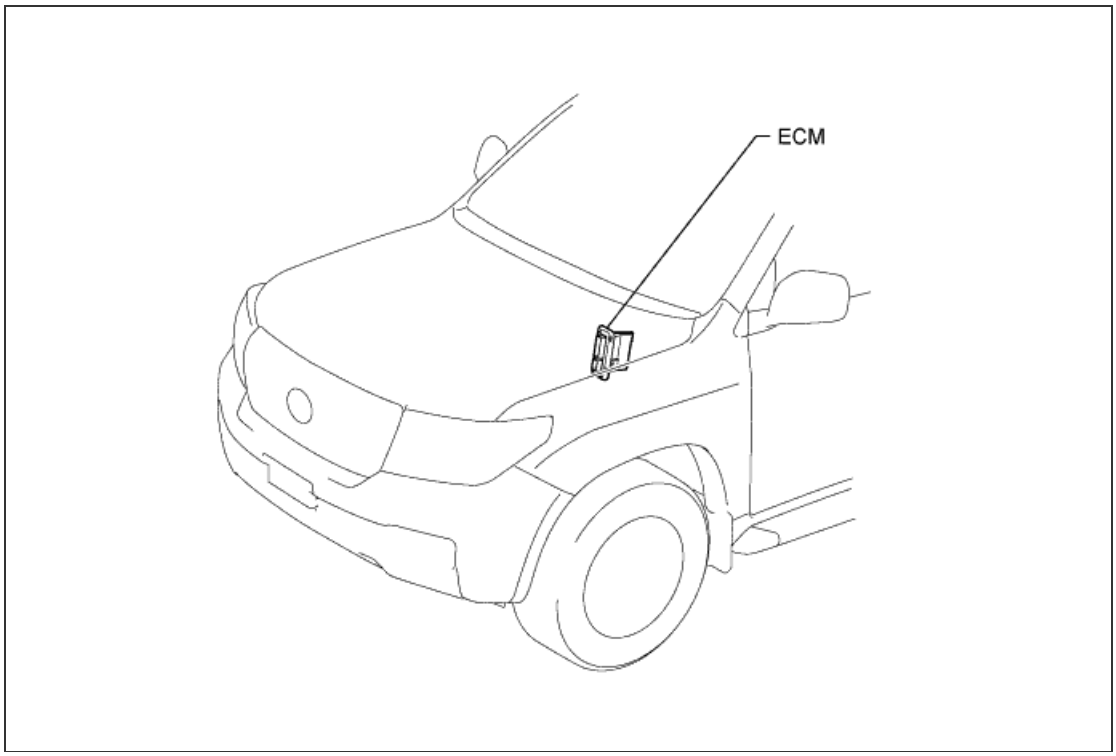
for Preparation Click here

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).

for Preparation Click here

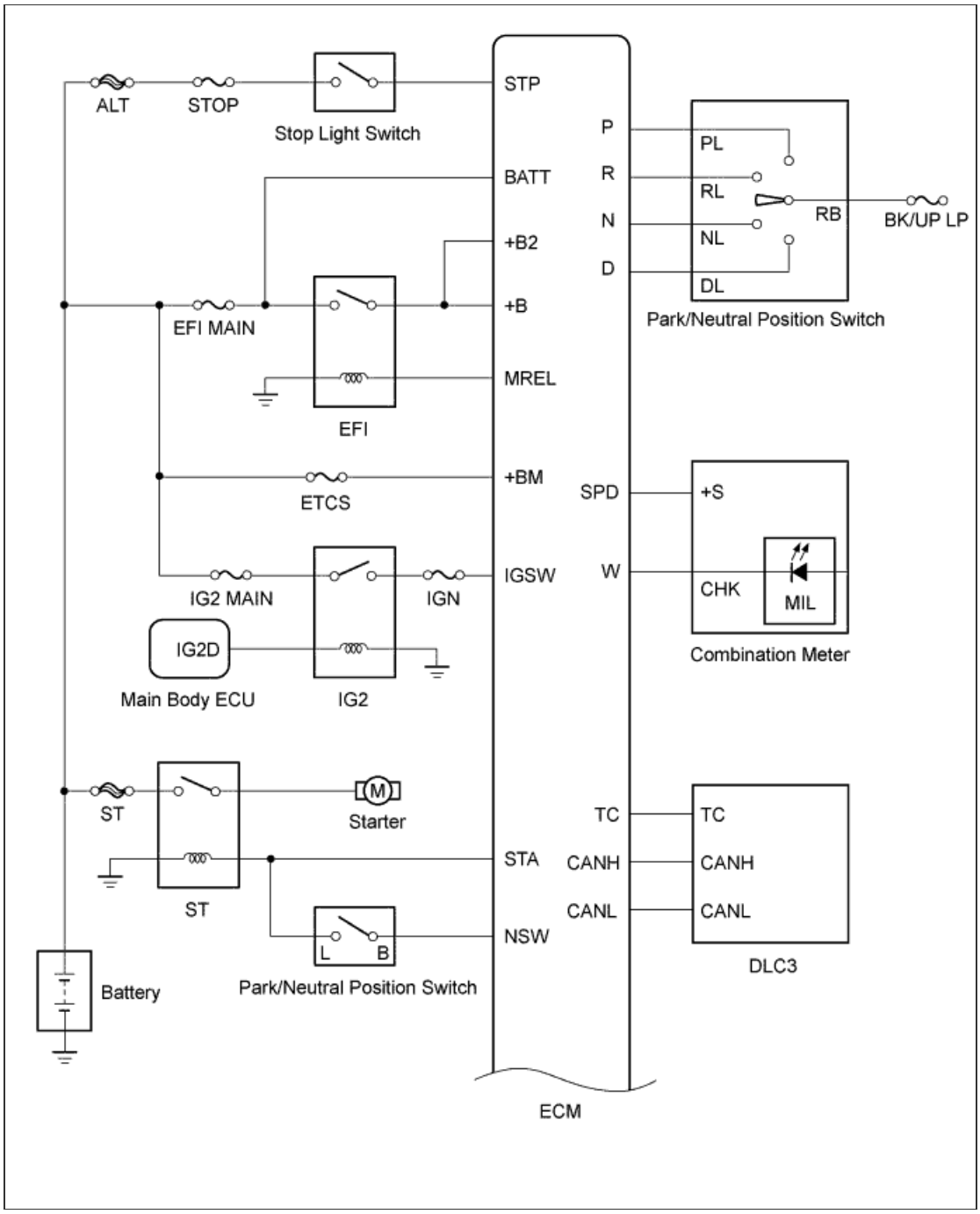


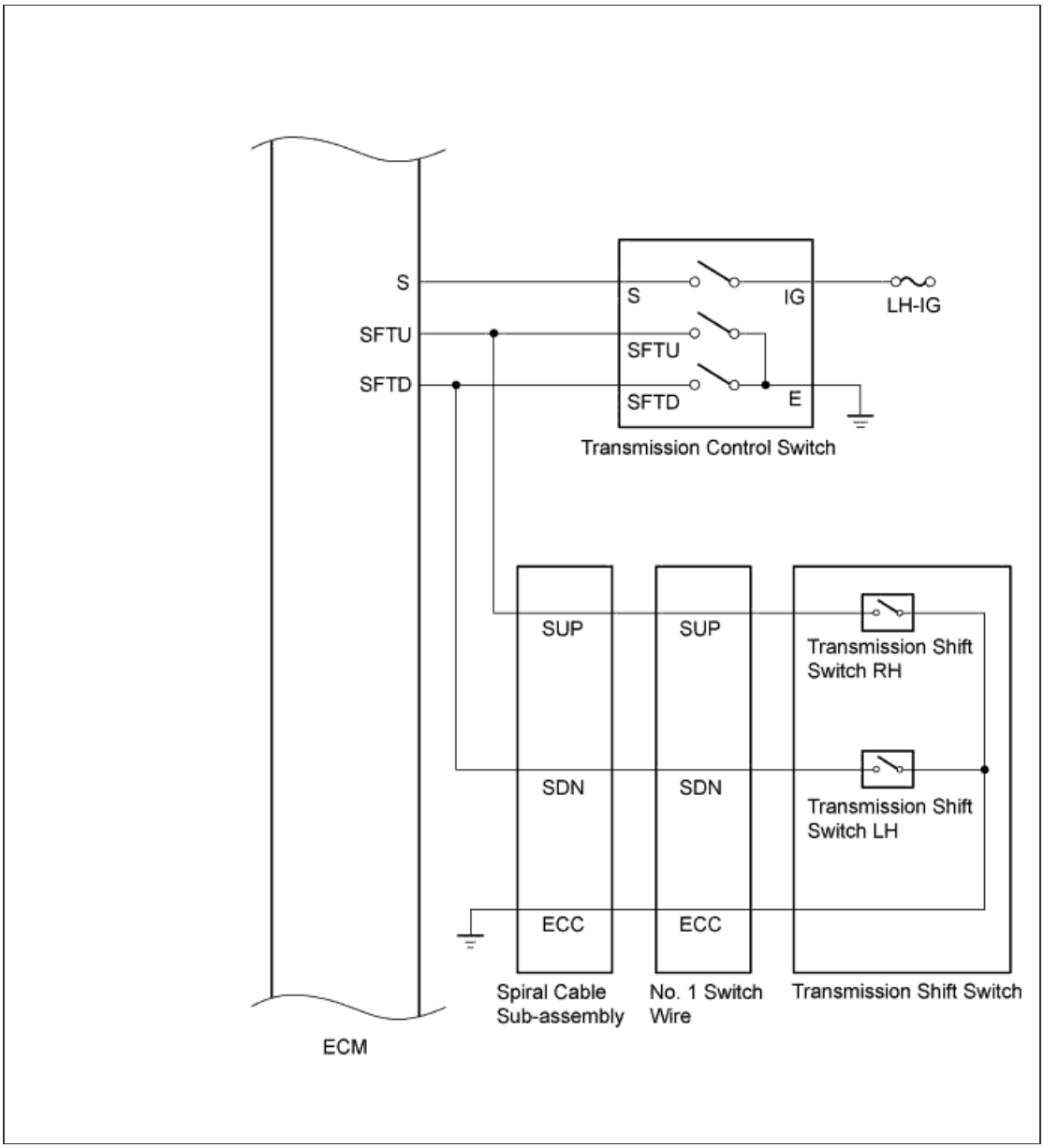

SHIFT SOLENOID VALVE S2
SHIFT SOLENOID VALVE S4
SHIFT SOLENOID VALVE S1
PARK/NEUTRAL POSITION SWITCH
SPEED SENSOR NT
SHIFT SOLENOID VALVE SLT
NO. 2 ATF TEMPERATURE SENSOR
NO. 1 ATF TEMPERATURE SENSOR
SPEED SENSOR SP2
SHIFT SOLENOID VALVE S3
TRANSFER SHIFT ACTUATOR ASSEMBLY
NO. 1 TRANSMISSION WIRE
SHIFT SOLENOID VALVE SLU
SHIFT SOLENOID VALVE SL2
NO. 2 TRANSMISSION WIRE
SHIFT SOLENOID VALVE SR
SHIFT SOLENOID VALVE SL1

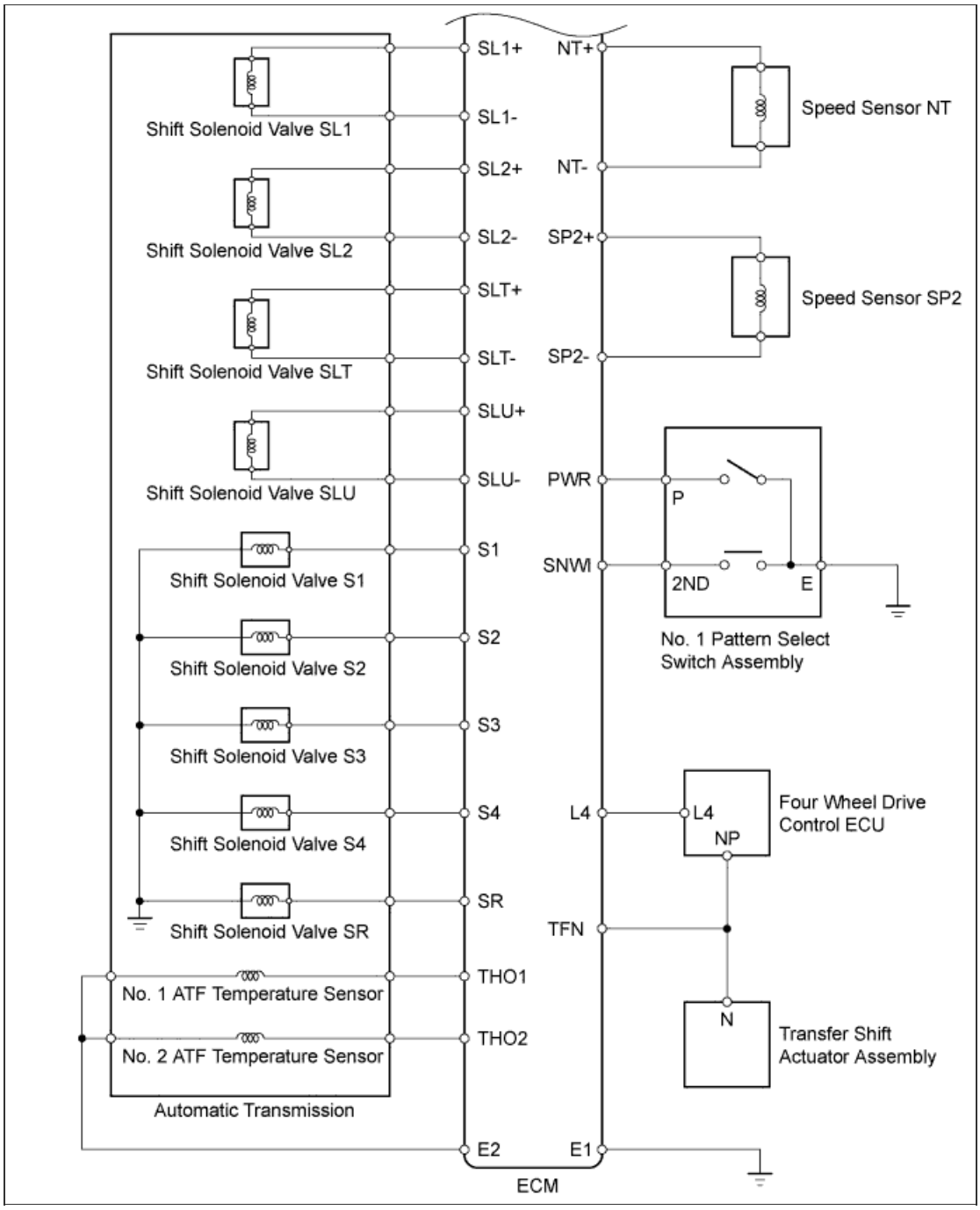

ECM

for Preparation Click here

The configuration of the electronic control system for the AB60F automatic transmission is as shown in the following chart.




S
SFTU
SFTD
S
IG
SFTU
SFTD
E
LH-IG
Transmission Control Switch
SUP
SDN
ECC
SUP
SDN
ECC
Transmission Shift Switch RH
Transmission Shift Switch LH
Spiral Cable Sub-assembly
No. 1 Switch Wire
Transmission Shift Switch
ECM


SL1+
SL1-
SL2+
SL2-
SLT+
SLT-
SLU+
SLU-
S1
S2
S3
S4
SR
THO1
THO2
E2
NT+
NT-
SP2+
SP2-
PWR
SNWI
L4
TFN
E1
Shift Solenoid Valve SL1
Shift Solenoid Valve SL2
Shift Solenoid Valve SLT
Shift Solenoid Valve SLU
Shift Solenoid Valve S1
Shift Solenoid Valve S2
Shift Solenoid Valve S3
Shift Solenoid Valve S4
Shift Solenoid Valve SR
No. 1 ATF Temperature Sensor
No. 2 ATF Temperature Sensor
Automatic Transmission
ECM
Speed Sensor NT
Speed Sensor SP2
P
2ND
E
No. 1 Pattern Select
Switch Assembly
L4
NP
Four Wheel Drive
Control ECU
N
Transfer Shift
Actuator Assembly

for Preparation Click here

SYSTEM DESCRIPTION

a. The Electronic Controlled Automatic Transmission (ECT) is an automatic transmission that electronically controls shift timing using the Engine Control Module (ECM). The ECM detects electrical signals that indicate engine and driving conditions, and controls the shift point based on driver habits and road conditions. As a result, fuel efficiency and power transmission performance are improved.
Shift shock is reduced by controlling the engine and transmission simultaneously.
In addition, the ECT has the following features:

- Diagnostic function.
- Fail-safe function when a malfunction occurs.

for Preparation Click here

HINT:

- **The ECM is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.**
- ***: Use the GTS.**

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.CUSTOMER PROBLEM ANALYSIS

a. Refer to How to Troubleshoot ECU Controlled Systems in the Introduction section (Click here).

NEXT

3.INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4.CONNECT GTS TO DLC3*

NEXT

5.CHECK AND CLEAR DTCS AND FREEZE FRAME DATA*

a. Refer to DTC Check/Clear (Click here).

NEXT

6.VISUAL INSPECTION

NEXT

7.SETTING CHECK MODE DIAGNOSIS*

a. Refer to Check Mode Procedure (Click here).

NEXT

8.PROBLEM SYMPTOM CONFIRMATION

a. Refer to Road Test (Click here).

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B. → GO TO STEP 10

A

9.SYMPTOM SIMULATION

a. Refer to Electronic Circuit Inspection Procedure (Click here).

NEXT

10.DTC CHECK*

a. Refer to DTC Check/Clear (Click here).

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B. → GO TO STEP 18

A

11.BASIC INSPECTION

a. Refer to Park/Neutral Position Switch (Click here).

b. Refer to Shift Lever Assembly (Click here).

NG. → GO TO STEP 21

OK

12.MECHANICAL SYSTEM TESTS

a. Refer to Mechanical System Tests (Click here).

NG. → GO TO STEP 17

OK

13.HYDRAULIC TEST

a. Refer to Hydraulic Test (Click here).

NG. → GO TO STEP 17

OK

14.MANUAL SHIFTING TEST

a. Refer to Manual Shifting Test (Click here).

NG. → GO TO STEP 16

OK

15.PROBLEM SYMPTOMS TABLE CHAPTER 1

a. Refer to Problem Symptoms Table (Click here).

NG. → GO TO STEP 19

OK

16.PROBLEM SYMPTOMS TABLE CHAPTER 2

a. Refer to Problem Symptoms Table (Click here).

NEXT

17.PART INSPECTION

NG. → GO TO STEP 21

OK

18.DTC CHART

a. Refer to Diagnostic Trouble Code Chart (Click here).

NEXT

19.CIRCUIT INSPECTION

NEXT

20.IDENTIFICATION OF PROBLEM

NEXT

21.REPAIR OR REPLACE

NEXT

22.CONFIRMATION TEST



END

for Preparation Click here

PROBLEM SYMPTOM CONFIRMATION

a. Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transmission does not shift up or down, or that the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and attempt to duplicate the problem symptoms.

ROAD TEST

a. Perform a road test.

CAUTION:

Check for safety before performing any tests.

NOTICE:

- **Be sure to inspect and adjust the engine before performing these tests.**
- **Perform the road test with the engine coolant temperature between 60 and 100°C (140 and 212°F) and the ATF temperature between 50 and 100°C (122 and 212°F).**
- **Perform these tests with the air conditioning and cruise control off.**

Inspection	Procedure
Transmission Control Switch Test	With the vehicle stationary and the shift lever in D, move the shift lever to S and return it to D. Check that the meter display changes from D to the appropriate S range and then back again.
S Position Test	With the vehicle stationary and the shift lever in S, move the shift lever to "+" and "-". Check that the meter display changes between S ranges properly.
D Position Shift Test	While driving the vehicle normally, check that the transmission shifts up and down through each gear properly.
Lock-up Function	While driving on a level surface at a constant speed in the lock-up range (80 km/h (50 mph) or more) with the shift lever in D, lightly depress the accelerator pedal and check that the engine speed does not change abruptly.
P Position Test	Stop the vehicle on an incline (approximately 5° or more). Then move the shift lever to P and release the parking brake. Check that the parking lock pawl holds the vehicle in place.
Abnormal Noise and Vibration	Check for abnormal noise and vibration while driving the vehicle forward and backward, and during shift operations.
Fluid Leakage	After performing all other road test inspections, check for fluid leakage.

for Preparation Click here

STALL SPEED TEST

HINT:

This test is to check the overall performance of the engine and transmission.

CAUTION:

- **To ensure safety, perform this test in an open and level area that provides good traction.**
- **The stall speed test should always be performed with at least 2 people. One person should observe the condition of the wheels and wheel chocks while the other is performing the test.**

NOTICE:

Do not perform the stall speed test for more than 5 seconds.

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Data List.

e. Run the vehicle until the transmission fluid temperature is between 50 and 80°C (122 and 176°F).

f. Allow the engine to idle with the air conditioning off.

g. Chock all 4 wheels.

h. Set the parking brake and keep the brake pedal depressed firmly with your left foot.

i. Move the shift lever to D.

j. Depress the accelerator pedal as much as possible with your right foot.

k. Read the engine speed (stall speed) and release the accelerator pedal immediately.

Standard value:
2350 +/-200 rpm

Evaluation

Test Result	Possible Cause
Stall speed is less than standard value	• Stator one-way clutch is not operating properly • Torque converter assembly is faulty (stall speed is less than standard value by 600 rpm or more) • Engine power may be insufficient
Stall speed is more than standard value	• Line pressure is low • C1 clutch is slipping • F3 one-way clutch is not operating properly • F4 one-way clutch is not operating properly

NOTICE:

Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).

SHIFT TIME LAG TEST

HINT:

This test is to check the condition of the direct clutch, forward clutch, 1st brake and reverse brake.

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Data List.

e. Run the vehicle until the transmission fluid temperature is between 50 and 80°C (122 and 176°F).

f. Allow the engine to idle with the air conditioning off.

g. Set the parking brake and keep the brake pedal depressed firmly.

h. Check the D position time lag.

   i. Move the shift lever to N and wait for 1 minute.

   ii. Move the shift lever to D and measure the time until the shock is felt.

   iii. Repeat the 2 procedures above 3 times, and then calculate the average time of the 3 tests.

i. Check the R position time lag.

   i. Move the shift lever to N and wait for 1 minute.

   ii. Move the shift lever to R and measure the time until the shock is felt.

   iii. Repeat the 2 procedures above 3 times, and then calculate the average time of the 3 tests.

Standard value:
D position time lag is less than 1.2 seconds
R position time lag is less than 1.5 seconds

Evaluation

Test Result	Possible Cause
D position time lag exceeds standard value	• Line pressure is low • C1 clutch is worn • F3 one-way clutch is not operating properly • F4 one-way clutch is not operating properly
R position time lag exceeds standard value	• Line pressure is low • C3 clutch is worn • B4 brake is worn • F1 one-way clutch is not operating properly

for Preparation Click here

PERFORM HYDRAULIC TEST

a. Measure the line pressure.

CAUTION:

The line pressure test should always be performed with at least 2 people. One person should observe the condition of the wheels and wheel chocks while the other is performing the test.

NOTICE:

- **Perform the test while the ATF (Automatic Transmission Fluid) temperature is between 50 and 80°C (122 and 176°F).**
- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **This check must be conducted after checking and adjusting the engine.**
- **Perform the test with the A/C off.**
- **When conducting stall test, do not continue for more than 5 seconds.**

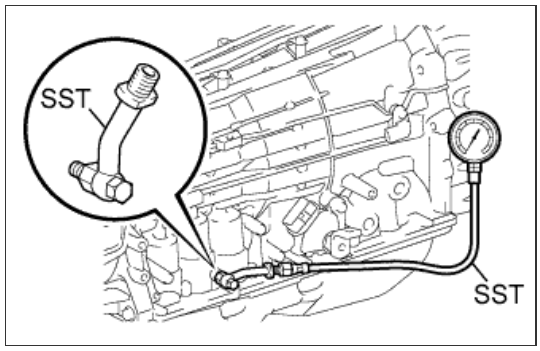
i. Warm up the ATF (Automatic Transmission Fluid).

ii. Turn the engine switch off.

iii. Lift the vehicle up.

iv. Remove the test plug from the transmission case and connect SST.

SST
09992-00095 (09992-00231, 09992-00271)



v. Lower the vehicle.

vi. Fully apply the parking brake and chock the 4 wheels.

vii. Start the engine and check the idling speed.

viii. Keep your left foot pressed firmly on the brake pedal and move the shift lever to D.

ix. Fully depress the accelerator pedal with your right foot. Quickly read the highest line pressure when the engine speed reaches the stall speed.

x. In the same manner, perform the test with the shift lever in R.

Specified Line Pressure

Condition	D Position	R Position
Stall speed	1370 to 1530 kPa (14.0 to 15.6 kgf/cm^2, 199 to 222 psi)	1540 to 1750 kPa (15.7 to 17.8 kgf/cm^2, 223 to 254 psi)

Evaluation

Problem	Possible Cause
Measured values at both positions are higher than specified pressure	• Shift solenoid valve SLT defective • Regulator valve defective
Measured values at both positions are below specified pressure	• Shift solenoid valve SLT defective • Regulator valve defective • Oil pump defective
Pressure is low in D position only	• D position circuit fluid leak • Clutch No. 1 (C1) defective
Pressure is low in R position only	• R position circuit fluid leak • Clutch No. 3 (C3) defective • Brake No. 4 (B4) defective

for Preparation Click here

MANUAL SHIFTING TEST

HINT:

- **Through this test, it can be determined whether the trouble occurs in an electrical circuit or if it is a mechanical problem in the transmission.**
- **If any abnormalities are found in the following test, the problem is in the transmission itself.**

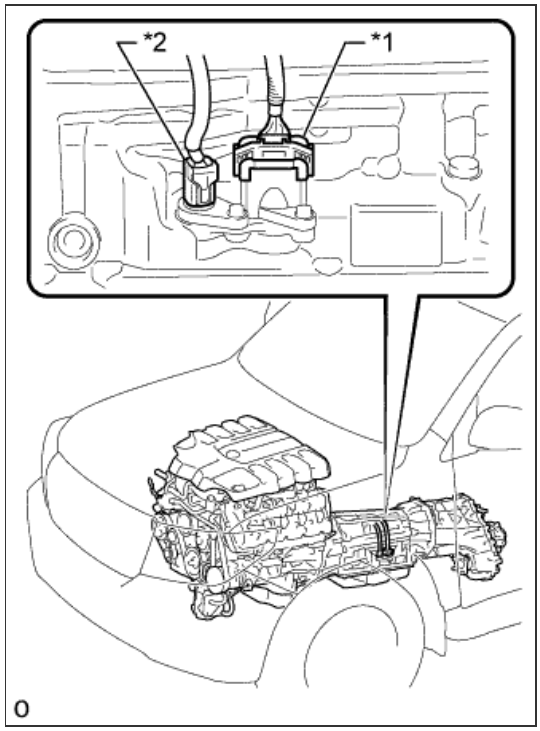
a. Disconnect the connector of the No. 1 transmission wire and/or No. 2 transmission wire.

HINT:

It is possible to deactivate the electrical shift control by disconnecting the transmission wires. The gear positions can then be changed mechanically with the shift lever.

Text in Illustration

*1	No. 1 Transmission Wire
*2	No. 2 Transmission Wire



b. Drive the vehicle with the transmission wires disconnected. Move the shift lever to each position and check whether the gear position changes as shown in the table below.

Shift Lever Position	Gear Position
P	P
R	R
D	• 4th*1 • 1st to 6th*2

HINT:

- ***1: When disconnecting only the No. 1 transmission wire or the No. 1 and No. 2 transmission wires.**
- ***2: When disconnecting only the No. 2 transmission wire.**

c. Connect the connector of the No. 1 transmission wire and/or No. 2 transmission wire.

d. Clear the DTCs (Click here).

for Preparation Click here

RESET MEMORY

NOTICE:

- **Perform Reset Memory (AT initialization) when replacing the automatic transmission assembly, valve body assembly or any of the shift solenoid valves.**
- **Reset Memory can be performed only with the GTS.**

HINT:

The ECM memorizes the control conditions of the automatic transmission assembly and engine assembly. Therefore, when the automatic transmission assembly, valve body assembly or any of the shift solenoid valves has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

The reset procedure is as follows.

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Utility / Reset Memory.

NOTICE:

After performing Reset Memory, be sure to perform the Road Test (Click here) described earlier.

HINT:

The ECM learns through the Road Test.

for Preparation Click here

TEST MONITOR DRIVE PATTERN FOR ECT

CAUTION:

Perform this drive pattern on a level surface and strictly observe the posted speed limits and traffic laws while driving.

HINT:

Performing this drive pattern is one method to simulate the malfunction detection conditions of the ECT.

The DTCs may not be stored through ordinary, everyday driving. Also, DTCs may not be stored through this drive pattern.

a. Preparation for driving

i. Warm up the engine sufficiently (engine coolant temperature is 60°C (140°F) or higher).

ii. Drive the vehicle when the atmospheric temperature is -10°C (14°F) or higher.
Malfunctions are not detected when the atmospheric temperature is less than -10°C (14°F).

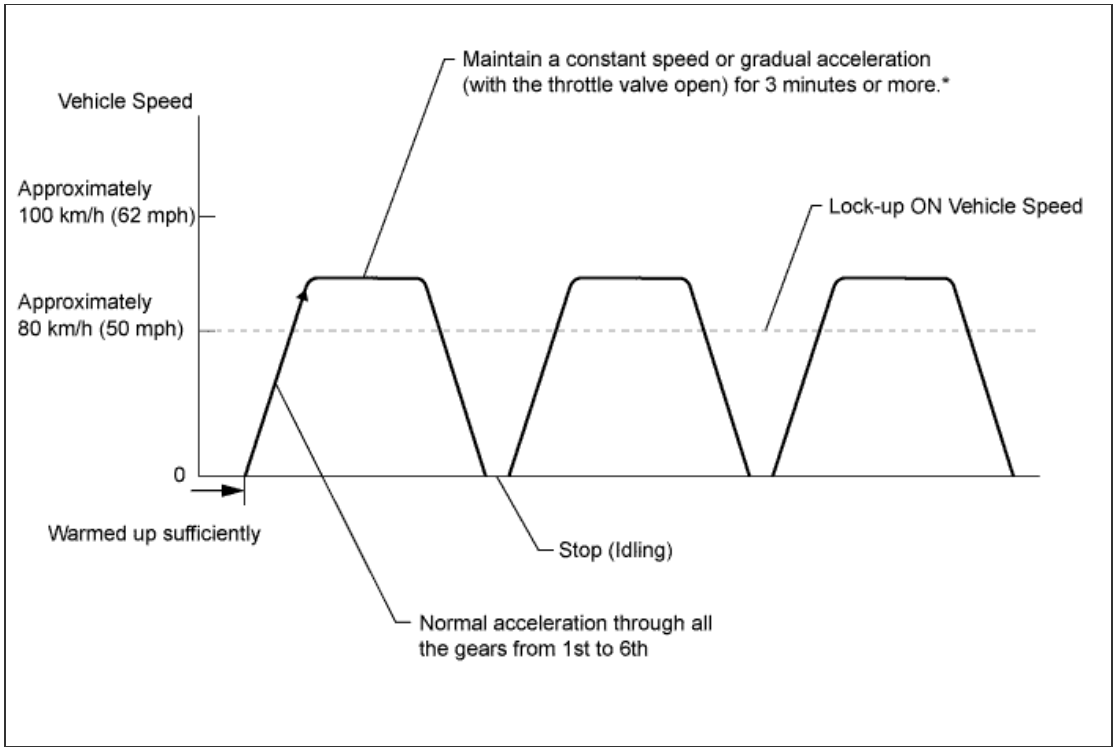
b. Drive pattern

i. Drive the vehicle through all the gears.
Stop → 1st → 2nd → 3rd → 4th → 5th → 5th (lock-up ON) → 6th → 6th (lock-up ON).

ii. Repeat the above drive pattern 3 times or more.

NOTICE:

- **When using the GTS, the monitor status can be checked in the Data List (Click here).**
- **In the event that the drive pattern must be interrupted (due to traffic conditions or other factors), the drive pattern can be resumed and, in most cases, the monitor can be completed.**



HINT:

*: Drive at such a speed in the uppermost gear so as to engage lock-up. The vehicle can be driven at a speed lower than the speed shown in the above diagram in lock-up.

NOTICE:

It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (No. 1 ATF temperature sensor malfunction).

for Preparation Click here

HINT:

- **Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.**
- **The Matrix Chart is divided into 2 chapters. When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 1 to proceed to 2, proceed as instructed.**
- **If the instruction "Proceed to Next Circuit Inspection Shown in Problem Symptoms Table" is given in the flowchart for a circuit, proceed to the next suspected area in the table.**
- **If the problem still occurs even though there are no malfunctions in any of the circuits, check the ECM and replace it if necessary.**
- ***: When the circuit is defective, a DTC may be output.**

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected Area	See page
No up-shift (1st -> 2nd)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No up-shift (2nd -> 3rd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No up-shift (3rd -> 4th)	Shift solenoid valve S3 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (4th -> 5th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (5th -> 6th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No down-shift (6th -> 5th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No down-shift (5th -> 4th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
		Click

	Shift solenoid valve SL2 circuit*	here
	ECM	Click here
No down-shift (4th -> 3rd)	Shift solenoid valve S3 circuit*	Click here
	ECM	Click here
No down-shift (3rd -> 2nd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No down-shift (2nd -> 1st)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No lock-up or no lock-up off	Shift solenoid valve SLU circuit*	Click here
	Stop light switch circuit*	Click here
	ECM	Click here
No lock-up	No. 1 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	Stop light switch circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
No lock-up off	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Shift point too high or too low	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Throttle position sensor circuit*	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Pattern select switch power mode circuit	Click here
	ECM	Click here
Up-shift to 4th from 3rd while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Up-shift to 5th from 4th while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No gear change by shifting into "+" or "-" while shift lever in S	Transmission control switch circuit	Click here
	ECM	Click here
	Shift paddle switch circuit	Click here

No gear change by operating the "+" or "-" shift paddle switch	Transmission control switch circuit	Click here
	ECM	Click here
Harsh engagement (N -> D)	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Harsh engagement (lock-up)	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Harsh engagement (any driving position)	Throttle position sensor circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Poor acceleration	No. 2 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch 2nd start mode circuit	Click here
	ECM	Click here
No engine brake	ECM	Click here
No kick-down	ECM	Click here
Engine stalls when starting off or stopping	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
ECT 2ND does not operate	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch 2nd start mode circuit	Click here
	ECM	Click here
ATF temperature warning light remains on or message is displayed in combination meter, lock-up at 3rd gear and/or shift point too high	No. 2 ATF temperature sensor circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Malfunction in shifting	Park/neutral position switch circuit*	Click here
	Transmission control switch circuit	Click here
	Shift paddle switch circuit	Click

		here
	ECM	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th)	Shift solenoid valve SR circuit*	Click here
Slip or shudder (5th -> 6th -> and 6th -> 5th)	Shift solenoid valve SR circuit*	Click here

2. Chapter 2: On-Vehicle Repair and Off-Vehicle Repair

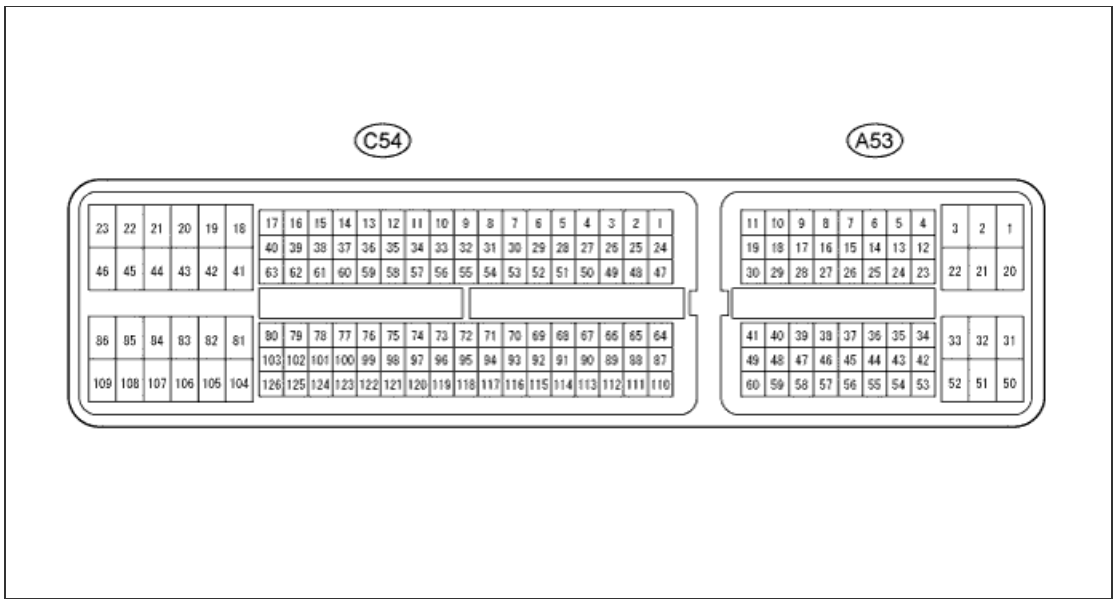
Symptom	Suspected Area	See page
Vehicle does not move when shift lever is in any forward position and reverse position	Transmission control cable	Click here
	Manual valve	Click here
	Parking lock pawl	Click here
	Rear planetary gear unit	Click here
	Torque converter assembly	Click here
Vehicle does not move with shift lever in R	Valve body assembly	Click here
	B4 brake	Click here
No up-shift (1st -> 2nd)	Valve body assembly	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
No up-shift (2nd -> 3rd)	Valve body assembly	Click here
	C3 clutch	Click here
No up-shift (3rd -> 4th)	Valve body assembly	Click here
	C2 clutch	Click here
No up-shift (4th -> 5th)	Valve body assembly	Click here
	B1 brake	Click here
No up-shift (5th -> 6th)	Valve body assembly	Click here
	B2 brake	Click here
No down-shift (6th -> 5th)	Valve body assembly	Click here
No down-shift (5th -> 4th)	Valve body assembly	Click here
No down-shift (4th -> 3rd)	Valve body assembly	Click here
No down-shift (3rd -> 2nd)	Valve body assembly	Click here
No down-shift (2nd -> 1st)	Valve body assembly	Click here
No lock-up or no lock-up off	Valve body assembly	Click here
	Torque converter assembly	Click here
Harsh engagement (N -> D)	Valve body assembly	Click here
	C1 accumulator	Click here
	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Harsh engagement (lock-up)	Valve body assembly	Click here
	Torque converter assembly	Click here
Harsh engagement (N -> R)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
	B4 brake	Click here
	F1 one-way clutch	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th -> 6th)	Valve body assembly	Click here
Harsh engagement (1st -> 2nd)	Valve body assembly	Click here
	B3 accumulator	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
Harsh engagement (2nd -> 3rd)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
	Valve body assembly	Click here

Harsh engagement (3rd -> 4th)	C2 accumulator	Click here
	C2 clutch	Click here
Harsh engagement (4th -> 5th)	Valve body assembly	Click here
	B1 accumulator	Click here
	B1 brake	Click here
Harsh engagement (5th -> 6th)	Valve body assembly	Click here
	B2 accumulator	Click here
	B2 brake	Click here
Harsh engagement (6th -> 5th)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Slip or shudder (forward and reverse, after warm-up)	Transmission control cable	Click here
	Valve body assembly	Click here
	Oil strainer	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
	Torque converter assembly	Click here
Slip or shudder (particular position, just after engine starts)	Torque converter assembly	Click here
Slip or shudder (shift lever in R)	B4 brake	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
Slip or shudder (1st)	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (2nd)	C1 clutch	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (3rd)	C1 clutch	Click here
	C3 clutch	Click here
	F1 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (4th)	C1 clutch	Click here
	C2 clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (5th)	C2 clutch	Click here
	C3 clutch	Click here
	B1 brake	Click here
Slip or shudder (6th)	C2 clutch	Click here
	B2 brake	Click here
No engine braking (1st to 4th, shift lever in S)	C4 clutch	Click here
No engine braking (1st: shift lever on 1)	Valve body assembly	Click here
	B4 brake	Click here
No engine braking (2nd: shift lever on 2)	Valve body assembly	Click here
	B2 brake	Click here
No engine braking (3rd: shift lever on 3)	Valve body assembly	Click here
	B1 brake	Click here
No engine braking (4th: shift lever on 4)	Valve body assembly	Click here
No kick-down	Valve body assembly	Click here
Shift point too high or too low	Valve body assembly	Click here
Poor acceleration (all positions)	Valve body assembly	Click here
	Torque converter assembly	Click here
Poor acceleration (6th)	B2 brake	Click here
	C2 clutch	Click here
	Front planetary gear unit	Click here
	Valve body assembly	Click here

Engine stalls when starting off or stopping	Torque converter assembly	Click here

for Preparation Click here

CHECK ECM



HINT:

- **Each ECM terminal standard voltage is shown in the table below.**
  In the table, first follow the information under "Condition". Look under "Terminal No. (Symbol)" for the terminals to be inspected.
  The standard voltage between the terminals is shown under "Specified Condition".
  Use the illustration above as a reference for the ECM terminals.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
A53-21 (L4) - C54-81 (E1)	BR-R - BR	Transfer L4 position signal	• Engine switch on (IG) • Transfer position switch on L4	Below 1.5 V
			• Engine switch on (IG) • Transfer position switch not on L4	11 to 14 V
A53-5 (TFN) - C54-81 (E1)	G - BR	N shift position switch signal	• Engine switch on (IG) • Transfer not in neutral	Below 1.5 V
			• Engine switch on (IG) • Transfer in neutral	11 to 14 V
C54-120 (NSW) - C54-81 (E1)	L - BR	PNP switch signal	• Engine switch on (IG) • Shift lever in P or N	Below 1 V
			• Engine switch on (IG) • Shift lever not in P or N	11 to 14 V
			• Engine switch	

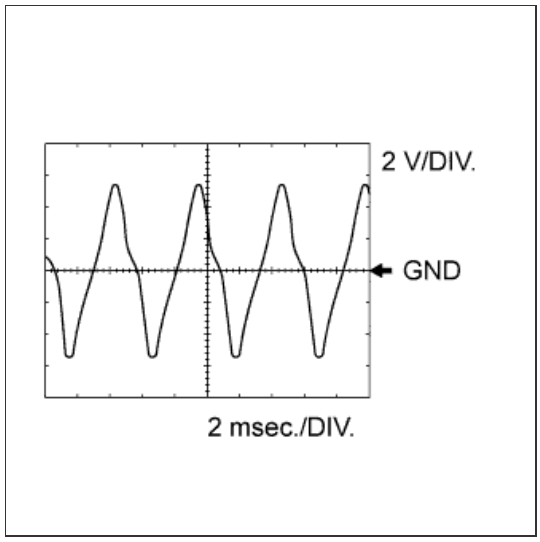
C54-2 (P) - C54-81 (E1)	G-B - BR	P shift position switch signal	• Engine switch on (IG) • Shift lever in P	11 to 14 V
			• Engine switch on (IG) • Shift lever not in P	Below 1 V
C54-26 (R) - C54-81 (E1)	L-R - BR	R shift position switch signal	• Engine switch on (IG) • Shift lever in R	11 to 14 V
			• Engine switch on (IG) • Shift lever not in R	Below 1 V
C54-25 (N) - C54-81 (E1)	G-W - BR	N shift position switch signal	• Engine switch on (IG) • Shift lever in N	11 to 14 V
			• Engine switch on (IG) • Shift lever not in N	Below 1 V
C54-27 (D) - C54-81 (E1)	G - BR	D shift position switch signal	• Engine switch on (IG) • Shift lever in D	11 to 14 V
			• Engine switch on (IG) • Shift lever not in D	Below 1 V
A53-25 (S) - C54-81 (E1)	W - BR	S shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
			• Engine switch on (IG) • Shift lever not in S	Below 1 V
A53-38 (SFTU) - C54-81 (E1)	Y - BR	Up-shift shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
			• Engine switch on (IG) • Shift lever in "+" (up-shift) or "+" shift paddle operated and held (up-shift)	Below 1 V
A53-27 (SFTD) - C54-81 (E1)	L - BR	Down-shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
			• Engine switch on (IG) • Shift lever in "-" (down-shift) or "-" shift paddle operated and held (down-shift)	Below 1 V
A53-36 (STP) - C54-81 (E1)	R - BR	Stop light switch signal	Brake pedal depressed	11 to 14 V
			Brake pedal released	Below 1.5 V
C54-7 (S1) - C54-81 (E1)	R - BR	Shift solenoid valve S1 signal	1st gear	Below 1 V
			Not in 1st gear	11 to 14 V

C54-6 (S2) - C54-81 (E1)	W - BR	Shift solenoid valve S2 signal	1st, 2nd or 6th gear	11 to 14 V
			3rd, 4th or 5th gear	Below 1 V
C54-3 (S3) - C54-81 (E1)	B-R - BR	Shift solenoid valve S3 signal	1st, 2nd or 3rd gear	11 to 14 V
			4th, 5th or 6th gear	Below 1 V
C54-5 (S4) - C54-81 (E1)	G-R - BR	Shift solenoid valve S4 signal	5th or 6th gear	11 to 14 V
			1st, 2nd, 3rd or 4th gear	Below 1 V
C54-4 (SR) - C54-81 (E1)	G - BR	Shift solenoid valve SR signal	1st, 2nd, 3rd or 4th gear	11 to 14 V
			5th or 6th gear	Below 1 V
C54-14 (SL1+) - C54-15 (SL1-)	Y - L	Shift solenoid valve SL1 signal	5th or 6th gear	Pulse generation
C54-12 (SL2+) - C54-13 (SL2-)	G-R - L-W	Shift solenoid valve SL2 signal	Engine idling	Pulse generation
C54-9 (SLT+) - C54-8 (SLT-)	B - G-B	Shift solenoid valve SLT signal	Engine idling	Pulse generation
C54-10 (SLU+) - C54-11 (SLU-)	L-Y - L-R	Shift solenoid valve SLU signal	5th (lock-up) gear or 6th (lock-up) gear	Pulse generation
C54-122 (THO1) - C54-98 (E2)	G-Y - BR	No. 1 ATF temperature sensor signal	No. 1 ATF temperature: 115°C (239°F) or higher	Below 1.5 V
C54-99 (THO2) - C54-98 (E2)	L - BR	No. 2 ATF temperature sensor signal	No. 2 ATF temperature: 115°C (239°F) or higher	Below 1.5 V
C54-101 (SP2+) - C54-100 (SP2-)	Y - B	Speed sensor SP2 signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (see waveform 1)
C54-124 (NT+) - C54-123 (NT-)	Y - B	Speed sensor NT signal	Engine idling (shift lever in P or N)	Pulse generation (see waveform 2)
A53-10 (CANH) - C54-81 (E1)	P - BR	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 3)
A53-11 (CANL) - C54-81 (E1)	B - BR	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 4)
A53-51 (PWR) - C54-81 (E1)	L-B - BR	Pattern select (PWR) switch signal	• Engine switch on (IG) • Pattern select (PWR) switch off	11 to 14 V
			• Engine switch on (IG) • Pattern select (PWR) switch on	Below 1.5 V
A53-4 (SNWI) - C54-81 (E1)	P-L - BR	Pattern select (2ND) switch signal	• Engine switch on (IG) • Pattern select (2ND) switch off	11 to 14 V
			• Engine switch on (IG) • Pattern select (2ND) switch continuously pressed	Below 1.5 V

a. Using an oscilloscope, check waveform 1.

Reference:

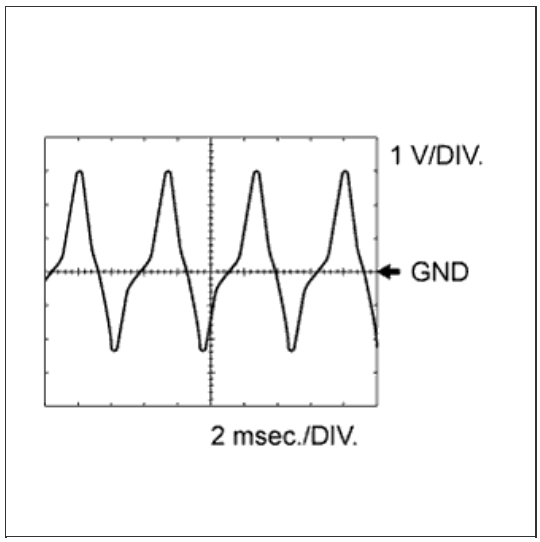
Terminal No. (Symbol)	Tool Setting	Condition
C54-101 (SP2+) - C54-100 (SP2-)	2 V/DIV., 2 msec./DIV.	Vehicle speed 20 km/h (12 mph)



b. Using an oscilloscope, check waveform 2.

Reference:

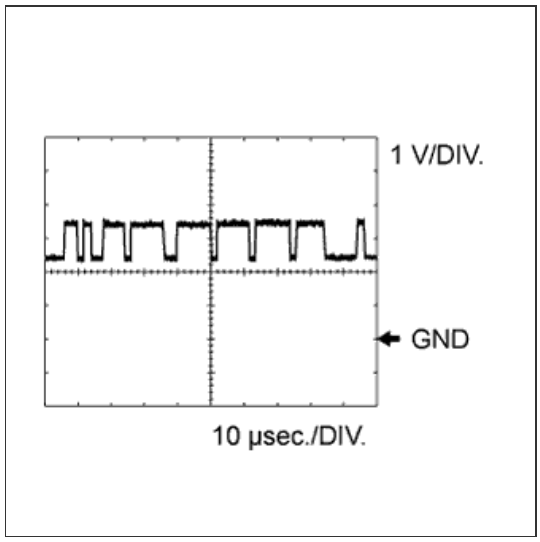
Terminal No. (Symbol)	Tool Setting	Condition
C54-124 (NT+) - C54-123 (NT-)	1 V/DIV., 2 msec./DIV.	Engine idling (shift lever in P or N)



c. Using an oscilloscope, check waveform 3.

Reference:

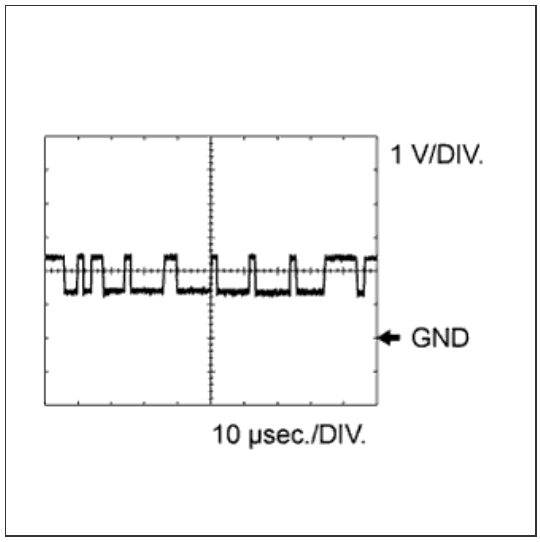
Terminal No. (Symbol)	Tool Setting	Condition
A53-10 (CANH) - C54-81 (E1)	1 V/DIV., 10 µsec./DIV.	Engine switch on (IG)



d. Using an oscilloscope, check waveform 4.

Reference:

Terminal No. (Symbol)	Tool Setting	Condition
A53-11 (CANL) - C54-81 (E1)	1 V/DIV., 10 µsec./DIV.	Engine switch on (IG)


1 V/DIV.
GND
10 µsec./DIV.

for Preparation Click here

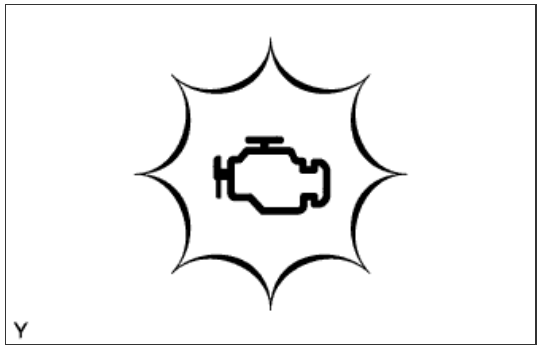
EURO-OBD

a. When troubleshooting Europe On-Board Diagnostic (Euro-OBD) vehicles, the vehicle must be connected to an OBD scan tool (complying with ISO 15765-4). Various data output from the vehicle ECM can then be read.

b. Euro-OBD regulations require that the vehicle on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in any of the following:

- The emission control system/components
- The powertrain control components which affect vehicle emissions
- The computer

In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO 15765-4 are stored in the ECM memory.
If the malfunction does not recur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain stored in the ECM memory.



c. To check DTCs, connect the GTS or OBD scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The scan tool displays DTCs, freeze frame data and a variety of engine data.
The DTCs and freeze frame data can be cleared with the scan tool (Click here).

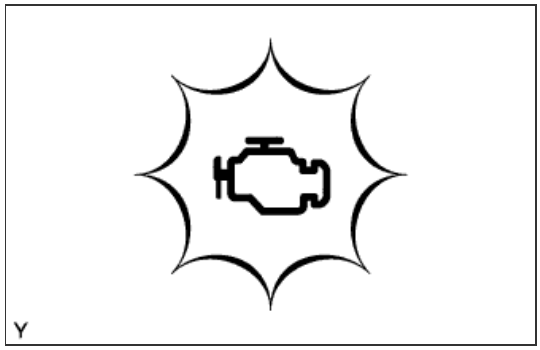
M-OBD (EXCEPT EUROPEAN SPECIFICATION)

a. When troubleshooting Multiplex On-Board Diagnostic (M-OBD) vehicles, the vehicle must be connected to the GTS. Various data output from the ECM can then be read.

b. OBD regulations require that the vehicle on-board computer illuminate the MIL on the instrument panel when the computer detects a malfunction in any of the following:

- The emission control system/components
- The powertrain control components which affect vehicle emissions
- The computer

In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO 15765-4 are stored in the ECM memory.
If the malfunction does not recur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain stored in the ECM memory.



NORMAL MODE AND CHECK MODE

a. The diagnosis system operates in normal mode during normal vehicle use. In normal mode, 2 trip detection logic is used to ensure accurate detection of malfunctions. Check mode is also available to technicians as an option. In check mode, 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, to including intermittent malfunctions.

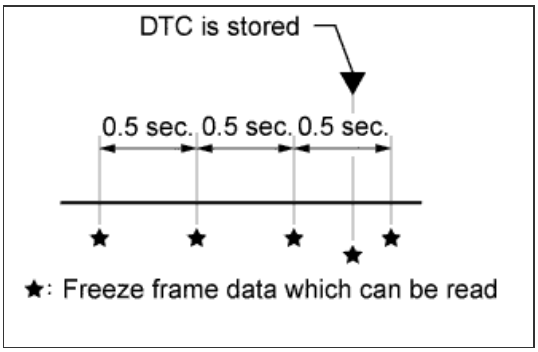
2 TRIP DETECTION LOGIC

a. When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next drive cycle, the MIL is illuminated (2nd trip).

FREEZE FRAME DATA

a. Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

b. The GTS records freeze frame data at 5 different times: 1) 3 times before the DTC is stored, 2) once when the DTC is stored, and 3) once after the DTC is stored. These data can be used to simulate the vehicle's condition from around the time when the malfunction occurred. The data may help find the cause of the malfunction, or judge if the DTC is being caused by a temporary malfunction or not.



CHECK DATA LINK CONNECTOR 3 (DLC3) (Click here)

CHECK MIL

a. Check that the MIL illuminates when turning the engine switch on (IG).
If the MIL does not illuminate, there is a problem in the MIL circuit (Click here).

b. Check that when the engine is started, the MIL should turn off.

for Preparation Click here

CHECK DTC

a. DTCs which are stored in the ECM can be displayed on the GTS.
The GTS can display pending DTCs and current DTCs. Some DTCs are not stored unless a malfunction is detected in consecutive driving cycles. When a malfunction is detected in only one driving cycle, it is stored as a pending DTC.

i. Connect the GTS to the DLC3.

ii. Turn the engine switch on (IG).

iii. Turn the GTS on.

iv. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

v. Confirm the DTCs and freeze frame data, and then write them down.

vi. Confirm the details of the DTCs (Click here).

NOTICE:

When simulating a symptom with the scan tool to check for DTCs, use normal mode. For codes on the Diagnostic Trouble Code Chart subject to "2 trip detection logic", perform the following actions:

Turn the engine switch off after the symptom is simulated once. Then repeat the simulation process. When the symptom has been simulated twice, the MIL illuminates and the DTCs are recorded in the ECM.

CLEAR DTC (using the GTS)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Clear.

CLEAR DTC (without using the GTS)

a. Perform either of the following operations.

i. Disconnect the cable from the negative (-) battery terminal for more than 1 minute.

ii. Remove the EFI MAIN and ETCS fuses from the engine room relay block located inside the engine compartment for more than 1 minute.

for Preparation Click here

DESCRIPTION

a. Check mode has a higher sensitivity to malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect. In check mode, DTCs are stored with 1 trip detection logic.

CHECK MODE PROCEDURE

a. Make sure that the following conditions are met:

   i. Battery positive voltage 11 V or more.

   ii. Throttle valve fully closed.

   iii. Shift lever in P or N.

   iv. A/C OFF.

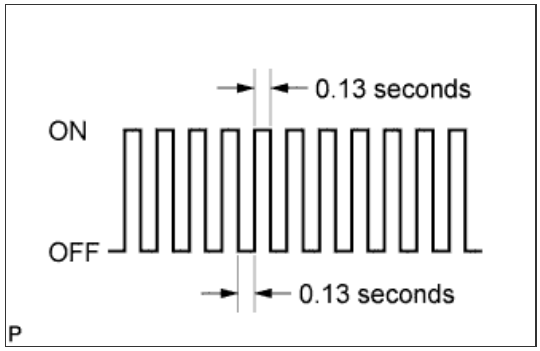
b. Connect the GTS to the DLC3.

c. Turn the engine switch on (IG).

d. Turn the GTS on.

e. Enter the following menus: Powertrain / Engine and ECT / Utility / Check Mode.

f. Check that the MIL flashes as shown in the illustration.



NOTICE:

- **All DTCs and freeze frame data will be cleared if: 1) the GTS is used to change the ECM from normal mode to check mode or vice versa; or 2) during check mode, the engine switch is turned from on (IG) to on (ACC) or off.**
- **Before changing to check mode, make a note of the DTCs and freeze frame data.**

g. Start the engine. The MIL should turn off after the engine starts.

h. Perform "Monitor Drive Pattern" for the ECT test (Click here), or reproduce the conditions of the malfunction described by the customer.

i. After reproducing the malfunction conditions, use the GTS to check the DTC and freeze frame data.

for Preparation Click here

Fail-safe

This function minimizes the loss of ECT functions when a malfunction occurs in a sensor or solenoid.

Fail-safe control list

Malfunctioning Part	Function
DTC P0717: Input Speed Sensor NT	During an input speed sensor malfunction, shift control is performed through the output speed sensor SP2 signal. During an input speed sensor malfunction, up-shift to 5th and 6th, AI-SHIFT* and flex lock-up clutch control are prohibited.
DTC P0722: Output Speed Sensor SP2	During an output speed sensor malfunction, shift control is performed using the input speed sensor NT signal. During an output speed sensor malfunction, up-shift to 5th and 6th, AI-SHIFT* and flex lock-up clutch control are prohibited.
DTC P0712, P0713: ATF Temperature Sensor	During an ATF temperature sensor malfunction, up-shift to 5th and 6th and flex lock-up clutch control are prohibited.
Shift Solenoid Valve S1, S2, S3, S4 and SR	The current to the malfunctioning solenoid valve is cut off and control is performed by operating the other normal solenoid valves. Shift control is performed depending on the failed solenoid as described in the table below.
DTC P0748, P0778: Shift Solenoid Valve SL1 and SL2	During a solenoid valve SL1 or SL2 malfunction, up-shift to 5th and 6th and flex lock-up clutch control are prohibited.
DTC P2714, P2716: Shift Solenoid Valve SLT	During a solenoid valve SLT malfunction, the current to the solenoid valve is stopped. This stops optimal line pressure control and shift shock increases. However, shifting is performed using normal clutch pressure control.
DTC P2757, P2759: Shift Solenoid Valve SLU	During a solenoid valve SLU malfunction, the current to the solenoid valve is stopped. This stops lock-up control and flex lock-up control, and fuel economy decreases.

HINT:

*: In addition to the switching of the shift pattern through the pattern select switch, Artificial Intelligence Shift (AI-SHIFT) control enables the ECM to estimate the road conditions and the driver's intention in order to automatically select the optimal shift pattern.

Shift Solenoid Valve Normal Operation Chart

Shift Lever Position	Gear*	Shift Solenoid S1	Shift Solenoid S2	Shift Solenoid S3	Shift Solenoid S4	Shift Solenoid SR	Shift Solenoid SL1	Shift Solenoid SL2
D, S6	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
	5th	ON	OFF	OFF	ON	OFF	ON	OFF
	6th	ON	ON	OFF	ON	OFF	ON	OFF
S5	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
	5th	ON	OFF	OFF	ON	OFF	ON	OFF
S4	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
S3	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd (E/B)	ON	OFF	ON	OFF	ON	OFF	OFF

S2	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd (E/B)	ON	ON	ON	ON	ON	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	OFF	ON	OFF	OFF

a. Fail-safe operation for electronically malfunctioning shift solenoid valve (S1, S2, S3, S4 and SR).

i. Fail-safe function

If any of the shift solenoid valve circuits has an open or short failure, the ECM turns the other shift solenoid valves ON and OFF in order to shift into the gear positions shown in the table below. Also, the ECM stops sending current to the open or short circuited solenoid.

Even if starting the engine again in fail-safe mode, the gear position remains in the same position.

HINT:

- ***: Actual gear shift (gear position) under fail-safe operation.**
- **X: OFF (the ECM stops sending current to the malfunctioning solenoid valve).**
- **Electrical malfunction: Condition is shown to the left of the "→".**
- **Fail-safe mode: Condition is shown to the right of the "→".**
- **E/B: Engine brake**

Shift Solenoid Valve S1 Electrical Malfunction (P0973, P0974)

Shift Lever Position	Gear*	Shift Solenoid S1	Shift Solenoid S2	Shift Solenoid S3	Shift Solenoid S4	Shift Solenoid SR	Shift Solenoid SL1	Shift Solenoid SL2
D, S6	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
	5th	X	OFF	OFF	ON	OFF	ON	OFF
	N → 5th	X	ON → OFF	OFF	ON	OFF	ON	OFF
S5	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
	5th	X	OFF	OFF	ON	OFF	ON	OFF
S4	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
S3	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd (E/B) → 4th	X	OFF	ON → OFF	OFF	ON	OFF	OFF → ON
S2	1st	X	ON	ON	OFF	ON	OFF	ON
	2nd (E/B) → 4th	X	ON → OFF	ON → OFF	ON → OFF	ON	OFF	OFF → ON
S1	1st (E/B)	X	ON	ON	OFF	ON	OFF	OFF

Shift Solenoid Valve S2 Electrical Malfunction (P0976, P0977)

Shift Lever Position	Gear*	Shift Solenoid S1	Shift Solenoid S2	Shift Solenoid S3	Shift Solenoid S4	Shift Solenoid SR	Shift Solenoid SL1	Shift Solenoid SL2
D, S6	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	4th	ON	X	OFF	OFF	ON	OFF	ON
	5th	ON	X	OFF	ON	OFF	ON	OFF
	5th	ON	X	OFF	ON	OFF	ON	OFF
S5	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON

	4th	ON	X	OFF	OFF	ON	OFF	ON
	5th	ON	X	OFF	ON	OFF	ON	OFF
S4	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	4th	ON	X	OFF	OFF	ON	OFF	ON
S3	3rd → 3rd (E/B)	OFF → ON	X	ON	OFF	ON	OFF	ON → OFF
	3rd → 3rd (E/B)	ON	X	ON	OFF	ON	OFF	ON → OFF
	3rd (E/B)	ON	X	ON	OFF	ON	OFF	OFF
S2	3rd → 3rd (E/B)	OFF → ON	X	ON	OFF	ON	ON → OFF	ON → OFF
	3rd (E/B)	ON	X	ON	ON → OFF	ON	OFF	OFF
S1	3rd (E/B)	OFF → ON	X	ON	OFF	ON	OFF	OFF

Shift Solenoid Valve S3 Electrical Malfunction (P0979, P0980)

Shift Lever Position	Gear*	Shift Solenoid S1	Shift Solenoid S2	Shift Solenoid S3	Shift Solenoid S4	Shift Solenoid SR	Shift Solenoid SL1	Shift Solenoid SL2
D, S6	3rd → 4th	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	5th	ON	OFF	X	ON	OFF	ON	OFF
	6th	ON	ON	X	ON	OFF	ON	OFF
S5	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	5th	ON	OFF	X	ON	OFF	ON	OFF
S4	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
S3	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	OFF → ON
S2	3rd	OFF	ON	X	OFF	ON	OFF	ON
	6th → 4th	ON	ON → OFF	X	ON → OFF	ON	OFF	OFF → ON
S1	1st	OFF	ON	X	OFF	ON	OFF	OFF

Shift Solenoid Valve S4 Electrical Malfunction (P0982, P0983)

Shift Lever Position	Gear*	Shift Solenoid S1	Shift Solenoid S2	Shift Solenoid S3	Shift Solenoid S4	Shift Solenoid SR	Shift Solenoid SL1	Shift Solenoid SL2
D, S6	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON
	4th	ON	ON → OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON
S5	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON

S4	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
S3	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd (E/B)	ON	OFF	ON	X	ON	OFF	OFF
S2	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd (E/B)	ON	ON	ON	X	ON	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	X	ON	OFF	OFF

Shift Solenoid Valve SR Electrical Malfunction (P0985, P0986)

Shift Lever Position	Gear*	Shift Solenoid S1	Shift Solenoid S2	Shift Solenoid S3	Shift Solenoid S4	Shift Solenoid SR	Shift Solenoid SL1	Shift Solenoid SL2
D, S6	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
	5th	ON	OFF	OFF	ON	X	ON	OFF
	6th	ON	ON	OFF	ON	X	ON	OFF
S5	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
	5th	ON	OFF	OFF	ON	X	ON	OFF
S4	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
S3	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd (E/B)	ON	OFF	ON	OFF	X	OFF	OFF
S2	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd (E/B)	ON	ON	ON	ON	X	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	OFF	X	OFF	OFF

b. Fail-safe operation in the event of a mechanical system malfunction.

i. Fail-safe function
The ECM controls the gear position as shown in the table below when malfunctions occur.

DTC	Condition	Gear*1					
-	Normal	1st	2nd	3rd	4th	5th	6th
P0751	Shift solenoid valve S1: Stuck OFF malfunction	1st*2	1st*2	3rd	3rd	3rd	3rd
P0761	Shift solenoid valve S3: Stuck ON malfunction	1st	2nd	3rd	3rd	3rd	3rd
P0766 P0776	Shift solenoid valve S4, Shift solenoid valve SL2 or Valve body (brake control valve): Malfunction	1st	2nd	3rd	3rd	3rd	3rd
P0781	Valve body (1-2 shift valve): Malfunction	1st*2	1st*2	3rd	3rd	3rd	3rd
P0729	Valve body (sequence valve): Malfunction	1st	2nd	3rd	3rd	3rd	3rd

HINT:

- ***1: Actual gear shift (gear position) under fail-safe operation.**
- ***2: Under engine braking, downshifting to 1st or 2nd gear is prohibited.**

for Preparation Click here

READ DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
N Range Status	Shift lever N status/ ON or OFF	• ON: Shift lever in N • OFF: Shift lever not in N	-
Neutral Position SW Signal	PNP switch status/ ON or OFF	Shift lever is: • In P or N: ON • Not in P or N: OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Transfer L4	Transfer status/ ON or OFF	• ON: Transfer in L4 • OFF: Transfer not in L4	-
Stop Light Switch	Stop light switch status/ ON or OFF	Brake pedal is: • Depressed: ON • Released: OFF	-
SPD (NT)	Input shaft speed/ Min.: 0 rpm Max.: 12750 rpm	Lock-up is: • ON (after warming up engine): Input turbine speed (NT) equal to engine speed • OFF (idling with shift lever in N): Input turbine speed (NT) nearly equal to engine speed	Data is displayed in increments of 50 rpm.
SPD (SP2)	Output shaft speed/ Min.: 0 km/h (0 mph) Max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph) (output shaft speed is equal to vehicle speed)	-
Shift SW Status (P	PNP switch status/	Shift lever is: • In P: ON	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:**

Range)	ON or OFF	• Not in P: OFF	When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Pattern Switch (PWR/M)	Pattern switch (PWR) status/ ON or OFF	• ON: Pattern switch (PWR) is pushed • OFF: Pattern switch (PWR) is not pushed	-
Shift SW Status (R Range)	PNP switch status/ ON or OFF	Shift lever is: • In R: ON • Not in R: OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Shift SW Status (N Range)	PNP switch status/ ON or OFF	Shift lever is: • In N: ON • Not in N: OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Shift SW Status (N, P Range) Supported	Status of PNP switch (N or P) supported/ Supp or Unsupp	-	-
Shift SW Status (N, P Range)	PNP switch status/ ON or OFF	• ON: Shift lever not in P or N • OFF: Shift lever in P or N	-
Sports Shift Up SW	Sport shift up switch status/ ON or OFF	• ON: Shift lever held in "+" (up-shift) • OFF: Shift lever not held in "+" (up-shift)	-
		• ON: "+" shift paddle operated and held (up-shift) • OFF: "+" shift paddle not operated (up-shift)	-
Sports Shift Down SW	Sport shift down switch status/ ON or OFF	• ON: Shift lever held in "-" (down-shift) • OFF: Shift lever not held in "-" (down-shift)	-
		• ON: "-" shift paddle operated and held (down-shift) • OFF: "-" shift paddle not operated (down-shift)	-
Sports Mode Selection SW	Sport mode select switch status/ ON or OFF	Shift lever is: • ON: In S, "+" and "-" • OFF: Not in S, "+" and "-"	-
Shift SW Status (D Range)	PNP switch status/ ON or OFF	Shift lever is: • In D, S, "+" and "-": ON • Not in D, S, "+" and "-": OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature while engine is cold	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.
A/T Oil	No. 2 ATF temperature sensor value/	• After stall test: Approximately 80°C (176°F)	If the value is -40°C (-40°F) or 215°C (419°F), the No.

Temperature 2	Min.: -40°C (-40°F) Max.: 215°C (419°F)	• Equal to ambient temperature while engine is cold	2 ATF temperature sensor circuit is open or shorted.
Lock Up	Lock-up/ ON or OFF	Lock-up is: • Operating: ON • Not operating: OFF	-
Shift Status	ECM gear shift command/ 1st, 2nd, 3rd, 4th, 5th or 6th	• In D: 1st, 2nd, 3rd, 4th, 5th or 6th • In S: 1st, 2nd, 3rd, 4th, 5th or 6th	-
SLT Solenoid Status	Shift solenoid SLT status/ ON or OFF	• Accelerator pedal is depressed: OFF • Accelerator pedal is released: ON	-
SLU Solenoid Status	Shift solenoid SLU status/ ON or OFF	Shift solenoid SLU is: • Operating: ON • Not operating: OFF	-
Snow or 2nd Start Mode	2nd Start mode status/ ON or OFF	• ON: 2nd Start mode on • OFF: 2nd Start mode off	-
AT Fluid	Flex lock-up judder judgment/ ON or OFF	• ON: Judder judgment occurs • OFF: Judder judgment does not occur	-

PERFORM ACTIVE TEST

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLU)	Operate the shift solenoid SLU	ON or OFF	[Vehicle Condition] • Engine stopped • Shift lever in P or N
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling • Shift lever in P or N
Activate the Solenoid (S1)	Operate the shift solenoid S1	ON or OFF	[Vehicle Condition] • Engine stopped • Shift lever in P or N
Activate the Solenoid	Operate the shift solenoid S2	ON or OFF	[Vehicle Condition] • Engine stopped

(S2)			• Shift lever in P or N
Activate the Solenoid (S3)	Operate the shift solenoid S3	ON or OFF	[Vehicle Condition] • Engine stopped • Shift lever in P or N
Activate the Solenoid (S4)	Operate the shift solenoid S4	ON or OFF	[Vehicle Condition] • Engine stopped • Shift lever in P or N
Activate the Lock Up	Control shift solenoid SLU to set automatic transmission to lock-up	ON or OFF	Possible to check shift solenoid valve SLU operation. [Vehicle Condition] • Throttle valve opening angle: Less than 35% • Vehicle speed: 60 km/h (36 mph) or more
Control the Shift Position	Operate shift solenoid valves and set each shift position by yourself	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less
Activate the Solenoid (SR)	Operate the shift solenoid SR	ON or OFF	[Vehicle Condition] • Engine stopped • Shift lever in P or N
Activate the Solenoid (SL1)	Operate the shift solenoid SL1	ON or OFF	[Vehicle Condition] • Engine stopped • Shift lever in P or N
Activate the Solenoid (SL2)	Operate the shift solenoid SL2	ON or OFF	[Vehicle Condition] • Engine stopped • Shift lever in P or N

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

for Preparation Click here

HINT:

- **If a DTC is displayed during the DTC check, check the parts listed in the table below and proceed to the "See page" given.**
- ***1: "Comes on" means the Malfunction Indicator Lamp (MIL) illuminates.**
- ***2: "DTC stored" means the ECM memorizes the trouble code if the ECM detects the DTC detection condition.**
- ***3: The ATF temperature warning light blinks or a message is displayed in the combination meter.**
- **These DTCs may be output when the clutch, brake, gear components, etc., inside the automatic transmission are damaged.**

Automatic Transmission System

DTC Code	Detection Item	MIL*1	Memory*2	See page
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	Comes on	DTC stored	Click here
P0711	Transmission Fluid Temperature Sensor "A" Performance	Comes on	DTC stored	Click here
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	Comes on	DTC stored	Click here
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	Comes on	DTC stored	Click here
P0717	Turbine Speed Sensor Circuit No Signal	Comes on	DTC stored	Click here
P0722	Output Speed Sensor Circuit No Signal	Comes on	DTC stored	Click here
P0729	Gear 6 Incorrect Ratio	Comes on	DTC stored	Click here
P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	Comes on	DTC stored	Click here
P0751	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	Comes on	DTC stored	Click here
P0756	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	Comes on	DTC stored	Click here
P0761	Shift Solenoid "C" Performance (Shift Solenoid Valve S3)	Comes on	DTC stored	Click here
P0766	Shift Solenoid "D" Performance (Shift Solenoid Valve S4)	Comes on	DTC stored	Click here
P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	Comes on	DTC stored	Click here
P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	Comes on	DTC stored	Click here
P0781	1-2 Shift (1-2 Shift Valve)	Comes on	DTC stored	Click here
P0894	Transmission Component Slipping	Comes on	DTC stored	Click here
P0973	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	Comes on	DTC stored	Click here
P0974	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)	Comes on	DTC stored	Click here
P0976	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	Comes on	DTC stored	Click here
P0977	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)	Comes on	DTC stored	Click here
P0979	Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)	Comes on	DTC stored	Click here
P0980	Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)	Comes on	DTC stored	Click here
P0982	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	Comes on	DTC stored	Click here
P0983	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)	Comes on	DTC stored	Click here

P0985	Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)	Comes on	DTC stored	Click here
P0986	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)	Comes on	DTC stored	Click here
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	Comes on	DTC stored	Click here
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	Comes on	DTC stored	Click here
P2742	Transmission Fluid Temperature Sensor "B" Circuit Low Input	-*3	DTC stored	Click here
P2743	Transmission Fluid Temperature Sensor "B" Circuit High Input	-*3	DTC stored	Click here
P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	Comes on	DTC stored	Click here
P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	Comes on	DTC stored	Click here
P2772	Four Wheel Drive (4WD) Low Switch Circuit Range / Performance	Comes on	DTC stored	Click here

DTC P0705 Transmission Range Sensor Circuit Malfunction (PRNDL Input)

for Preparation Click here

DESCRIPTION

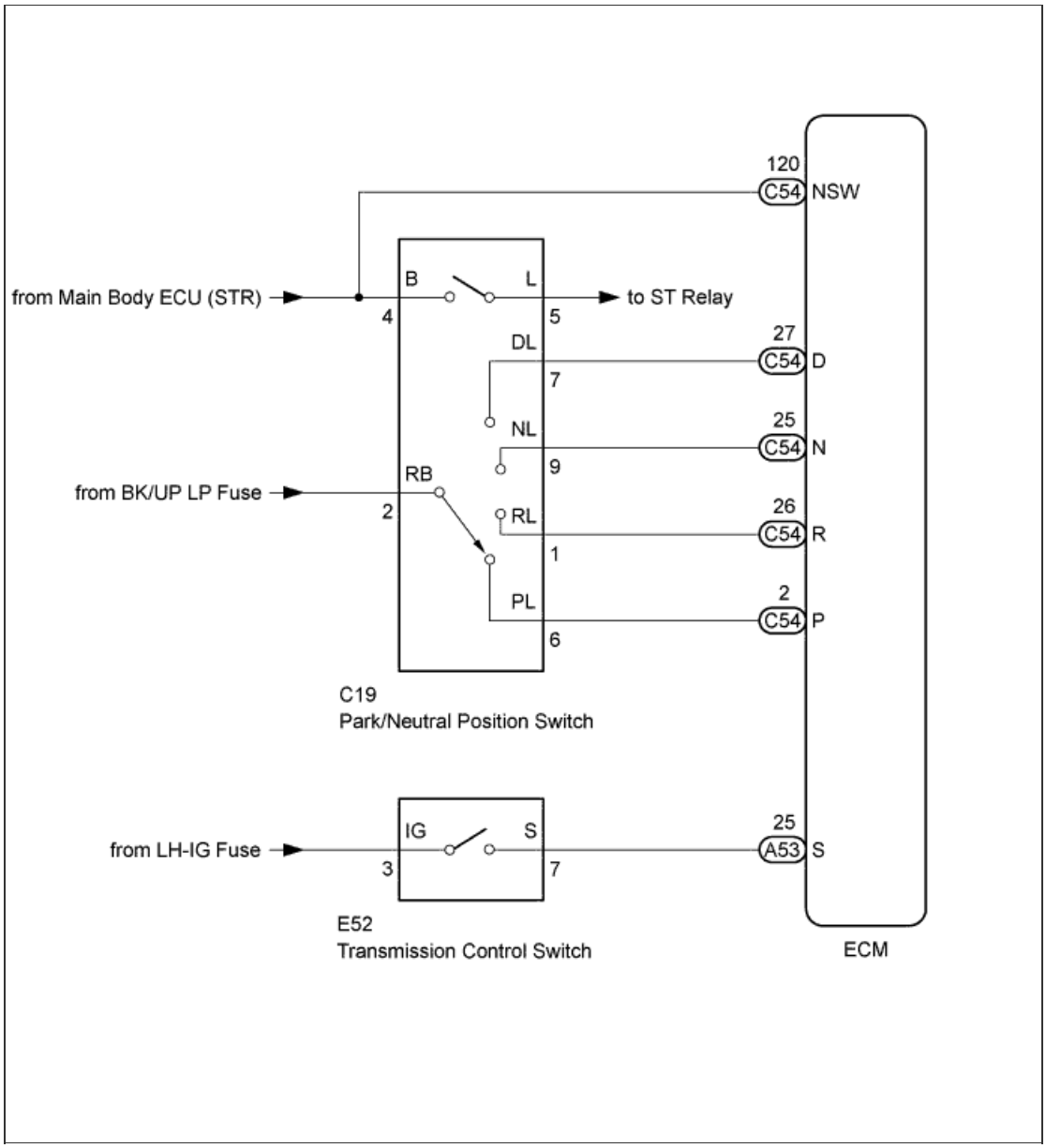
The Park/Neutral Position (PNP) switch detects the shift lever position and sends signals to the ECM.

DTC Code	DTC Detection Condition	Trouble Area
P0705	When one of the following conditions is met: (A) Any 2 or more of the following signals are ON simultaneously (2 trip detection logic). • P input signal • N input signal • R input signal • D input signal (B) Any 2 or more of the following signals are ON simultaneously (2 trip detection logic). • NSW input signal • R input signal • D input signal (C) Any of the following signals are ON for 2.0 sec. or more when the shift lever is in S (2 trip detection logic). • NSW input signal • P input signal • N input signal • R input signal (D) All the signals are OFF simultaneously for the P, R, N and D positions (2 trip detection logic).	• Park/neutral position switch • Transmission control switch (transmission floor shift assembly) • Open or short in park/neutral position switch circuit • ECM

MONITOR DESCRIPTION

This DTC indicates a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.
The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that the engine can be started only when the shift lever is in P or N.
The park/neutral position switch sends a signal to the ECM according to the shift lever position (P, R, N, D or S).
The ECM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The ECM will illuminate the MIL and store the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

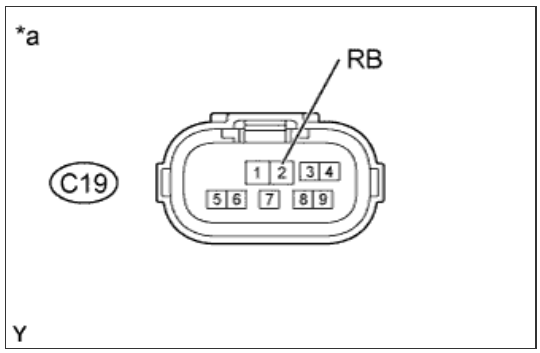
Tester	Measurement	Normal Condition	Diagnostic Note

Display	Item/Range		
Neutral Position SW Signal	PNP switch status/ ON or OFF	Shift lever: • In P or N: ON • Not in P or N: OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (R Range)	PNP switch status/ ON or OFF	Shift lever: • In R: ON • Not in R: OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (P Range)	PNP switch status/ ON or OFF	Shift lever: • In P: ON • Not in P: OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (N Range)	PNP switch status/ ON or OFF	Shift lever: • In N: ON • Not in N: OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (D Range)	PNP switch status/ ON or OFF	Shift lever: • In D: ON • Not in D: OFF	When the shift lever position displayed on the GTS differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Sports Shift Up SW	Sport shift up switch status/ ON or OFF	• ON: Shift lever held in "+" (up-shift) • OFF: Shift lever not in "+" (up-shift)	-
		• ON: "+" shift paddle operated and held (up-shift) • OFF: "+" shift paddle not operated (up-shift)	
Sports Shift Down SW	Sport shift down switch status/ ON or OFF	• ON: Shift lever held in "-" (down-shift) • OFF: Shift lever not in "-" (down-shift)	-
		• ON: "-" shift paddle operated and held (down-shift) • OFF: "-" shift paddle not operated (down-shift)	

1.CHECK HARNESS AND CONNECTOR (BK/UP LP FUSE - PARK/NEUTRAL POSITION SWITCH)

a. Disconnect the park/neutral position switch connector.

b. Measure the voltage according to the value(s) in the table below.



Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
C19-2 (RB) - Body ground	Engine switch on (IG)	11 to 14 V
C19-2 (RB) - Body ground	Engine switch off	Below 1 V

Text in Illustration

*a	Front view of wire harness connector (to Park/Neutral Position Switch)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

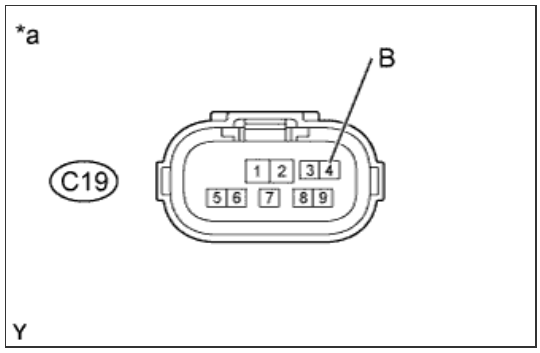
2.CHECK HARNESS AND CONNECTOR (NSW TERMINAL VOLTAGE)

a. Disconnect the park/neutral position switch connector.

b. Measure the voltage according to the value(s) in the table below.

Standard voltage:

Tester Connection	Condition	Specified Condition
C19-4 (B) - Body ground	Engine switch on (IG)	11 to 14 V
C19-4 (B) - Body ground	Engine switch off	Below 1 V



Text in Illustration

*a	Front view of wire harness connector (to Park/Neutral Position Switch)

NG → Go to step 7

OK

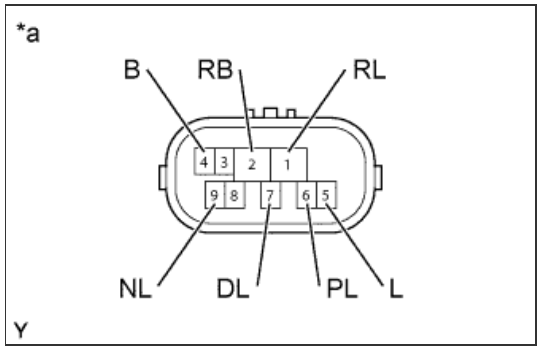
3.INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

a. Disconnect the park/neutral position switch connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
• 2 (RB) - 6 (PL) • 4 (B) - 5 (L)	Shift lever in P	Below 1 Ω
2 (RB) - 1 (RL)	Shift lever in R	Below 1 Ω
• 2 (RB) - 9 (NL) • 4 (B) - 5 (L)	Shift lever in N	Below 1 Ω
2 (RB) - 7 (DL)	• Shift lever in D • Shift lever in S, "+" or "-"	Below 1 Ω
• 2 (RB) - 6 (PL) • 4 (B) - 5 (L)	Shift lever not in P	10 kΩ or higher
2 (RB) - 1 (RL)	Shift lever not in R	10 kΩ or higher
• 2 (RB) - 9 (NL) • 4 (B) - 5 (L)	Shift lever not in N	10 kΩ or higher



2 (RB) - 7 (DL)	• Shift lever not in D • Shift lever not in S, "+" or "-"	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (Park/Neutral Position Switch)

NG → REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY (Click here)

OK

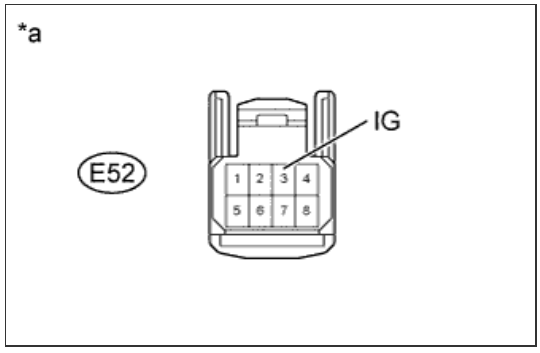
4.CHECK HARNESS AND CONNECTOR (LH-IG FUSE - TRANSMISSION CONTROL SWITCH)

a. Disconnect the transmission control switch connector.

b. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E52-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V
E52-3 (IG) - Body ground	Engine switch off	Below 1 V



Text in Illustration

*a	Front view of wire harness connector (to Transmission Control Switch)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

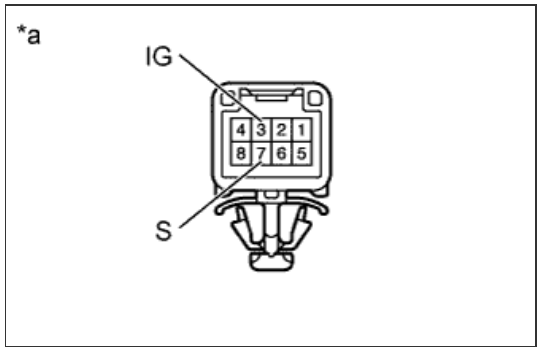
5.INSPECT TRANSMISSION CONTROL SWITCH

a. Disconnect the transmission control switch connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 7 (S)	Shift lever in S, "+" or "-"	Below 1 Ω
3 (IG) - 7 (S)	Shift lever not in S, "+" or "-"	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (Transmission Control Switch)

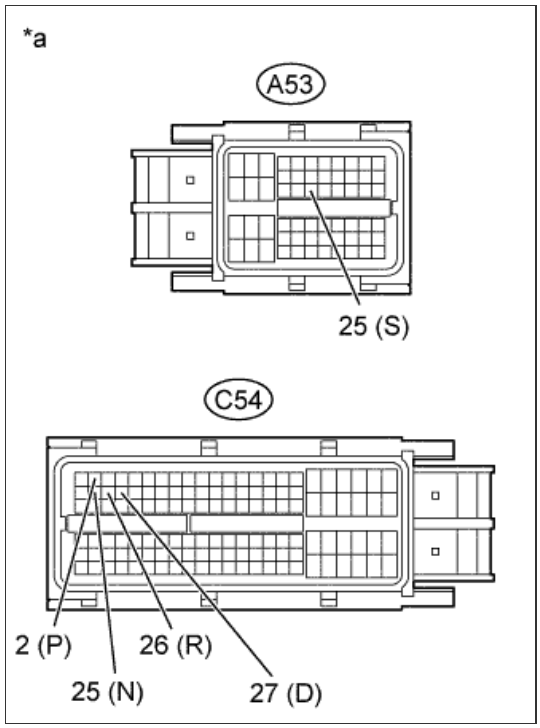
NG → REPLACE TRANSMISSION CONTROL SWITCH (TRANSMISSION FLOOR SHIFT ASSEMBLY) (Click here)

OK

6.CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH, TRANSMISSION CONTROL SWITCH - ECM)

a. Disconnect the ECM connector.

b. Measure the voltage according to the value(s) in the table below.



Standard Voltage:

Tester Connection	Condition	Specified Condition
C54-2 (P) - Body ground	• Engine switch on (IG) • Shift lever in P	11 to 14 V
C54-26 (R) - Body ground	• Engine switch on (IG) • Shift lever in R	11 to 14 V*
C54-25 (N) - Body ground	• Engine switch on (IG) • Shift lever in N	11 to 14 V
C54-27 (D) - Body ground	• Engine switch on (IG) • Shift lever in D	11 to 14 V
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
C54-2 (P) - Body ground	• Engine switch on (IG) • Shift lever not in P	Below 1 V
C54-26 (R) - Body ground	• Engine switch on (IG) • Shift lever not in R	Below 1 V
C54-25 (N) - Body ground	• Engine switch on (IG) • Shift lever not in N	Below 1 V
C54-27 (D) - Body ground	• Engine switch on (IG) • Shift lever	Below 1 V

	not in D	
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

HINT:

*: The voltage will drop slightly due to the turning on of the back up light.

Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK →

REPLACE ECM (Click here)

7.CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)

a. Disconnect the C19 park/neutral position switch connector.

b. Disconnect the C54 ECM connector.

c. Measure the voltage according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C19-4 (B) - C54-120 (NSW)	Always	Below 1 Ω
C19-4 (B) or C54-120 (NSW) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK →

REPLACE ECM (Click here)

DTC P0973 Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)

DTC P0974 Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

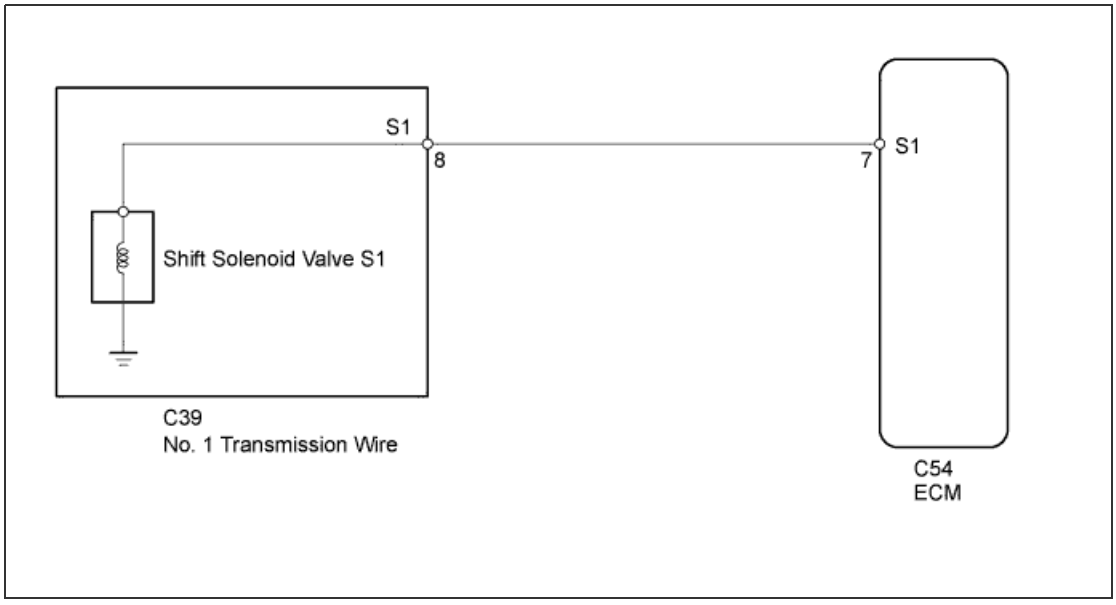
Shifting from 1st to 6th is performed in combination with ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0973	The ECM detects a short in the solenoid valve S1 circuit 2 times when the solenoid valve S1 is operated (1 trip detection logic).	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	The ECM detects an open in the solenoid valve S1 circuit 2 times when the solenoid valve S1 is not operated (1 trip detection logic).	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S1 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve S1 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S1 circuit.
When the shift solenoid valve S1 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S1 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve S1 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)

a. Disconnect the No. 1 transmission wire connector.

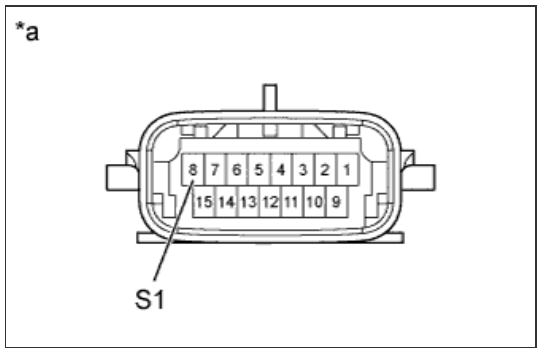
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
8 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)



NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

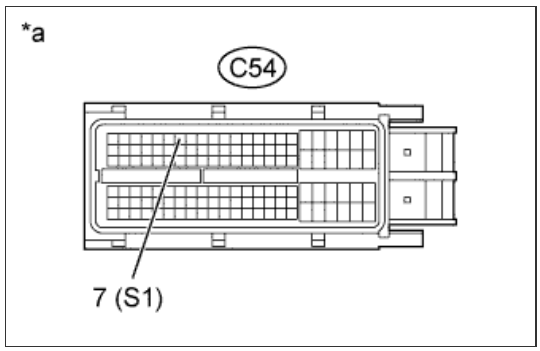
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

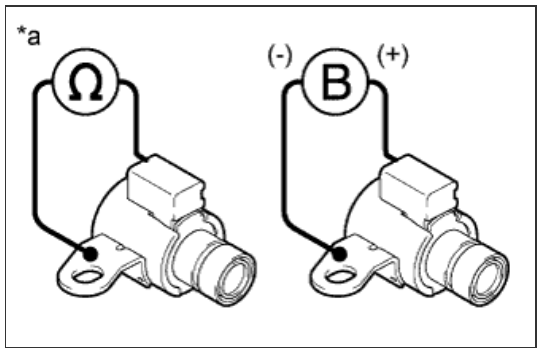
3.INSPECT SHIFT SOLENOID VALVE S1

a. Remove the shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve	Valve moves and makes an operating noise

S1 body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0711 Transmission Fluid Temperature Sensor "A" Performance

for Preparation Click here

DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the ATF temperature into a resistance value which is input into the ECM.
The ECM applies a voltage to the temperature sensor through ECM terminal THO1.
The sensor resistance changes with the ATF temperature.
One terminal of the sensor is grounded so that the sensor resistance and voltage decrease as the temperature becomes higher.
The ECM calculates the ATF temperature based on the voltage signal.

DTC Code	DTC Detection Condition	Trouble Area
P0711	Either condition is met: 1. Conditions (a), (b), (c), (d) and (e) are met (2 trip detection logic): (a) 10 minutes elapse after the engine is started. (b) The vehicle is driven 4.7 km (3.0 miles) or more after the engine is started. (c) IAT is 15°C (59°F) or more. (d) ECT is 15°C (59°F) or more. (e) ATF temperature is less than 20°C (68°F). 2. Conditions (a) and (b) are met (2 trip detection logic): (a) Engine coolant temperature is less than 35°C (95°F) after the engine is started. (b) ATF temperature is 110°C (230°F) or more when the engine coolant temperature reaches 60°C (140°F) after 10 sec. or more.	No. 1 transmission wire (No. 1 ATF temperature sensor)

MONITOR DESCRIPTION

This DTC indicates that there is a problem with output from the Automatic Transmission Fluid (ATF) temperature sensor and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an open or short in the ATF temperature sensor circuit or a fault in the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 20°C (68°F) after running the vehicle for a certain period, the ECM interprets this as a fault, turns on the MIL and stores the DTC.
When the ATF temperature is 110°C (230°F) or more and the engine coolant temperature takes 10 seconds or more to reach 60°C (140°F) after a cold start, the ECM also determines this as a fault, turns on the MIL and stores the DTC.

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature	No. 1 ATF temperature sensor value/	• After stall test: Approximately 80°C (176°F)	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1

1	Min.: -40°C (-40°F) Max.: 215°C (419°F)	• Equal to ambient temperature when engine cold	ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is output and the GTS output is 150°C (302°F) or more, there is a short circuit.

When DTC P0713 is output and the GTS output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the GTS in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored.
It is not necessary to inspect the circuit when P0711 is stored.

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0711)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P0711 is output	A
P0711 and other DTCs are output	B

HINT:

If any other codes besides P0711 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.CHECK TRANSMISSION FLUID LEVEL

a. Check the transmission fluid level (Click here).

OK:
Automatic transmission fluid level is correct.

NG → **ADD FLUID (Click here)**

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0973 Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)

DTC P0974 Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

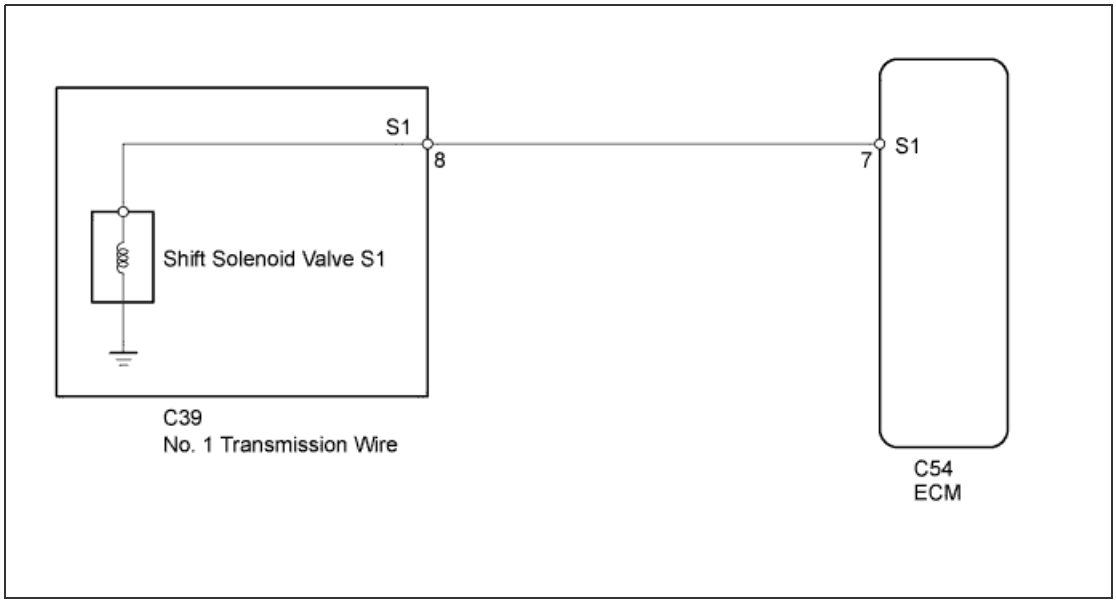
Shifting from 1st to 6th is performed in combination with ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0973	The ECM detects a short in the solenoid valve S1 circuit 2 times when the solenoid valve S1 is operated (1 trip detection logic).	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	The ECM detects an open in the solenoid valve S1 circuit 2 times when the solenoid valve S1 is not operated (1 trip detection logic).	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S1 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve S1 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S1 circuit.
When the shift solenoid valve S1 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S1 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve S1 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)

a. Disconnect the No. 1 transmission wire connector.

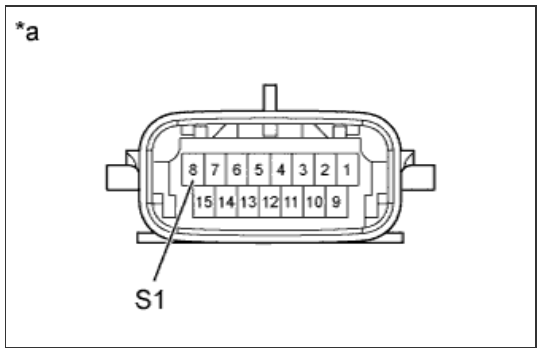
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
8 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)



NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

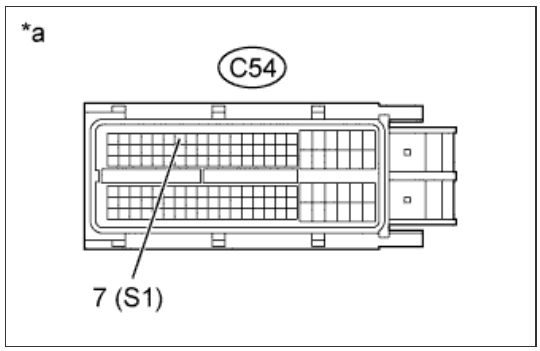
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

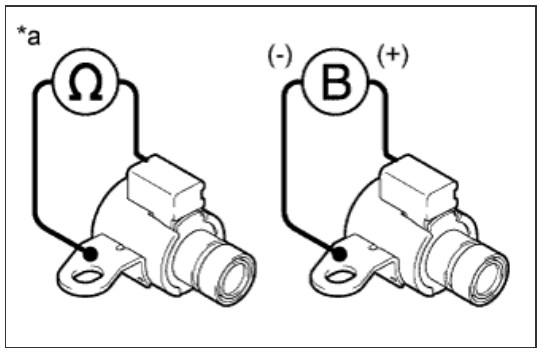
3.INSPECT SHIFT SOLENOID VALVE S1

a. Remove the shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve	Valve moves and makes an operating noise

S1 body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC P0713 Transmission Fluid Temperature Sensor "A" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies voltage to the temperature sensor through the ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.

DTC Code	DTC Detection Condition	Trouble Area
P0712	The No. 1 ATF temperature sensor resistance is below 79 Ω for 0.5 seconds or more (1 trip detection logic).	• Short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0713	ATF temperature sensor resistance is higher than 156 kΩ for 0.5 sec. or more and either condition is met (1 trip detection logic). (A) 15 min. or more have elapsed after the engine start when the engine coolant temperature or intake air temperature is -29.375°C (-20.875°F) or less. (B) 10 sec. or more have elapsed after the engine start when the engine coolant temperature and intake air temperature are higher than -29.375°C (-20.875°F).	• Open in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM

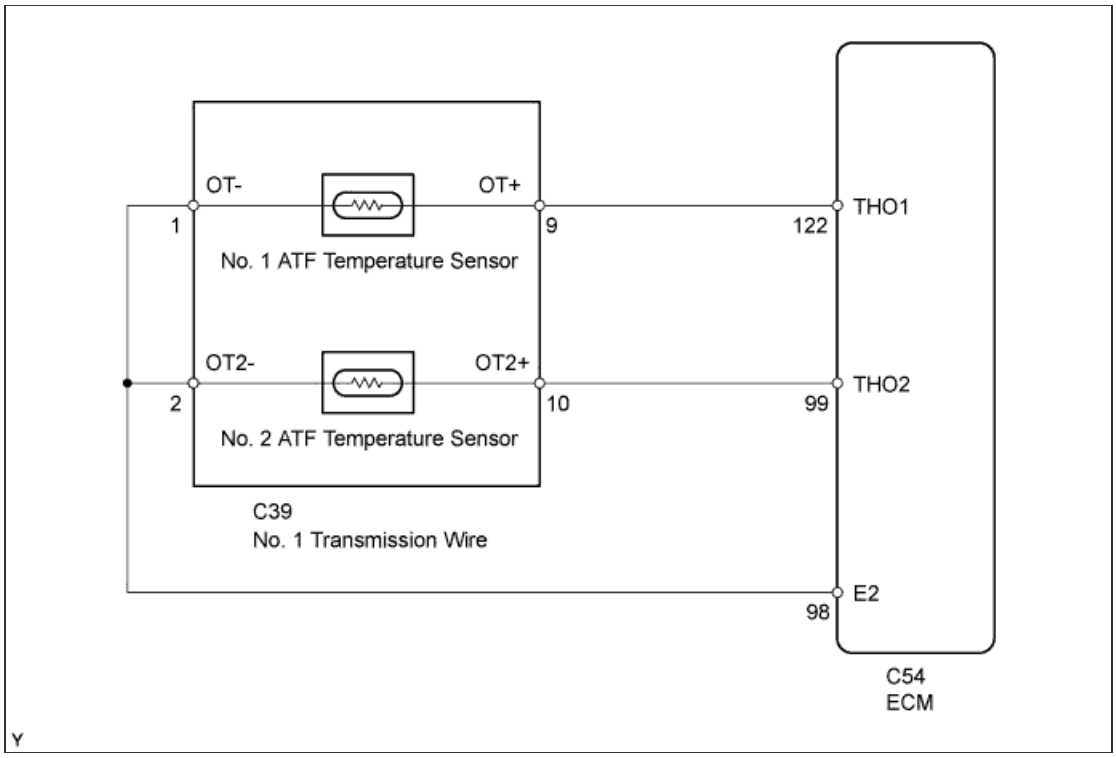
MONITOR DESCRIPTION

These DTCs indicate an open or short in the Automatic Transmission Fluid (ATF) temperature sensor circuit. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 79 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

HINT:

- **The ATF temperature can be checked on the GTS display.**
- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is stored and the GTS output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the GTS output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the GTS in order to check if a malfunction exists.

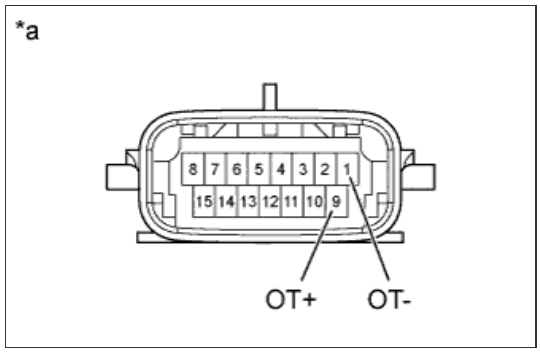
Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 1 ATF TEMPERATURE SENSOR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
1 (OT-) - 9 (OT+)	Always	79 Ω to 156 kΩ
1 (OT-) - Body ground	Always	10 kΩ or higher
9 (OT+) - Body ground	Always	10 kΩ or higher

HINT:

If the resistance is out of the specified range of one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

Text in Illustration

*a	Component without harness connected (No. 1 transmission wire)

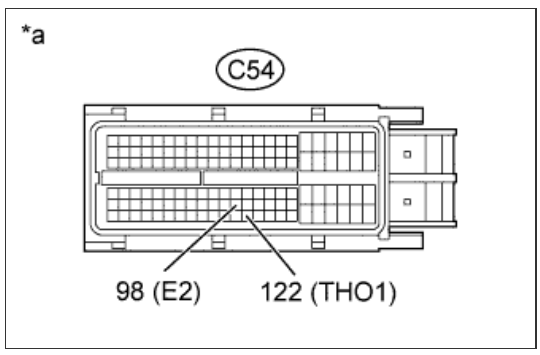
NG → REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-122 (THO1) - C54-98 (E2)	Always	79 Ω to 156 kΩ
C54-122 (THO1) - Body ground	Always	10 kΩ or higher
C54-98 (E2) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0976 Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)

DTC P0977 Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

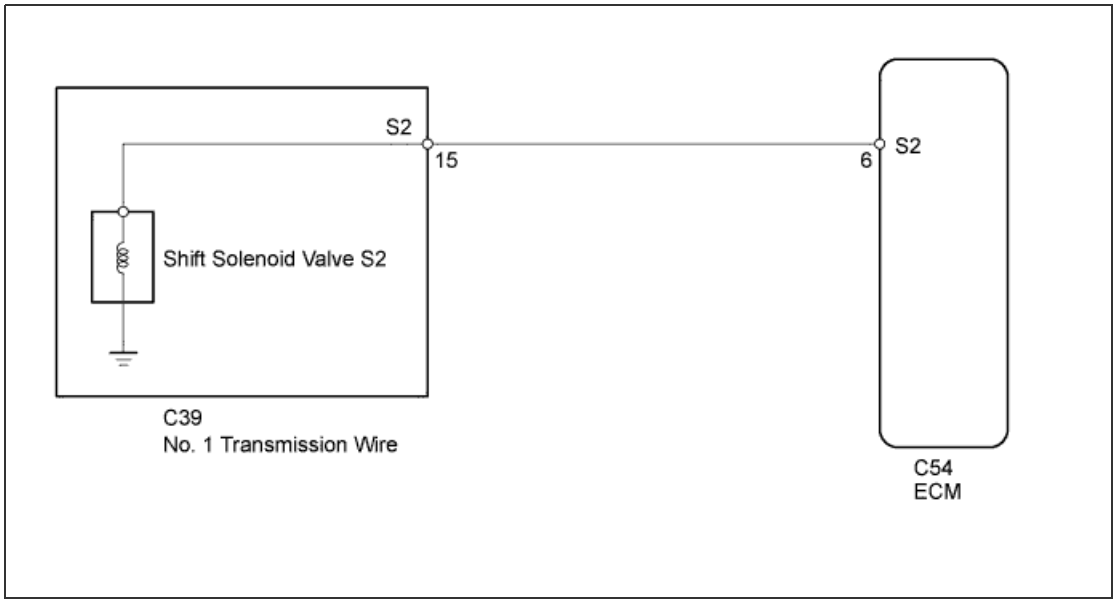
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0976	The ECM detects a short in the solenoid valve S2 circuit 2 times when the solenoid valve S2 is operated (1 trip detection logic).	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	The ECM detects an open in the solenoid valve S2 circuit 2 times when the solenoid valve S2 is not operated (1 trip detection logic).	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S2 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve S2 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S2 circuit.
When the shift solenoid valve S2 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S2 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve S2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)

a. Disconnect the No. 1 transmission wire connector.

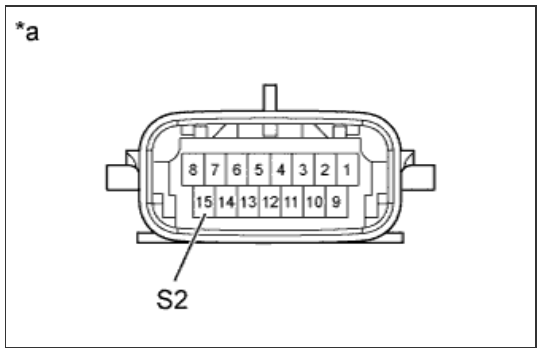
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
15 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)



NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

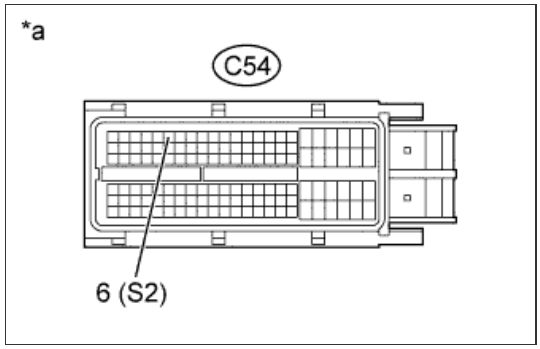
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

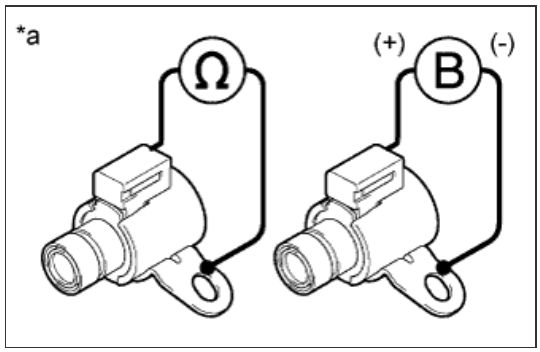
3.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve	Valve moves and makes an operating noise

S2 body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC P0713 Transmission Fluid Temperature Sensor "A" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies voltage to the temperature sensor through the ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.

DTC Code	DTC Detection Condition	Trouble Area
P0712	The No. 1 ATF temperature sensor resistance is below 79 Ω for 0.5 seconds or more (1 trip detection logic).	• Short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0713	ATF temperature sensor resistance is higher than 156 kΩ for 0.5 sec. or more and either condition is met (1 trip detection logic). (A) 15 min. or more have elapsed after the engine start when the engine coolant temperature or intake air temperature is -29.375°C (-20.875°F) or less. (B) 10 sec. or more have elapsed after the engine start when the engine coolant temperature and intake air temperature are higher than -29.375°C (-20.875°F).	• Open in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM

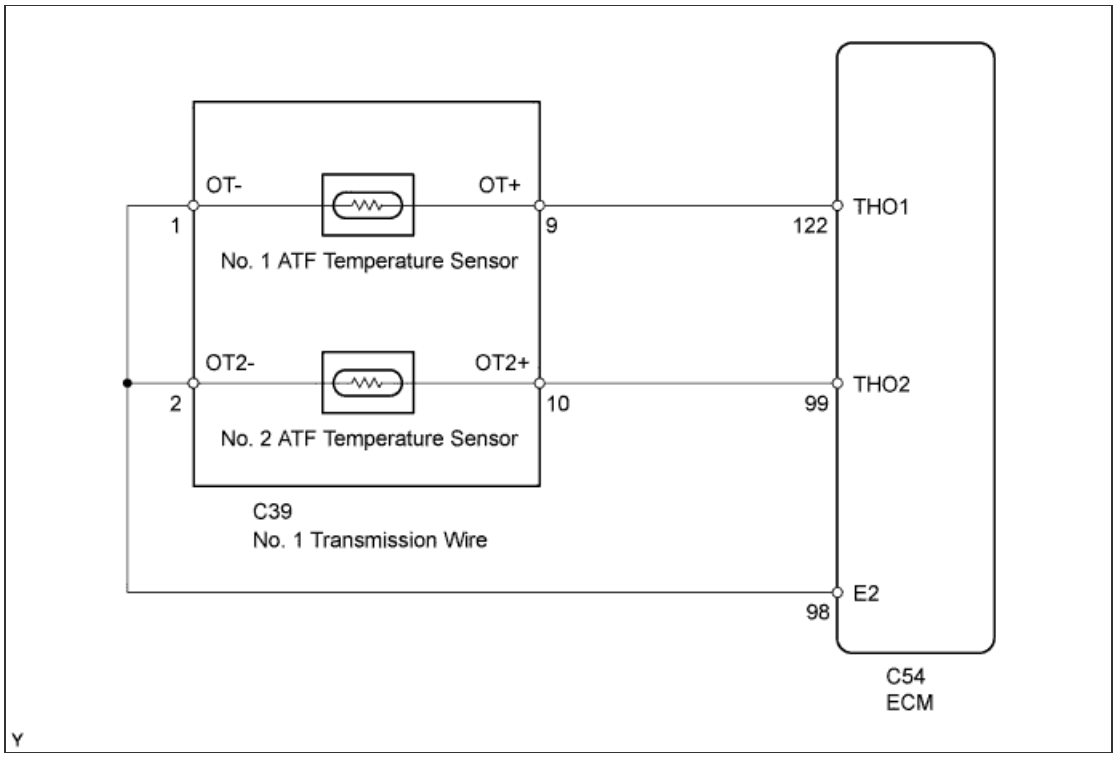
MONITOR DESCRIPTION

These DTCs indicate an open or short in the Automatic Transmission Fluid (ATF) temperature sensor circuit. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 79 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

HINT:

- **The ATF temperature can be checked on the GTS display.**
- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is stored and the GTS output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the GTS output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the GTS in order to check if a malfunction exists.

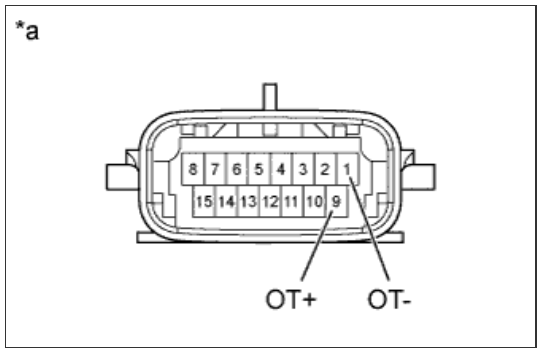
Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 1 ATF TEMPERATURE SENSOR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
1 (OT-) - 9 (OT+)	Always	79 Ω to 156 kΩ
1 (OT-) - Body ground	Always	10 kΩ or higher
9 (OT+) - Body ground	Always	10 kΩ or higher

HINT:

If the resistance is out of the specified range of one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

Text in Illustration

*a	Component without harness connected (No. 1 transmission wire)

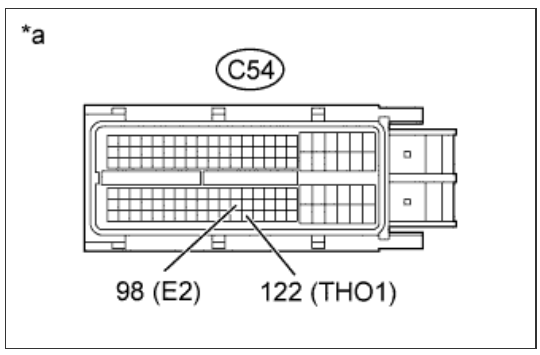
NG → REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-122 (THO1) - C54-98 (E2)	Always	79 Ω to 156 kΩ
C54-122 (THO1) - Body ground	Always	10 kΩ or higher
C54-98 (E2) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0976 Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)

DTC P0977 Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

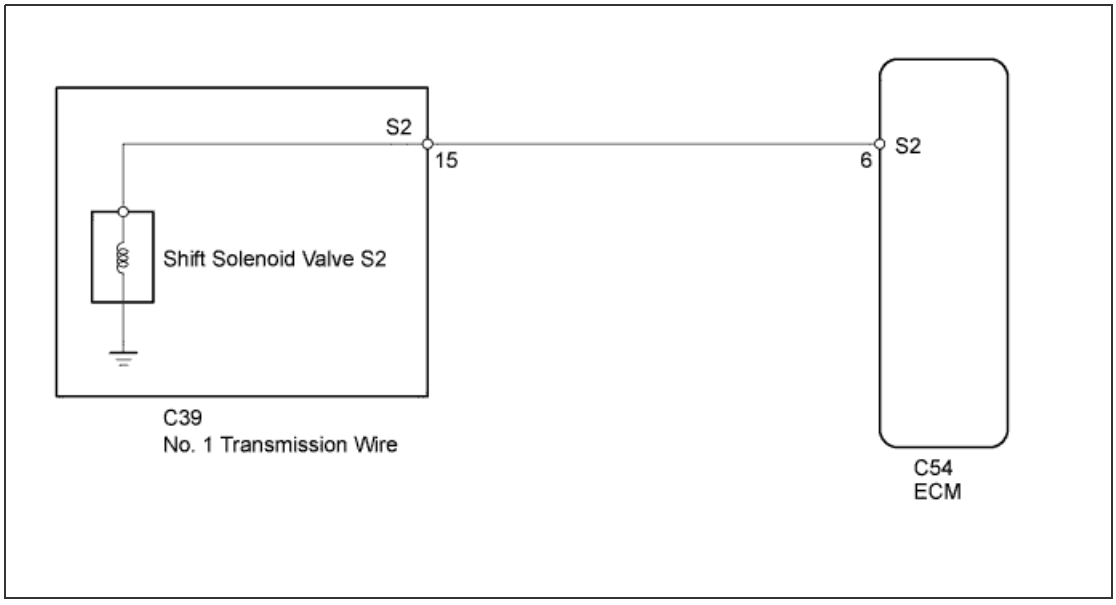
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0976	The ECM detects a short in the solenoid valve S2 circuit 2 times when the solenoid valve S2 is operated (1 trip detection logic).	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	The ECM detects an open in the solenoid valve S2 circuit 2 times when the solenoid valve S2 is not operated (1 trip detection logic).	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S2 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve S2 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S2 circuit.
When the shift solenoid valve S2 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S2 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve S2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)

a. Disconnect the No. 1 transmission wire connector.

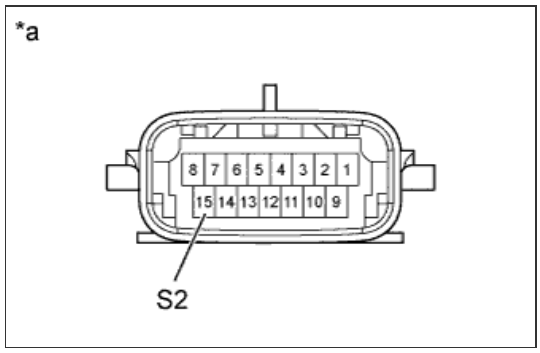
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
15 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)



NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

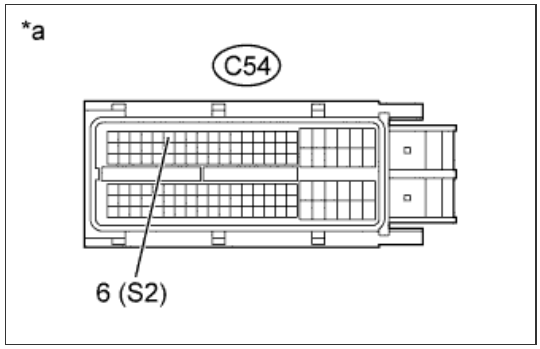
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

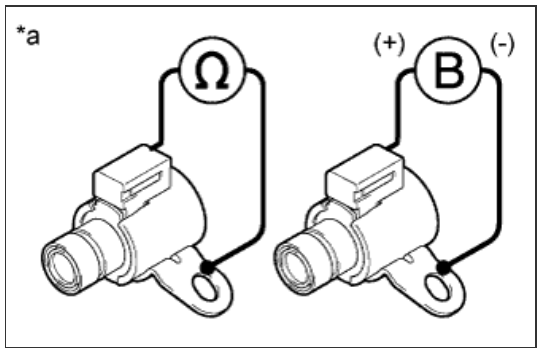
3.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve	Valve moves and makes an operating noise

S2 body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0717 Turbine Speed Sensor Circuit No Signal

for Preparation Click here

DESCRIPTION

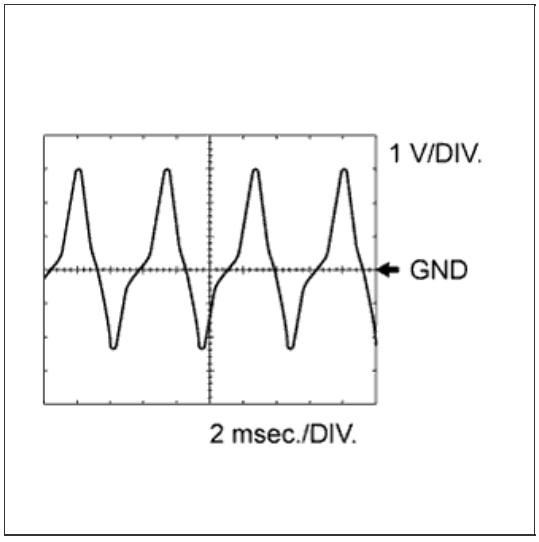
This sensor detects the rotation speed of the turbine which shows the input revolution of the transmission. By comparing the input turbine speed signal NT with the counter gear speed sensor signal SP2, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. As a result, the gears shift smoothly.

DTC Code	DTC Detection Condition	Trouble Area
P0717	All the conditions below are detected for 5 sec. or more (1 trip detection logic). (a) Gear change is not performed. (b) The gear position is 4th, 5th or 6th. (c) The T/M input shaft rpm is 300 rpm or less. (d) The T/M output shaft rpm is 1000 rpm or more. (e) The park/neutral position switch: • The NSW input signal is OFF. • The R input signal is OFF. (f) The shift solenoid valves and park/neutral position switch are operating normally.	• Open or short in speed sensor NT circuit • Speed sensor NT • ECM • Automatic transmission (clutch, brake or gear, etc.)

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

Standard:

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-124 (NT+) - C54-123 (NT-)	1 V/DIV., 2 msec./DIV.	Engine idling (shift lever in P or N)	Refer to illustration



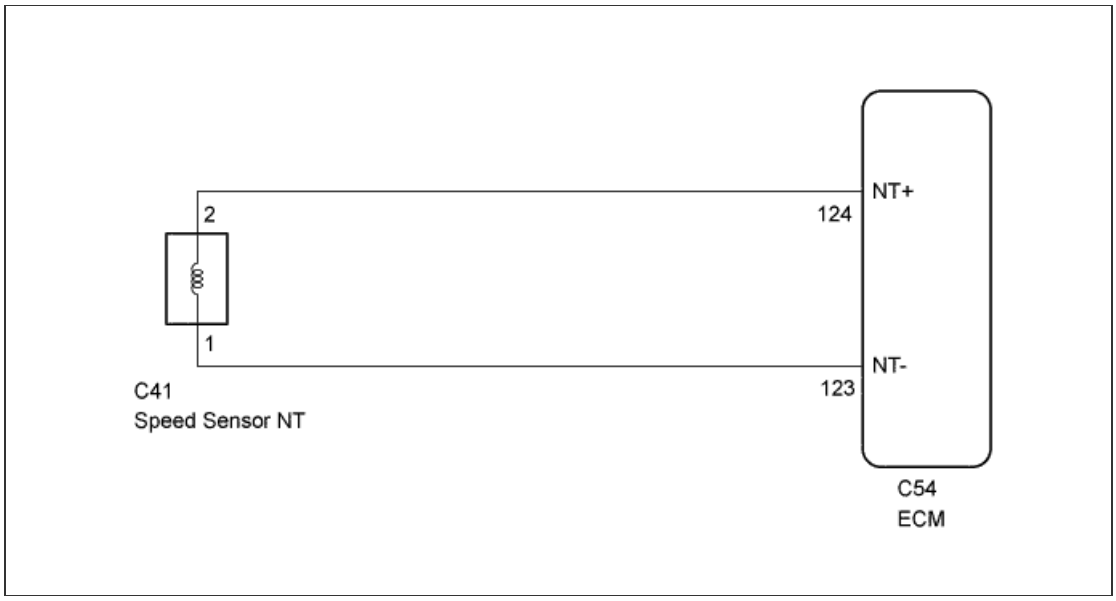
MONITOR DESCRIPTION

This DTC indicates that a pulse is not output from the speed sensor NT (turbine (input) speed sensor) or is output only a little. The NT terminal of the ECM detects the pulse signal from the speed sensor NT (input RPM). The ECM outputs a gear shift signal comparing the input speed sensor NT with the output speed sensor SP2.
While the vehicle is operating in the 4th, 5th or 6th gear position with the shift lever in D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is 1000 rpm or more*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

HINT:

- ***1: Pulse is not output or is irregularly output.**
- ***2: The vehicle speed is approximately 50 km/h (31 mph) or more.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPD (NT)	Input shaft speed/ Min.: 0 rpm Max.: 12750 rpm	Lock-up: • ON (after warming up engine): Input turbine speed (NT) equal to engine speed • OFF (idling with shift lever in N): Input turbine speed (NT) nearly equal to engine speed	The data is displayed in increments of 50 rpm.

HINT:

- **SPD (NT) is always 0 while driving:**
  Open or short in the sensor or circuit.
- **SPD (NT) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:**
  Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1.INSPECT SPEED SENSOR NT INSTALLATION

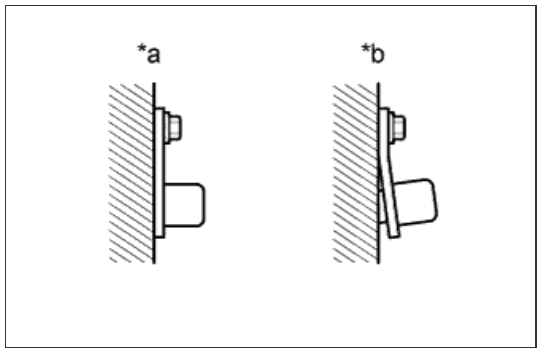
a. Check the speed sensor NT installation.

OK:
The installation bolt is tightened properly and there is no clearance

between the sensor and transmission case.

Text in Illustration

*a	CORRECT
*b	INCORRECT



NG → SECURELY INSTALL OR REPLACE SPEED SENSOR NT (Click here)

OK

2.INSPECT SPEED SENSOR NT

a. Disconnect the speed sensor connector.

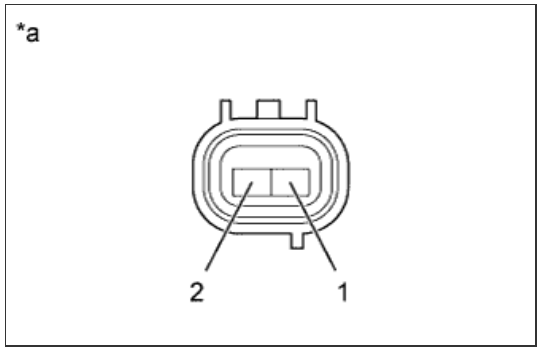
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

Text in Illustration

*a	Component without harness connected (Speed Sensor NT)



NG → REPLACE SPEED SENSOR NT (Click here)

OK

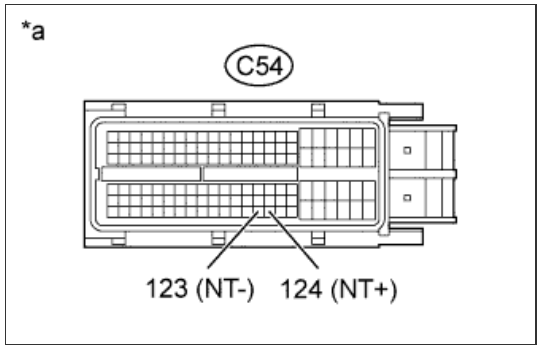
3.CHECK HARNESS AND CONNECTOR (SPEED SENSOR NT - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-124 (NT+) - C54-123 (NT-)	20°C (68°F)	560 to 680 Ω
C54-124 (NT+) - Body ground	Always	10 kΩ or higher
C54-123 (NT-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0979 Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)

DTC P0980 Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

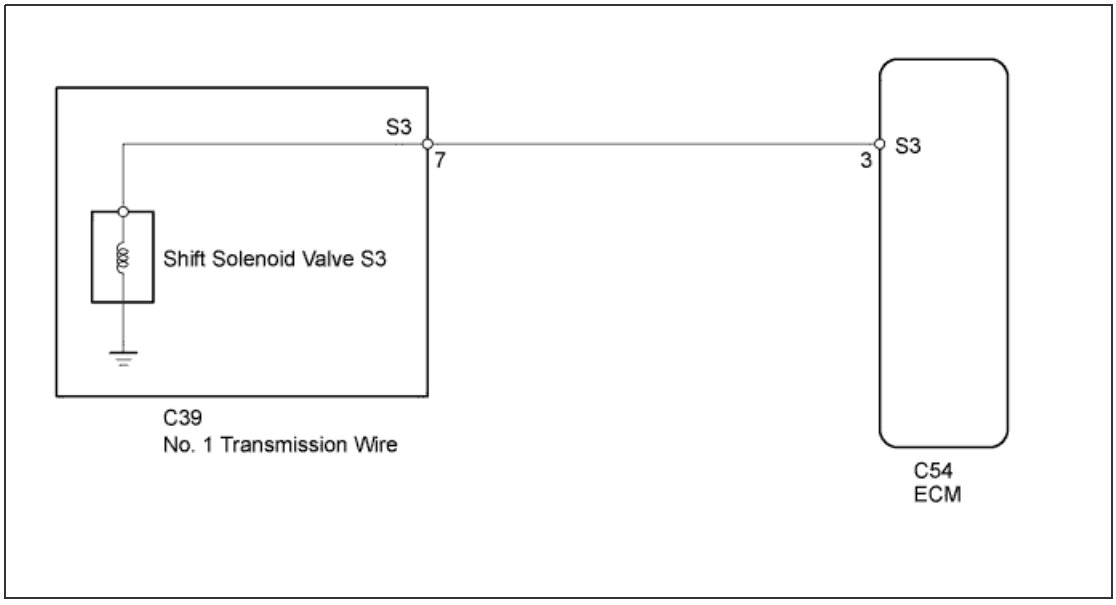
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0979	The ECM detects a short in the solenoid valve S3 circuit 2 times when the solenoid valve S3 is operated (1 trip detection logic).	• Short in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM
P0980	The ECM detects an open in the solenoid valve S3 circuit 2 times when the solenoid valve S3 is not operated (1 trip detection logic).	• Open in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S3 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve S3 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S3 circuit.
When the shift solenoid valve S3 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S3 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve S3 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S3)

a. Disconnect the No. 1 transmission wire connector.

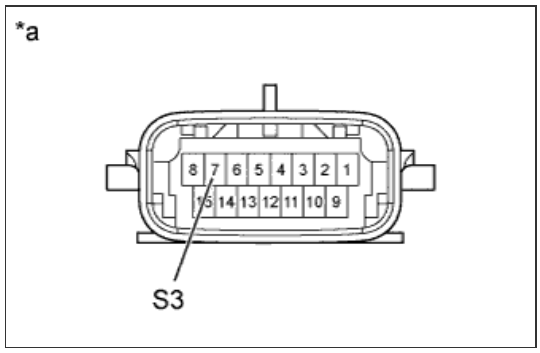
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
7 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)



NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

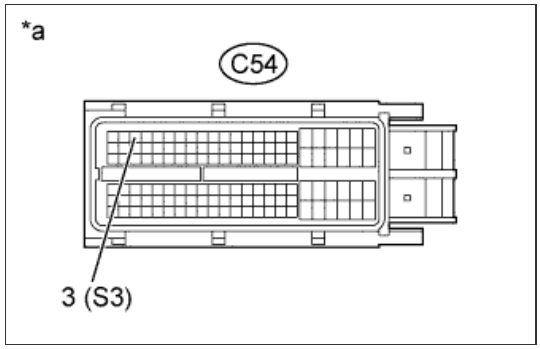
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

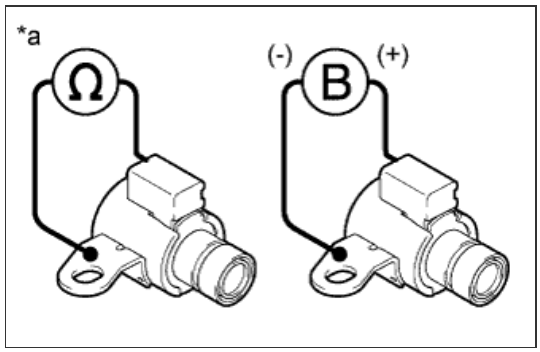
3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove the shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve	Valve moves and makes an operating noise

S3 body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0722 Output Speed Sensor Circuit No Signal

for Preparation Click here

DESCRIPTION

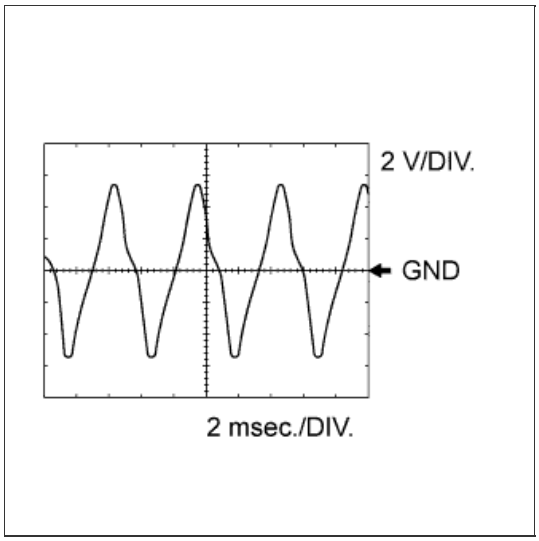
The speed sensor SP2 detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals. An AC voltage is generated in the speed sensor SP2 coil as the parking gear mounted on the rear planetary gear assembly rotates, and this voltage is sent to the ECM. The parking gear on the rear planetary gear is used as the timing rotor for this sensor.
The gear shift point and lock-up timing are controlled by the ECM based on the signals from this vehicle speed sensor and the throttle position sensor signal.

DTC Code	DTC Detection Condition	Trouble Area
P0722	All conditions are met 5 seconds or more continuously (2 trip detection logic). (a) No signal from the speed sensor SP2 is input to the ECM while 4 pulses of the No. 1 vehicle speed sensor signal are sent. (b) The vehicle speed is 9 km/h (6 mph) or more for at least 5 sec. (c) The park/neutral position switch is off.	• Open or short in speed sensor SP2 circuit • Speed sensor SP2 • ECM • Automatic transmission (clutch, brake or gear, etc.)

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

Standard:

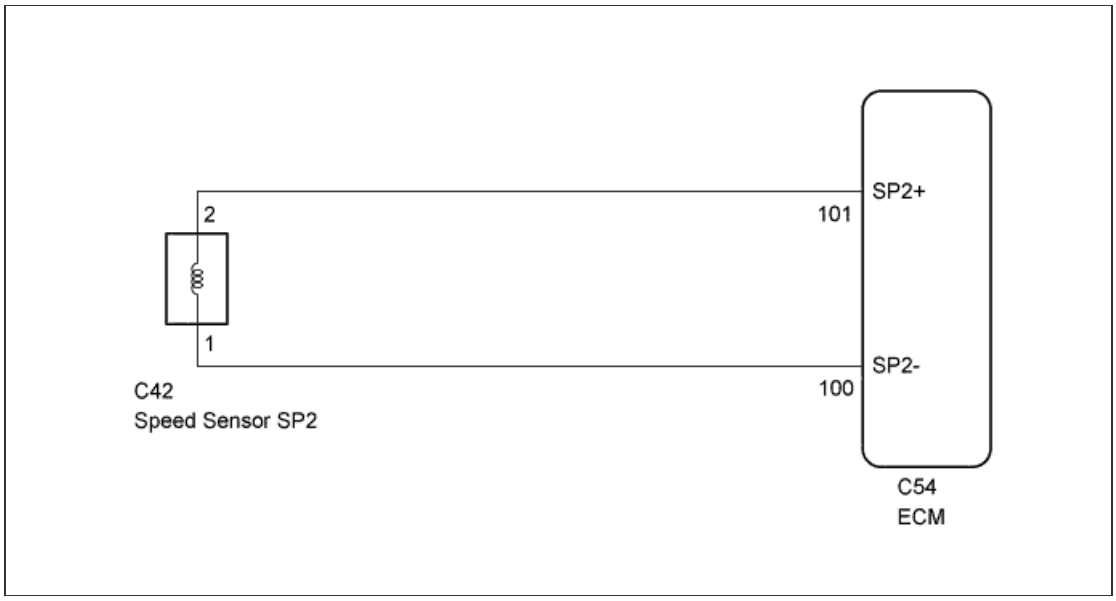
Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-101 (SP2+) - C54-100 (SP2-)	2 V/DIV., 2 msec./DIV	Vehicle speed 20 km/h (12 mph)	Refer to illustration



MONITOR DESCRIPTION

The output speed sensor SP2 monitors the output shaft speed. The ECM controls the gear shift point and the lock up timing based on the signals from the output speed sensor SP2 and throttle position sensor.
If the ECM detects no signal from the output speed sensor SP2 even while the vehicle is moving, it will conclude that there is a malfunction of the output speed sensor SP2. The ECM will illuminate the MIL and store a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPD (SP2)	Output shaft speed/ Min.: 0 km/h (0 mph) Max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph) (output shaft speed equal to vehicle speed)	-

HINT:

- **SPD (SP2) is always 0 while driving:**
  Open or short in the sensor or circuit.
- **The SPD (SP2) value displayed on the GTS is much lower than the actual vehicle speed:**
  Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1.INSPECT SPEED SENSOR SP2 INSTALLATION

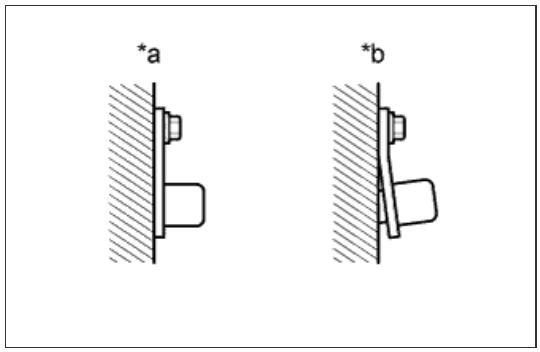
a. Check the speed sensor SP2 installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transmission case.

Text in Illustration

*a	CORRECT
*b	INCORRECT



NG → SECURELY INSTALL OR REPLACE SPEED SENSOR SP2 (Click here)

OK

2.INSPECT SPEED SENSOR SP2

a. Disconnect the speed sensor connector.

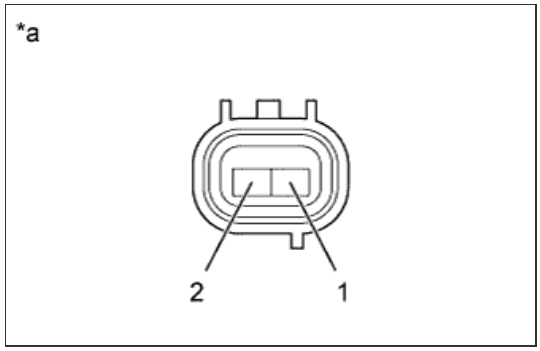
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

Text in Illustration

*a	Component without harness connected (Speed Sensor SP2)



NG → REPLACE SPEED SENSOR SP2 (Click here)

OK

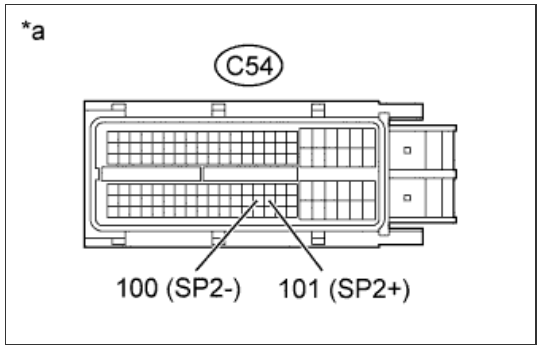
3.CHECK HARNESS AND CONNECTOR (SPEED SENSOR SP2 - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-101 (SP2+) - C54-100 (SP2-)	20°C (68°F)	560 to 680 Ω
C54-101 (SP2+) - Body ground	Always	10 kΩ or higher
C54-100 (SP2-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0979 Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)

DTC P0980 Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

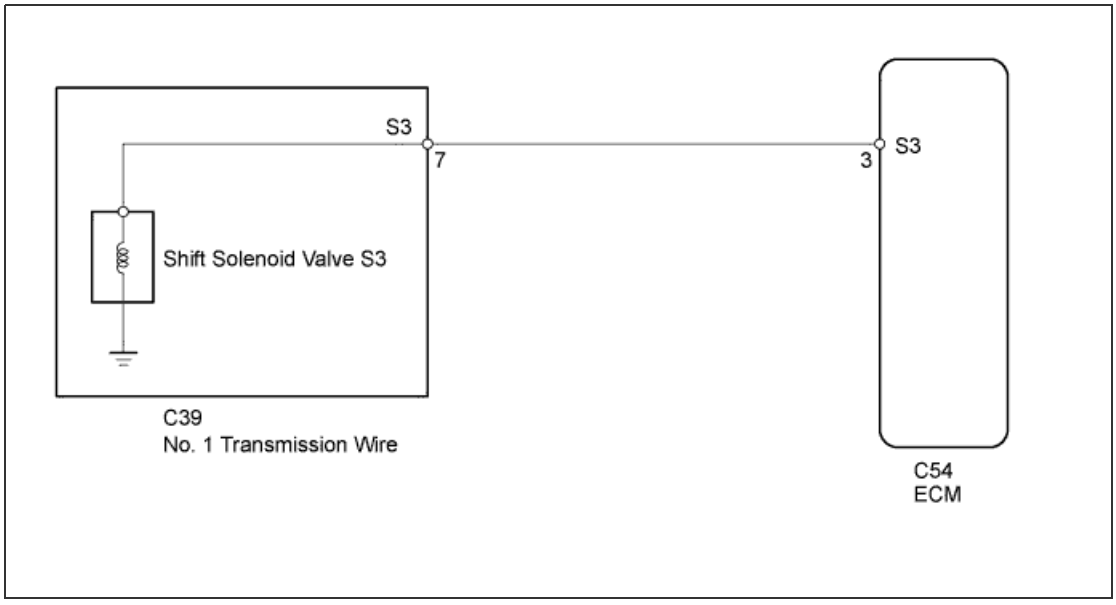
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0979	The ECM detects a short in the solenoid valve S3 circuit 2 times when the solenoid valve S3 is operated (1 trip detection logic).	• Short in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM
P0980	The ECM detects an open in the solenoid valve S3 circuit 2 times when the solenoid valve S3 is not operated (1 trip detection logic).	• Open in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S3 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve S3 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S3 circuit.
When the shift solenoid valve S3 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S3 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve S3 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S3)

a. Disconnect the No. 1 transmission wire connector.

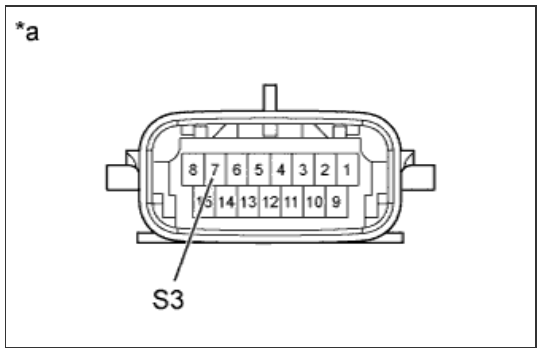
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
7 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)



NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

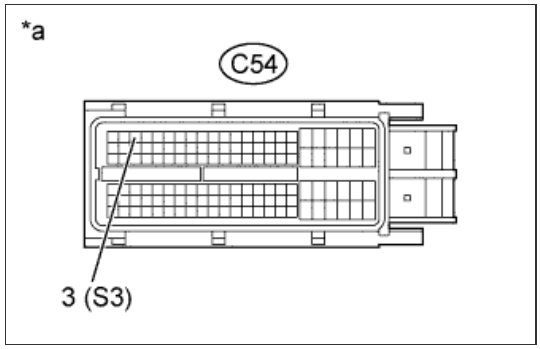
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

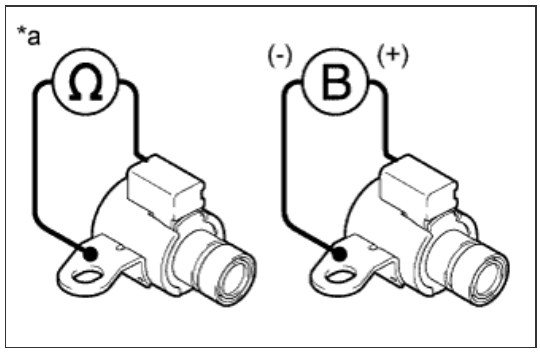
3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove the shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve	Valve moves and makes an operating noise

S3 body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0729 Gear 6 Incorrect Ratio

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output speed sensor SP2 and input speed sensor NT to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0729	6th gearshift malfunction: The ECM determines there is a malfunction when both of the following conditions are met (2 trip detection logic). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Valve body is blocked up or stuck (sequence valve) • Shift solenoid valve SLT remains open or closed • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a solenoid valve mechanical problem:**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	2nd	3rd	4th	5th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF and switching oil pressure to the valves in the valve body.
The DTC indicates that the sequence valve is locked in the direction the spring stretches and that shifting to 6th gear is impossible.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0729)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P0729 is output	A
P0729 and other DTCs are output	B

HINT:

If any other codes besides P0729 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING GTS (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the GTS to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position by yourself	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shift must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shift must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**
- **Gear positions in the event of a solenoid valve mechanical problem:**

Tester command gearshift	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	2nd	3rd	4th	5th	4th

OK:

Gear position changes in accordance with the GTS command.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (**Click here**)

OK

3.PERFORM ACTIVE TEST USING GTS (SHIFT SOLENOID VALVE SLT)

NOTICE:

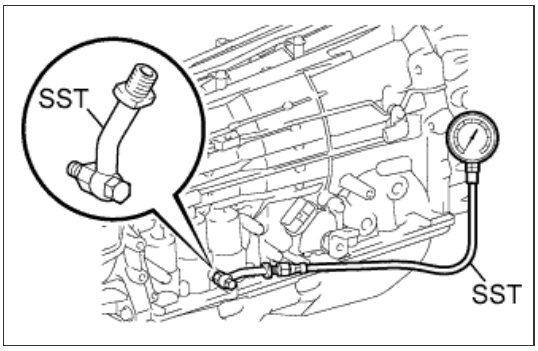
- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**

- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **Perform the test with the A/C off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case and connect SST.



SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the GTS to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (**Click here**)

OK

4.CLEAR DTC AND PERFORM RUNNING TEST

a. Clear the DTC (Click here).

b. Check the DTC again after conducting the Monitor Drive Pattern (Click here).

OK:

No DTC code output.

NG → REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (**Click here**)

OK

END

DTC P0982 Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)

DTC P0983 Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)

for Preparation Click here

DESCRIPTION

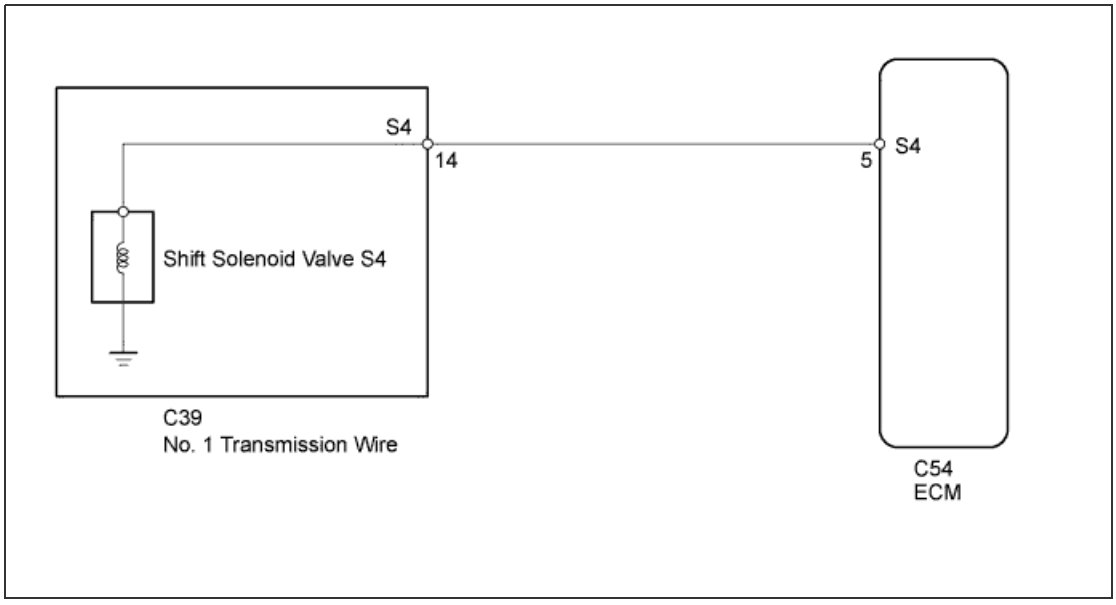
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0982	The ECM detects a short in the solenoid valve S4 circuit 2 times when the solenoid valve S4 is operated (1 trip detection logic).	• Short in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM
P0983	The ECM detects an open in the solenoid valve S4 circuit 2 times when the solenoid valve S4 is not operated (1 trip detection logic).	• Open in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S4 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve S4 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S4 circuit.
When the shift solenoid valve S4 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S4 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve S4 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S4)

a. Disconnect the No. 1 transmission wire connector.

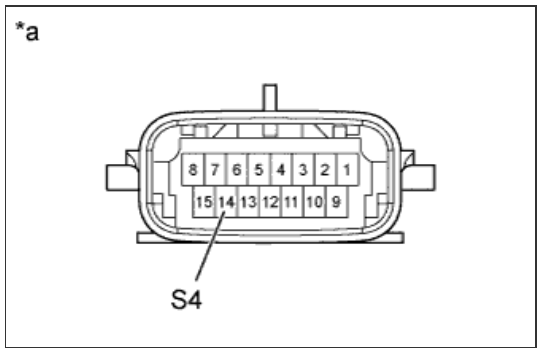
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
14 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)



NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

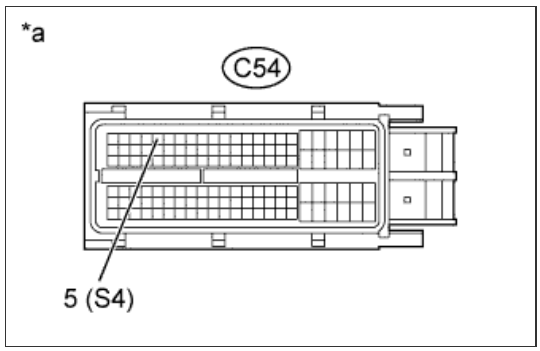
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

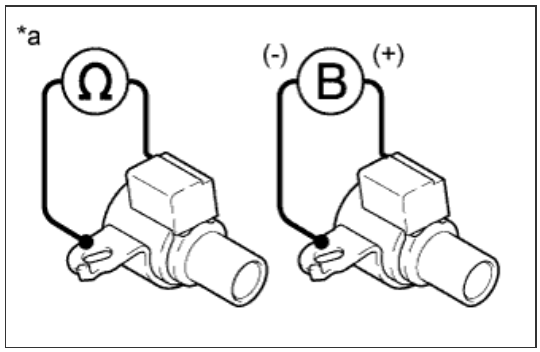
3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove the shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve	Valve moves and makes an operating noise

S4 body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0748 Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)

for Preparation Click here

DESCRIPTION

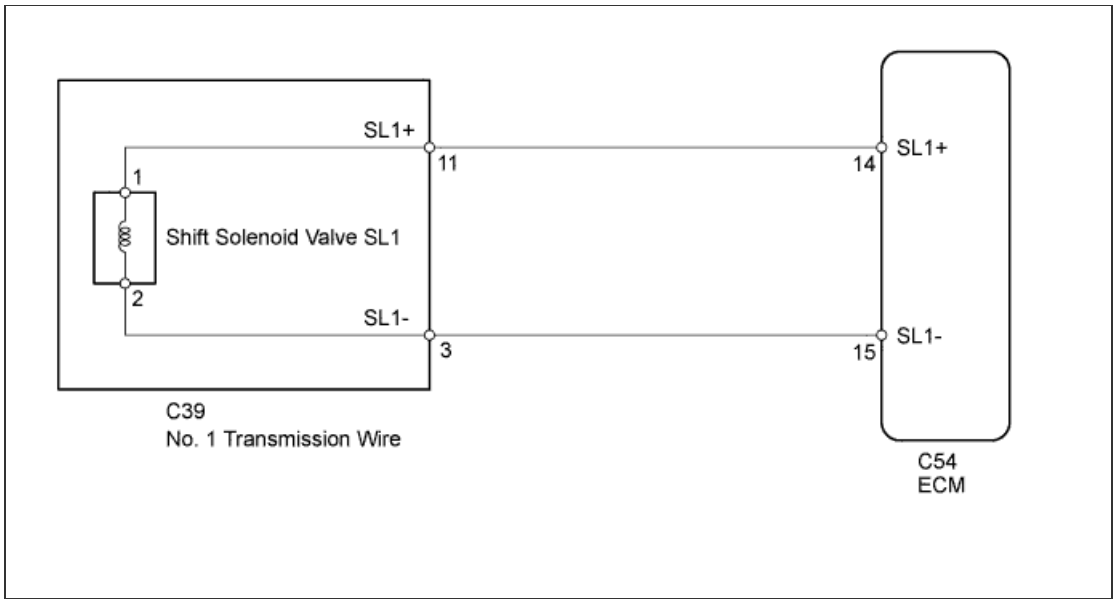
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0748	The ECM checks for an open or short in the shift solenoid valve SL1 circuit while driving and shifting between 4th and 5th gear (1 trip detection logic). The output signal duty equals 100%. **HINT:** The SL1 output signal duty is less than 100% under normal conditions.	• Open or short in shift solenoid valve SL1 circuit • Shift solenoid valve SL1 • ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL1 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the open or short circuited solenoid.
While driving and shifting between 4th and 5th gears, if the ECM detects an open or short in the shift solenoid valve SL1 circuit, the ECM determines that there is a malfunction (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

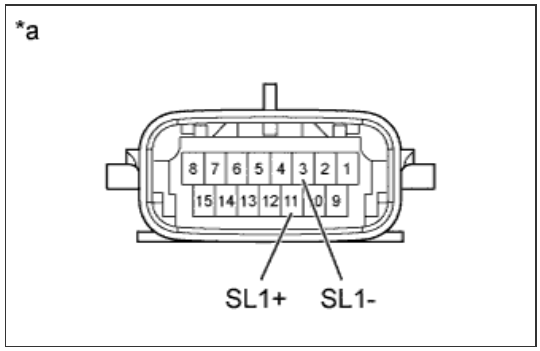
The shift solenoid valve SL1 turns ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL1	OFF	OFF	OFF	OFF	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL1)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
11 (SL1+) - 3 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
11 (SL1+) - Body ground	Always	10 kΩ or higher
3 (SL1-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

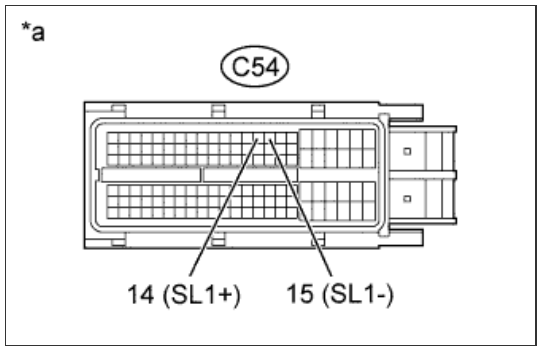
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-14 (SL1+) - C54-15 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
C54-14 (SL1+) - Body ground	Always	10 kΩ or higher
C54-15 (SL1-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SL1

a. Remove the shift solenoid valve SL1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

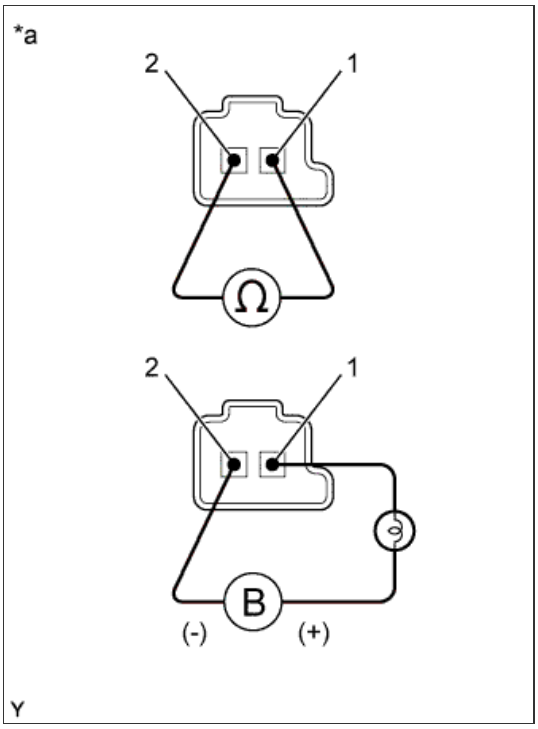
OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W	

bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL1)



NG → REPLACE SHIFT SOLENOID VALVE SL1 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0982 Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)

DTC P0983 Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)

for Preparation Click here

DESCRIPTION

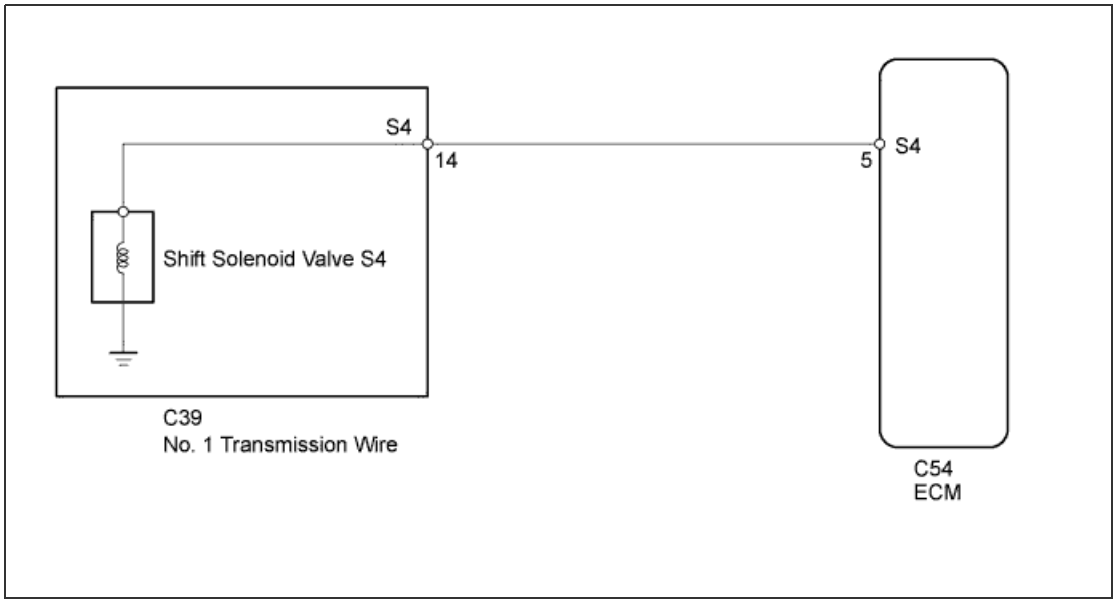
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0982	The ECM detects a short in the solenoid valve S4 circuit 2 times when the solenoid valve S4 is operated (1 trip detection logic).	• Short in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM
P0983	The ECM detects an open in the solenoid valve S4 circuit 2 times when the solenoid valve S4 is not operated (1 trip detection logic).	• Open in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S4 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve S4 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S4 circuit.
When the shift solenoid valve S4 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S4 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve S4 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S4)

a. Disconnect the No. 1 transmission wire connector.

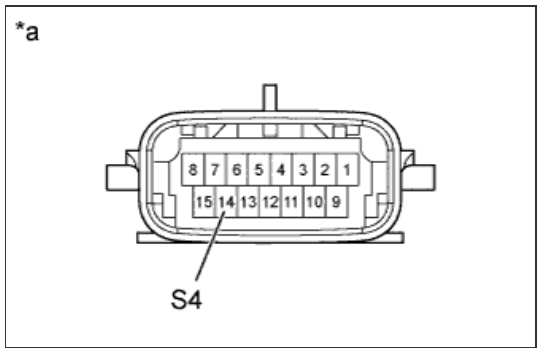
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
14 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)



NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

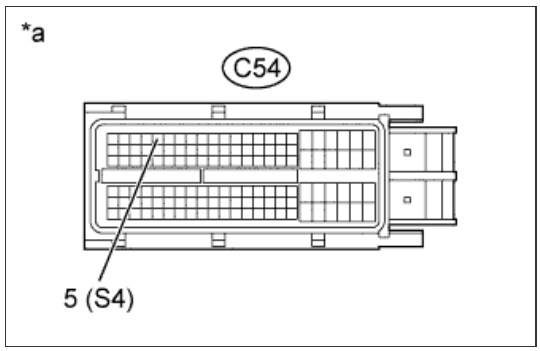
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

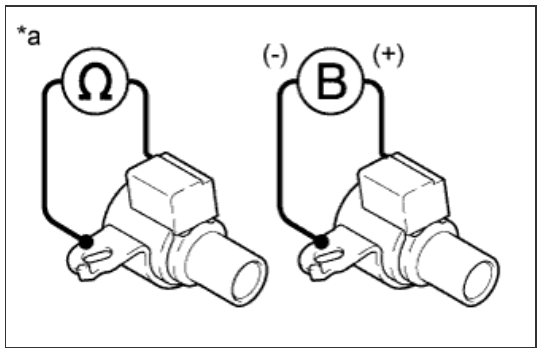
3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove the shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve	Valve moves and makes an operating noise

S4 body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0751 Shift Solenoid "A" Performance (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0751	S1 stuck ON malfunction*1: The ECM determines there is a malfunction when the following conditions are both met. (2 trip detection logic) (a) When the ECM directs the transmission to switch to 1st gear, the actual gear is shifted to 2nd. (b) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th.	• Shift solenoid valve S1 remains closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0751	S1 stuck OFF malfunction*2: The ECM determines there is a malfunction when conditions (a) and (b) are met. (2 trip detection logic) (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th. (b) When the ECM directs the transmission to switch to 6th gear, the engine overruns (clutch slips).	• Shift solenoid valve S1 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked • No. 2 brake malfunction (Driving is difficult.) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a solenoid valve mechanical problem:**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under S1 stuck ON malfunction	2nd	2nd	3rd	4th	5th	6th
*2: Actual gear position under S1 stuck OFF malfunction	1st	1st	3rd	4th	5th	N*

N*: Neutral

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode when S1 stuck ON malfunction	2nd	2nd	3rd	4th	5th	6th
*2: Actual gear position under fail-safe mode when S1 stuck OFF malfunction	1st*	1st*	3rd	3rd	3rd	3rd

***: Under engine braking, downshifting to 1st or 2nd gear is prohibited.**

MONITOR DESCRIPTION

This DTC indicates stuck ON malfunction or stuck OFF malfunction of shift solenoid valve S1.
The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valves and set each shift position by yourself	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shift must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shift must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**
- **Shift solenoid valve S1 turns ON/OFF normally when the shift lever is in D.**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0751)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P0751 is output	A
P0751 and other DTCs are output	B

HINT:

If any other codes besides P0751 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING GTS (SHIFT SOLENOID VALVE SLT)

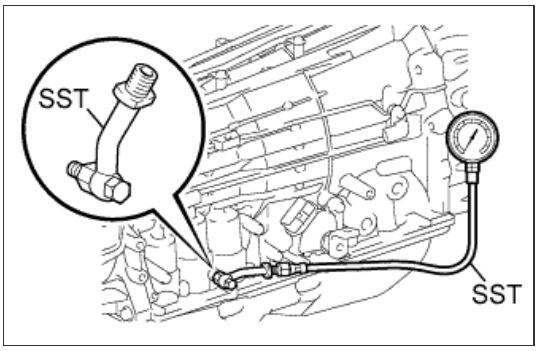
NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **Perform the test with the A/C off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case and connect SST.



SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the GTS to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

3.INSPECT SHIFT SOLENOID VALVE S1

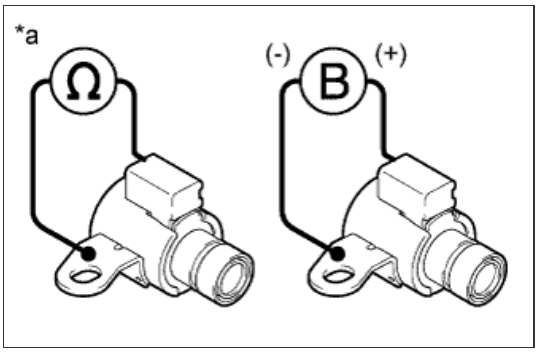
a. Remove the shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified

		Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

4.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0985 Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)

DTC P0986 Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)

for Preparation Click here

DESCRIPTION

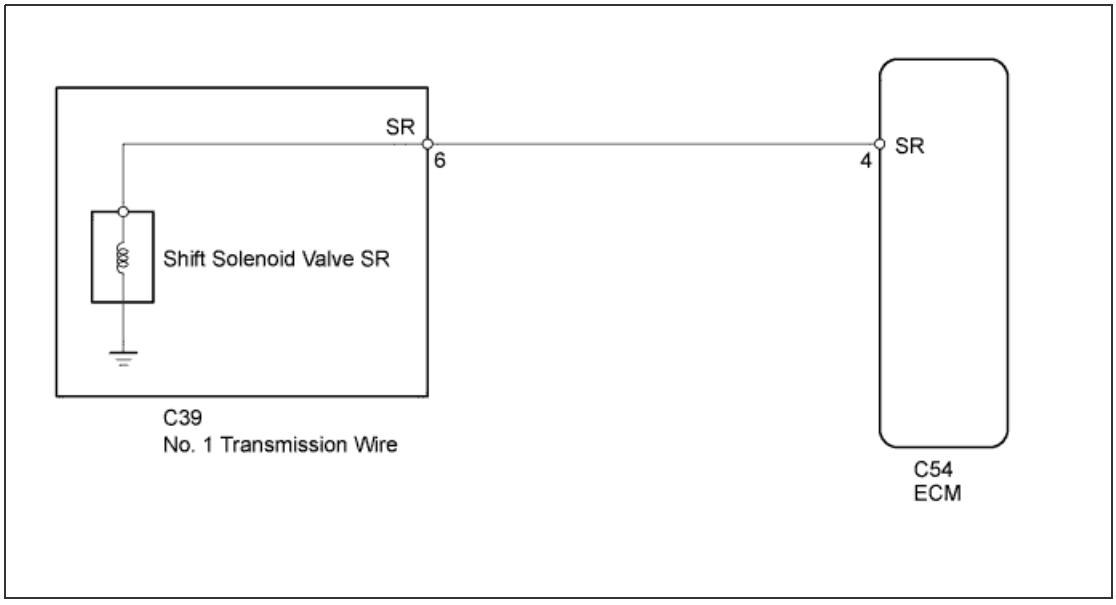
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0985	The ECM detects a short in the solenoid valve SR circuit 2 times when the solenoid valve SR is operated (1 trip detection logic).	• Short in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM
P0986	The ECM detects an open in the solenoid valve SR circuit 2 times when the solenoid valve SR is not operated (1 trip detection logic).	• Open in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve SR circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve SR is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve SR circuit.
When the shift solenoid valve SR is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve SR circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve SR is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SR	ON	ON	ON	ON	OFF	OFF

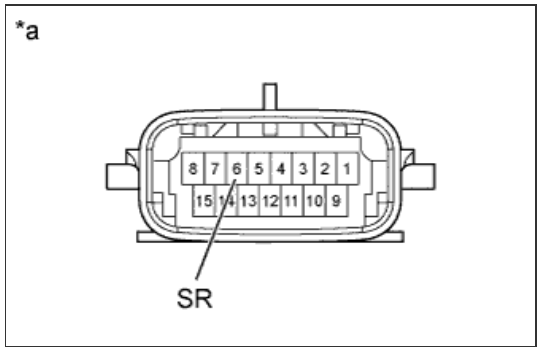
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
6 (SR) - Body ground	20°C (68°F)	11 to 15 Ω



Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

NG → Go to step 3

OK

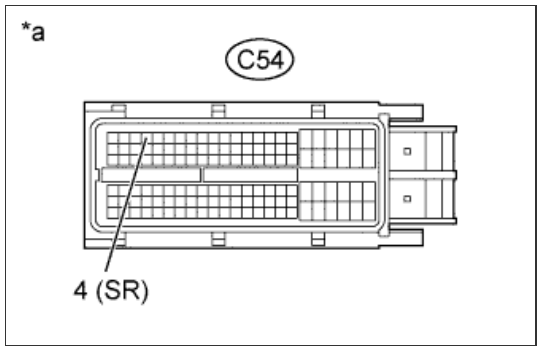
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω



Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

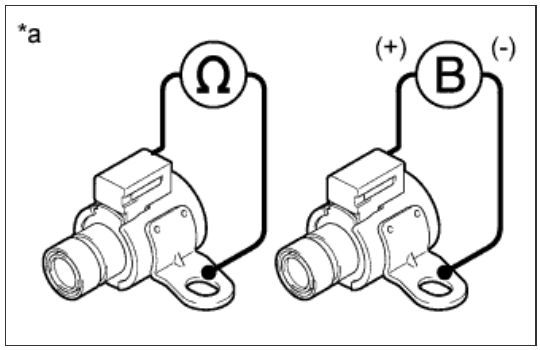
3.INSPECT SHIFT SOLENOID VALVE SR

a. Remove the shift solenoid valve SR.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve SR connector terminal - Shift solenoid valve SR body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve SR connector • Battery negative	Valve moves and makes an operating noise

	(-) → Shift solenoid valve SR body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SR)

NG → REPLACE SHIFT SOLENOID VALVE SR (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0756 Shift Solenoid "B" Performance (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body and automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0756	S2 stuck ON malfunction*1: Shifting to 3rd and 5th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2 trip detection logic): (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 6th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 6th.	• Shift solenoid valve S2 remains closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0756	S2 stuck OFF malfunction*2: The vehicle starts in 3rd gear and shifting to 6th gear is impossible. The ECM determines there is a malfunction when the following conditions are both met (2 trip detection logic): (a) When the ECM directs the transmission to switch to 1st gear, the actual gear is shifted to 3rd. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 5th.	• Shift solenoid valve S2 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

HINT:

Gear positions in the event of a solenoid valve mechanical problem:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under S2 stuck ON malfunction	1st	2nd	2nd	4th	6th	6th
*2: Actual gear position under S2 stuck OFF malfunction	3rd	3rd	3rd	4th	5th	5th

MONITOR DESCRIPTION

This DTC indicates a "stuck ON malfunction" or "stuck OFF malfunction" of the shift solenoid valve S2.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valves and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**
- **The shift solenoid valve S2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0756)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P0756 is output	A
P0756 and other DTCs are output	B

HINT:

If any other codes besides P0756 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.INSPECT SHIFT SOLENOID VALVE S2

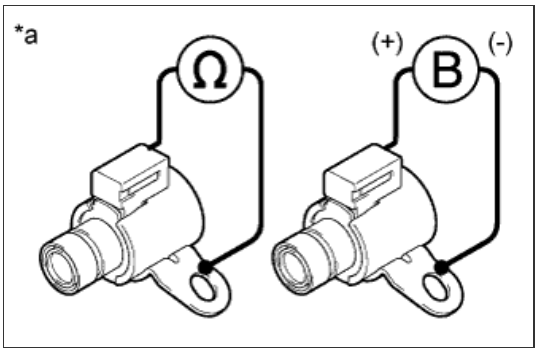
a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector		

terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

3.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0985 Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)

DTC P0986 Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)

for Preparation Click here

DESCRIPTION

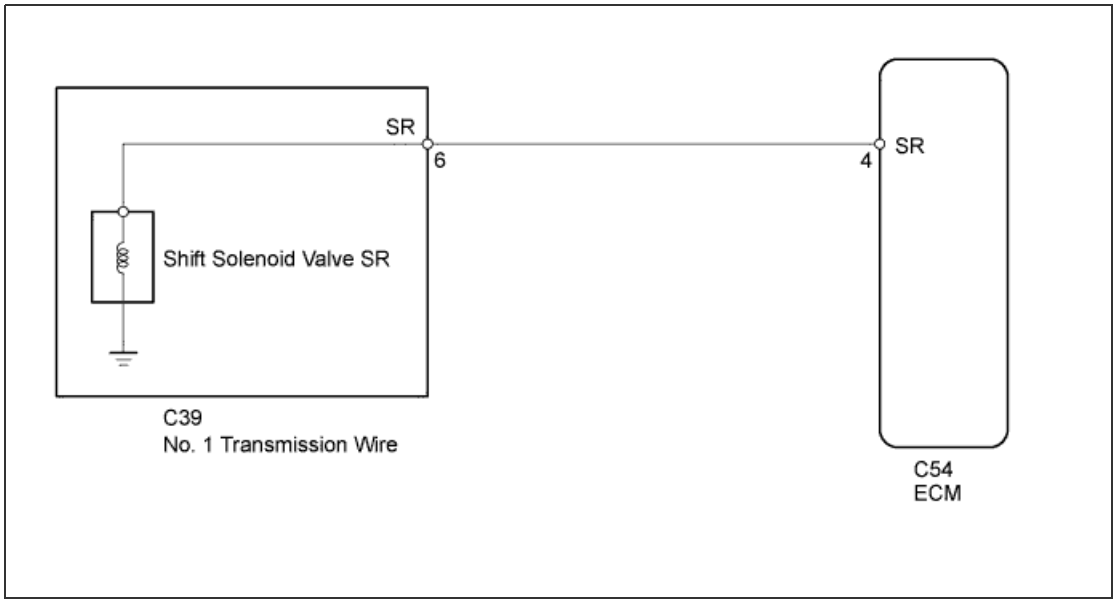
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited solenoid (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0985	The ECM detects a short in the solenoid valve SR circuit 2 times when the solenoid valve SR is operated (1 trip detection logic).	• Short in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM
P0986	The ECM detects an open in the solenoid valve SR circuit 2 times when the solenoid valve SR is not operated (1 trip detection logic).	• Open in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve SR circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When the shift solenoid valve SR is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve SR circuit.
When the shift solenoid valve SR is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve SR circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve SR is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SR	ON	ON	ON	ON	OFF	OFF

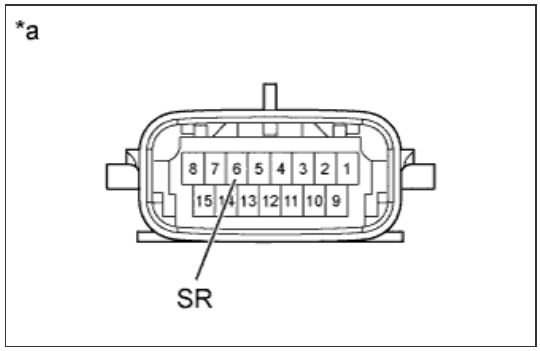
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
6 (SR) - Body ground	20°C (68°F)	11 to 15 Ω



Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

NG → Go to step 3

OK

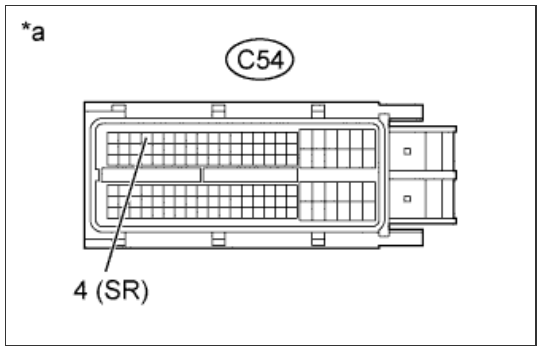
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω



Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

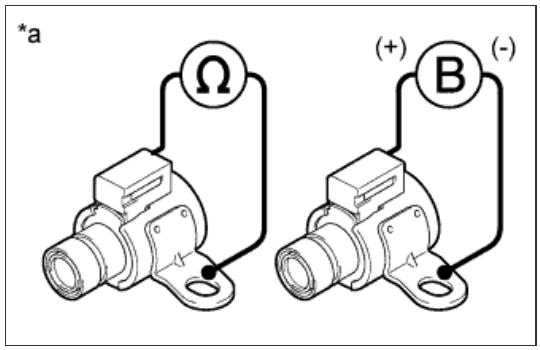
3.INSPECT SHIFT SOLENOID VALVE SR

a. Remove the shift solenoid valve SR.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve SR connector terminal - Shift solenoid valve SR body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve SR connector • Battery negative	Valve moves and makes an operating noise

	(-) → Shift solenoid valve SR body	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SR)

NG → REPLACE SHIFT SOLENOID VALVE SR (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0761 Shift Solenoid "C" Performance (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0761	S3 stuck ON malfunction*1: When the ECM directs the gearshift to switch to 5th or 6th gear, the engine overruns (clutch slips). The ECM determines there is a malfunction when either of the following conditions is met (2 trip detection logic). (a) When the ECM directs the transmission to switch to 4th gear, the actual gear is shifted to 3rd. (b) When the ECM directs the transmission to switch to 5th gear, the engine overruns (clutch slips).	• Shift solenoid valve S3 remains closed • Shift solenoid valve SLT remains closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0761	S3 stuck OFF malfunction*2: Shifting to 1st, 2nd, and 3rd gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2 trip detection logic). (a) When the ECM directs the transmission to switch to 2nd gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 6th.	• Shift solenoid valve S3 remains open • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a solenoid valve mechanical problem:**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under S3 stuck ON malfunction	1st	2nd	3rd	3rd	N*	N*
*2: Actual gear position under S3 stuck OFF malfunction	3rd	4th	4th	4th	5th	6th

N*: Neutral

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode when S3 stuck ON malfunction	1st	2nd	3rd	3rd	3rd	3rd
*2: Actual gear position under fail-safe mode when S3 stuck OFF malfunction	3rd	4th	4th	4th	5th	6th

MONITOR DESCRIPTION

This DTC indicates stuck ON malfunction or stuck OFF malfunction of shift solenoid valve S3.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valves and set each shift position by yourself	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shift must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shift must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0761)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P0761 is output	A
P0761 and other DTCs are output	B

HINT:

If any other codes besides P0761 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING GTS (SHIFT SOLENOID VALVE SLT)

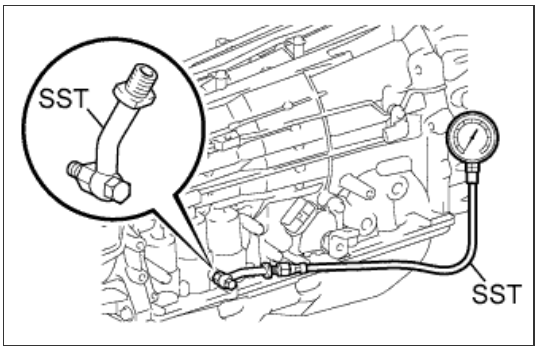
NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **Perform the test with the A/C off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case and connect SST.



SST
09992-00095 (09992-00231, 09992-00271)

b. Connect the GTS to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

OK:
The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

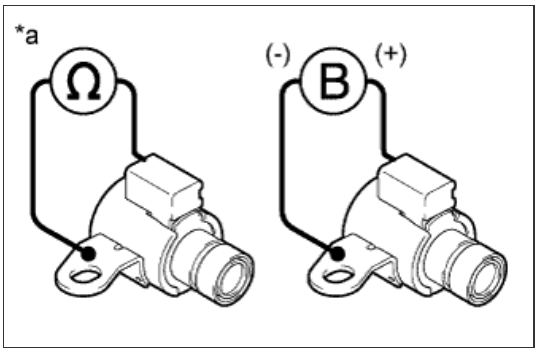
3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove the shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω



c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

4.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

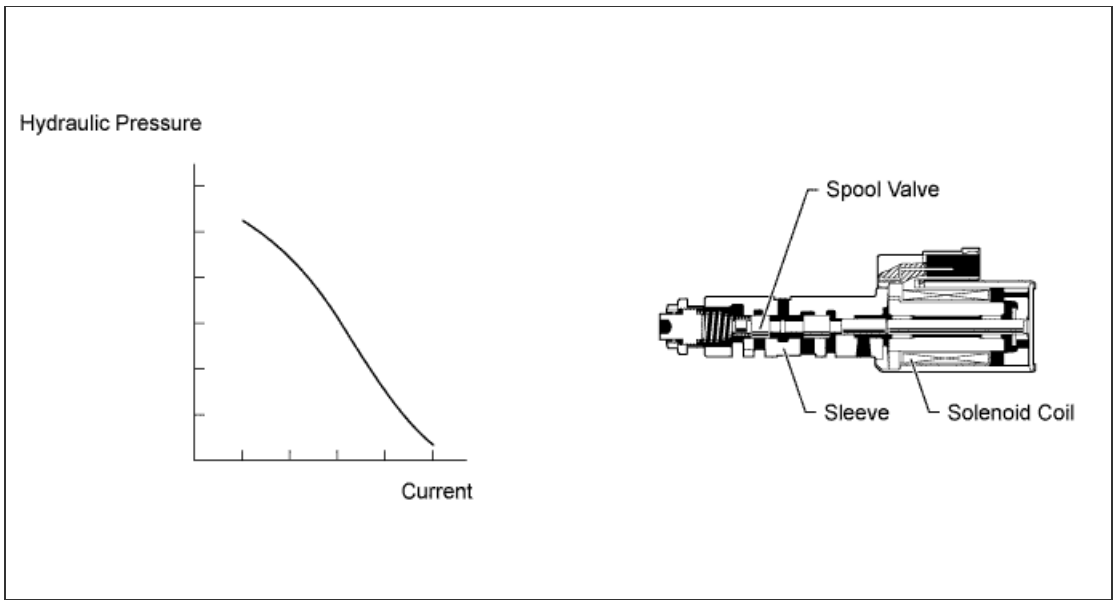
NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

for Preparation Click here

DESCRIPTION



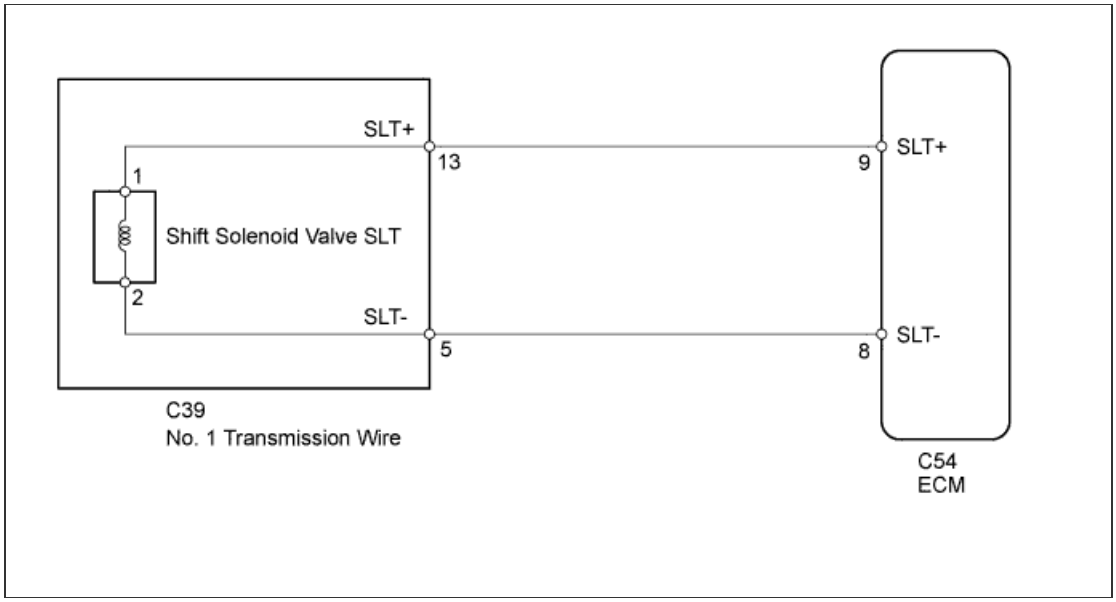
Shift solenoid valve SLT controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and vehicle speed sensor. The ECM adjusts the current to shift solenoid valve SLT to control the hydraulic line pressure coming from the primary regulator valve.
Appropriate line pressure assures smooth shifting with varying engine outputs.

DTC Code	DTC Detection Condition	Trouble Area
P2716	Open or short is detected in shift solenoid valve SLT circuit for 1 second or more while driving (1 trip detection logic)	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM

MONITOR DESCRIPTION

When an open or short in the shift solenoid valve SLT circuit is detected, the ECM interprets this as a fault. The ECM will turn on the MIL and store the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

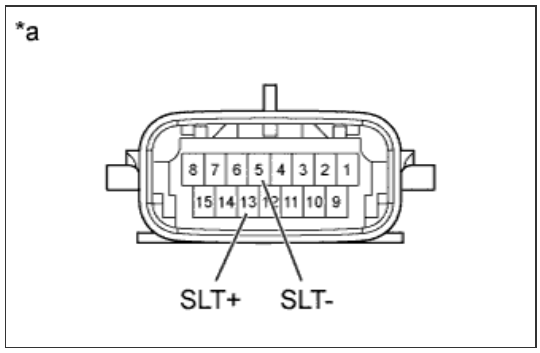
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLT)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
13 (SLT+) - 5 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
13 (SLT+) - Body ground	Always	10 kΩ or higher
5 (SLT-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

NG → Go to step 3

OK →

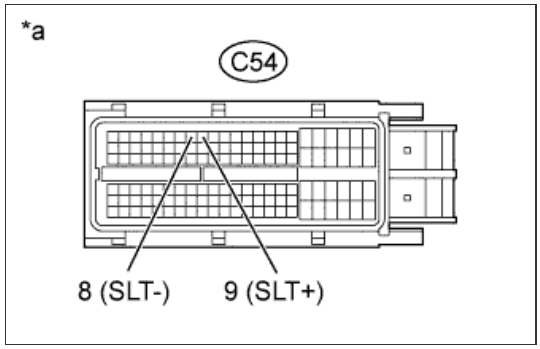
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-9 (SLT+) - C54-8 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
C54-9 (SLT+) - Body ground	Always	10 kΩ or higher
C54-8 (SLT-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK →

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve

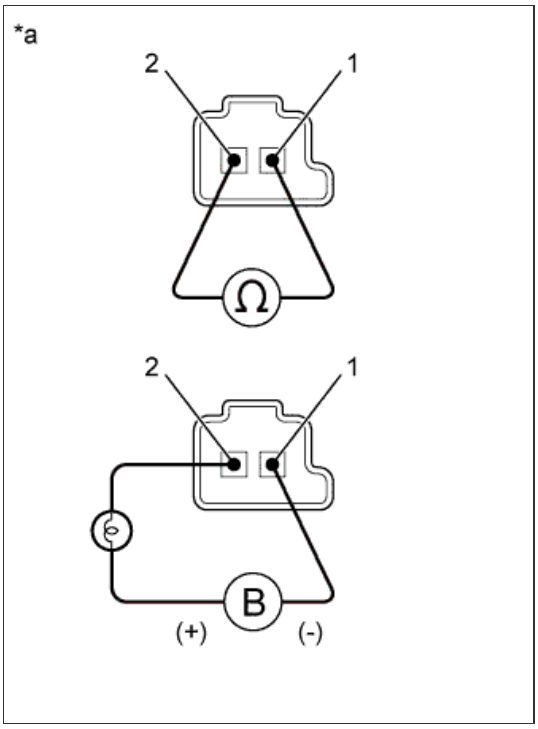
moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLT)



NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0766 Shift Solenoid "D" Performance (Shift Solenoid Valve S4)

DTC P0776 Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0766	S4 stuck OFF malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met. (2 trip detection logic) (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve S4 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked (Brake control valve) • Automatic transmission (clutch, brake, gear, etc.)
P0776	SL2 stuck ON malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2 trip detection logic): (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve SL2 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked (Brake control valve) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a solenoid valve mechanical problem:**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under malfunction	1st	2nd	3rd	4th	4th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

MONITOR DESCRIPTION

This DTC indicates stuck OFF malfunction of shift solenoid valve S4, stuck ON malfunction of shift solenoid valve SL2, or brake control valve malfunction. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valves and set each shift position by yourself	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shift must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shift must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0766 AND P0776)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P0766 and P0776 are output	A
P0766, P0776 and other DTCs are output	B

HINT:

If any other codes besides P0766 and P0776 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.PERFORM ACTIVE TEST USING GTS (SHIFT SOLENOID VALVE SLT)

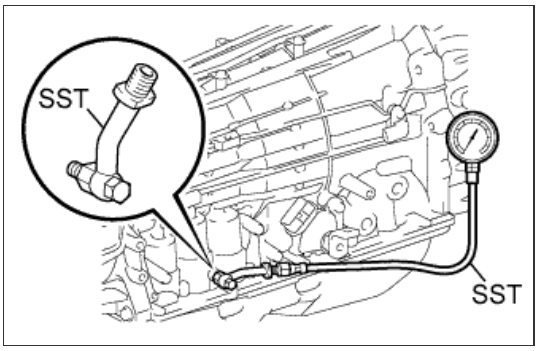
NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **Perform the test with the A/C off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case and connect SST.



SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the GTS to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

3.INSPECT SHIFT SOLENOID VALVE S4

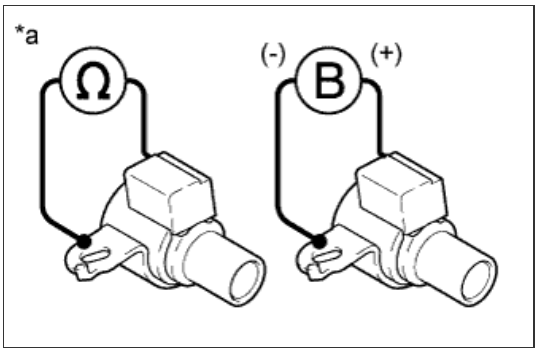
a. Remove the shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.



OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

4.INSPECT SHIFT SOLENOID VALVE SL2

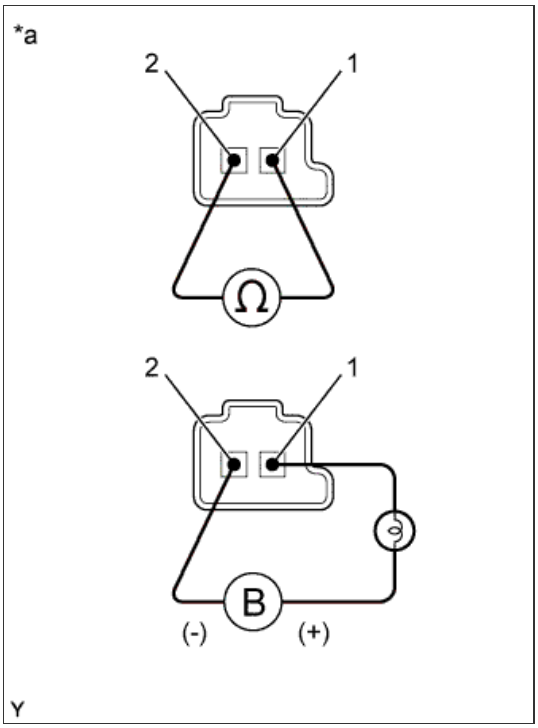
a. Remove the shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.



OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)

NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2742 Transmission Fluid Temperature Sensor "B" Circuit Low Input

DTC P2743 Transmission Fluid Temperature Sensor "B" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor is on the transmission, just in front of the oil cooler inlet pipeline.
If the ECM detects an abnormally high ATF temperature near this sensor, it illuminates the warning light.

HINT:

- **The temperature of ATF easily rises when towing, climbing hills, in traffic, etc.**
- **If the ATF temperature sensor becomes short-circuited, the signal that indicates that the ATF temperature is 150°C (302°F) or higher is input into the ECM.**

Vehicle conditions when the sensor is normal and when the sensor is short-circuited are indicated in the table below.

No. 2 ATF Temperature Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	ATF temperature more than 150°C (302°F)	ATF temperature warning light remains ON	ATF temperature less than 135°C (275°F)*1
	ATF temperature more than 130°C (266°F)	Shift point too high	ATF temperature less than 110°C (230°F)
	When the conditions (a) and (b) are satisfied. (a) ATF temperature more than 130°C (266°F) (b) Engine coolant temperature more than 95°C (203°F)	Lock-up at 3rd gear*2	ATF temperature less than 110°C (230°F)*1 and engine coolant temperature more than 95°C (203°F)
Sensor is short-circuited	Any conditions	• ATF temperature warning light blinks or message is displayed in combination meter • Shift point too high	Symptoms still occur
	Engine coolant temperature more than 95°C (203°F)	Lock-up at 3rd gear*2	Symptoms still occur

HINT:

*1: When ATF temperature is in the normal range, it decreases to less than 135°C (275°F) within 5 minutes with the shift lever in P or N in an idling state.

*2: When ATF temperature is normal, transmission lock-up occurs in 5th or 6th gear with the shift lever in D or S with the S6 range selected, in 5th gear with the shift lever in S with the S5 range selected, and 4th gear with the shift lever in S with the S4 range selected.

DTC Code	DTC Detection Condition	Trouble Area
P2742	No. 2 ATF temperature sensor resistance is less than 25 Ω (0.046 V) for 0.5 seconds or more (1 trip detection logic).	• Short in No. 2 ATF temperature sensor circuit • No. 2 ATF temperature sensor (No. 1 transmission wire) • ECM
P2743	ATF temperature sensor resistance is higher than 156 kΩ (4.915 V) for 0.5 sec. or more and either condition is met (1 trip detection logic): (A) 15 min. or more have elapsed after the engine start when the engine coolant temperature or intake air temperature is -29.375°C (-20.875°F) or less. (B) 10 sec. or more have elapsed after the engine start when the engine coolant temperature and intake air temperature are higher than -29.375°C (-20.875°F).	• Open in No. 2 ATF temperature sensor circuit • No. 2 ATF temperature sensor (No. 1 transmission wire) • ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 25 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM stores a DTC, and the ATF temperature warning light blinks or a message is displayed in the combination meter.

HINT:

- ***1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**
- **The ATF temperature can be checked on the GTS display.**

WIRING DIAGRAM

Refer to DTC P0712 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature while engine is cold	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.

HINT:

- **When DTC P2742 is output and the GTS output is 150°C (302°F) or more, there is a short circuit.**
- **When DTC P2743 is output and the GTS output is -40°C (-40°F), there is an open circuit.**
  Measure the resistance between terminal THO2 and the body ground.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 2 ATF TEMPERATURE SENSOR)

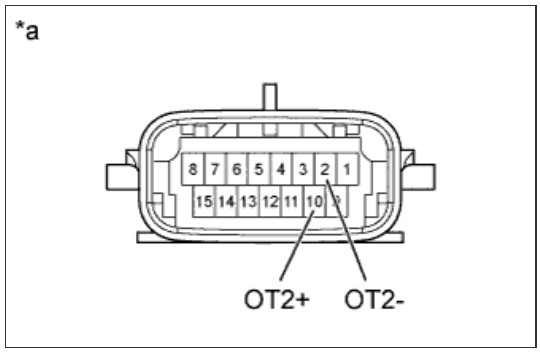
a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
2 (OT2-) - 10 (OT2+)	Always	25 Ω to 156 kΩ
2 (OT2-) - Body	Always	10 kΩ or higher

ground		
10 (OT2+) - Body ground	Always	10 kΩ or higher



HINT:

If the resistance is out of the specified range at any of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Standard Resistance:

ATF temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

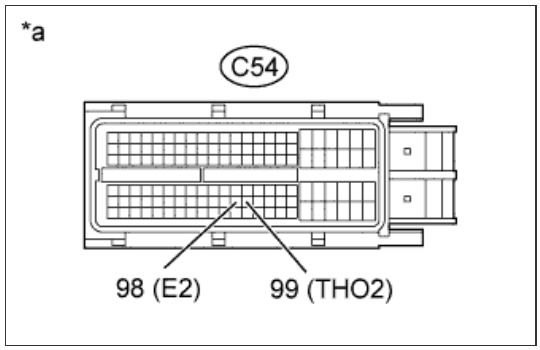
NG → REPAIR OR REPLACE NO. 2 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-99 (THO2) - C54-98 (E2)	Always	25 Ω to 156 kΩ
C54-99 (THO2) - Body ground	Always	10 kΩ or higher
C54-98 (E2) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0766 Shift Solenoid "D" Performance (Shift Solenoid Valve S4)

DTC P0776 Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0766	S4 stuck OFF malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met. (2 trip detection logic) (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve S4 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked (Brake control valve) • Automatic transmission (clutch, brake, gear, etc.)
P0776	SL2 stuck ON malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2 trip detection logic): (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve SL2 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked (Brake control valve) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a solenoid valve mechanical problem:**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under malfunction	1st	2nd	3rd	4th	4th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

MONITOR DESCRIPTION

This DTC indicates stuck OFF malfunction of shift solenoid valve S4, stuck ON malfunction of shift solenoid valve SL2, or brake control valve malfunction. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valves and set each shift position by yourself	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shift must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shift must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0766 AND P0776)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P0766 and P0776 are output	A
P0766, P0776 and other DTCs are output	B

HINT:

If any other codes besides P0766 and P0776 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.PERFORM ACTIVE TEST USING GTS (SHIFT SOLENOID VALVE SLT)

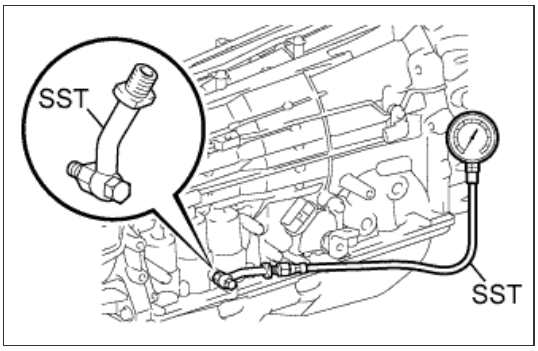
NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **Perform the test with the A/C off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case and connect SST.



SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the GTS to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

3.INSPECT SHIFT SOLENOID VALVE S4

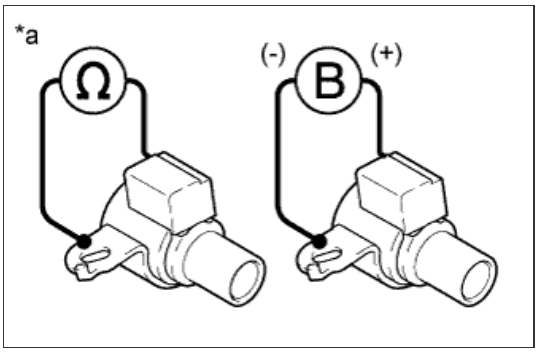
a. Remove the shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.



OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

4.INSPECT SHIFT SOLENOID VALVE SL2

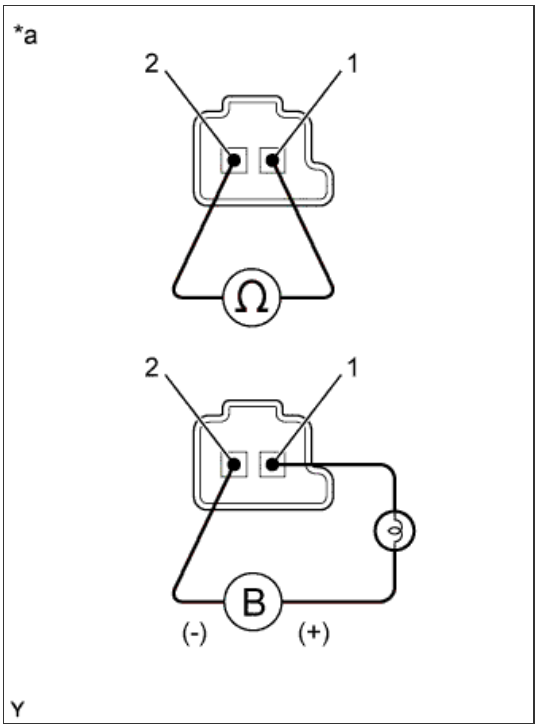
a. Remove the shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.



OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)

NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2742 Transmission Fluid Temperature Sensor "B" Circuit Low Input

DTC P2743 Transmission Fluid Temperature Sensor "B" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor is on the transmission, just in front of the oil cooler inlet pipeline.
If the ECM detects an abnormally high ATF temperature near this sensor, it illuminates the warning light.

HINT:

- **The temperature of ATF easily rises when towing, climbing hills, in traffic, etc.**
- **If the ATF temperature sensor becomes short-circuited, the signal that indicates that the ATF temperature is 150°C (302°F) or higher is input into the ECM.**

Vehicle conditions when the sensor is normal and when the sensor is short-circuited are indicated in the table below.

No. 2 ATF Temperature Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	ATF temperature more than 150°C (302°F)	ATF temperature warning light remains ON	ATF temperature less than 135°C (275°F)*1
	ATF temperature more than 130°C (266°F)	Shift point too high	ATF temperature less than 110°C (230°F)
	When the conditions (a) and (b) are satisfied. (a) ATF temperature more than 130°C (266°F) (b) Engine coolant temperature more than 95°C (203°F)	Lock-up at 3rd gear*2	ATF temperature less than 110°C (230°F)*1 and engine coolant temperature more than 95°C (203°F)
Sensor is short-circuited	Any conditions	• ATF temperature warning light blinks or message is displayed in combination meter • Shift point too high	Symptoms still occur
	Engine coolant temperature more than 95°C (203°F)	Lock-up at 3rd gear*2	Symptoms still occur

HINT:

*1: When ATF temperature is in the normal range, it decreases to less than 135°C (275°F) within 5 minutes with the shift lever in P or N in an idling state.

*2: When ATF temperature is normal, transmission lock-up occurs in 5th or 6th gear with the shift lever in D or S with the S6 range selected, in 5th gear with the shift lever in S with the S5 range selected, and 4th gear with the shift lever in S with the S4 range selected.

DTC Code	DTC Detection Condition	Trouble Area
P2742	No. 2 ATF temperature sensor resistance is less than 25 Ω (0.046 V) for 0.5 seconds or more (1 trip detection logic).	• Short in No. 2 ATF temperature sensor circuit • No. 2 ATF temperature sensor (No. 1 transmission wire) • ECM
P2743	ATF temperature sensor resistance is higher than 156 kΩ (4.915 V) for 0.5 sec. or more and either condition is met (1 trip detection logic): (A) 15 min. or more have elapsed after the engine start when the engine coolant temperature or intake air temperature is -29.375°C (-20.875°F) or less. (B) 10 sec. or more have elapsed after the engine start when the engine coolant temperature and intake air temperature are higher than -29.375°C (-20.875°F).	• Open in No. 2 ATF temperature sensor circuit • No. 2 ATF temperature sensor (No. 1 transmission wire) • ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 25 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM stores a DTC, and the ATF temperature warning light blinks or a message is displayed in the combination meter.

HINT:

- ***1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**
- **The ATF temperature can be checked on the GTS display.**

WIRING DIAGRAM

Refer to DTC P0712 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the GTS to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the GTS, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature while engine is cold	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.

HINT:

- **When DTC P2742 is output and the GTS output is 150°C (302°F) or more, there is a short circuit.**
- **When DTC P2743 is output and the GTS output is -40°C (-40°F), there is an open circuit.**
  Measure the resistance between terminal THO2 and the body ground.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 2 ATF TEMPERATURE SENSOR)

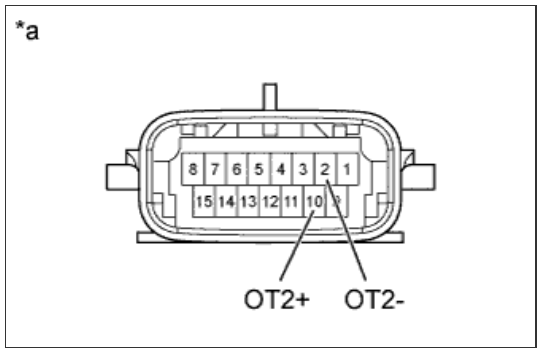
a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
2 (OT2-) - 10 (OT2+)	Always	25 Ω to 156 kΩ
2 (OT2-) - Body	Always	10 kΩ or higher

ground		
10 (OT2+) - Body ground	Always	10 kΩ or higher



HINT:

If the resistance is out of the specified range at any of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Standard Resistance:

ATF temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

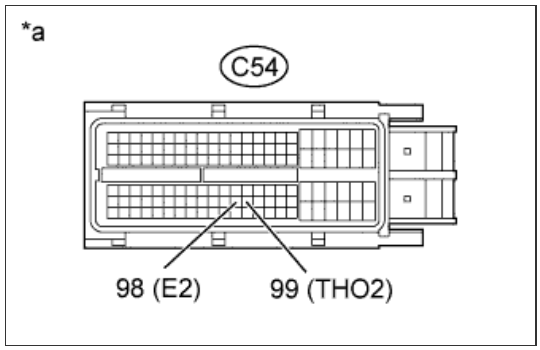
NG → REPAIR OR REPLACE NO. 2 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-99 (THO2) - C54-98 (E2)	Always	25 Ω to 156 kΩ
C54-99 (THO2) - Body ground	Always	10 kΩ or higher
C54-98 (E2) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0778 Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

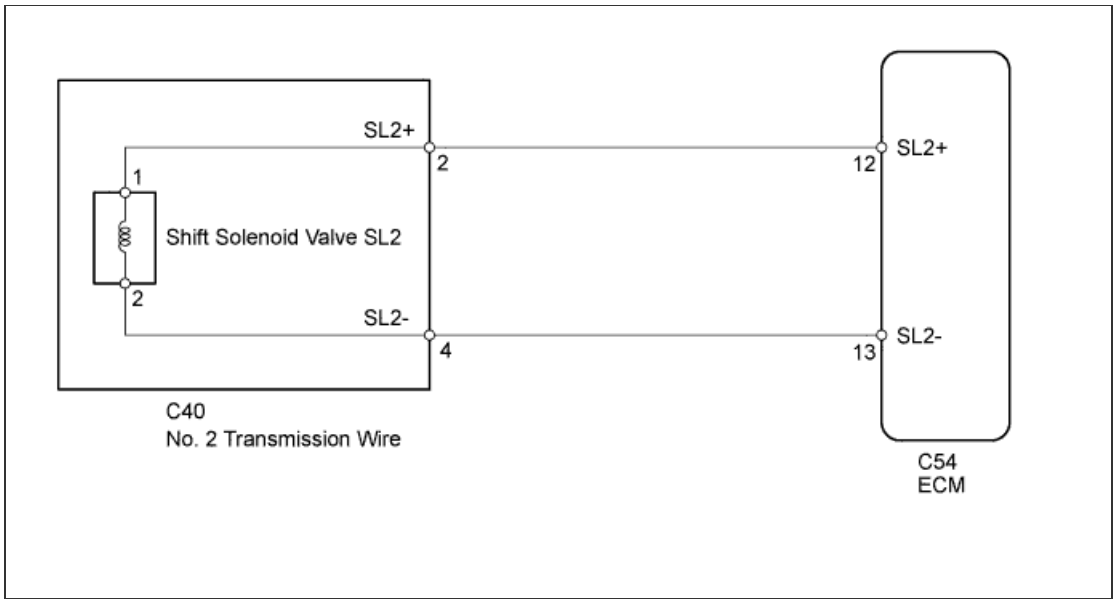
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of the shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0778	The ECM checks for an open or short in the shift solenoid valve SL2 circuit while driving and shifting gears (1 trip detection logic). The output signal duty ratio equals 100% (the SL2 output signal duty ratio is less than 100% under normal conditions).	• Open or short in shift solenoid valve SL2 circuit • Shift solenoid valve SL2 • ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL2 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normally functioning shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the open or short circuited solenoid.
While driving and shifting gears, if the ECM detects an open or short in the shift solenoid valve SL2 circuit, the ECM determines there is a malfunction (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The shift solenoid valve SL2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

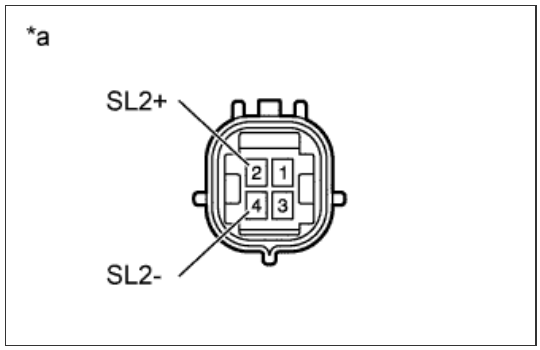
1.INSPECT NO. 2 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL2)

a. Disconnect the No. 2 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
2 (SL2+) - 4 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
2 (SL2+) - Body ground	Always	10 kΩ or higher
4 (SL2-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 2 Transmission Wire)

NG → Go to step 3

OK

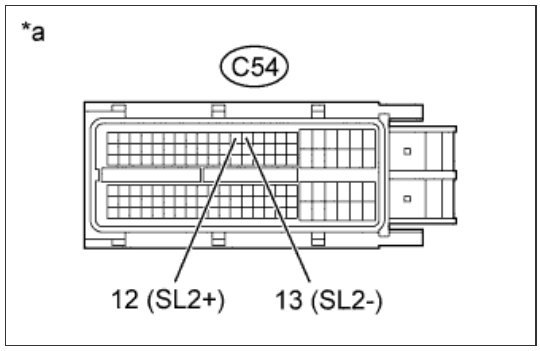
2.CHECK HARNESS AND CONNECTOR (NO. 2 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-12 (SL2+) - C54-13 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
C54-12 (SL2+) - Body ground	Always	10 kΩ or higher
C54-13 (SL2-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove the shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

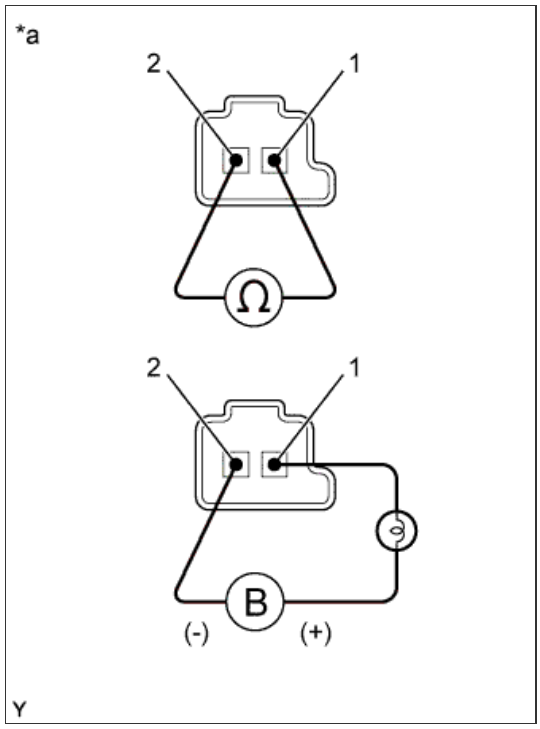
OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal	Valve moves and makes an

	1 • Battery negative (-) → Terminal 2	operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)



NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

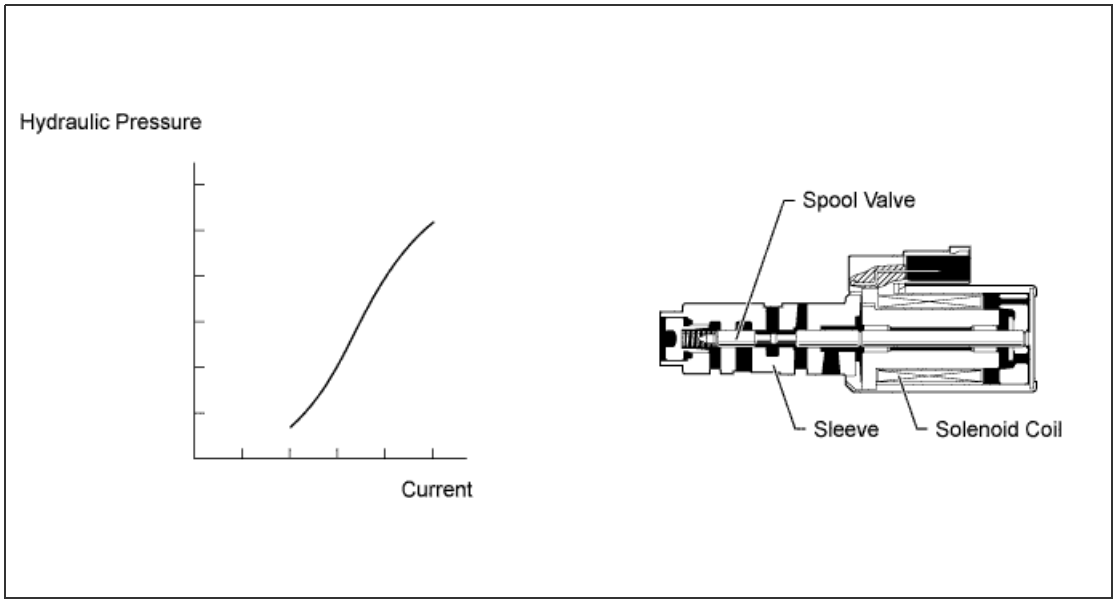
REPAIR OR REPLACE NO. 2 TRANSMISSION WIRE (Click here)

DTC P2757 Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)

for Preparation Click here

DESCRIPTION

The ECM uses the signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, output speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.



Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical problems of the shift solenoid valve SLU, valve body and torque converter assembly.

DTC Code	DTC Detection Condition	Trouble Area
P2757	Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h (50 mph)), or lock-up remains ON in the lock-up OFF range (2 trip detection logic).	• Shift solenoid valve SLU remains open or closed • Valve body is blocked • Shift solenoid valve SLU • Torque converter assembly • Automatic transmission (clutch, brake, gear, etc.) • Line pressure is too low

MONITOR DESCRIPTION

Torque converter assembly lock-up is controlled by the ECM based on the turbine (input) speed sensor NT, output speed sensor SP2, engine speed, engine load, engine temperature, vehicle speed, transmission temperature and gear selection. The ECM determines the lock-up status of the torque converter assembly by comparing the engine speed (NE) to the input turbine speed (NT). The ECM calculates the actual transmission gear by comparing input turbine speed (NT) to the output shaft speed (SP2). When conditions are appropriate, the ECM requests lock-up by applying control voltage to the shift solenoid SLU. When the SLU is turned ON, it applies pressure to the lock-up relay valve and locks the torque converter assembly. If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in the shift solenoid valve SLU or lock-up system performance.
The ECM will illuminate the MIL and store the DTC.
Example:
When one of the following conditions is met, the system determines that there is a malfunction.

- There is a difference in speed between the input side (engine speed) and output side (input turbine speed) of the torque converter assembly when the ECM commands lock-up ON.
  Engine speed is at least 70 rpm more than input turbine speed.
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter assembly when the ECM commands lock-up OFF.
  The difference between engine speed and input turbine speed is less than 35 rpm.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive

functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the GTS to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

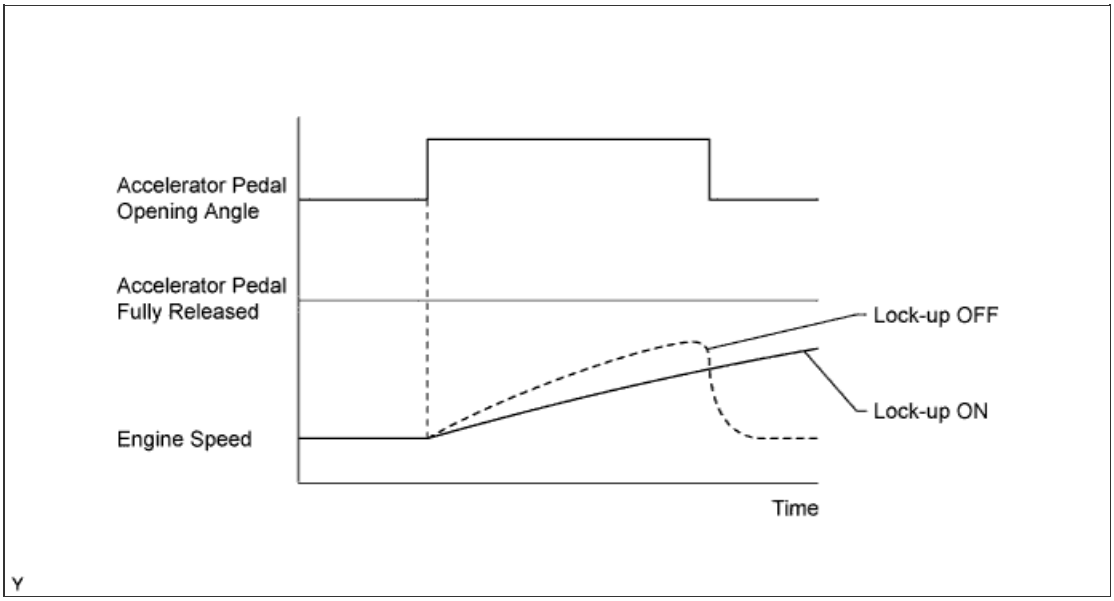
Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Lock Up	Control shift solenoid SLU to set automatic transmission to lock-up	ON or OFF	Possible to check shift solenoid valve SLU operation. [Vehicle Condition] • Throttle valve opening angle: Less than 35% • Vehicle speed: 60 km/h (36 mph) or more

HINT:

- **This test can be conducted when the vehicle speed is 60 km/h (36 mph) or more.**
- **Perform this test while driving in 5th or 6th gear.**

h. Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.



HINT:

- **When changing the accelerator pedal opening angle while driving, if the engine speed does not change rapidly, lock-up is on.**
- **Slowly release the accelerator pedal in order to decelerate, but do not fully release the pedal. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off automatically.)**

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P2757)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P2757 is output	A
P2757 and other DTCs are output	B

HINT:

If any other codes besides P2757 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.INSPECT SHIFT SOLENOID VALVE SLU

a. Remove shift solenoid valve SLU.

b. Measure the resistance according to the value(s) in the table below.

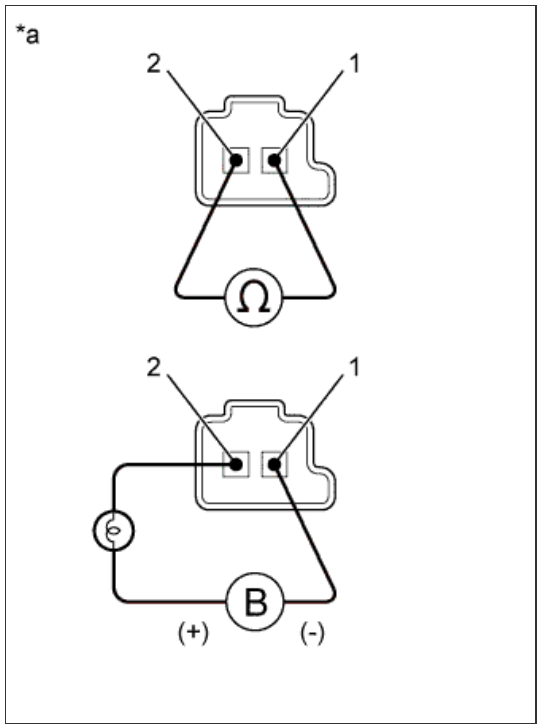
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLU)

NG → REPLACE SHIFT SOLENOID VALVE SLU (Click here)

OK

3.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

4.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:

The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0781 1-2 Shift (1-2 Shift Valve)

for Preparation Click here

DESCRIPTION

The 1-2 shift valve performs shifting to 1st gear and other gears. When shifting to 2nd and 4th gears is impossible, or when the ECM directs the gearshift to switch to 5th and 6th gear and the engine overruns (clutch slips), this DTC is output.

DTC Code	DTC Detection Condition	Trouble Area
P0781	When conditions (a) and (b), or (a) and (c) are met. (2 trip detection logic) (a) When the ECM directs the transmission to switch to 2nd gear, the actual gear is shifted to 1st. (b) When the ECM directs the transmission to switch to 4th gear, the actual gear is shifted to 3rd. (c) When the ECM directs the transmission to switch to 5th gear, the engine overruns (clutch slips).	• Valve body is blocked up or stuck (1-2 shift valve) • Shift solenoid valve SLT remains open or closed • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- Gear positions in the event of a solenoid valve mechanical problem:

ECM command gearshift	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	1st	3rd	3rd	N*	N*

N*: Neutral

- Gear position during fail-safe operation:
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
Actual gear position under fail-safe mode	1st*	1st*	3rd	3rd	3rd	3rd

1st*: Under engine braking, downshifting to 1st or 2nd gear is prohibited.

MONITOR DESCRIPTION

This DTC indicates that the 1-2 shift valve in the valve body is locked in the position in which the spring is compressed.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF and switching oil pressure to the valves in the valve body.
The ECM calculates the actual transmission gear by comparing the signals from the input speed sensor (NT) and the output speed sensor (SP2). The ECM can detect many mechanical problems in the shift solenoids, valve body, transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and commanded gear position are different, it will illuminate the MIL and store the DTC.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0781)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
Only P0781 is output	A
P0781 and other DTCs are output	B

HINT:

If any other codes besides P0781 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING GTS (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Test early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Test.

a. Connect the GTS to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valves and set each shift position by yourself	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shift must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shift must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**
- **Gear positions in the event of a solenoid valve mechanical problem:**

Tester command gearshift	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	1st	3rd	3rd	N*	N*

N*: Neutral

OK:

Gear position changes in accordance with the GTS command.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

3.PERFORM ACTIVE TEST USING GTS (SHIFT SOLENOID VALVE SLT)

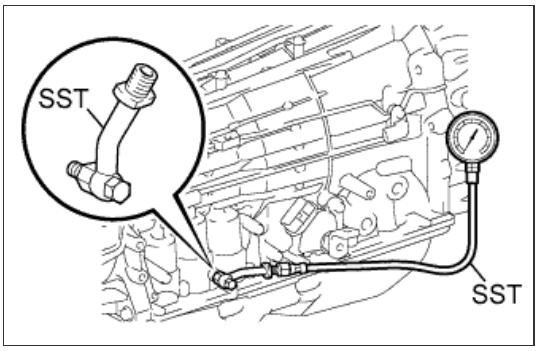
NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **Perform the test with the A/C off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case and connect SST.



SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the GTS to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (**Click here**)

OK

4.CLEAR DTC AND PERFORM RUNNING TEST

a. Clear the DTC (Click here).

b. Check the DTC again after conducting the Monitor Drive Pattern (Click here).

OK:

No DTC code output.

NG → REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (**Click here**)

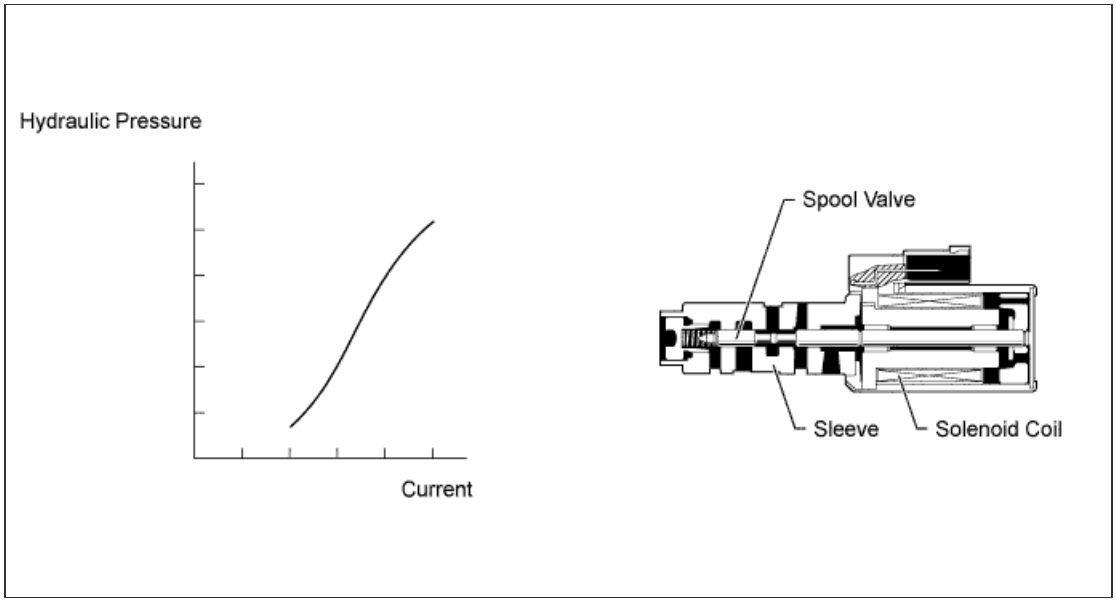

OK
END

DTC P2759 Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)

for Preparation Click here

DESCRIPTION

The amount of current flow to the solenoid is controlled by the ECM. During the lock-up operation, if the current increases, the lock-up hydraulic pressure increases.

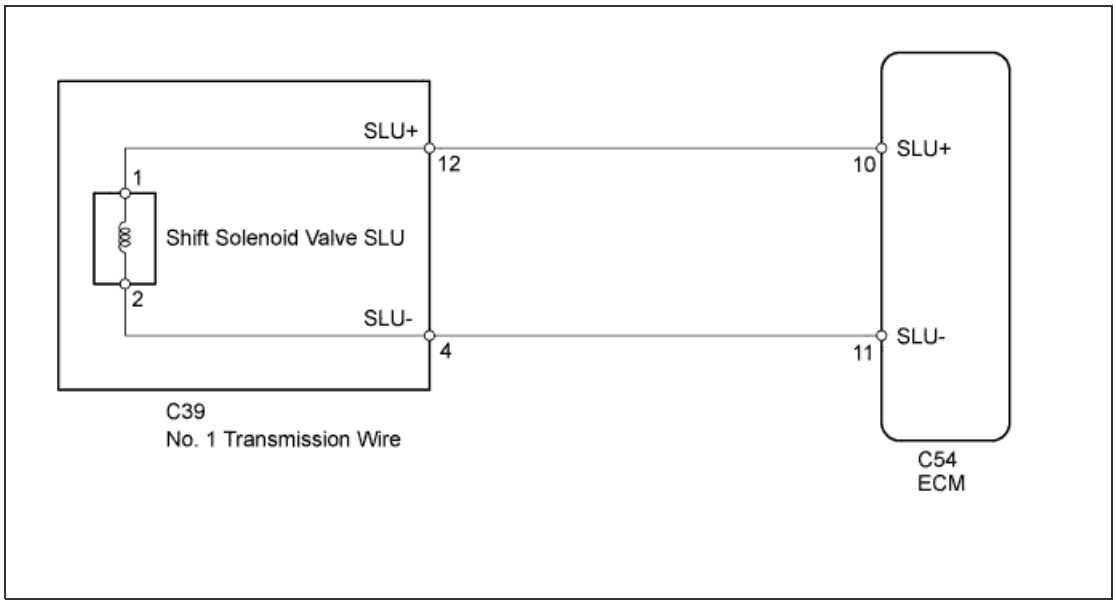


DTC Code	DTC Detection Condition	Trouble Area
P2759	An open or short is detected in the shift solenoid valve SLU circuit for 1 sec. or more while driving (1 trip detection logic).	• Open or short in shift solenoid valve SLU circuit • Shift solenoid valve SLU • ECM

MONITOR DESCRIPTION

When an open or short in the shift solenoid valve SLU circuit is detected, the ECM determines that there is a malfunction. The ECM will illuminate the MIL and store this DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

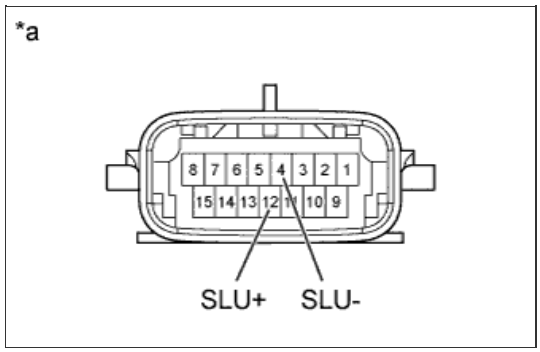
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLU)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
12 (SLU+) - 4 (SLU-)	20°C (68°F)	5.0 to 5.6 Ω
12 (SLU+) - Body ground	Always	10 kΩ or higher
4 (SLU-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

NG → Go to step 3

OK

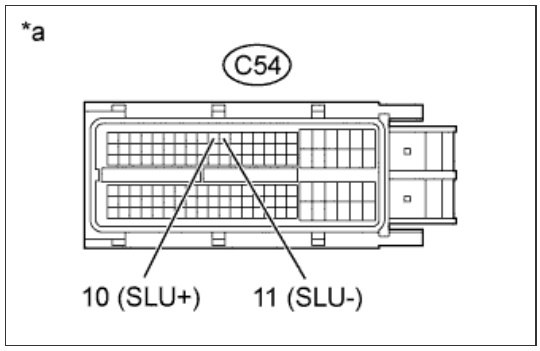
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C54-10 (SLU+) - C54-11 (SLU-)	20°C (68°F)	5.0 to 5.6 Ω
C54-10 (SLU+) - Body ground	Always	10 kΩ or higher
C54-11 (SLU-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SLU

a. Remove shift solenoid valve SLU.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve

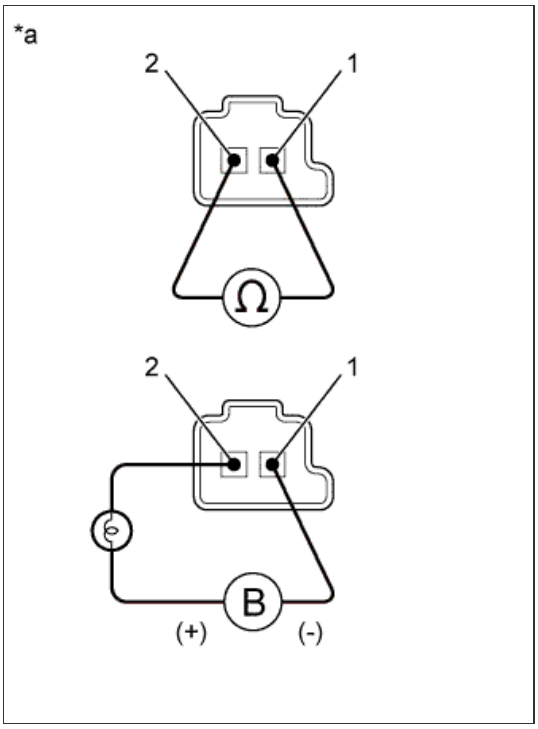
moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLU)



NG → REPLACE SHIFT SOLENOID VALVE SLU (Click here)

OK

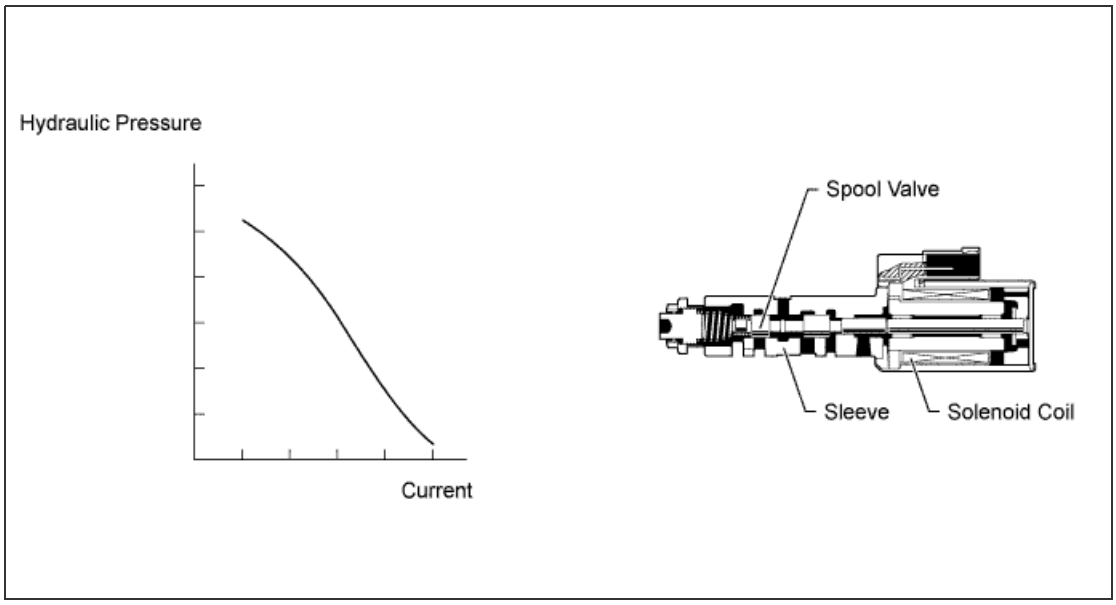
REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0894 Transmission Component Slipping

DTC P2714 Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

for Preparation Click here

DESCRIPTION



Shift solenoid valve SLT controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and vehicle speed sensor. The ECM adjusts the current to shift solenoid valve SLT to control the hydraulic line pressure coming from the primary regulator valve.
Appropriate line pressure assures smooth shifting with varying engine outputs.

DTC Code	DTC Detection Condition	Trouble Area
P0894	The ECM detects a malfunction in shift solenoid valve SLT, S1, S2, S3, S4 or SL2, or the 1-2 shift valve, or an incorrect gear 6 ratio according to the difference in speed of the turbine and output shaft, and also by the oil pressure (2 trip detection logic).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P2714	The ECM detects a malfunction in shift solenoid valve SLT (ON side) according to the difference in speed of the turbine and output shaft, and also by the oil pressure (2 trip detection logic).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

MONITOR DESCRIPTION

The ECM calculates the amount of heat absorbed by the friction material based on the difference in speed (clutch slippage) between the turbine and output shaft. The ECM illuminates the MIL and stores this DTC when the amount of heat absorption exceeds the specified value.
There are two causes of speed difference.

- When the shift solenoid valve SLT remains ON, oil pressure decreases, which causes the clutch engagement force to decrease.
- When a shift solenoid valve remains ON or OFF, the gear position commanded by the ECM and the actual gear position are not the same.

NOTICE:

If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0894 AND P2714)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
• Only P0894 is output • Only P0894 and P2714 are output	A
P0894, P2714 and other DTCs are output	B

HINT:

If any other codes besides P0894 and P2714 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING GTS (SHIFT SOLENOID VALVE SLT)

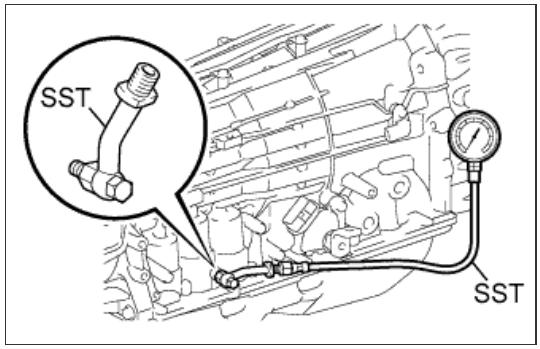
NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **Perform the test with the A/C off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case and connect SST.



SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the GTS to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → Go to step 17

OK

3.PERFORM ACTIVE TEST USING GTS (RUNNING TEST)

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the GTS to the DLC3.

b. Clear the DTC (Click here).

c. Enter the following menus: Powertrain / Engine and ECT / Active Test.

d. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valves and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**

e. Compare the ECM gear shift command and the actual gear position.

Result

ECM Gear Shift Command			1st	2nd	3rd	4th	5th	6th	Proceed to
Actual gear position under malfunction	Shift solenoid S1	Stuck ON*1	2nd	2nd	3rd	4th	5th	6th	A
		Stuck OFF	1st	1st	3rd	4th	5th	N*2	
	Shift solenoid S2	Stuck ON	1st	2nd	2nd	4th	6th	6th	B
		Stuck OFF	3rd	3rd	3rd	4th	5th	5th	
	Shift solenoid S3	Stuck ON	1st	2nd	3rd	3rd	N*2	N*2	C
		Stuck OFF	3rd	4th	4th	4th	5th	6th	
	Shift solenoid S4	Stuck ON*3	1st	2nd	3rd	4th	5th	6th	D
		Stuck OFF	1st	2nd	3rd	4th	4th	4th	
Actual gear position when normal			1st	2nd	3rd	4th	5th	6th	E

HINT:

- ***1: When shift solenoid S1 is stuck ON, the vehicle cannot drive in reverse.**
- ***2: Neutral**
- ***3: When shift solenoid S4 is stuck ON, gear shifting is normal.**

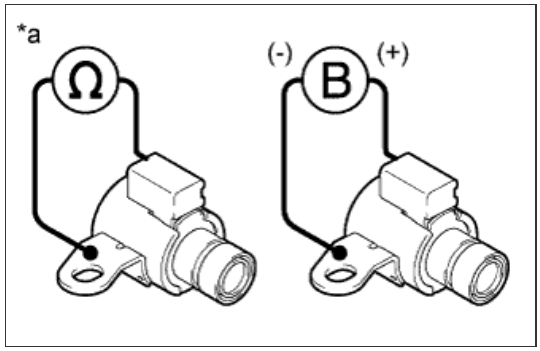
B	Go to step 7
C	Go to step 10
D	Go to step 13
E	Go to step 20

A

4.INSPECT SHIFT SOLENOID VALVE S1

a. Remove the shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

6.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:
The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

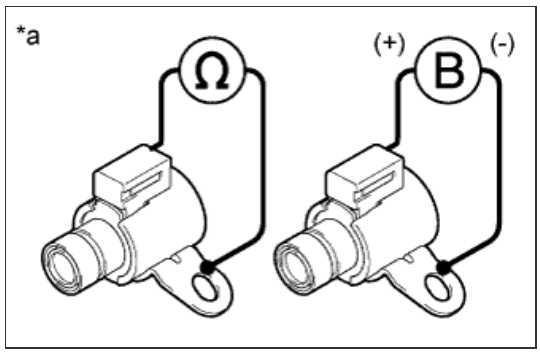
OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

7.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

8.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:
There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

9.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:
The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

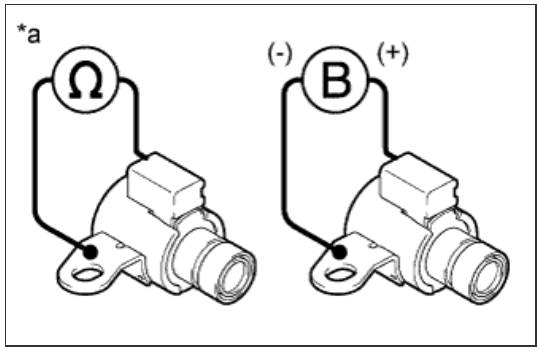
OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

10.INSPECT SHIFT SOLENOID VALVE S3

a. Remove the shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

11.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:
There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

12.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:
The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

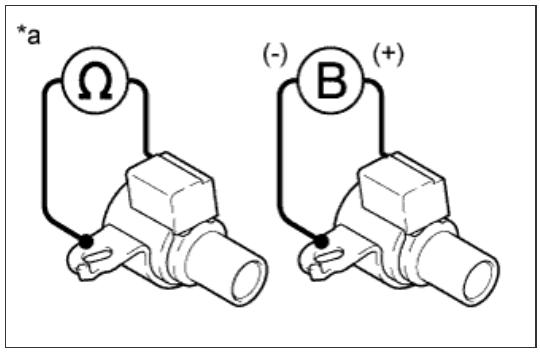
OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

13.INSPECT SHIFT SOLENOID VALVE S4

a. Remove the shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

14.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove the shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

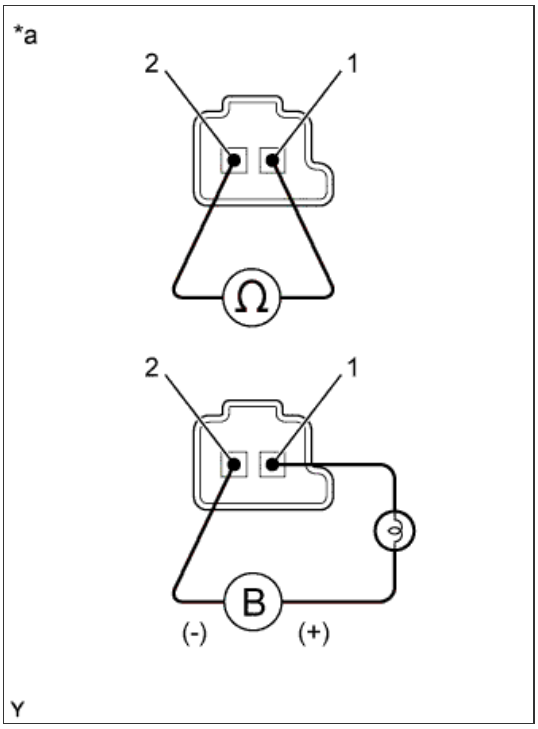
OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative	Valve moves and makes an operating noise

(-) → Terminal 2	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)



NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

15.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

16.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:

The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

17.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

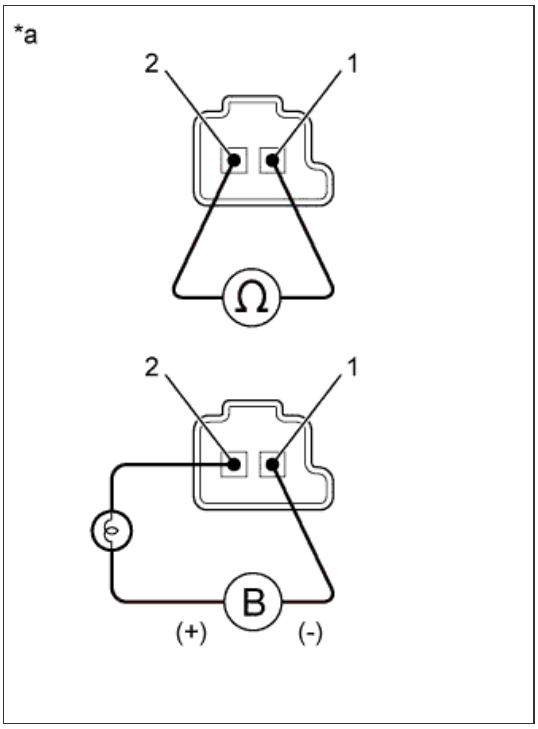
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLT)

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

18.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

19.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:

The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

20.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

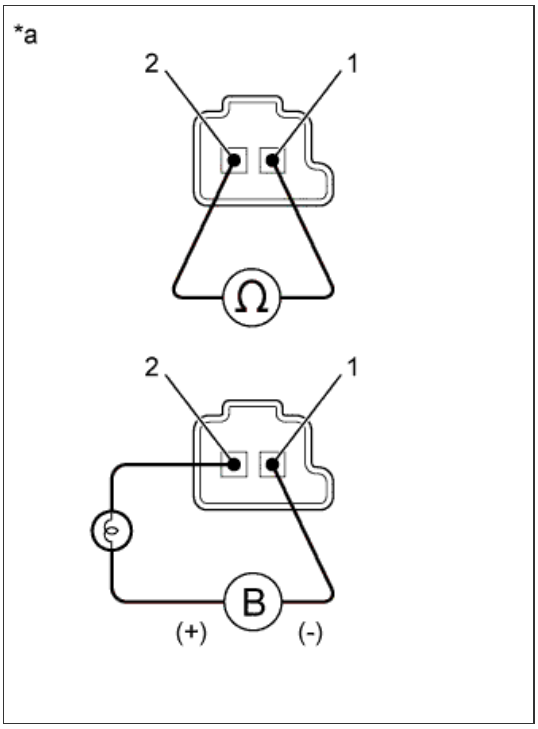
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLT)

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

21.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

22.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:

The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2772 Four Wheel Drive (4WD) Low Switch Circuit Range / Performance

for Preparation Click here

DESCRIPTION

The ECM detects the signal from the transfer L4 position switch.
This DTC indicates that the transfer L4 position switch remains on.

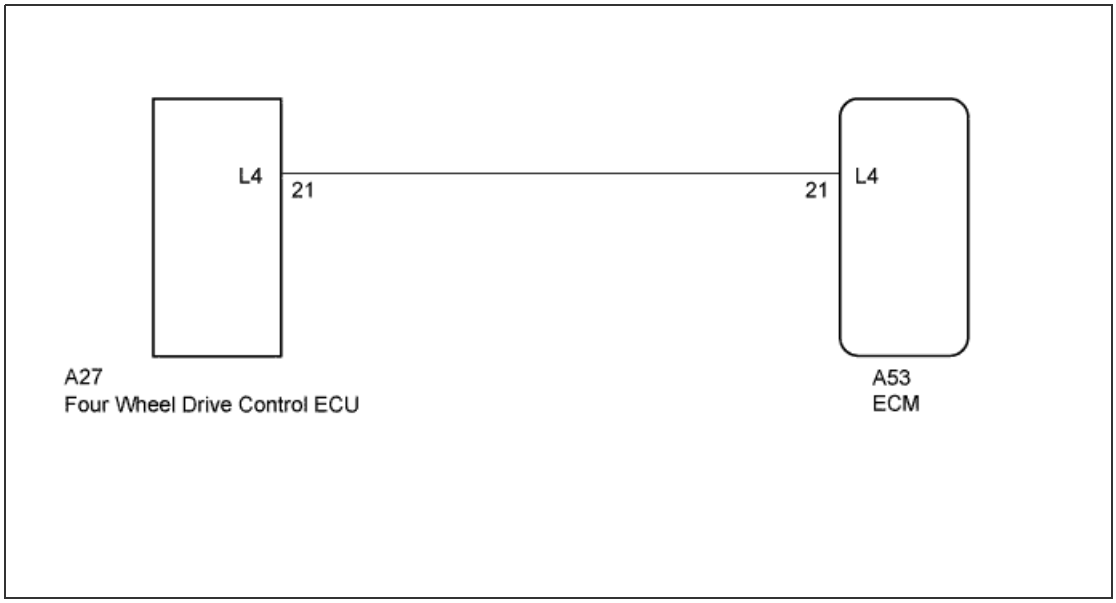
DTC Code	DTC Detection Condition	Trouble Area
P2772	The transfer L4 position switch remains on while the vehicle is running under the following conditions for 1.8 sec. or more (1 trip detection logic). (a) The output shaft speed is between 1000 and 3000 rpm. (b) The transfer position switch is in H4.	• Short in transfer L4 position switch circuit • Four wheel drive control ECU • ECM

MONITOR DESCRIPTION

The ECM monitors the transfer-case L4 position switch to determine when the transfer-case L4 gears are engaged. If the L4 switch indicates that the transfer-case L4 gears remain engaged under the following conditions, the ECM will conclude that there is a malfunction of the L4 position switch, illuminate the MIL and store the DTC:

- The transfer-case shifter is in the "H4" position.
- The transfer-case output shaft rpm is between 1000 and 3000 rpm.
- The specified time period has elapsed.

WIRING DIAGRAM



INSPECTION PROCEDURE

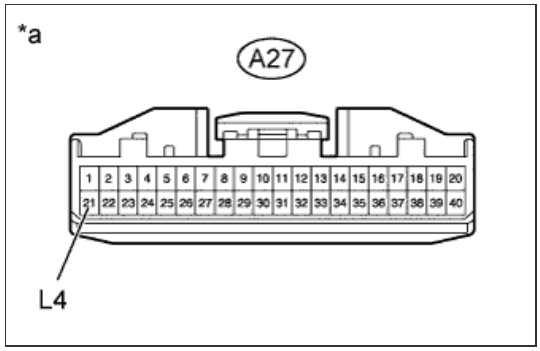
1.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - BODY GROUND)

a. Disconnect the four wheel drive control ECU connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-21 (L4) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Front view of wire harness connector

	(to Four Wheel Drive control ECU)

NG → Go to step 2

OK

GO TO TRANSFER SYSTEM INSPECTION (Click here)

2.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - ECM)

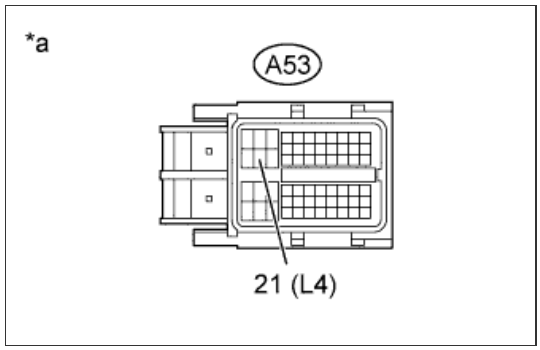
a. Disconnect the ECM connector.

b. Disconnect the A27 four wheel drive control ECU connector.

c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
A53-21 (L4) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

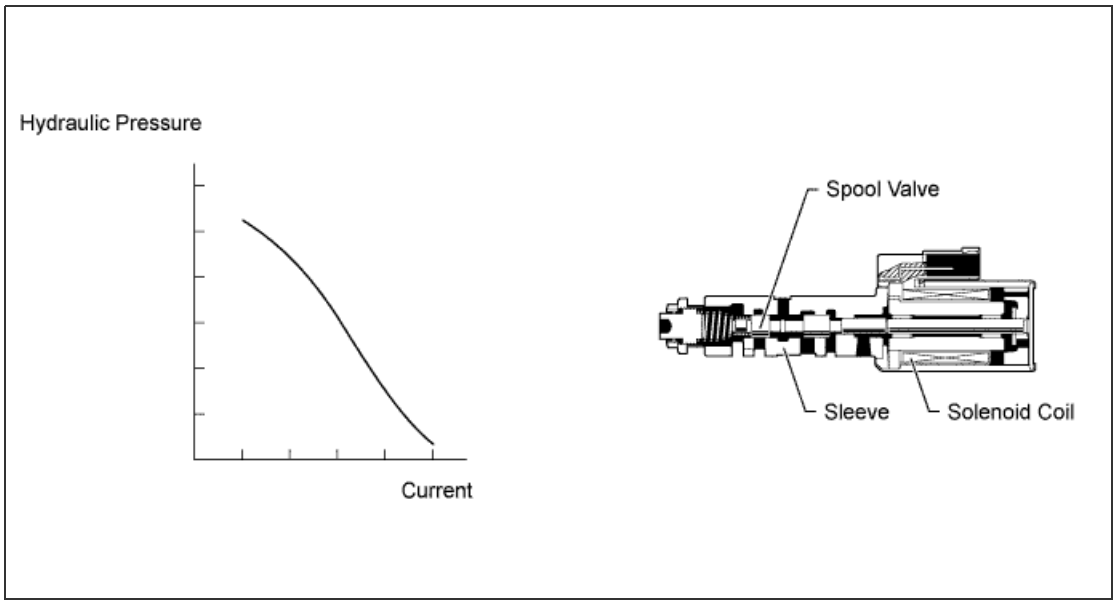
REPLACE ECM (Click here)

DTC P0894 Transmission Component Slipping

DTC P2714 Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

for Preparation Click here

DESCRIPTION



Shift solenoid valve SLT controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and vehicle speed sensor. The ECM adjusts the current to shift solenoid valve SLT to control the hydraulic line pressure coming from the primary regulator valve.
Appropriate line pressure assures smooth shifting with varying engine outputs.

DTC Code	DTC Detection Condition	Trouble Area
P0894	The ECM detects a malfunction in shift solenoid valve SLT, S1, S2, S3, S4 or SL2, or the 1-2 shift valve, or an incorrect gear 6 ratio according to the difference in speed of the turbine and output shaft, and also by the oil pressure (2 trip detection logic).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P2714	The ECM detects a malfunction in shift solenoid valve SLT (ON side) according to the difference in speed of the turbine and output shaft, and also by the oil pressure (2 trip detection logic).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

MONITOR DESCRIPTION

The ECM calculates the amount of heat absorbed by the friction material based on the difference in speed (clutch slippage) between the turbine and output shaft. The ECM illuminates the MIL and stores this DTC when the amount of heat absorption exceeds the specified value.
There are two causes of speed difference.

- When the shift solenoid valve SLT remains ON, oil pressure decreases, which causes the clutch engagement force to decrease.
- When a shift solenoid valve remains ON or OFF, the gear position commanded by the ECM and the actual gear position are not the same.

NOTICE:

If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0894 AND P2714)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the GTS on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the GTS.

Result

Result	Proceed to
• Only P0894 is output • Only P0894 and P2714 are output	A
P0894, P2714 and other DTCs are output	B

HINT:

If any other codes besides P0894 and P2714 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING GTS (SHIFT SOLENOID VALVE SLT)

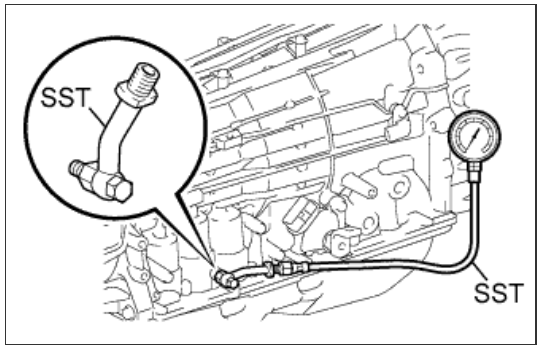
NOTICE:

- **Perform the test while the ATF temperature is between 50 and 80°C (122 and 176°F).**
- **Be careful to prevent the hose of SST from interfering with the exhaust pipe.**
- **Perform the test with the A/C off.**

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case and connect SST.



SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the GTS to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the GTS on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the GTS, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate the shift solenoid SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands SLT solenoid to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • Vehicle stopped • Engine idling

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Please note that the pressure values in the Active Test and Hydraulic Test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → Go to step 17

OK

3.PERFORM ACTIVE TEST USING GTS (RUNNING TEST)

HINT:

Using the GTS to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the GTS to the DLC3.

b. Clear the DTC (Click here).

c. Enter the following menus: Powertrain / Engine and ECT / Active Test.

d. According to the display on the GTS, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the GTS.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valves and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of the shift solenoid valves. [Vehicle Condition] 50 km/h (30 mph) or less

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (30 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the GTS.**

e. Compare the ECM gear shift command and the actual gear position.

Result

ECM Gear Shift Command			1st	2nd	3rd	4th	5th	6th	Proceed to
Actual gear position under malfunction	Shift solenoid S1	Stuck ON*1	2nd	2nd	3rd	4th	5th	6th	A
		Stuck OFF	1st	1st	3rd	4th	5th	N*2	
	Shift solenoid S2	Stuck ON	1st	2nd	2nd	4th	6th	6th	B
		Stuck OFF	3rd	3rd	3rd	4th	5th	5th	
	Shift solenoid S3	Stuck ON	1st	2nd	3rd	3rd	N*2	N*2	C
		Stuck OFF	3rd	4th	4th	4th	5th	6th	
	Shift solenoid S4	Stuck ON*3	1st	2nd	3rd	4th	5th	6th	D
		Stuck OFF	1st	2nd	3rd	4th	4th	4th	
Actual gear position when normal			1st	2nd	3rd	4th	5th	6th	E

HINT:

- ***1: When shift solenoid S1 is stuck ON, the vehicle cannot drive in reverse.**
- ***2: Neutral**
- ***3: When shift solenoid S4 is stuck ON, gear shifting is normal.**

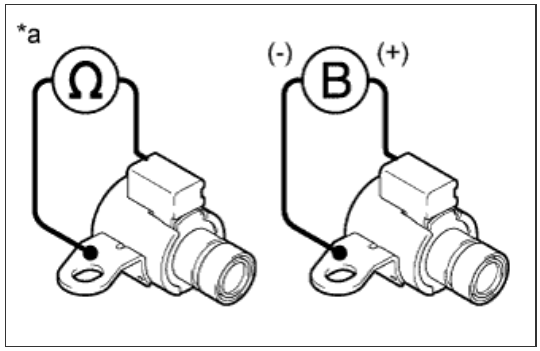
B	Go to step 7
C	Go to step 10
D	Go to step 13
E	Go to step 20

A

4.INSPECT SHIFT SOLENOID VALVE S1

a. Remove the shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

6.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:
The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

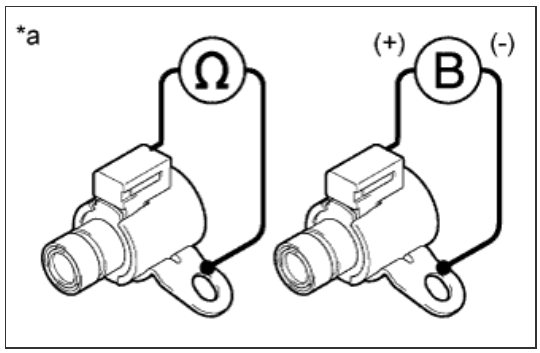
OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

7.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

8.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:
There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

9.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:
The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

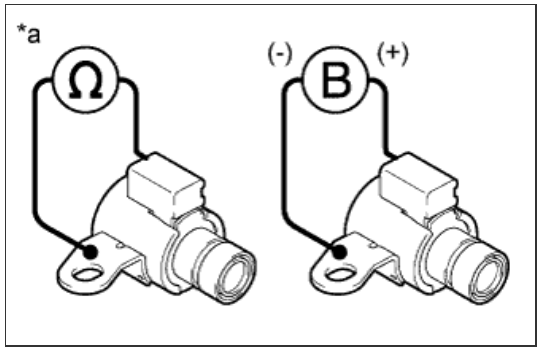
OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

10.INSPECT SHIFT SOLENOID VALVE S3

a. Remove the shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

11.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:
There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

12.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:
The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

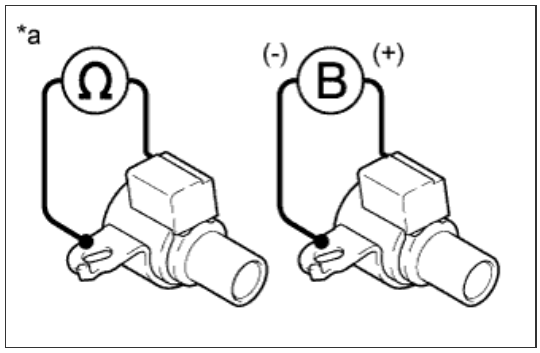
OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

13.INSPECT SHIFT SOLENOID VALVE S4

a. Remove the shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

14.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove the shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

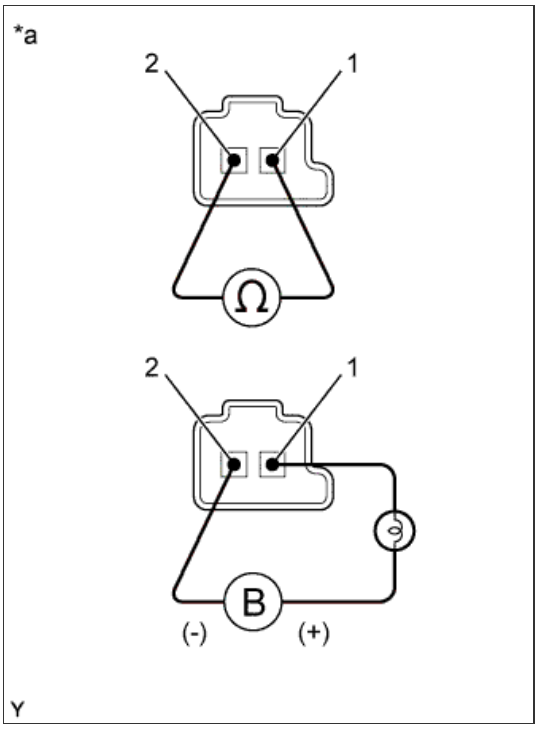
OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative	Valve moves and makes an operating noise

(-) → Terminal 2	

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)



NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

15.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

16.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:

The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

17.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

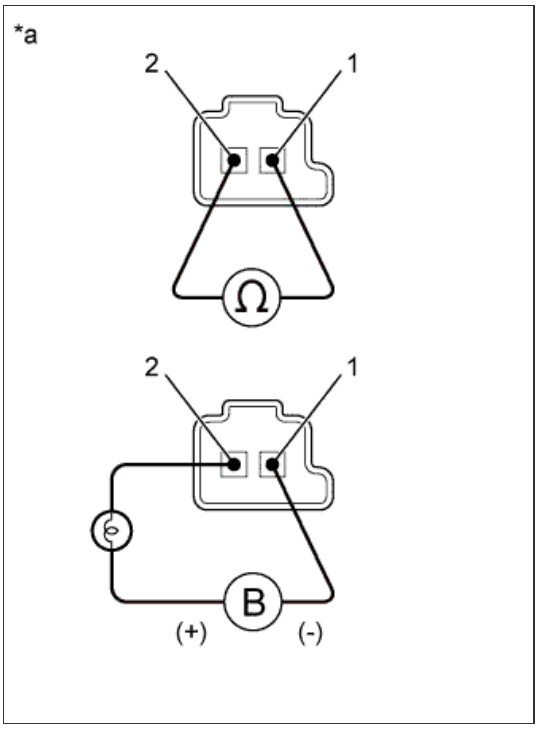
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLT)

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

18.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

19.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:

The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

20.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

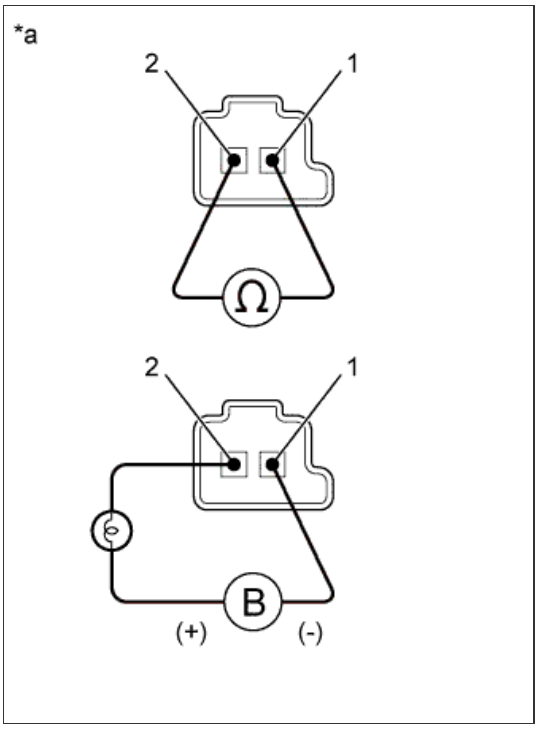
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLT)

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

21.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

22.INSPECT TORQUE CONVERTER ASSEMBLY

a. Check the torque converter assembly (Click here).

OK:

The torque converter assembly operates normally.

NG → REPLACE TORQUE CONVERTER ASSEMBLY (Click here)

OK

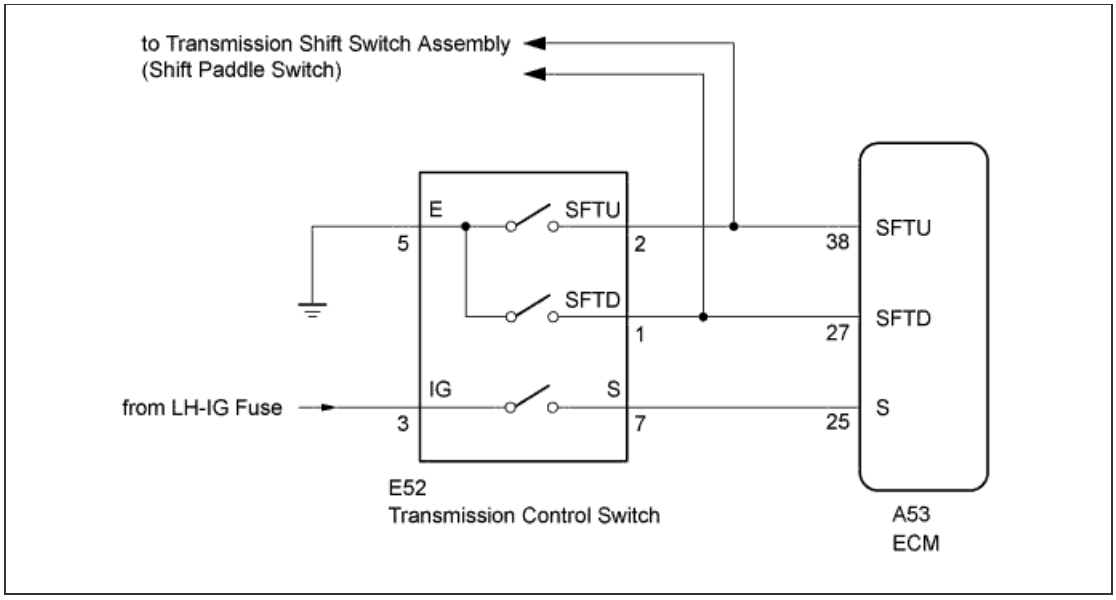
REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

for Preparation Click here

DESCRIPTION

When moving the shift lever to S using the transmission control switch, it is possible to switch the shift range between "1" (1st range) and "6" (6th range). Shifting to "+" once raises the shift range by one, and shifting to "-" lowers the shift range by one.

WIRING DIAGRAM

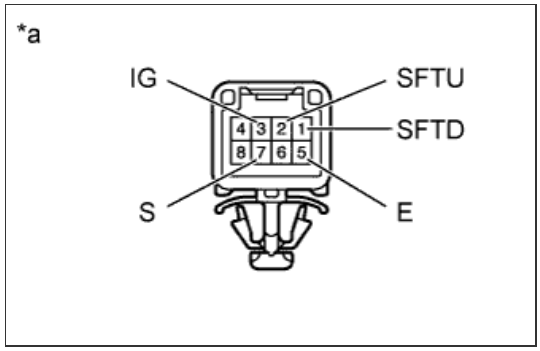


INSPECTION PROCEDURE

1.INSPECT TRANSMISSION CONTROL SWITCH

a. Disconnect the transmission control switch connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 7 (S)	Shift lever in S, "+" or "-"	Below 1 Ω
2 (SFTU) - 5 (E)	Shift lever held in "+" (Up-shift)	Below 1 Ω
1 (SFTD) - 5 (E)	Shift lever held in "-" (Down-shift)	Below 1 Ω
3 (IG) - 7 (S)	Shift lever not in S, "+" or "-"	10 kΩ or higher
2 (SFTU) - 5 (E)	Shift lever in S	10 kΩ or higher
1 (SFTD) - 5 (E)	Shift lever in S	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (Transmission Control Switch)

NG → REPLACE TRANSMISSION CONTROL SWITCH (TRANSMISSION FLOOR SHIFT ASSEMBLY) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - BATTERY, BODY GROUND)

a. Disconnect the transmission control switch connector.

b. Measure the voltage according to the value(s) in the table below.

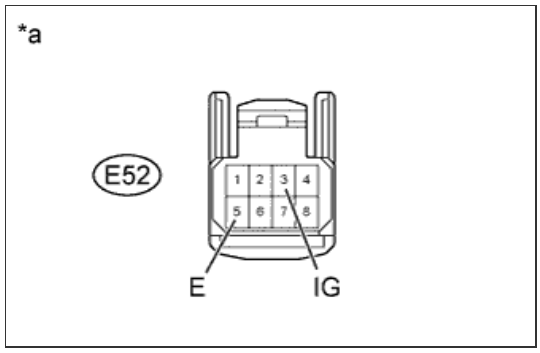
Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E52-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V
E52-3 (IG) - Body ground	Engine switch off	Below 1 V

c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
E52-5 (E) - Body ground	Always	Below 1 Ω



Text in Illustration

*a	Front view of wire harness connector (to Transmission Control Switch)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - ECM)

a. Disconnect the ECM connector.

b. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

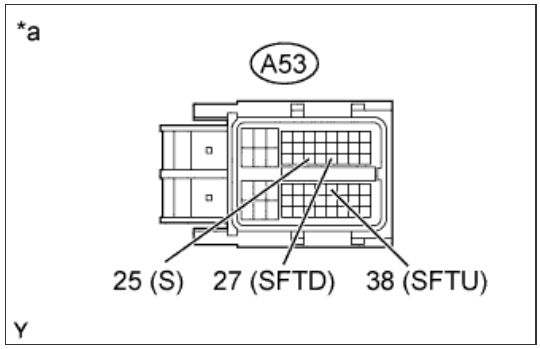
Tester Connection	Condition	Specified Condition
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

c. Turn the engine switch off.

d. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition



A53-38 (SFTU) - Body ground	Shift lever held in "+" (Up-shift)	Below 1 Ω
A53-27 (SFTD) - Body ground	Shift lever held in "-" (Down-shift)	Below 1 Ω
A53-38 (SFTU) - Body ground	Shift lever in S	10 kΩ or higher
A53-27 (SFTD) - Body ground	Shift lever in S	10 kΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

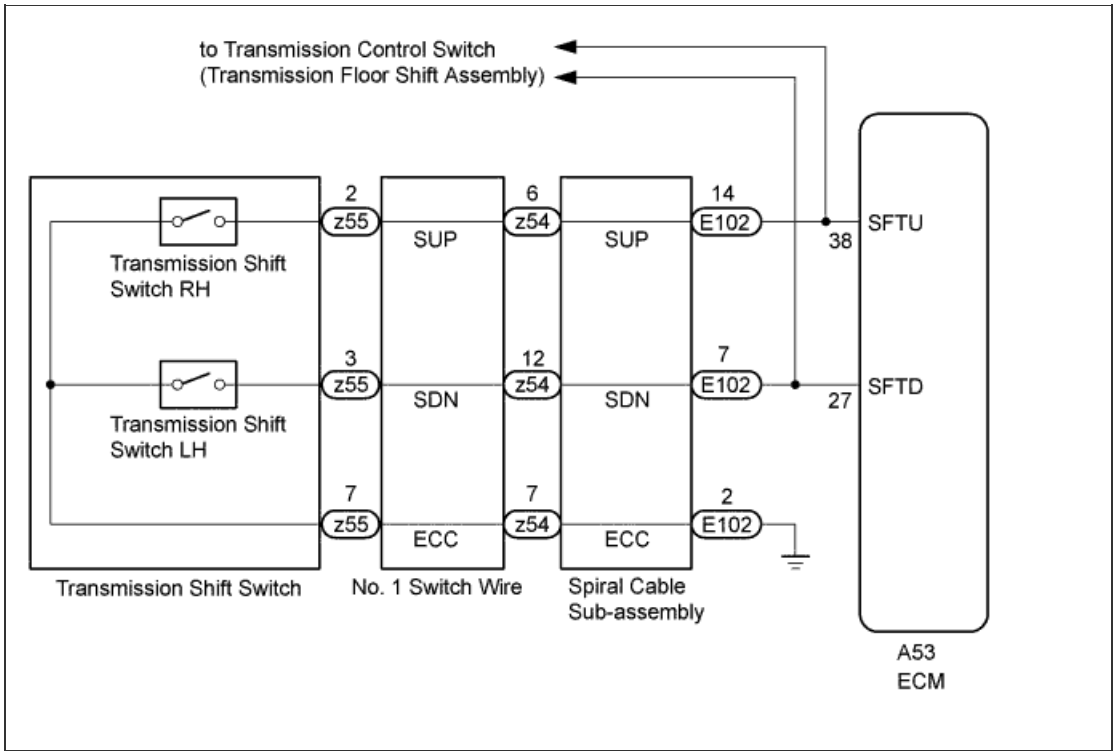
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

When the shift lever is in S, the shift range can be changed using the shift paddle switches. It is also possible to select the shift range when the vehicle is being driven with the shift lever in D by operating the shift paddle switches.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - BODY GROUND)

a. Disconnect the spiral cable connector.

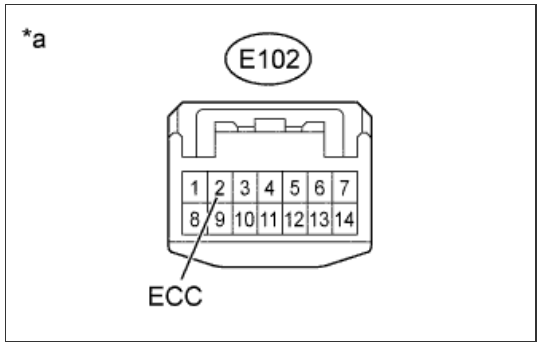
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
E102-2 (ECC) - Body ground	Always	Below 1 Ω

Text in Illustration

*a	Front view of wire harness connector (to Spiral Cable with Sensor Sub-assembly)

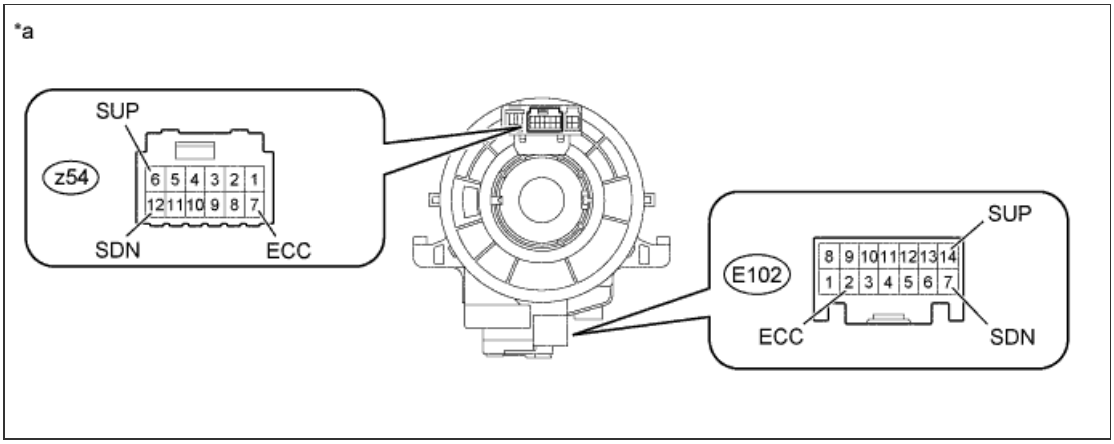


NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2.INSPECT SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

a. Remove the spiral cable with sensor sub-assembly (Click here).



b. Set the spiral cable to the center position.

c. Measure the resistance between the terminals of the spiral cable.

i. After setting the spiral cable to the center position, rotate the spiral cable 2.5 times clockwise and measure the resistance. Then rotate the spiral cable 2.5 times counterclockwise and measure the resistance.

ii. After setting the spiral cable to the center position, rotate the spiral cable 2.5 times clockwise. Then while rotating the spiral cable 5 times counterclockwise, measure the resistance.

Standard Resistance:

Tester Connection	Condition	Specified Condition
z54-6 (SUP) - E102-14 (SUP)	Always	Below 1 Ω
z54-12 (SDN) - E102-7 (SDN)	Always	Below 1 Ω
z54-7 (ECC) - E102-2 (ECC)	Always	Below 1 Ω

NOTICE:

As the spiral cable may break, do not rotate the spiral cable more than the specified amount.

Text in Illustration

*a	Component without harness connected (Spiral Cable with Sensor Sub-assembly)

NG → REPLACE SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY (Click here)

OK

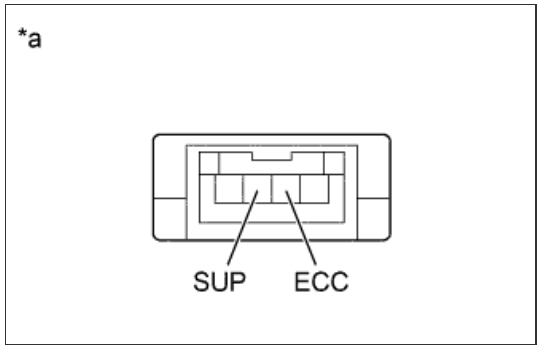
3.INSPECT TRANSMISSION SHIFT SWITCH ASSEMBLY RH (+)

a. Remove the transmission shift switch assembly RH (+) (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
SUP - ECC	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
SUP - ECC	"+" shift paddle not operated (up-shift)	1 MΩ or higher



Text in Illustration

*a	Component without harness connected (Transmission Shift Switch Assembly RH (+))

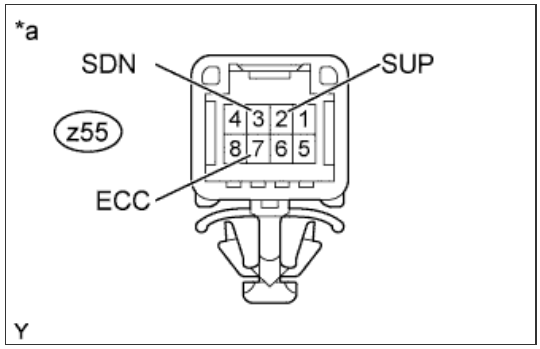
NG → REPLACE TRANSMISSION SHIFT SWITCH ASSEMBLY RH (+) (Click here)

OK

4.INSPECT TRANSMISSION SHIFT SWITCH ASSEMBLY LH (-)

a. Disconnect the transmission shift switch assembly LH (-) connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
z55-2 (SUP) - z55-7 (ECC)	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
z55-3 (SDN) - z55-7 (ECC)	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
z55-2 (SUP) - z55-7 (ECC)	"+" shift paddle not operated (up-shift)	1 MΩ or higher
z55-3 (SDN) - z55-7 (ECC)	"-" shift paddle not operated (down-shift)	1 MΩ or higher

Text in Illustration

*a	Front view of wire harness connector (Transmission Shift Switch Assembly LH (-))

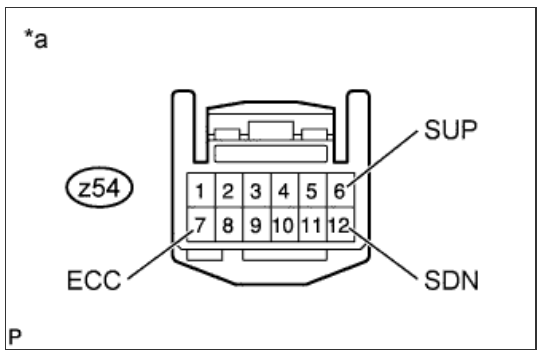
NG → REPLACE TRANSMISSION SHIFT SWITCH ASSEMBLY LH (-) (Click here)

OK

5.INSPECT NO. 1 SWITCH WIRE

a. Disconnect the No. 1 switch wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
z54-6 (SUP) - z54-7 (ECC)	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
z54-12 (SDN) - z54-7 (ECC)	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
z54-6 (SUP) - z54-7 (ECC)	"+" shift paddle not operated (up-shift)	1 MΩ or higher
z54-12 (SDN) - z54-7 (ECC)	"-" shift paddle not operated (down-shift)	1 MΩ or higher

Text in Illustration

*a	Component without harness connected (No. 1 Switch Wire)

NG → REPLACE NO. 1 SWITCH WIRE (Click here)

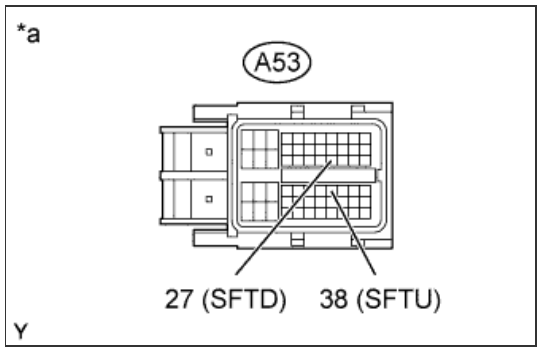
OK

6.CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - ECM)

a. Disconnect the ECM connector.

b. Disconnect the transmission control switch (transmission floor shift assembly) connector.

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
A53-38 (SFTU) - Body ground	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
A53-27 (SFTD) - Body ground	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
A53-38 (SFTU) - Body ground	"+" shift paddle not operated (up-shift)	1 MΩ or higher
A53-27 (SFTD) - Body ground	"-" shift paddle not operated (down-shift)	1 MΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

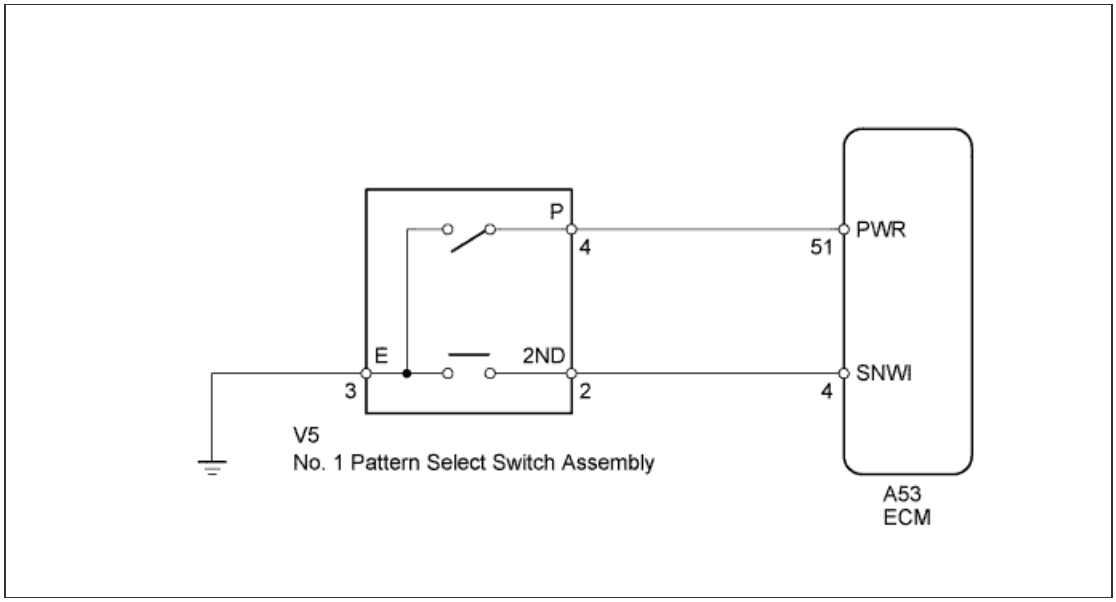
REPLACE ECM (Click here)

for Preparation Click here

DESCRIPTION

The ECM memory contains the programs for the normal and power shift patterns and lock-up pattern.
By following the programs corresponding to the signals from the No. 1 pattern select switch assembly, the park/neutral position switch and other various sensors, the ECM switches the shift solenoid valves on and off, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

When the pattern select switch (PWR) is pushed, switch contact is made and power mode is selected. To cancel power mode, push the pattern select switch (PWR) once again.

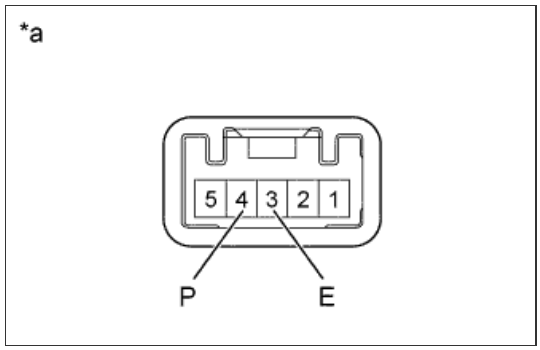
1.INSPECT NO. 1 PATTERN SELECT SWITCH ASSEMBLY (PWR)

a. Remove the No. 1 pattern select switch assembly (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
4 (P) - 3 (E)	Pattern select switch (PWR) on	Below 1 Ω
4 (P) - 3 (E)	Pattern select switch (PWR) off	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 1 Pattern Select Switch Assembly)

NG → REPLACE NO. 1 PATTERN SELECT SWITCH ASSEMBLY (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - BODY GROUND)

a. Disconnect the No. 1 pattern select switch assembly connector.

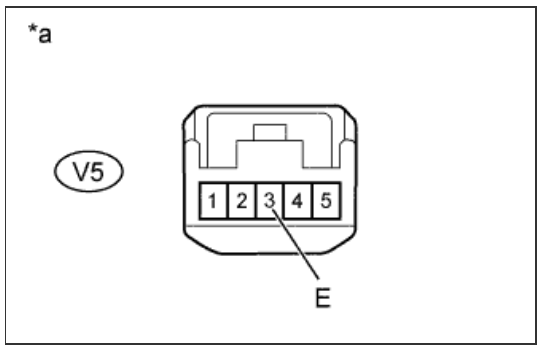
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
V5-3 (E) - Body ground	Always	Below 1 Ω

Text in Illustration

*a	Front view of wire harness connector (to No. 1 Pattern Select Switch Assembly)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - ECM)

a. Disconnect the ECM connector.

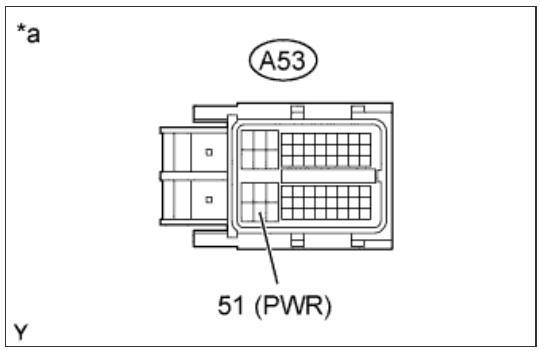
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
A53-51 (PWR) - Body ground	Pattern select switch (PWR) on	Below 1 Ω
A53-51 (PWR) - Body ground	Pattern select switch (PWR) off	10 kΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to ECM)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

When 2nd mode is selected with the No. 1 pattern select switch assembly, the ECM controls the shift solenoid valves and the transmission starts from 2nd gear.
The 2nd mode is the system that operates the throttle motor to control engine output to reduce skidding of the driving wheels, and guarantee takeoff acceleration, driving straightness and turning stability.
When the shift lever is in D, the transmission automatically shifts up through 3rd to 6th as usual.

WIRING DIAGRAM

Refer to Pattern Select Switch Power Mode Circuit (Click here).

INSPECTION PROCEDURE

When the pattern select switch (2ND) is pushed, switch contact is made and 2nd mode is selected. To cancel 2nd mode, push the pattern select switch (2ND) once again.

HINT:

2nd mode is automatically canceled when the engine switch is turned off.

1.DRIVING TEST

HINT:

The driving test should be performed on a paved road (nonskid road).

a. Start the engine.

b. Turn the 2ND switch off (normal drive mode).

c. Confirm vehicle response by driving from a parked position to fully depressing the accelerator pedal.

d. Turn the 2ND switch on and perform the same check as above.
When driving the vehicle with the 2ND switch on and off, check that there is a difference in acceleration.

OK:
There is a difference in acceleration.

NG → Go to step 2

OK →

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

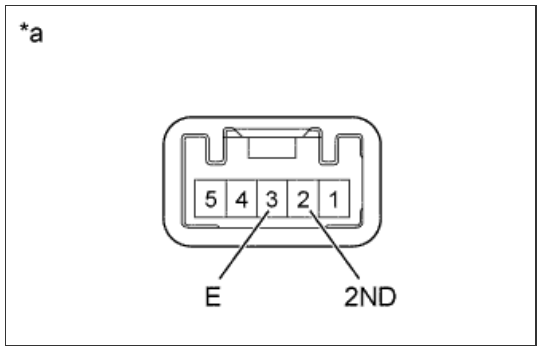
2.INSPECT NO. 1 PATTERN SELECT SWITCH ASSEMBLY (2ND)

a. Remove the No. 1 pattern select switch assembly (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
2 (2ND) - 3 (E)	Pattern select switch (2ND) and held pressed	Below 1 Ω
2 (2ND) - 3 (E)	Pattern select switch (2ND) released	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 1 Pattern Select Switch Assembly)

NG → REPLACE NO. 1 PATTERN SELECT SWITCH ASSEMBLY (Click here)

OK

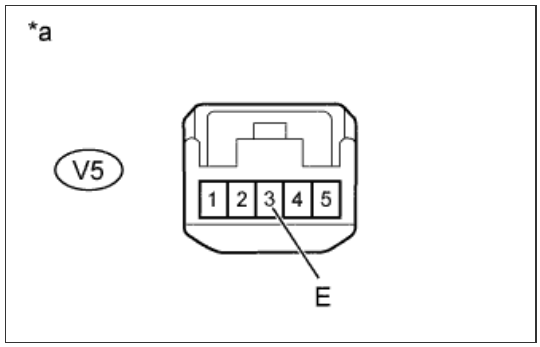
3.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - BODY GROUND)

a. Disconnect the No. 1 pattern select switch assembly connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
V5-3 (E) - Body ground	Always	Below 1 Ω



Text in Illustration

*a	Front view of wire harness connector (to No. 1 Pattern Select Switch Assembly)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

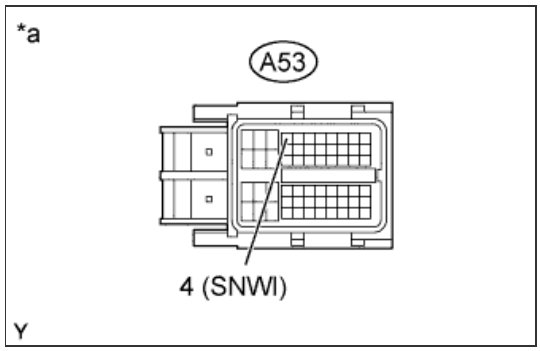
4.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
A53-4 (SNWI) - Body ground	Pattern select switch (2ND) pressed and held	Below 1 Ω
A53-4 (SNWI) - Body ground	Pattern select switch (2ND) released	10 kΩ or higher



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

NOTICE:

Perform the Reset Memory procedures (A/T initialization) after replacing the automatic transmission assembly, valve body assembly or any of the shift solenoid valves (Click here).

HINT:

Reset Memory cannot be completed by only reconnecting the cable to the negative (-) battery terminal.

CAUTION:

When using compressed air, always aim away from yourself to prevent Automatic Transmission Fluid (ATF) or kerosene from spraying on your face.

NOTICE:

- **The automatic transmission is composed of precision-made parts, necessitating careful inspection before reassembly because even a small nick could cause fluid leakage or affect performance.**
- **The procedures are organized so that you work on only one component group at a time. This will help avoid confusion with similar-looking parts of different sub-assemblies being on your workbench at the same time.**
- **The component groups are inspected and repaired from the converter housing side.**
- **Whenever possible, complete the inspection, repair and reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups.**
- **Use of Toyota Genuine ATF WS is recommended.**
- **All disassembled parts should be washed clean, and compressed air should be blown through any fluid passages and holes.**
- **Dry all parts with compressed air. Never use cloth.**
- **The recommended ATF or kerosene should be used for cleaning.**
- **After cleaning, the parts should be arranged in the order they were removed for efficient inspection, repairs, and reassembly.**
- **New discs for the brakes and clutches that will be used for replacement must be soaked in ATF for at least 15 minutes before reassembly.**
- **All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.**
- **All old gaskets and rubber O-rings must be replaced.**
- **Do not apply adhesive cement to gaskets and similar parts.**
- **Make sure that the ends of the snap rings are not aligned with any cutouts. Also make sure that snap rings are correctly installed into the grooves.**
- **If a worn bushing is to be replaced, the sub-assembly containing the bushing must also be replaced.**
- **Check the thrust bearings and races for wear or damage. Replace them if necessary.**
- **Use petroleum jelly to keep parts in place.**
- **When working with FIPG material, perform the following:**
  Using a razor blade and gasket scraper, remove all old FIPG material from the gasket surface.
  Clean all components thoroughly to remove all foreign matter.
  Clean both sealing surfaces with non-residue solvent.
  Apply FIPG material in a continuous line approximately 1 mm (0.0394 in.) in diameter on the sealing surface.
  Reassemble parts within 10 minutes of applying FIPG material. Failing to do so will require the FIPG material to be removed and reapplied.

for Preparation Click here

NOTICE:

Perform the Reset Memory procedures (A/T initialization) after replacing the automatic transmission assembly, valve body assembly or any of the shift solenoid valves (Click here).

HINT:

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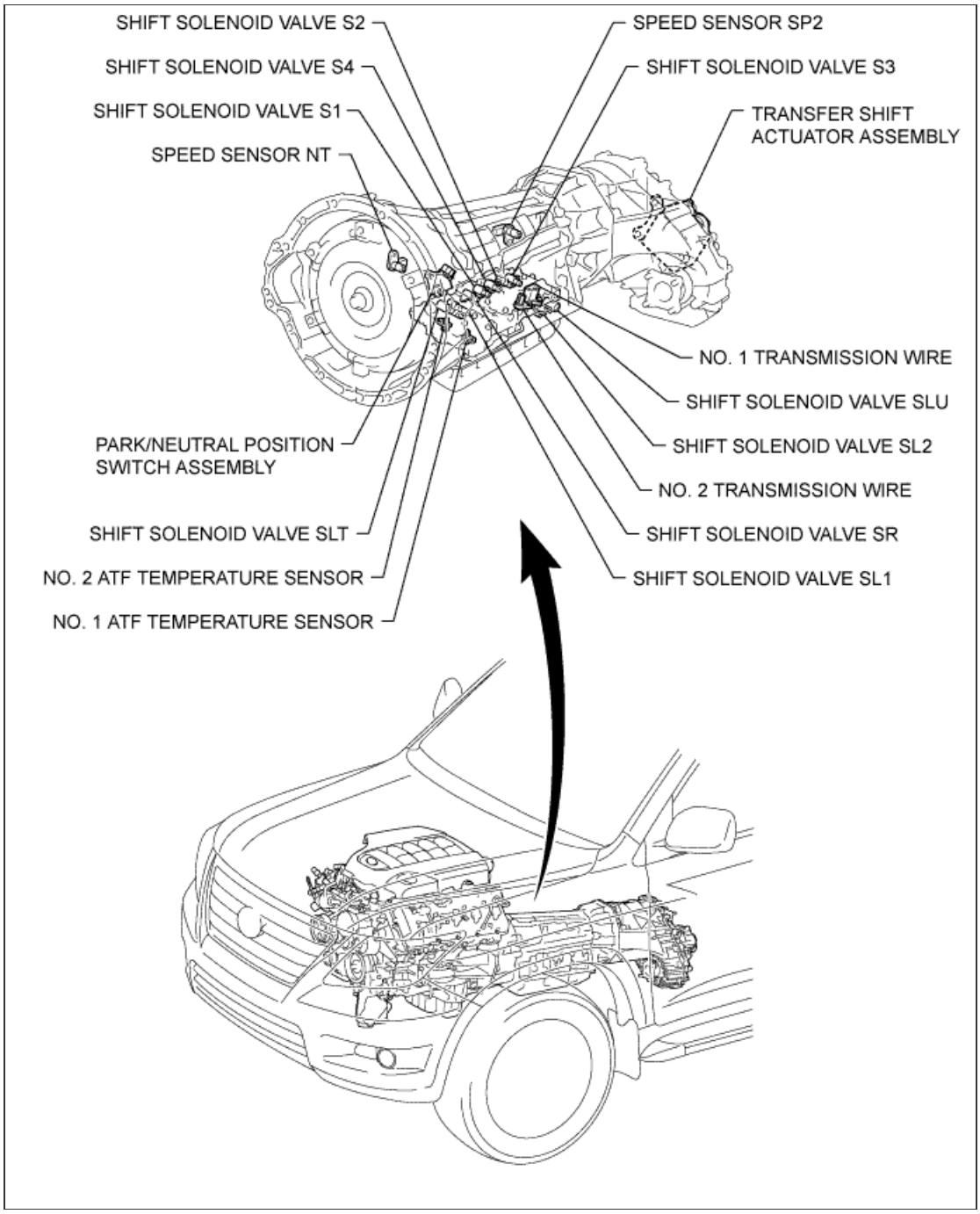
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  Clean both sealing surfaces with non-residue solvent.
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  Reassemble parts within 10 minutes of applying FIPG material. Failing to do so will require the FIPG material to be removed and reapplied.

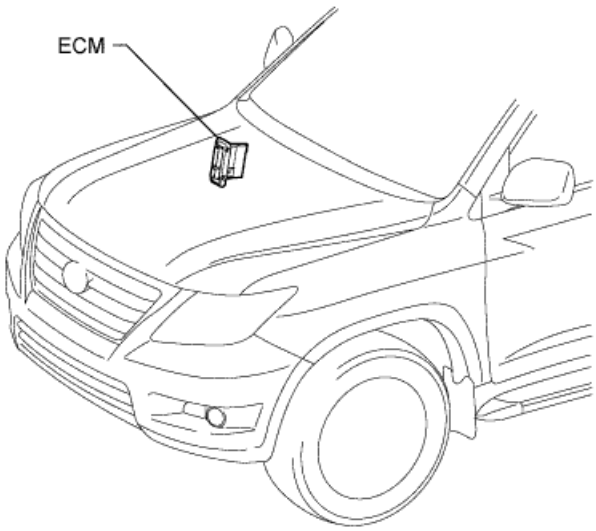
for Preparation Click here

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).

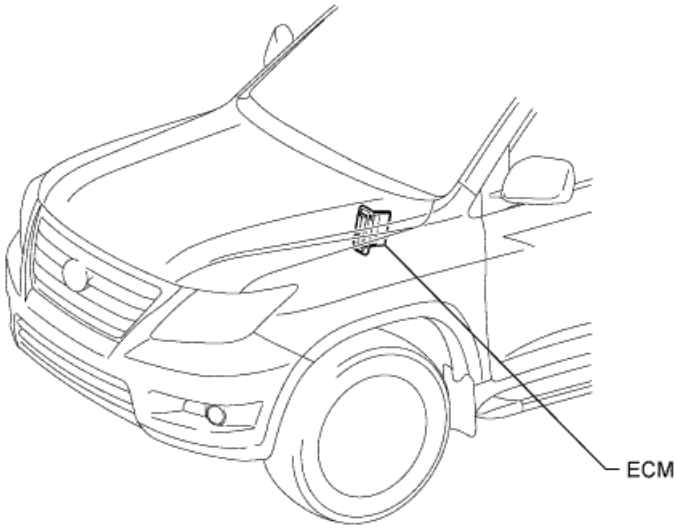
for Preparation Click here

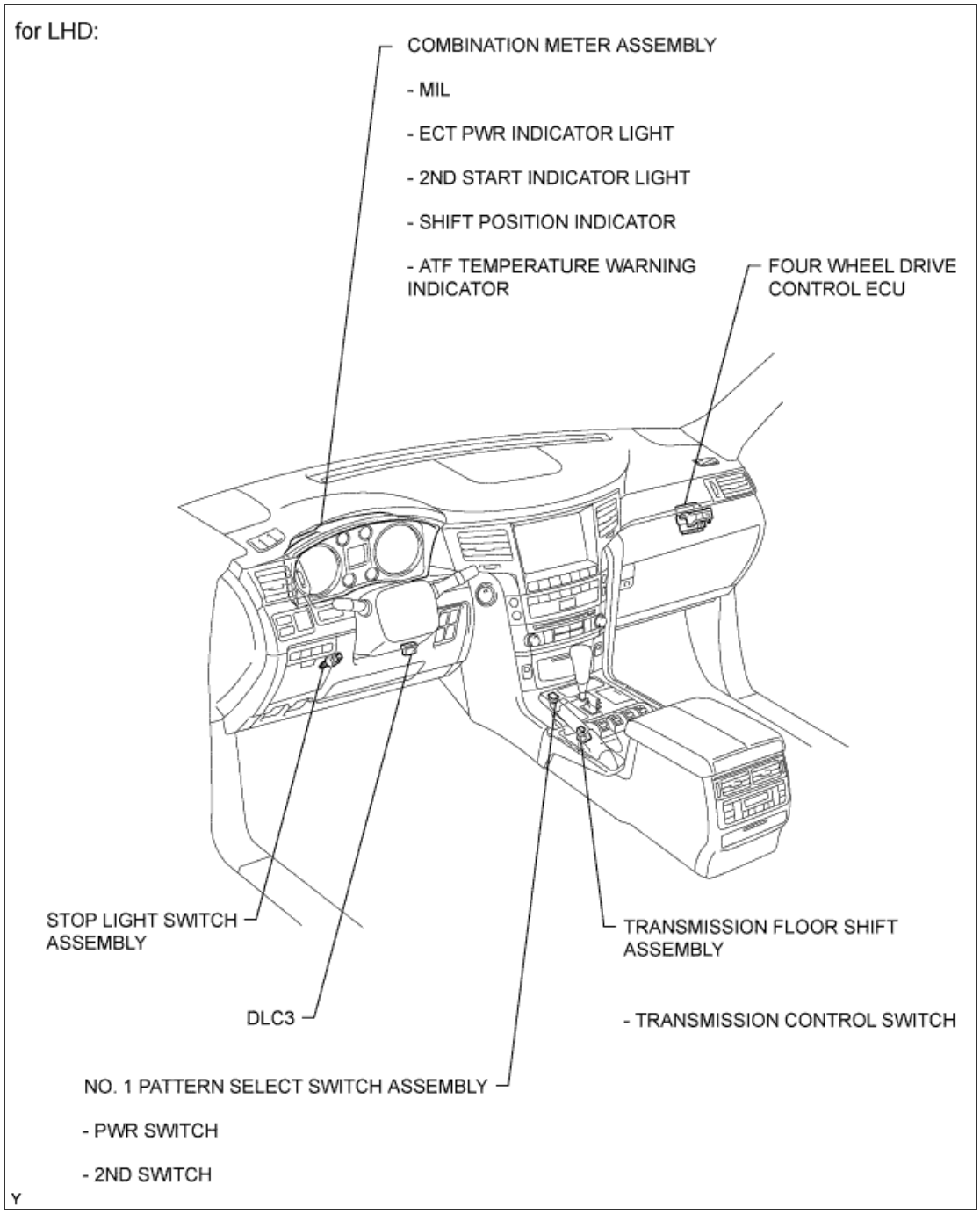


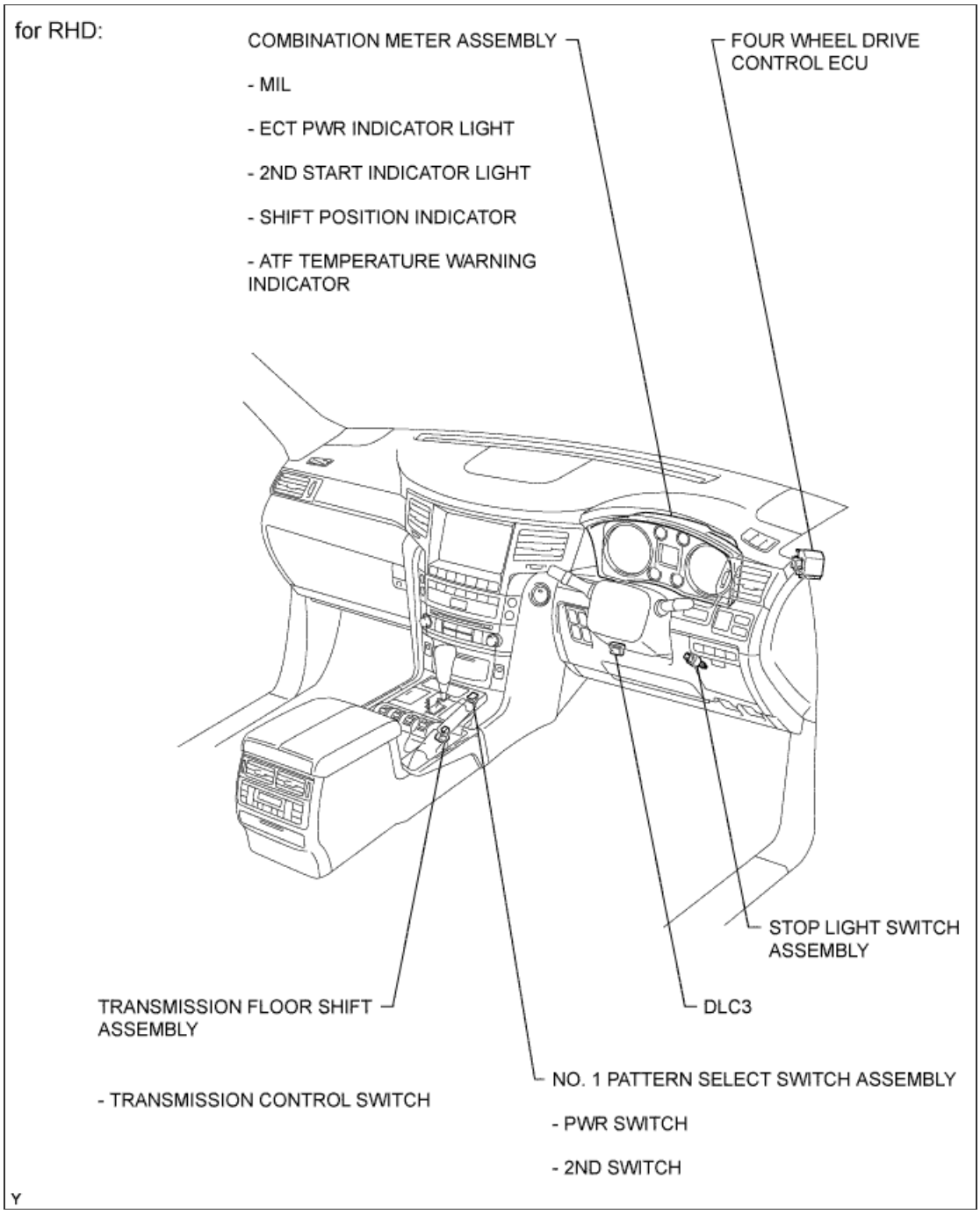
for LHD:



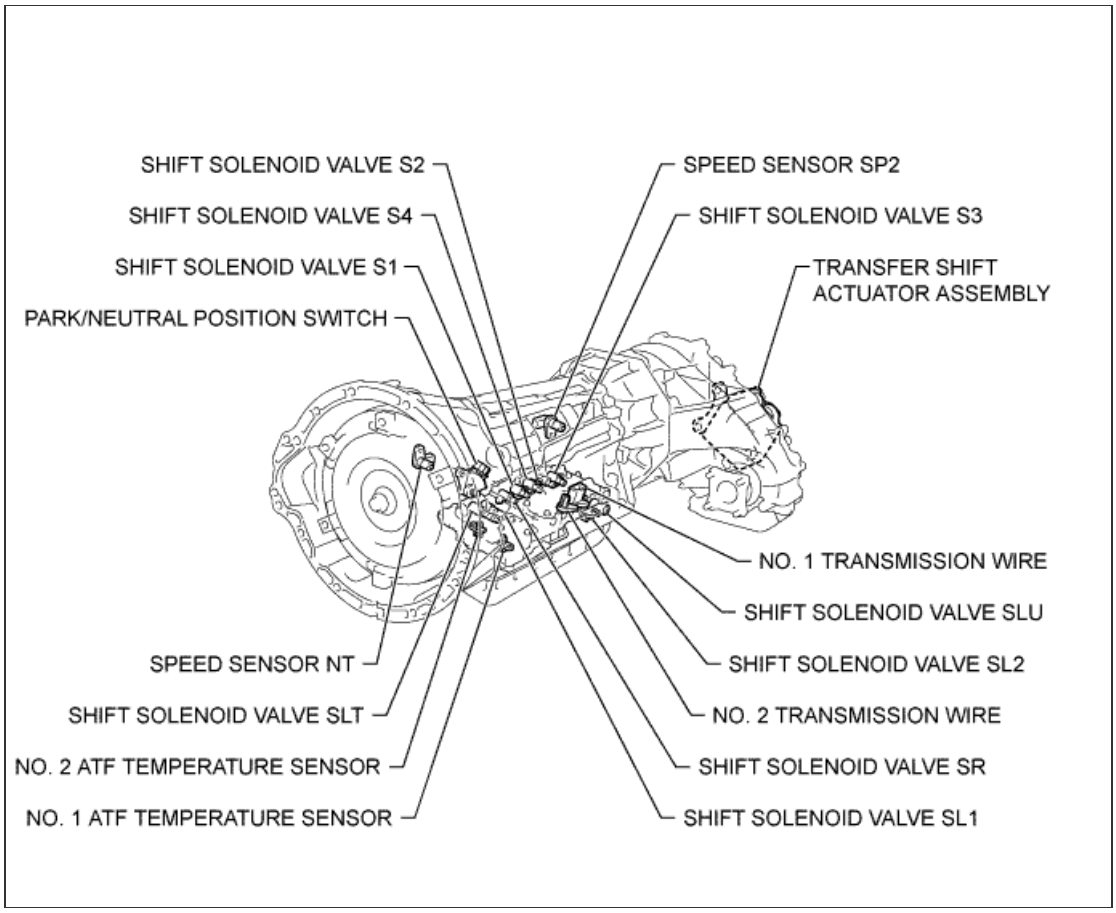
for RHD:

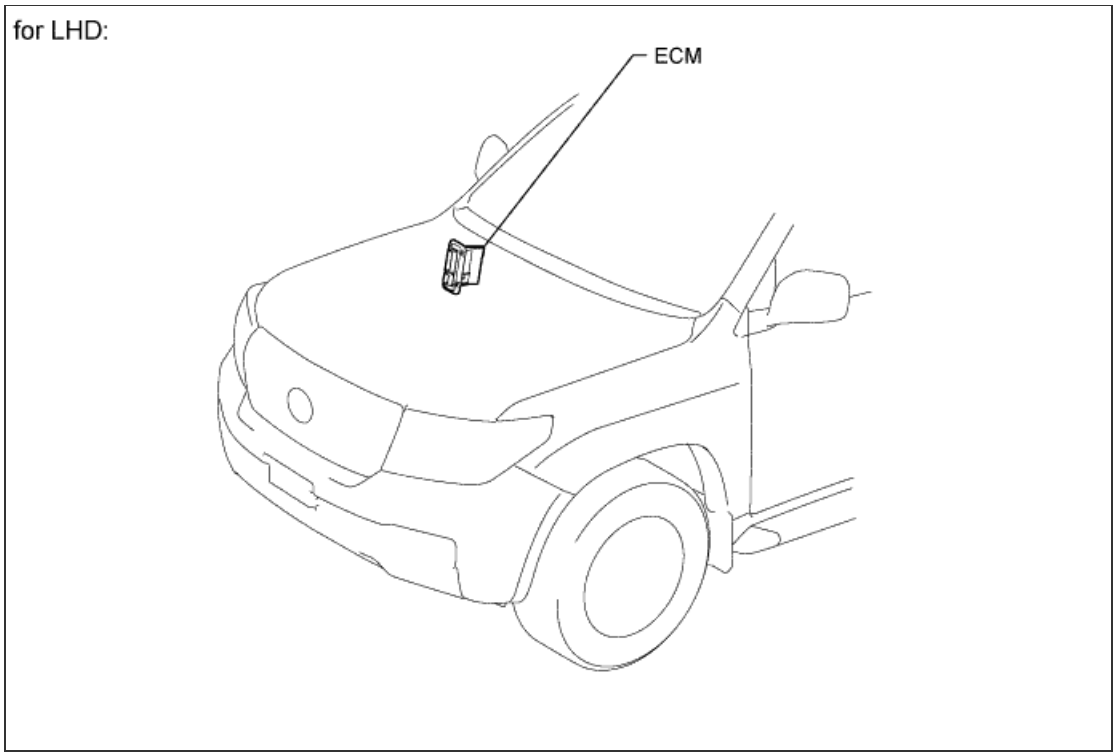



for LHD:
COMBINATION METER ASSEMBLY
- MIL
- ECT PWR INDICATOR LIGHT
- 2ND START INDICATOR LIGHT
- SHIFT POSITION INDICATOR
- ATF TEMPERATURE WARNING INDICATOR
FOUR WHEEL DRIVE CONTROL ECU
STOP LIGHT SWITCH ASSEMBLY
DLC3
TRANSMISSION FLOOR SHIFT ASSEMBLY
- TRANSMISSION CONTROL SWITCH
NO. 1 PATTERN SELECT SWITCH ASSEMBLY
- PWR SWITCH
- 2ND SWITCH
Y

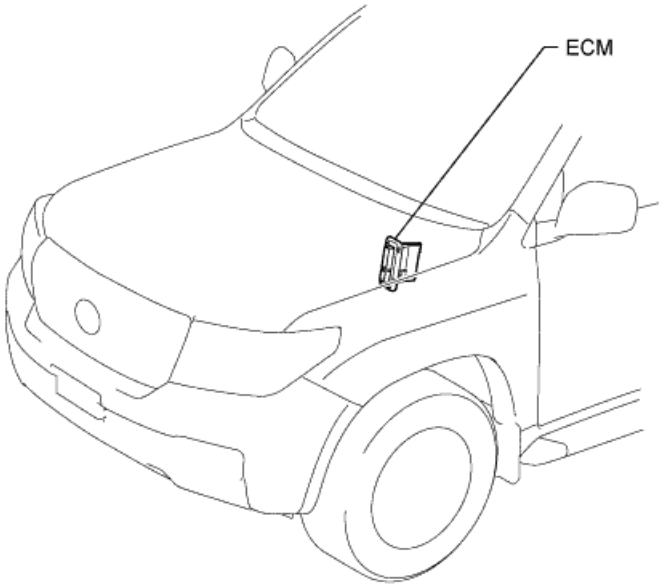

for RHD:
COMBINATION METER ASSEMBLY
- MIL
- ECT PWR INDICATOR LIGHT
- 2ND START INDICATOR LIGHT
- SHIFT POSITION INDICATOR
- ATF TEMPERATURE WARNING INDICATOR
FOUR WHEEL DRIVE CONTROL ECU
STOP LIGHT SWITCH ASSEMBLY
DLC3
TRANSMISSION FLOOR SHIFT ASSEMBLY
- TRANSMISSION CONTROL SWITCH
NO. 1 PATTERN SELECT SWITCH ASSEMBLY
- PWR SWITCH
- 2ND SWITCH
Y

for Preparation Click here

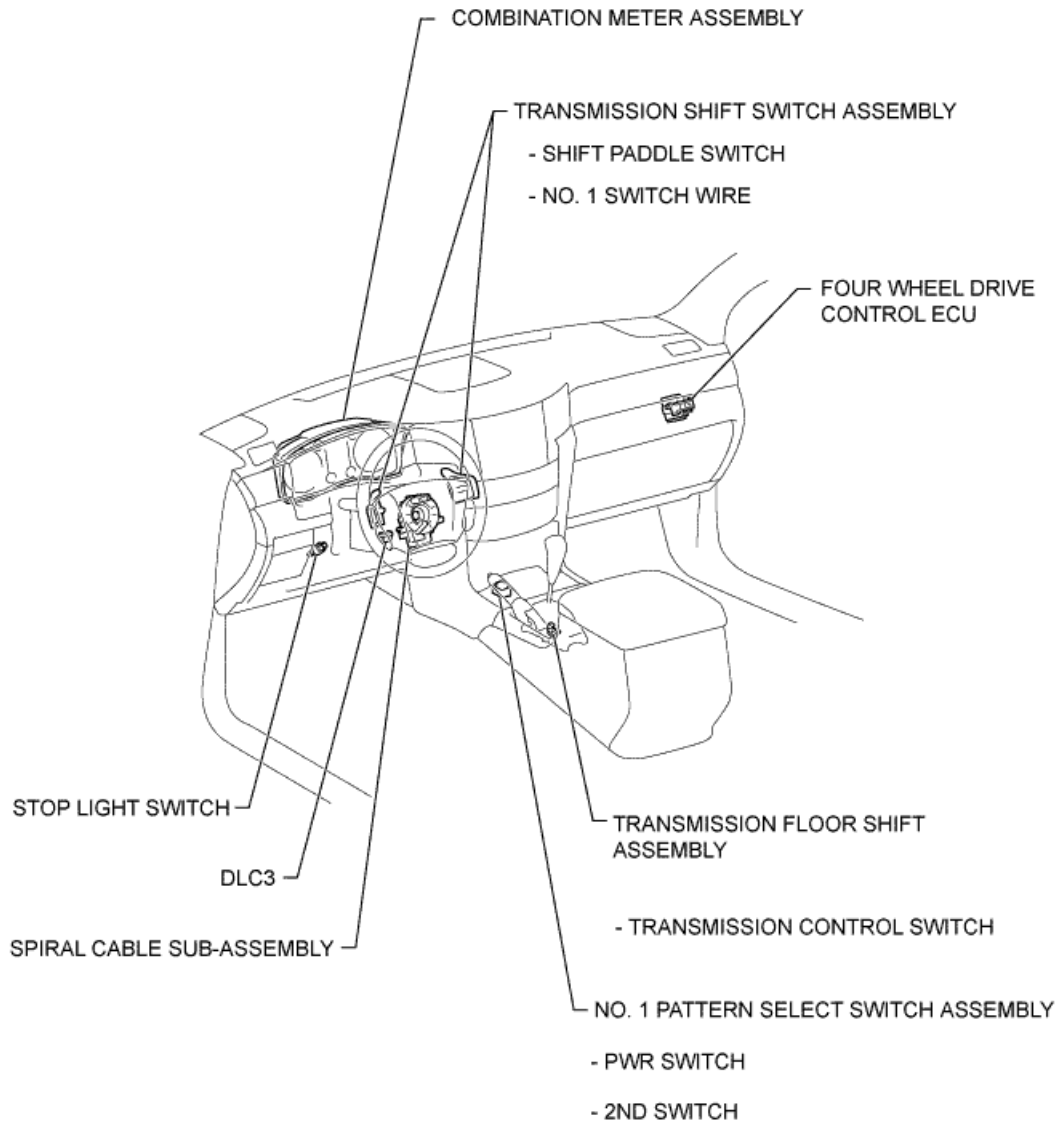




for RHD:

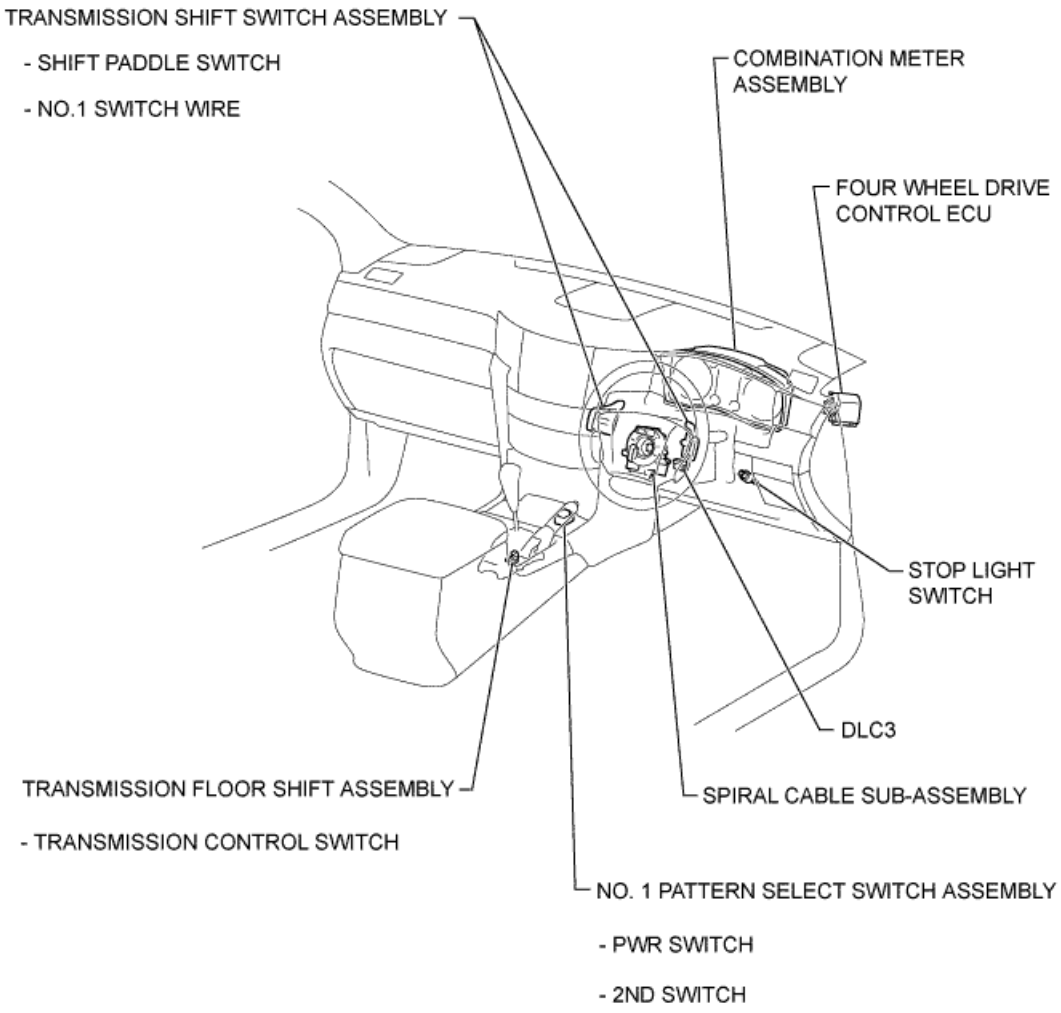


for LHD:


COMBINATION METER ASSEMBLY
TRANSMISSION SHIFT SWITCH ASSEMBLY
- SHIFT PADDLE SWITCH
- NO. 1 SWITCH WIRE
FOUR WHEEL DRIVE CONTROL ECU
STOP LIGHT SWITCH
DLC3
SPIRAL CABLE SUB-ASSEMBLY
TRANSMISSION FLOOR SHIFT ASSEMBLY
- TRANSMISSION CONTROL SWITCH
NO. 1 PATTERN SELECT SWITCH ASSEMBLY
- PWR SWITCH
- 2ND SWITCH

o

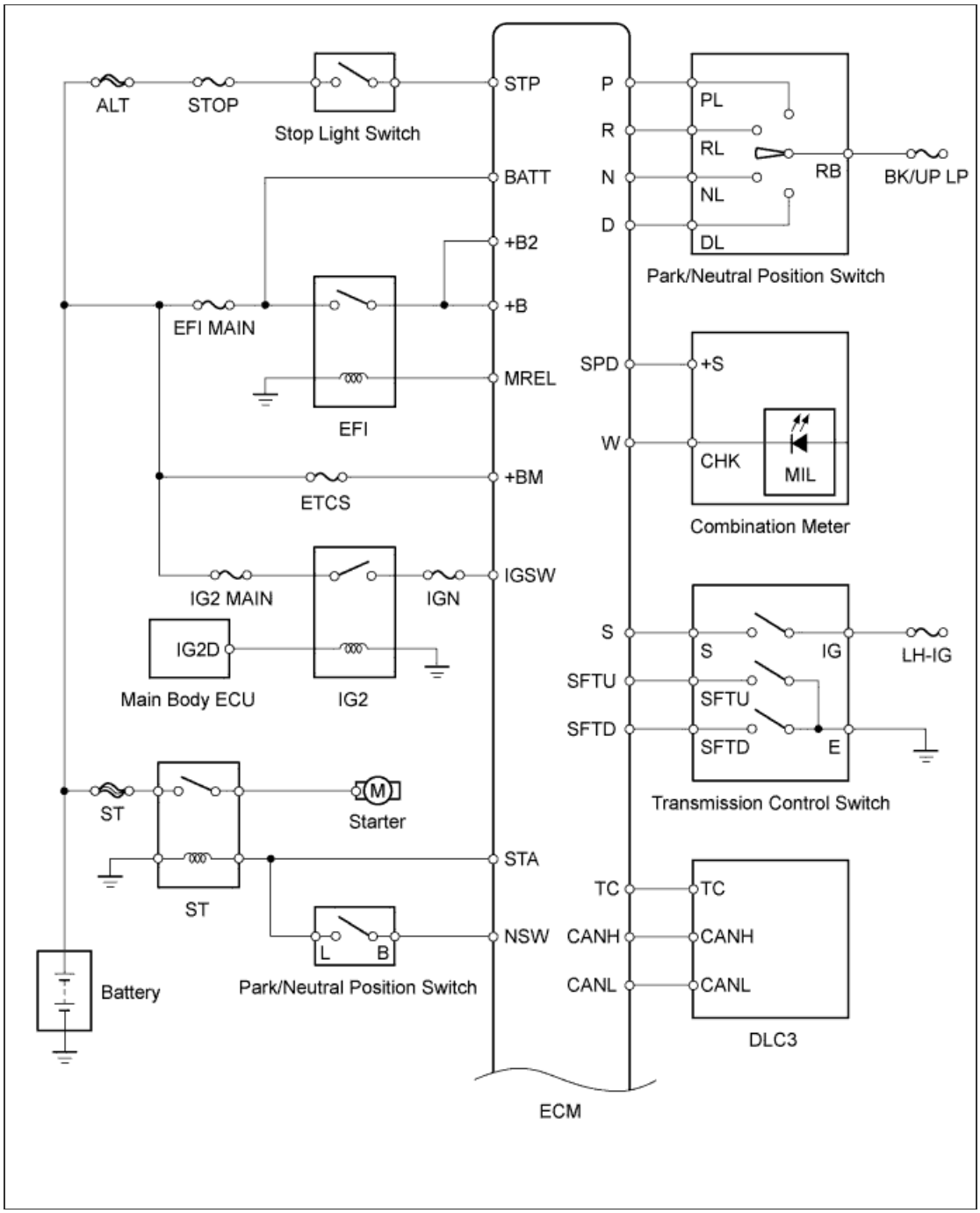
for RHD:

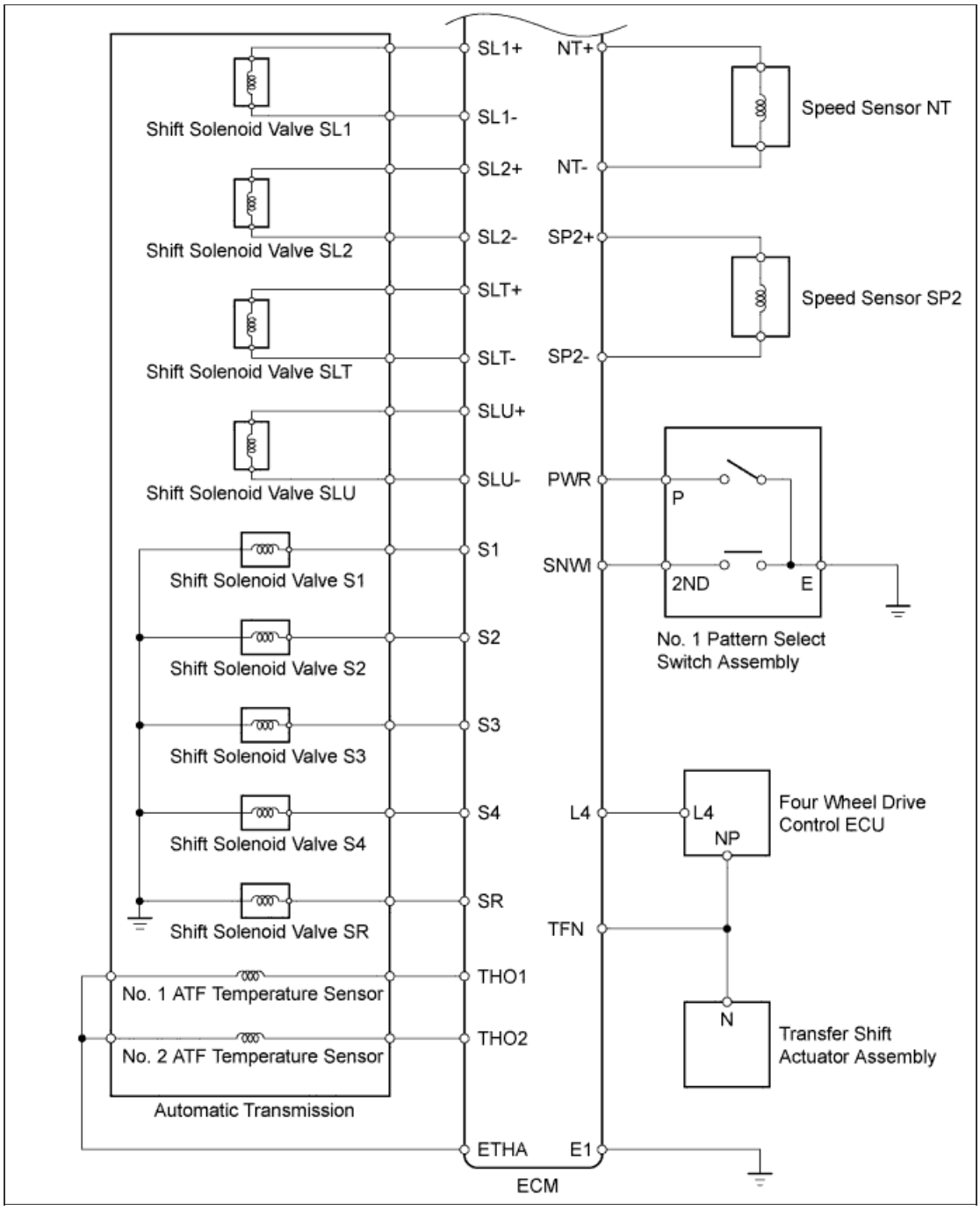

TRANSMISSION SHIFT SWITCH ASSEMBLY
- SHIFT PADDLE SWITCH
- NO.1 SWITCH WIRE
COMBINATION METER ASSEMBLY
FOUR WHEEL DRIVE CONTROL ECU
STOP LIGHT SWITCH
DLC3
TRANSMISSION FLOOR SHIFT ASSEMBLY
- TRANSMISSION CONTROL SWITCH
SPIRAL CABLE SUB-ASSEMBLY
NO. 1 PATTERN SELECT SWITCH ASSEMBLY
- PWR SWITCH
- 2ND SWITCH

0

for Preparation Click here

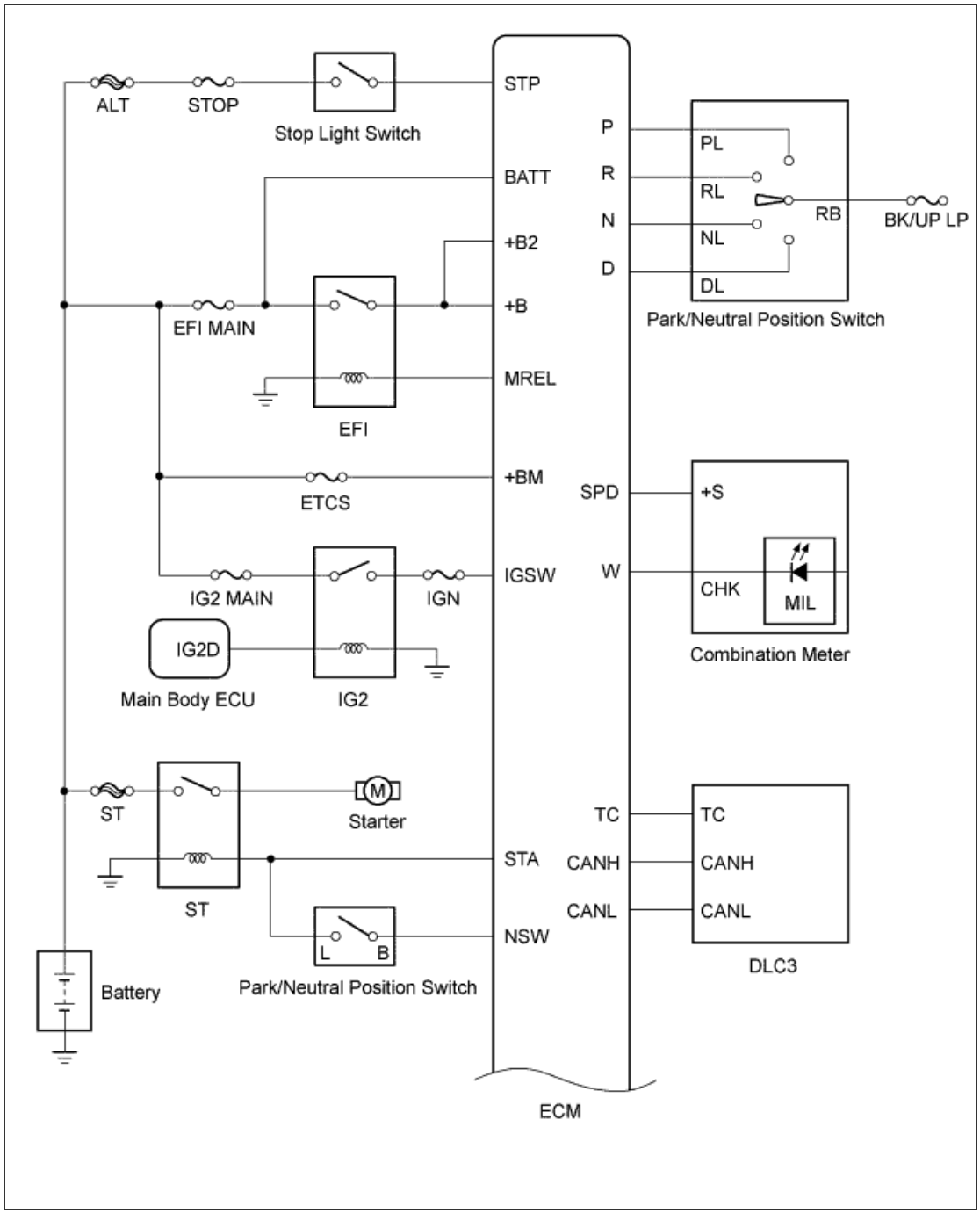
The configuration of the electronic control system in the AB60F automatic transmission is as shown in the following chart.

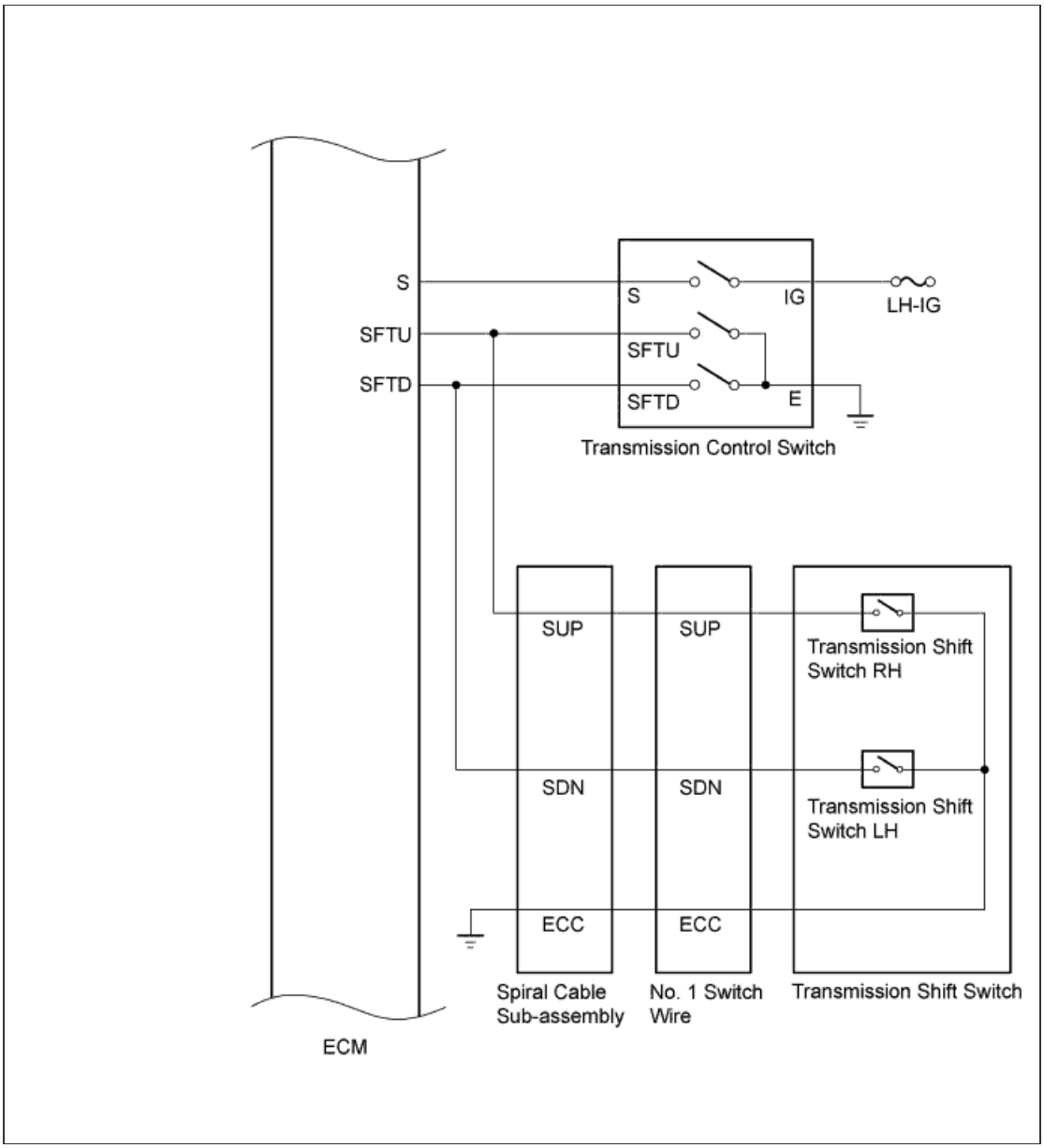


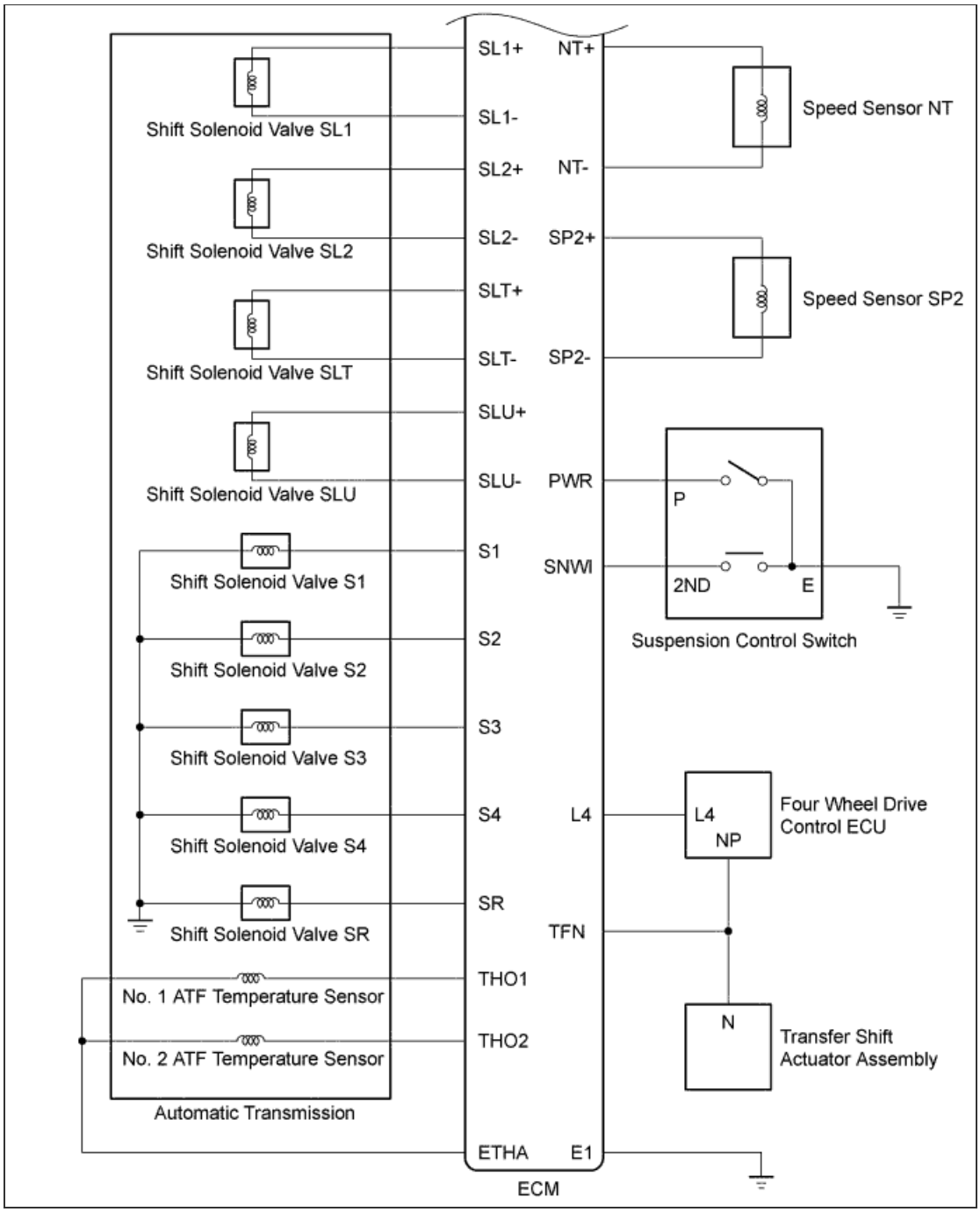

SL1+
SL1-
SL2+
SL2-
SLT+
SLT-
SLU+
SLU-
S1
S2
S3
S4
SR
THO1
THO2
ETHA
NT+
NT-
SP2+
SP2-
PWR
SNWI
L4
TFN
E1
Shift Solenoid Valve SL1
Shift Solenoid Valve SL2
Shift Solenoid Valve SLT
Shift Solenoid Valve SLU
Shift Solenoid Valve S1
Shift Solenoid Valve S2
Shift Solenoid Valve S3
Shift Solenoid Valve S4
Shift Solenoid Valve SR
No. 1 ATF Temperature Sensor
No. 2 ATF Temperature Sensor
Automatic Transmission
ECM
Speed Sensor NT
Speed Sensor SP2
P
2ND
E
No. 1 Pattern Select
Switch Assembly
L4
NP
Four Wheel Drive
Control ECU
N
Transfer Shift
Actuator Assembly

for Preparation Click here

The configuration of the electronic control system in the AB60F automatic transmission is as shown in the following chart.




S
SFTU
SFTD
S
IG
SFTU
SFTD
E
LH-IG
Transmission Control Switch
SUP
SDN
ECC
SUP
SDN
ECC
Transmission Shift Switch RH
Transmission Shift Switch LH
Spiral Cable Sub-assembly
No. 1 Switch Wire
Transmission Shift Switch
ECM


SL1+
NT+
SL1-
SL2+
NT-
SL2-
SP2+
SLT+
SLT-
SP2-
SLU+
SLU-
PWR
S1
SNWI
S2
S3
S4
L4
SR
TFN
THO1
THO2
ETHA
E1
ECM
Shift Solenoid Valve SL1
Shift Solenoid Valve SL2
Shift Solenoid Valve SLT
Shift Solenoid Valve SLU
Shift Solenoid Valve S1
Shift Solenoid Valve S2
Shift Solenoid Valve S3
Shift Solenoid Valve S4
Shift Solenoid Valve SR
No. 1 ATF Temperature Sensor
No. 2 ATF Temperature Sensor
Automatic Transmission
Speed Sensor NT
Speed Sensor SP2
P
2ND
E
Suspension Control Switch
L4
NP
Four Wheel Drive
Control ECU
N
Transfer Shift
Actuator Assembly

for Preparation Click here

SYSTEM DESCRIPTION

a. The Electronic Controlled Automatic Transmission (ECT) is an automatic transmission that electronically controls shift timing using the Engine Control Module (ECM). The ECM detects electrical signals that indicate engine and driving conditions, and controls the shift point based on driver habits and road conditions. As a result, fuel efficiency and power transmission performance are improved.
Shift shock is reduced by controlling the engine and transmission simultaneously.
In addition, the ECT has the following features:

- Diagnostic function.
- Fail-safe function when a malfunction occurs.

for Preparation Click here

HINT:

- **The ECM is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.**
- ***: Use the intelligent tester.**

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.CUSTOMER PROBLEM ANALYSIS

NEXT

3.INSPECT BATTERY VOLTAGE

Standard Voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4.CONNECT INTELLIGENT TESTER TO DLC3*

NEXT

5.CHECK AND CLEAR DTCS AND FREEZE FRAME DATA*

a. Refer to the DTC Check / Clear (Click here).

NEXT

6.VISUAL INSPECTION

NEXT

7.SETTING CHECK MODE DIAGNOSIS*

a. Refer to the Check Mode Procedure (Click here).

NEXT

8.PROBLEM SYMPTOM CONFIRMATION

a. Refer to the Road Test (Click here).

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B. → GO TO STEP 10

A

9.SYMPTOM SIMULATION

a. Refer to the Electronic Circuit Inspection Procedure (Click here).

NEXT

10.DTC CHECK*

a. Refer to the DTC Check / Clear (Click here).

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B. → GO TO STEP 18

A

11.BASIC INSPECTION

a. Refer to the Automatic Transmission Fluid (Click here).

b. Refer to the Park/Neutral Position Switch (Click here).

c. Refer to the Shift Lever Assembly (Click here).

NG. → GO TO STEP 21

OK

12.MECHANICAL SYSTEM TESTS

a. Refer to the Mechanical System Tests (Click here).

NG. → GO TO STEP 17

OK

13.HYDRAULIC TEST

a. Refer to the Hydraulic Test (Click here).

NG. → GO TO STEP 17

OK

14.MANUAL SHIFTING TEST

a. Refer to the Manual Shifting Test (Click here).

NG. → GO TO STEP 16

OK

15.PROBLEM SYMPTOMS TABLE CHAPTER 1

a. Refer to the Problem Symptoms Table (Click here).

NG. → GO TO STEP 19

OK

16.PROBLEM SYMPTOMS TABLE CHAPTER 2

a. Refer to the Problem Symptoms Table (Click here).

NEXT

17.PART INSPECTION

NG. → GO TO STEP 21

OK

18.DTC CHART

a. Refer to the Diagnostic Trouble Code Chart (Click here).

NEXT

19.CIRCUIT INSPECTION

NEXT

20.IDENTIFICATION OF PROBLEM

NEXT

21.REPAIR OR REPLACE

NEXT

22.CONFIRMATION TEST



END

for Preparation Click here

HINT:

- **The ECM is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.**
- ***: Use the intelligent tester.**

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.CUSTOMER PROBLEM ANALYSIS

NEXT

3.INSPECT BATTERY VOLTAGE

Standard Voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4.CONNECT INTELLIGENT TESTER TO DLC3*

NEXT

5.CHECK AND CLEAR DTCS AND FREEZE FRAME DATA*

a. Refer to the DTC Check / Clear (Click here).

NEXT

6.VISUAL INSPECTION

NEXT

7.SETTING CHECK MODE DIAGNOSIS*

a. Refer to the Check Mode Procedure (Click here).

NEXT

8.PROBLEM SYMPTOM CONFIRMATION

a. Refer to the Road Test (Click here).

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B. → GO TO STEP 10

A

9.SYMPTOM SIMULATION

a. Refer to the Electronic Circuit Inspection Procedure (Click here).

NEXT

10.DTC CHECK*

a. Refer to the DTC Check / Clear (Click here).

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B. → GO TO STEP 18

A

11.BASIC INSPECTION

a. Refer to the Automatic Transmission Fluid (Click here).

b. Refer to the Park/Neutral Position Switch (Click here).

c. Refer to the Shift Lever Assembly (Click here).

NG. → GO TO STEP 21

OK

12.MECHANICAL SYSTEM TESTS

a. Refer to the Mechanical System Tests (Click here).

NG. → GO TO STEP 17

OK

13.HYDRAULIC TEST

a. Refer to the Hydraulic Test (Click here).

NG. → GO TO STEP 17

OK

14.MANUAL SHIFTING TEST

a. Refer to the Manual Shifting Test (Click here).

NG. → GO TO STEP 16

OK

15.PROBLEM SYMPTOMS TABLE CHAPTER 1

a. Refer to the Problem Symptoms Table (Click here).

NG. → GO TO STEP 19

OK

16.PROBLEM SYMPTOMS TABLE CHAPTER 2

a. Refer to the Problem Symptoms Table (Click here).

NEXT

17.PART INSPECTION

NG. → GO TO STEP 21

OK

18.DTC CHART

a. Refer to the Diagnostic Trouble Code Chart (Click here).

NEXT

19.CIRCUIT INSPECTION

NEXT

20.IDENTIFICATION OF PROBLEM

NEXT

21.REPAIR OR REPLACE

NEXT

22.CONFIRMATION TEST



END

for Preparation Click here

HINT:

- **The ECM is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.**
- ***: Use the intelligent tester.**

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.CUSTOMER PROBLEM ANALYSIS

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Standard Voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

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7.SETTING CHECK MODE DIAGNOSIS*

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NEXT

8.PROBLEM SYMPTOM CONFIRMATION

a. Refer to the Road Test (Click here).

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B. → GO TO STEP 10

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9.SYMPTOM SIMULATION

a. Refer to the Electronic Circuit Inspection Procedure (Click here).

NEXT

10.DTC CHECK*

a. Refer to the DTC Check / Clear (Click here).

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B. → GO TO STEP 18

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11.BASIC INSPECTION

a. Refer to the Park/Neutral Position Switch (Click here).

b. Refer to the Shift Lever Assembly (Click here).

NG. → GO TO STEP 21

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a. Refer to the Mechanical System Tests (Click here).

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NG. → GO TO STEP 17

OK

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a. Refer to the Manual Shifting Test (Click here).

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OK

15.PROBLEM SYMPTOMS TABLE CHAPTER 1

a. Refer to the Problem Symptoms Table (Click here).

NG. → GO TO STEP 19

OK

16.PROBLEM SYMPTOMS TABLE CHAPTER 2

a. Refer to the Problem Symptoms Table (Click here).

NEXT

17.PART INSPECTION

NG. → GO TO STEP 21

OK

18.DTC CHART

a. Refer to the Diagnostic Trouble Code Chart (Click here).

NEXT

19.CIRCUIT INSPECTION

NEXT

20.IDENTIFICATION OF PROBLEM

NEXT

21.REPAIR OR REPLACE

NEXT

22.CONFIRMATION TEST

NEXT

END

for Preparation Click here

PROBLEM SYMPTOM CONFIRMATION

a. Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transmission does not shift up, shift down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

ROAD TEST

NOTICE:

Perform the test at the normal operating ATF temperature of 50 to 80°C (122 to 176°F).

a. D position test
Move the shift lever to D, fully depress the accelerator pedal and check the following points.

i. Check up-shift operation.
Check that the 1 → 2, 2 → 3, 3 → 4, 4 → 5 and 5 → 6 up-shifts take place at the shift points shown in the automatic shift schedule (Click here).

HINT:

6th Gear Up-shift Prohibition Control

- **The engine coolant temperature is below 60°C (140°F) and the vehicle speed is less than 55 km/h (34 mph).**

5th Gear Up-shift Prohibition Control

- **The engine coolant temperature is below 55°C (131°F) and the vehicle speed is less than 51 km/h (32 mph).**

4th Gear Up-shift Prohibition Control

- **The engine coolant temperature is below 47°C (117°F) and the vehicle speed is less than 49 km/h (30 mph).**

Lock-up Prohibition Control

- **The brake pedal is depressed.**
- **The accelerator pedal is released.**
- **The engine coolant temperature is below 60°C (140°F).**
- **Lock-up in 5th or 6th gear is not engaged when the shift lever is in the S4 range.**
- **Lock-up in 6th gear is not engaged when the shift lever is in the S5 range.**
- **Lock-up in 3rd or 2nd gear is engaged when the ATF temperature is higher than 125°C (257°F).**
- **Lock-up control during acceleration is not engaged when the shift lever is in the S1 range, or in 1st gear.**

ii. Check for shift shock and slippage.
Check for shock and slippage at the 1 → 2, 2 → 3, 3 → 4, 4 → 5 and 5 → 6 up-shifts.

iii. Check for abnormal noise and vibration.
Check for abnormal noise and vibration when up-shifting from 1 → 2, 2 → 3, 3 → 4, 4 → 5 and 5 → 6 while driving with the shift lever in D, and also check while driving in the lock-up condition.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

iv. Check kick-down operation.
Check the vehicle speeds when the 2 → 1, 3 → 2, 4 → 3, 5 → 4 and 6 → 5 kick-downs take place while driving with the shift lever in D. Confirm that each speed is within the applicable vehicle speed range indicated in the automatic shift schedule (Click here).

v. Check for abnormal shock and slippage at each kick-down.

vi. Check the lock-up mechanism.

- Drive in 5th gear with the shift lever in D at a steady speed (lock-up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

If there is a sudden increase in engine speed, there is no lock-up.

b. S position test

i. Check shift operation.

- While driving the vehicle in 6th gear with the shift lever in D, move the shift lever to S and return to D. With the vehicle speed at 100 km/h (62.1 mph) or less, check that the 6 → 4 down-shift and 4 → 6 up-shift can be performed.
- With the shift lever in S (while the vehicle is stopped), shift into the "+" position to check that the shift position on the combination meter changes as follows: 1 → 2, 2 → 3, 3 → 4, 4 → 5 and 5 → 6.
- While driving the vehicle in 6th gear with the shift lever in the S6 range (at a vehicle speed of approximately 70 to 80 km/h (43 to 50 mph)), shift into the "-" position and check if the 5th gear down-shift occurs and the engine brake operates properly.
- While driving the vehicle in 5th gear with the shift lever in the S5 range (at a vehicle speed of approximately 55 to 65 km/h (34 to 40 mph)), shift into the "-" position and check if the 4th gear down-shift occurs and the engine brake operates properly.
- While driving the vehicle in 4th gear with the shift lever in the S4 range (at a vehicle speed of approximately 35 to 45 km/h (21 to 28 mph)), shift into the "-" position and check if the 3rd gear down-shift occurs and the engine brake operates properly.
- While driving the vehicle in 3rd gear with the shift lever in the S3 range (at a vehicle speed of approximately 20 to 30 km/h (12 to 19 mph)), shift into the "-" position and check if the 2nd gear down-shift occurs and the engine brake operates properly.
- While driving the vehicle in 2nd gear with the shift lever in the S2 range (at a vehicle speed of approximately 10 to 20 km/h (6 to 12 mph)), shift into the "-" position and check if the 1st gear down-shift occurs and the engine brake operates properly.

HINT:

Manual shift (S range) is prohibited under either of the following conditions:

- **Down-shifting that causes engine overrun.**
- **The driver repeatedly down-shifts (down-shifting to 1st gear may not be performed).**

c. R position test
Move the shift lever to R, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.

CAUTION:

Before conducting this test, ensure that the test area is free of people and obstructions.

d. P position test
Stop the vehicle on an incline (more than 5°) and after moving the shift lever to P, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

for Preparation Click here

PROBLEM SYMPTOM CONFIRMATION

a. Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transmission does not shift up or down, or that the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and attempt to duplicate the problem symptoms.

ROAD TEST

a. Perform a road test.

CAUTION:

Check for safety before performing any tests.

NOTICE:

- **Be sure to inspect and adjust the engine before performing these tests.**
- **Perform the road test with the engine coolant temperature between 60 and 100°C (140 and 212°F) and the ATF temperature between 50 and 100°C (122 and 212°F).**
- **Perform these tests with the air conditioning and cruise control off.**

Inspection	Procedure
Transmission Control Switch Test	With the vehicle stationary and the shift lever in D, move the shift lever to S and return it to D. Check that the meter display changes from D to the appropriate S range and then back again.
S Position Test	With the vehicle stationary and the shift lever in S, move the shift lever to "+" and "-". Check that the meter display changes between S ranges properly.
D Position Shift Test	While driving the vehicle normally, check that the transmission shifts up and down through each gear properly.
Lock-up Function	While driving on a level surface at a constant speed in the lock-up range (80 km/h (50 mph) or more) with the shift lever in D, lightly depress the accelerator pedal and check that the engine speed does not change abruptly.
P Position Test	Stop the vehicle on an incline (approximately 5° or more). Then move the shift lever to P and release the parking brake. Check that the parking lock pawl holds the vehicle in place.
Abnormal Noise and Vibration	Check for abnormal noise and vibration while driving the vehicle forward and backward, and during shift operations.
Fluid Leakage	After performing all other road test inspections, check for fluid leakage.

for Preparation Click here

STALL SPEED TEST

HINT:

This test is to check the overall performance of the engine and transmission.

CAUTION:

- **To ensure safety, perform this test in an open and level area that provides good traction.**
- **The stall speed test should always be performed with at least 2 people. One person should observe the condition of the wheels and wheel chocks while the other is performing the test.**

NOTICE:

Do not perform the stall speed test for more than 5 seconds.

a. Connect the intelligent tester to the DLC3.

b. Run the vehicle until the transmission fluid temperature has reached 50 to 80°C (122 to 176°F).

c. Allow the engine to idle with the A/C off.

d. Chock all 4 wheels.

e. Set the parking brake and keep the brake pedal depressed firmly with your left foot.

f. Move the shift lever to D.

g. Depress the accelerator pedal as much as possible with your right foot.

h. Read the engine speed (stall speed) and release the accelerator pedal immediately.

Standard value:
2350 +/-200 rpm

Evaluation

Test Result	Possible Cause
Stall speed is less than standard value	• Stator one-way clutch is not operating properly • Torque converter is faulty (stall speed is less than standard value by 600 rpm or more) • Engine power may be insufficient
Stall speed is more than standard value	• Line pressure is low • C1 clutch slipping • F3 one-way clutch is not operating properly • F4 one-way clutch is not operating properly

NOTICE:

Perform the test at the normal operating ATF temperature of 50 to 80°C (122 to 176°F).

SHIFT TIME LAG TEST

HINT:

This test is to check the condition of the direct clutch, forward clutch, 1st brake and reverse brake.

a. Connect the intelligent tester to the DLC3.

b. Run the vehicle until the transmission fluid temperature has reached 50 to 80°C (122 to 176°F).

c. Allow the engine to idle with the A/C off.

d. Set the parking brake and keep the brake pedal depressed firmly.

e. Check the D position time lag.

i. Move the shift lever to N and wait for 1 minute.

ii. Move the shift lever to D and measure the time until the shock is felt.

iii. Repeat the 2 procedures above 3 times, and calculate the average time of the 3 tests.

f. Check the R position time lag.

i. Move the shift lever to N and wait for 1 minute.

ii. Move the shift lever to R and measure the time until the shock is felt.

iii. Repeat the 2 procedures above 3 times, and calculate the average time of the 3 tests.

Standard value:
D position time lag is less than 1.2 seconds
R position time lag is less than 1.5 seconds

Evaluation

Test Result	Possible Cause
D position time lag exceeds standard value	• Line pressure is low • C1 clutch is worn • F3 one-way clutch is not operating properly • F4 one-way clutch is not operating properly
R position time lag exceeds standard value	• Line pressure is low • C3 clutch is worn • B4 brake is worn • F1 one-way clutch is not operating properly

for Preparation Click here

PERFORM HYDRAULIC TEST

a. Measure the line pressure.

CAUTION:

The line pressure test should always be carried out in pairs. One technician should observe the conditions of the wheels and wheel chocks from outside the vehicle while the other is performing the test.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **This check must be conducted after checking and adjusting the engine.**
- **Perform the test with the A/C turned off.**
- **When conducting the stall test, do not continue for more than 5 seconds.**

i. Warm up the ATF (Automatic Transmission Fluid).

ii. Turn the engine switch off.

iii. Lift the vehicle up.

iv. Remove the test plug on the transmission case center right side and connect SST.

SST
09992-00095 (09992-00231, 09992-00271)

v. Lower the vehicle.

vi. Fully apply the parking brake and chock the 4 wheels.

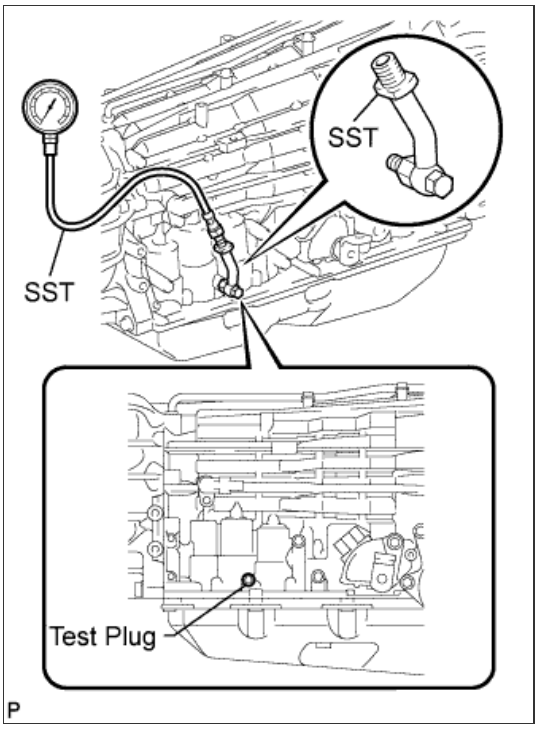
vii. Start the engine and check the idling speed.

viii. Keep your left foot pressed firmly on the brake pedal and move the shift lever to D.

ix. Measure the line pressure when the engine is idling.

x. Fully depress the accelerator pedal with your right foot. Quickly read the highest line pressure when the engine speed reaches the stall speed.

xi. In the same manner, perform the test with the shift lever in R.



Specified Line Pressure

Condition	D Position kPa (kgf/cm^2, psi)	R Position kPa (kgf/cm^2, psi)
Idling	350 to 430 kPa (3.5 to 4.4 kgf/cm^2, 50 to 63 psi)	540 to 650 kPa (5.5 to 6.7 kgf/cm^2, 78 to 95 psi)
Stall speed	1370 to 1530 kPa (14.0 to 15.6 kgf/cm^2, 199 to 221 psi)	1540 to 1750 kPa (15.7 to 17.9 kgf/cm^2, 223 to 254 psi)

Evaluation

Problem	Possible Cause
	• Shift solenoid valve SLT

Measured values at D and R positions are higher than specified pressure	defective • Regulator valve defective
Measured values at D and R positions are below specified pressure	• Shift solenoid valve SLT defective • Regulator valve defective • Oil pump defective
Pressure is low in D position only	• D position circuit fluid leak • Clutch No. 1 (C1) defective
Pressure is low in R position only	• R position circuit fluid leak • Clutch No. 3 (C3) defective • Brake No. 4 (B4) defective

for Preparation Click here

MANUAL SHIFTING TEST

HINT:

- **Through this test, it can be determined whether the trouble occurs in an electrical circuit or if it is a mechanical problem in the transmission.**
- **If any abnormalities are found in the following test, the problem is in the transmission itself.**

a. Disconnect the connector of the No. 1 transmission wire and/or No. 2 transmission wire.

HINT:

It is possible to deactivate the electrical shift control by disconnecting the transmission wires. The gear positions can then be changed mechanically with the shift lever.

b. Drive the vehicle with the transmission wires disconnected. Move the shift lever to each position to check whether the gear position changes as shown in the table below.

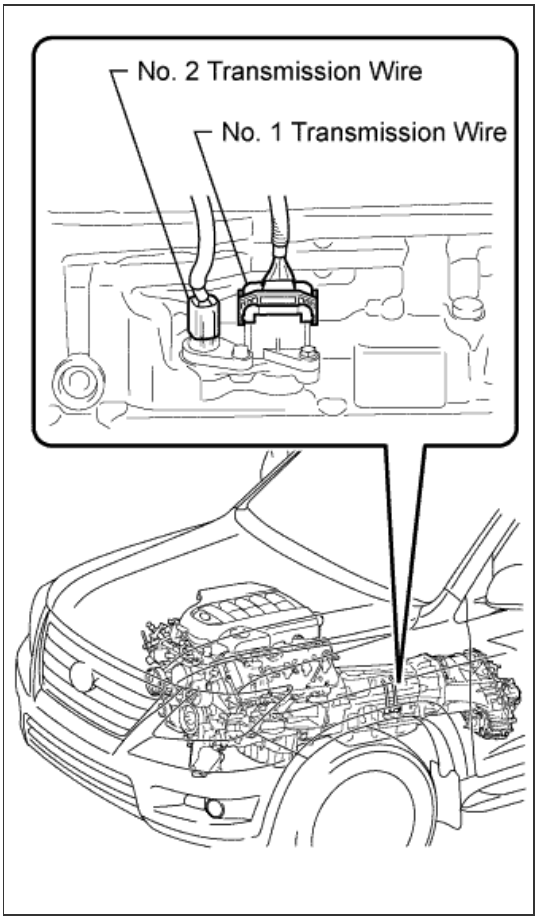
Shift Lever Position	Gear Position
P	P
R	R
D	• 4th*1 • 1st to 6th*2

HINT:

- ***1: When disconnecting only the No. 1 transmission wire or the No. 1 and No. 2 transmission wires.**
- ***2: When disconnecting only the No. 2 transmission wire.**

c. Connect the connector of the No. 1 transmission wire and/or No. 2 transmission wire.

d. Clear the DTC (Click here).



for Preparation Click here

MANUAL SHIFTING TEST

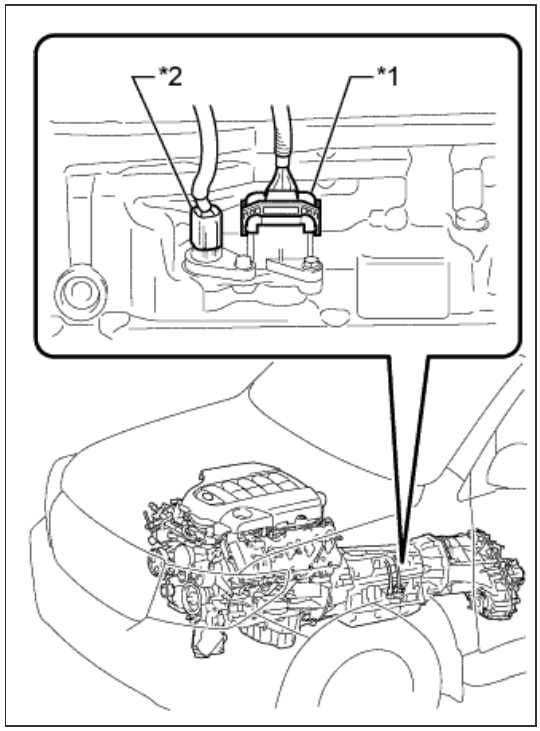
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Text in Illustration

*1	No. 1 Transmission Wire
*2	No. 2 Transmission Wire

b. Drive the vehicle with the transmission wires disconnected. Move the shift lever to each position to check whether the gear position changes as shown in the table below.

Shift Lever Position	Gear Position
P	P
R	R
D	• 4th*1 • 1st to 6th*2

HINT:

- ***1: When disconnecting only the No. 1 transmission wire or the No. 1 and No. 2 transmission wires.**
- ***2: When disconnecting only the No. 2 transmission wire.**

c. Connect the connector of the No. 1 transmission wire and/or No. 2 transmission wire.

d. Clear the DTC (Click here).

for Preparation Click here

RESET MEMORY

NOTICE:

- **Perform the Reset Memory (AT initialization) when replacing the automatic transmission assembly, valve body assembly or any of the shift solenoid valves.**
- **The Reset Memory can only be performed with the intelligent tester.**

HINT:

The ECM memorizes the control conditions of the automatic transmission assembly and engine assembly. Therefore, when the automatic transmission assembly, valve body assembly or any of the shift solenoid valves has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Utility / Reset Memory.

NOTICE:

After performing the Reset Memory, be sure to perform the Road Test (Click here) described earlier.

HINT:

The ECM learns through the Road Test.

for Preparation Click here

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for Preparation Click here

AUTOMATIC TRANSMISSION MONITOR DRIVE PATTERN

CAUTION:

Perform this drive pattern on a level surface and strictly observe the posted speed limits and traffic laws while driving.

HINT:

Performing this drive pattern is one method to simulate the automatic transmission malfunction detection conditions.

The DTCs may not be stored through ordinary, everyday driving. Also, DTCs may not be stored through this drive pattern.

a. Preparation for driving

i. Warm up the engine sufficiently (engine coolant temperature is 60°C (140°F) or higher).

ii. Drive the vehicle when the atmospheric temperature is -10°C (14°F) or higher.
Malfunctions are not detected when the atmospheric temperature is below -10°C (14°F).

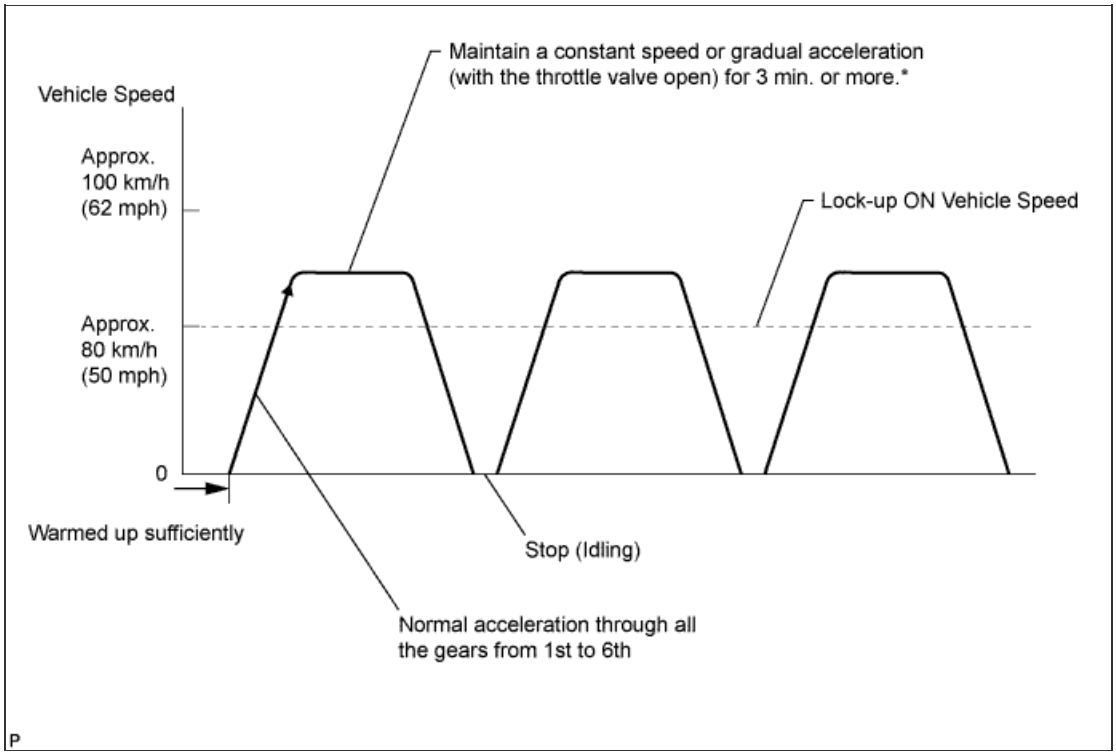
b. Drive pattern

i. Drive the vehicle through all the gears.
Stop → 1st → 2nd → 3rd → 4th → 5th → 5th (lock-up ON) → 6th → 6th (lock-up ON).

ii. Repeat the above drive pattern 3 times or more.

NOTICE:

- **When using the intelligent tester, the monitor status can be checked in the Data List (Click here).**
- **In the event that the drive pattern must be interrupted (due to traffic conditions or other factors), the drive pattern can be resumed and, in most cases, the monitor can be completed.**



HINT:

*: Drive at such a speed in the uppermost gear to engage lock-up. The vehicle can be driven at a speed less than the speed shown in the above diagram under the lock-up condition.

NOTICE:

It is necessary to drive the vehicle for approximately 30 minutes to store DTC P0711 (No. 1 ATF temperature sensor malfunction).

for Preparation Click here

AUTOMATIC TRANSMISSION MONITOR DRIVE PATTERN

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Perform this drive pattern on a level surface and strictly observe the posted speed limits and traffic laws while driving.

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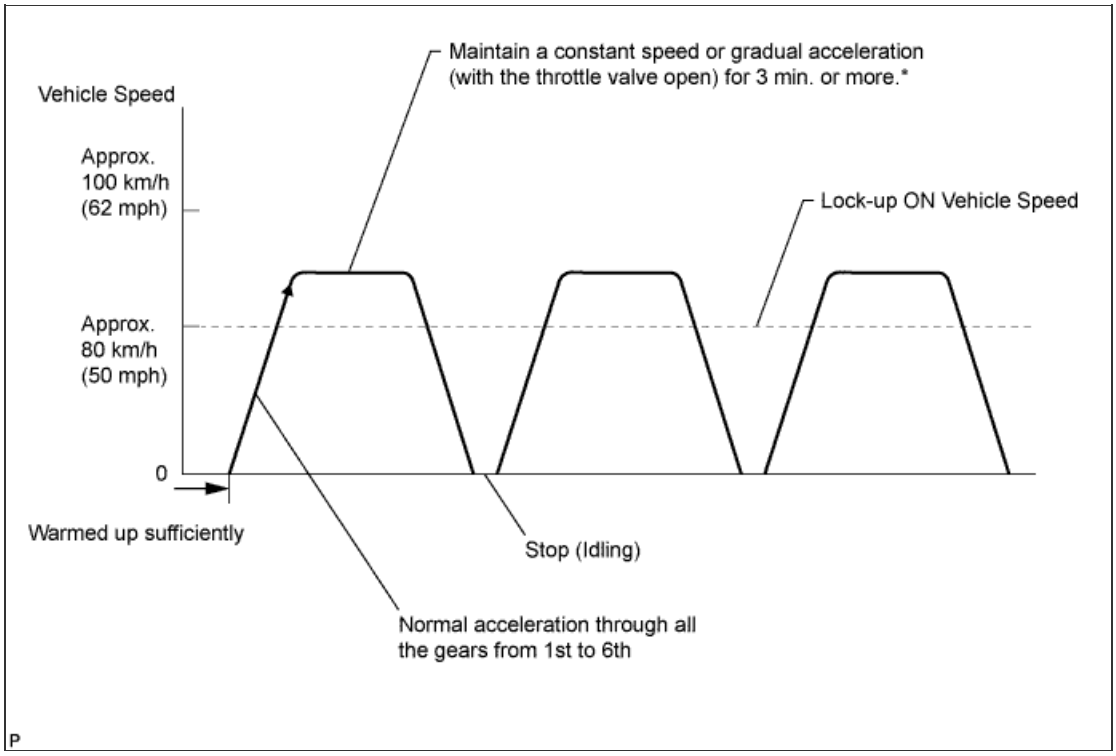
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NOTICE:

It is necessary to drive the vehicle for approximately 30 minutes to store DTC P0711 (No. 1 ATF temperature sensor malfunction).

for Preparation Click here

HINT:

- **Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.**
- **The Matrix Chart is divided into 2 chapters. When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 1 to proceed to 2, proceed as instructed.**
- **If the instruction "Proceed to next circuit inspection shown in problem symptoms table" is given in the flowchart for a circuit, proceed to the next suspected area in the table.**
- **If the problem still occurs even though there are no malfunctions in any of the circuits, check the ECM and replace it if necessary.**
- ***: When the circuit is defective, a DTC may be output.**

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected Area	See page
No up-shift (1st -> 2nd)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No up-shift (2nd -> 3rd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No up-shift (3rd -> 4th)	Shift solenoid valve S3 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (4th -> 5th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (5th -> 6th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No down-shift (6th -> 5th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No down-shift (5th -> 4th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	ECM	Click here
No down-shift (4th -> 3rd)	Shift solenoid valve S3 circuit*	Click here
	ECM	Click here
No down-shift (3rd -> 2nd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No down-shift (2nd -> 1st)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No lock-up or no lock-up off	Shift solenoid valve SLU circuit*	Click here
	Stop light switch circuit*	Click here
	ECM	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here

No lock-up	Engine coolant temperature sensor circuit*	Click here
	Stop light switch circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
No lock-up off	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Shift point too high or too low	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Throttle position sensor circuit*	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Pattern select switch (PWR) circuit	Click here
	ECM	Click here
Up-shift to 4th from 3rd while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Up-shift to 5th from 4th while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No gear change by shifting into "+" or "-" while shift lever in S	Transmission control switch circuit	Click here
	ECM	Click here
Harsh engagement (N -> D)	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Harsh engagement (lock-up)	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Harsh engagement (any gear position)	Throttle position sensor circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Poor acceleration	No. 2 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch (2ND) circuit	Click here
	ECM	Click here
No engine brake	ECM	Click here
No kick-down	ECM	Click here
Engine stalls when starting off or stopping	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
ECT 2ND does not operate	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch (2ND) circuit	Click here
	ECM	Click here
ATF temperature warning indicator remains on, lock-up at 3rd gear and/or shift point too high	No. 2 ATF temperature sensor circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Malfunction in shifting	Park/neutral position switch circuit*	Click here
	Transmission control switch circuit	Click here
	ECM	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th)	Shift solenoid valve SR circuit*	Click here
Slip or shudder (5th -> 6th -> and 6th -> 5th)	Shift solenoid valve SR circuit*	Click here

2. Chapter 2: On-vehicle Repair and Off-vehicle Repair

Symptom	Suspected Area	See page
Vehicle does not move when shift lever is in any forward position or reverse position	Floor shift gear shifting rod sub-assembly	Click here
	Manual valve	Click here
	Parking lock pawl	Click here
	Rear planetary gear unit	Click here
	Torque converter clutch	Click here
Vehicle does not move with shift lever in R	Valve body assembly	Click here
	B4 brake	Click here
No up-shift (1st -> 2nd)	Valve body assembly	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
No up-shift (2nd -> 3rd)	Valve body assembly	Click here
	C3 clutch	Click here
No up-shift (3rd -> 4th)	Valve body assembly	Click here
	C2 clutch	Click here
No up-shift (4th -> 5th)	Valve body assembly	Click here
	B1 brake	Click here
No up-shift (5th -> 6th)	Valve body assembly	Click here
	B2 brake	Click here
No down-shift (6th -> 5th)	Valve body assembly	Click here
No down-shift (5th -> 4th)	Valve body assembly	Click here
No down-shift (4th -> 3rd)	Valve body assembly	Click here
No down-shift (3rd -> 2nd)	Valve body assembly	Click here
No down-shift (2nd -> 1st)	Valve body assembly	Click here
No lock-up or no lock-up off	Valve body assembly	Click here
	Torque converter clutch	Click here
Harsh engagement (N -> D)	Valve body assembly	Click here
	C1 accumulator	Click here
	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Harsh engagement (lock-up)	Valve body assembly	Click here
	Torque converter clutch	Click here
Harsh engagement (N -> R)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
	B4 brake	Click here
	F1 one-way clutch	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th -> 6th)	Valve body assembly	Click here
Harsh engagement (1st -> 2nd)	Valve body assembly	Click here
	B3 accumulator	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
Harsh engagement (2nd -> 3rd)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Harsh engagement (3rd -> 4th)	Valve body assembly	Click here
	C2 accumulator	Click here
	C2 clutch	Click here
Harsh engagement (4th -> 5th)	Valve body assembly	Click here
	B1 accumulator	Click here
	B1 brake	Click here
	Valve body assembly	Click here

Harsh engagement (5th -> 6th)	B2 accumulator B2 brake	Click here Click here
Harsh engagement (6th -> 5th)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Slip or shudder (forward and reverse, after warm-up)	Floor shift gear shifting rod sub-assembly	Click here
	Valve body assembly	Click here
	Oil strainer	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
	Torque converter clutch	Click here
Slip or shudder (particular position, just after engine starts)	Torque converter clutch	Click here
Slip or shudder (shift lever in R)	B4 brake	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
Slip or shudder (1st)	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (2nd)	C1 clutch	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (3rd)	C1 clutch	Click here
	C3 clutch	Click here
	F1 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (4th)	C1 clutch	Click here
	C2 clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (5th)	C2 clutch	Click here
	C3 clutch	Click here
	B1 brake	Click here
Slip or shudder (6th)	C2 clutch	Click here
	B2 brake	Click here
No engine braking (1st to 4th, shift lever in S)	C4 clutch	Click here
No engine braking (1st: shift lever in 1)	Valve body assembly	Click here
	B4 brake	Click here
No engine braking (2nd: shift lever in 2)	Valve body assembly	Click here
	B2 brake	Click here
No engine braking (3rd: shift lever in 3)	Valve body assembly	Click here
	B1 brake	Click here
No engine braking (4th: shift lever in 4)	Valve body assembly	Click here
No kick-down	Valve body assembly	Click here
Shift point too high or too low	Valve body assembly	Click here
Poor acceleration (all positions)	Valve body assembly	Click here
	Torque converter clutch	Click here
Poor acceleration (6th)	B2 brake	Click here
	C2 clutch	Click here
	Front planetary gear unit	Click here
Engine stalls when starting off or stopping	Valve body assembly	Click here
	Torque converter clutch	Click here

for Preparation Click here

HINT:

- **Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.**
- **The Matrix Chart is divided into 2 chapters. When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 1 to proceed to 2, proceed as instructed.**
- **If the instruction "Proceed to next circuit inspection shown in problem symptoms table" is given in the flowchart for a circuit, proceed to the next suspected area in the table.**
- **If the problem still occurs even though there are no malfunctions in any of the circuits, check the ECM and replace it if necessary.**
- ***: When the circuit is defective, a DTC may be output.**

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected Area	See page
No up-shift (1st -> 2nd)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No up-shift (2nd -> 3rd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No up-shift (3rd -> 4th)	Shift solenoid valve S3 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (4th -> 5th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (5th -> 6th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No down-shift (6th -> 5th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No down-shift (5th -> 4th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	ECM	Click here
No down-shift (4th -> 3rd)	Shift solenoid valve S3 circuit*	Click here
	ECM	Click here
No down-shift (3rd -> 2nd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No down-shift (2nd -> 1st)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No lock-up or no lock-up off	Shift solenoid valve SLU circuit*	Click here
	Stop light switch circuit*	Click here
	ECM	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here

No lock-up	Engine coolant temperature sensor circuit*	Click here
	Stop light switch circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
No lock-up off	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Shift point too high or too low	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Throttle position sensor circuit*	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Pattern select switch (PWR) circuit	Click here
	ECM	Click here
Up-shift to 4th from 3rd while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Up-shift to 5th from 4th while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No gear change by shifting into "+" or "-" while shift lever in S	Transmission control switch circuit	Click here
	ECM	Click here
Harsh engagement (N -> D)	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Harsh engagement (lock-up)	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Harsh engagement (any gear position)	Throttle position sensor circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Poor acceleration	No. 2 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch (2ND) circuit	Click here
	ECM	Click here
No engine brake	ECM	Click here
No kick-down	ECM	Click here
Engine stalls when starting off or stopping	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
ECT 2ND does not operate	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch (2ND) circuit	Click here
	ECM	Click here
ATF temperature warning indicator remains on, lock-up at 3rd gear and/or shift point too high	No. 2 ATF temperature sensor circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Malfunction in shifting	Park/neutral position switch circuit*	Click here
	Transmission control switch circuit	Click here
	ECM	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th)	Shift solenoid valve SR circuit*	Click here
Slip or shudder (5th -> 6th -> and 6th -> 5th)	Shift solenoid valve SR circuit*	Click here

2. Chapter 2: On-vehicle Repair and Off-vehicle Repair

Symptom	Suspected Area	See page
Vehicle does not move when shift lever is in any forward position or reverse position	Floor shift gear shifting rod sub-assembly	Click here
	Manual valve	Click here
	Parking lock pawl	Click here
	Rear planetary gear unit	Click here
	Torque converter clutch	Click here
Vehicle does not move with shift lever in R	Valve body assembly	Click here
	B4 brake	Click here
No up-shift (1st -> 2nd)	Valve body assembly	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
No up-shift (2nd -> 3rd)	Valve body assembly	Click here
	C3 clutch	Click here
No up-shift (3rd -> 4th)	Valve body assembly	Click here
	C2 clutch	Click here
No up-shift (4th -> 5th)	Valve body assembly	Click here
	B1 brake	Click here
No up-shift (5th -> 6th)	Valve body assembly	Click here
	B2 brake	Click here
No down-shift (6th -> 5th)	Valve body assembly	Click here
No down-shift (5th -> 4th)	Valve body assembly	Click here
No down-shift (4th -> 3rd)	Valve body assembly	Click here
No down-shift (3rd -> 2nd)	Valve body assembly	Click here
No down-shift (2nd -> 1st)	Valve body assembly	Click here
No lock-up or no lock-up off	Valve body assembly	Click here
	Torque converter clutch	Click here
Harsh engagement (N -> D)	Valve body assembly	Click here
	C1 accumulator	Click here
	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Harsh engagement (lock-up)	Valve body assembly	Click here
	Torque converter clutch	Click here
Harsh engagement (N -> R)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
	B4 brake	Click here
	F1 one-way clutch	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th -> 6th)	Valve body assembly	Click here
Harsh engagement (1st -> 2nd)	Valve body assembly	Click here
	B3 accumulator	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
Harsh engagement (2nd -> 3rd)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Harsh engagement (3rd -> 4th)	Valve body assembly	Click here
	C2 accumulator	Click here
	C2 clutch	Click here
Harsh engagement (4th -> 5th)	Valve body assembly	Click here
	B1 accumulator	Click here
	B1 brake	Click here
	Valve body assembly	Click here

Harsh engagement (5th -> 6th)	B2 accumulator B2 brake	Click here Click here
Harsh engagement (6th -> 5th)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Slip or shudder (forward and reverse, after warm-up)	Floor shift gear shifting rod sub-assembly	Click here
	Valve body assembly	Click here
	Oil strainer	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
	Torque converter clutch	Click here
Slip or shudder (particular position, just after engine starts)	Torque converter clutch	Click here
Slip or shudder (shift lever in R)	B4 brake	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
Slip or shudder (1st)	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (2nd)	C1 clutch	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (3rd)	C1 clutch	Click here
	C3 clutch	Click here
	F1 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (4th)	C1 clutch	Click here
	C2 clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (5th)	C2 clutch	Click here
	C3 clutch	Click here
	B1 brake	Click here
Slip or shudder (6th)	C2 clutch	Click here
	B2 brake	Click here
No engine braking (1st to 4th, shift lever in S)	C4 clutch	Click here
No engine braking (1st: shift lever in 1)	Valve body assembly	Click here
	B4 brake	Click here
No engine braking (2nd: shift lever in 2)	Valve body assembly	Click here
	B2 brake	Click here
No engine braking (3rd: shift lever in 3)	Valve body assembly	Click here
	B1 brake	Click here
No engine braking (4th: shift lever in 4)	Valve body assembly	Click here
No kick-down	Valve body assembly	Click here
Shift point too high or too low	Valve body assembly	Click here
Poor acceleration (all positions)	Valve body assembly	Click here
	Torque converter clutch	Click here
Poor acceleration (6th)	B2 brake	Click here
	C2 clutch	Click here
	Front planetary gear unit	Click here
Engine stalls when starting off or stopping	Valve body assembly	Click here
	Torque converter clutch	Click here

for Preparation Click here

HINT:

- **Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.**
- **The Matrix Chart is divided into 2 chapters. When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 1 to proceed to 2, proceed as instructed.**
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- **If the problem still occurs even though there are no malfunctions in any of the circuits, check the ECM and replace it if necessary.**
- ***: When the circuit is defective, a DTC may be output.**

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected Area	See page
No up-shift (1st -> 2nd)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No up-shift (2nd -> 3rd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No up-shift (3rd -> 4th)	Shift solenoid valve S3 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (4th -> 5th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (5th -> 6th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No down-shift (6th -> 5th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No down-shift (5th -> 4th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	ECM	Click here
No down-shift (4th -> 3rd)	Shift solenoid valve S3 circuit*	Click here
	ECM	Click here
No down-shift (3rd -> 2nd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No down-shift (2nd -> 1st)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No lock-up or no lock-up off	Shift solenoid valve SLU circuit*	Click here
	Stop light switch circuit*	Click here
	ECM	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here

No lock-up	Engine coolant temperature sensor circuit*	Click here
	Stop light switch circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
No lock-up off	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Shift point too high or too low	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Throttle position sensor circuit*	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Pattern select switch (PWR) circuit	Click here
	ECM	Click here
Up-shift to 4th from 3rd while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Up-shift to 5th from 4th while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No gear change by shifting into "+" or "-" while shift lever in S	Transmission control switch circuit	Click here
	ECM	Click here
Harsh engagement (N -> D)	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Harsh engagement (lock-up)	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Harsh engagement (any gear position)	Throttle position sensor circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Poor acceleration	No. 2 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch (2ND) circuit	Click here
	ECM	Click here
No engine brake	ECM	Click here
No kick-down	ECM	Click here
Engine stalls when starting off or stopping	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
ECT 2ND does not operate	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch (2ND) circuit	Click here
	ECM	Click here
ATF temperature warning indicator remains on, lock-up at 3rd gear and/or shift point too high	No. 2 ATF temperature sensor circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Malfunction in shifting	Park/neutral position switch circuit*	Click here
	Transmission control switch circuit	Click here
	ECM	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th)	Shift solenoid valve SR circuit*	Click here
Slip or shudder (5th -> 6th -> and 6th -> 5th)	Shift solenoid valve SR circuit*	Click here

2. Chapter 2: On-vehicle Repair and Off-vehicle Repair

Symptom	Suspected Area	See page
Vehicle does not move when shift lever is in any forward position or reverse position	Floor shift gear shifting rod sub-assembly	Click here
	Manual valve	Click here
	Parking lock pawl	Click here
	Rear planetary gear unit	Click here
	Torque converter clutch	Click here
Vehicle does not move with shift lever in R	Valve body assembly	Click here
	B4 brake	Click here
No up-shift (1st -> 2nd)	Valve body assembly	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
No up-shift (2nd -> 3rd)	Valve body assembly	Click here
	C3 clutch	Click here
No up-shift (3rd -> 4th)	Valve body assembly	Click here
	C2 clutch	Click here
No up-shift (4th -> 5th)	Valve body assembly	Click here
	B1 brake	Click here
No up-shift (5th -> 6th)	Valve body assembly	Click here
	B2 brake	Click here
No down-shift (6th -> 5th)	Valve body assembly	Click here
No down-shift (5th -> 4th)	Valve body assembly	Click here
No down-shift (4th -> 3rd)	Valve body assembly	Click here
No down-shift (3rd -> 2nd)	Valve body assembly	Click here
No down-shift (2nd -> 1st)	Valve body assembly	Click here
No lock-up or no lock-up off	Valve body assembly	Click here
	Torque converter clutch	Click here
Harsh engagement (N -> D)	Valve body assembly	Click here
	C1 accumulator	Click here
	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Harsh engagement (lock-up)	Valve body assembly	Click here
	Torque converter clutch	Click here
Harsh engagement (N -> R)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
	B4 brake	Click here
	F1 one-way clutch	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th -> 6th)	Valve body assembly	Click here
Harsh engagement (1st -> 2nd)	Valve body assembly	Click here
	B3 accumulator	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
Harsh engagement (2nd -> 3rd)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Harsh engagement (3rd -> 4th)	Valve body assembly	Click here
	C2 accumulator	Click here
	C2 clutch	Click here
Harsh engagement (4th -> 5th)	Valve body assembly	Click here
	B1 accumulator	Click here
	B1 brake	Click here
	Valve body assembly	Click here

Harsh engagement (5th -> 6th)	B2 accumulator B2 brake	Click here Click here
Harsh engagement (6th -> 5th)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Slip or shudder (forward and reverse, after warm-up)	Floor shift gear shifting rod sub-assembly	Click here
	Valve body assembly	Click here
	Oil strainer	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
	Torque converter clutch	Click here
Slip or shudder (particular position, just after engine starts)	Torque converter clutch	Click here
Slip or shudder (shift lever in R)	B4 brake	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
Slip or shudder (1st)	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (2nd)	C1 clutch	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (3rd)	C1 clutch	Click here
	C3 clutch	Click here
	F1 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (4th)	C1 clutch	Click here
	C2 clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (5th)	C2 clutch	Click here
	C3 clutch	Click here
	B1 brake	Click here
Slip or shudder (6th)	C2 clutch	Click here
	B2 brake	Click here
No engine braking (1st to 4th, shift lever in S)	C4 clutch	Click here
No engine braking (1st: shift lever in 1)	Valve body assembly	Click here
	B4 brake	Click here
No engine braking (2nd: shift lever in 2)	Valve body assembly	Click here
	B2 brake	Click here
No engine braking (3rd: shift lever in 3)	Valve body assembly	Click here
	B1 brake	Click here
No engine braking (4th: shift lever in 4)	Valve body assembly	Click here
No kick-down	Valve body assembly	Click here
Shift point too high or too low	Valve body assembly	Click here
Poor acceleration (all positions)	Valve body assembly	Click here
	Torque converter clutch	Click here
Poor acceleration (6th)	B2 brake	Click here
	C2 clutch	Click here
	Front planetary gear unit	Click here
Engine stalls when starting off or stopping	Valve body assembly	Click here
	Torque converter clutch	Click here

for Preparation Click here

HINT:

- **Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.**
- **The Matrix Chart is divided into 2 chapters. When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 1 to proceed to 2, proceed as instructed.**
- **If the instruction "Proceed to next circuit inspection shown in problem symptoms table" is given in the flowchart for a circuit, proceed to the next suspected area in the table.**
- **If the problem still occurs even though there are no malfunctions in any of the circuits, check the ECM and replace it if necessary.**
- ***: When the circuit is defective, a DTC may be output.**

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected Area	See page
No up-shift (1st -> 2nd)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No up-shift (2nd -> 3rd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No up-shift (3rd -> 4th)	Shift solenoid valve S3 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (4th -> 5th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No up-shift (5th -> 6th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No down-shift (6th -> 5th)	Park/neutral position switch circuit*	Click here
	Shift solenoid valve S2 circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No down-shift (5th -> 4th)	Shift solenoid valve S4 circuit*	Click here
	Shift solenoid valve SR circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	ECM	Click here
No down-shift (4th -> 3rd)	Shift solenoid valve S3 circuit*	Click here
	ECM	Click here
No down-shift (3rd -> 2nd)	Shift solenoid valve S2 circuit*	Click here
	ECM	Click here
No down-shift (2nd -> 1st)	Shift solenoid valve S1 circuit*	Click here
	ECM	Click here
No lock-up or no lock-up off	Shift solenoid valve SLU circuit*	Click here
	Stop light switch circuit*	Click here
	ECM	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here

No lock-up	Engine coolant temperature sensor circuit*	Click here
	Stop light switch circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
No lock-up off	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Shift point too high or too low	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Throttle position sensor circuit*	Click here
	No. 1 ATF temperature sensor circuit*	Click here
	Pattern select switch (PWR) circuit	Click here
	ECM	Click here
Up-shift to 4th from 3rd while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Up-shift to 5th from 4th while engine is cold	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
No gear change by shifting into "+" or "-" while shift lever in S	Transmission control switch circuit	Click here
	ECM	Click here
No gear change by operating the "+" or "-" shift paddle switch	Shift paddle switch circuit	Click here
	Transmission control switch circuit	Click here
	ECM	Click here
Harsh engagement (N -> D)	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Harsh engagement (lock-up)	Speed sensor NT circuit*	Click here
	Speed sensor SP2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
Harsh engagement (any gear position)	Throttle position sensor circuit*	Click here
	Shift solenoid valve SL1 circuit*	Click here
	Shift solenoid valve SL2 circuit*	Click here
	Shift solenoid valve SLU circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Speed sensor NT circuit*	Click here
	ECM	Click here
Poor acceleration	No. 2 ATF temperature sensor circuit*	Click here
	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch (2ND) circuit	Click here
	ECM	Click here
No engine brake	ECM	Click here
No kick-down	ECM	Click here
Engine stalls when starting off or stopping	Shift solenoid valve SLU circuit*	Click here
	ECM	Click here
ECT 2ND does not operate	Shift solenoid valve SLT circuit*	Click here
	Pattern select switch (2ND) circuit	Click here
	ECM	Click here
ATF temperature warning indicator remains on, lock-up at 3rd gear and/or shift point too high	No. 2 ATF temperature sensor circuit*	Click here
	Engine coolant temperature sensor circuit*	Click here
	ECM	Click here
Malfunction in shifting	Park/neutral position switch circuit*	Click here
	Transmission control switch circuit	Click here
	Shift paddle switch circuit	Click here
	ECM	Click here

Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th)	Shift solenoid valve SR circuit*	Click here
Slip or shudder (5th -> 6th -> and 6th -> 5th)	Shift solenoid valve SR circuit*	Click here

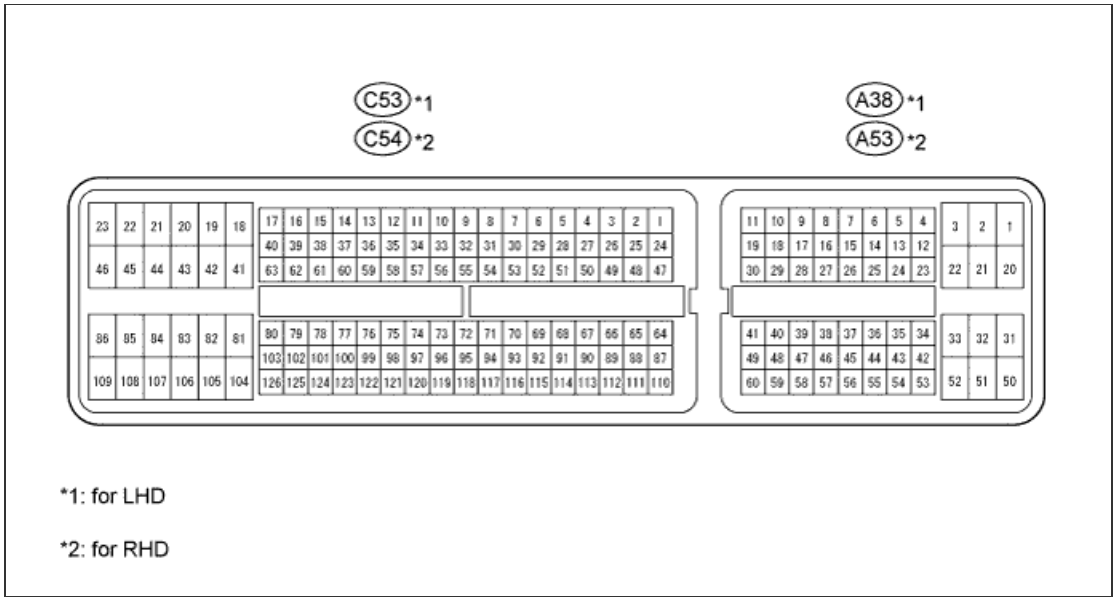
2. Chapter 2: On-vehicle Repair and Off-vehicle Repair

Symptom	Suspected Area	See page
Vehicle does not move when shift lever is in any forward position or reverse position	Floor shift gear shifting rod sub-assembly	Click here
	Manual valve	Click here
	Parking lock pawl	Click here
	Rear planetary gear unit	Click here
	Torque converter clutch	Click here
Vehicle does not move with shift lever in R	Valve body assembly	Click here
	B4 brake	Click here
No up-shift (1st -> 2nd)	Valve body assembly	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
No up-shift (2nd -> 3rd)	Valve body assembly	Click here
	C3 clutch	Click here
No up-shift (3rd -> 4th)	Valve body assembly	Click here
	C2 clutch	Click here
No up-shift (4th -> 5th)	Valve body assembly	Click here
	B1 brake	Click here
No up-shift (5th -> 6th)	Valve body assembly	Click here
	B2 brake	Click here
No down-shift (6th -> 5th)	Valve body assembly	Click here
No down-shift (5th -> 4th)	Valve body assembly	Click here
No down-shift (4th -> 3rd)	Valve body assembly	Click here
No down-shift (3rd -> 2nd)	Valve body assembly	Click here
No down-shift (2nd -> 1st)	Valve body assembly	Click here
No lock-up or no lock-up off	Valve body assembly	Click here
	Torque converter clutch	Click here
Harsh engagement (N -> D)	Valve body assembly	Click here
	C1 accumulator	Click here
	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Harsh engagement (lock-up)	Valve body assembly	Click here
	Torque converter clutch	Click here
Harsh engagement (N -> R)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
	B4 brake	Click here
	F1 one-way clutch	Click here
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th -> 6th)	Valve body assembly	Click here
Harsh engagement (1st -> 2nd)	Valve body assembly	Click here
	B3 accumulator	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
Harsh engagement (2nd -> 3rd)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Harsh engagement (3rd -> 4th)	Valve body assembly	Click here
	C2 accumulator	Click here
	C2 clutch	Click here
	Valve body assembly	Click here

Harsh engagement (4th -> 5th)	B1 accumulator	Click here
	B1 brake	Click here
Harsh engagement (5th -> 6th)	Valve body assembly	Click here
	B2 accumulator	Click here
	B2 brake	Click here
Harsh engagement (6th -> 5th)	Valve body assembly	Click here
	C3 accumulator	Click here
	C3 clutch	Click here
Slip or shudder (forward and reverse, after warm-up)	Floor shift gear shifting rod sub-assembly	Click here
	Valve body assembly	Click here
	Oil strainer	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
	Torque converter clutch	Click here
Slip or shudder (particular position, just after engine starts)	Torque converter clutch	Click here
Slip or shudder (shift lever in R)	B4 brake	Click here
	F1 one-way clutch	Click here
	C3 clutch	Click here
Slip or shudder (1st)	C1 clutch	Click here
	F3 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (2nd)	C1 clutch	Click here
	B3 brake	Click here
	F1 one-way clutch	Click here
	F2 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (3rd)	C1 clutch	Click here
	C3 clutch	Click here
	F1 one-way clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (4th)	C1 clutch	Click here
	C2 clutch	Click here
	F4 one-way clutch	Click here
Slip or shudder (5th)	C2 clutch	Click here
	C3 clutch	Click here
	B1 brake	Click here
Slip or shudder (6th)	C2 clutch	Click here
	B2 brake	Click here
No engine braking (1st to 4th, shift lever in S)	C4 clutch	Click here
No engine braking (1st: shift lever in 1)	Valve body assembly	Click here
	B4 brake	Click here
No engine braking (2nd: shift lever in 2)	Valve body assembly	Click here
	B2 brake	Click here
No engine braking (3rd: shift lever in 3)	Valve body assembly	Click here
	B1 brake	Click here
No engine braking (4th: shift lever in 4)	Valve body assembly	Click here
No kick-down	Valve body assembly	Click here
Shift point too high or too low	Valve body assembly	Click here
Poor acceleration (all positions)	Valve body assembly	Click here
	Torque converter clutch	Click here
Poor acceleration (6th)	B2 brake	Click here
	C2 clutch	Click here
	Front planetary gear unit	Click here
Engine stalls when starting off or stopping	Valve body assembly	Click here
	Torque converter clutch	Click here

for Preparation Click here

CHECK ECM



HINT:

- **Each ECM terminal standard voltage is shown in the table below.**
  In the table, first follow the information under "Condition". Look under "Terminal No. (Symbol)" for the terminals to be inspected.
  The standard voltage between the terminals is shown under "Specified Condition".
  Use the illustration above as a reference for the ECM terminals.
- ***1: for LHD**
- ***2: for RHD**

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
A38-21 (L4) - C53-81 (E1)*1 A53-21 (L4) - C54-81 (E1)*2	BR-R - W-B	Transfer L4 position signal	• Engine switch on (IG) • Transfer position switch on L4	Below 1.5 V
A38-21 (L4) - C53-81 (E1)*1 A53-21 (L4) - C54-81 (E1)*2	BR-R - W-B	Transfer L4 position signal	• Engine switch on (IG) • Transfer position switch not on L4	11 to 14 V
A38-5 (TFN) - C53-81 (E1)*1 A53-5 (TFN) - C54-81 (E1)*2	G - W-B	Transfer neutral position signal	• Engine switch on (IG) • Transfer position in neutral	Below 1.5 V
A38-5 (TFN) - C53-81 (E1)*1 A53-5 (TFN) - C54-81 (E1)*2	G - W-B	Transfer neutral position signal	• Engine switch on (IG) • Transfer position not in neutral	11 to 14 V
C53-120 (NSW) - C53-81 (E1)*1 C54-120 (NSW) - C54-81 (E1)*2	L - W-B	PNP switch signal	• Engine switch on (IG) • Shift lever in P or N	Below 1 V
C53-120 (NSW) - C53-81 (E1)*1			• Engine switch on (IG)	

C54-120 (NSW) - C54-81 (E1)*2	L - W-B	PNP switch signal	• Shift lever not in P or N	11 to 14 V
C53-2 (P) - C53-81 (E1)*1 C54-2 (P) - C54-81 (E1)*2	G-B - W-B	P shift position switch signal	• Engine switch on (IG) • Shift lever in P	11 to 14 V
C53-2 (P) - C53-81 (E1)*1 C54-2 (P) - C54-81 (E1)*2	G-B - W-B	P shift position switch signal	• Engine switch on (IG) • Shift lever not in P	Below 1 V
C53-26 (R) - C53-81 (E1)*1 C54-26 (R) - C54-81 (E1)*2	L-R - W-B	R shift position switch signal	• Engine switch on (IG) • Shift lever in R	11 to 14 V
C53-26 (R) - C53-81 (E1)*1 C54-26 (R) - C54-81 (E1)*2	L-R - W-B	R shift position switch signal	• Engine switch on (IG) • Shift lever not in R	Below 1 V
C53-25 (N) - C53-81 (E1)*1 C54-25 (N) - C54-81 (E1)*2	G-W - W-B	N shift position switch signal	• Engine switch on (IG) • Shift lever in N	11 to 14 V
C53-25 (N) - C53-81 (E1)*1 C54-25 (N) - C54-81 (E1)*2	G-W - W-B	N shift position switch signal	• Engine switch on (IG) • Shift lever not in N	Below 1 V
C53-27 (D) - C53-81 (E1)*1 C54-27 (D) - C54-81 (E1)*2	G - W-B	D shift position switch signal	• Engine switch on (IG) • Shift lever in D	11 to 14 V
C53-27 (D) - C53-81 (E1)*1 C54-27 (D) - C54-81 (E1)*2	G - W-B	D shift position switch signal	• Engine switch on (IG) • Shift lever not in D	Below 1 V
A38-25 (S) - C53-81 (E1)*1 A53-25 (S) - C54-81 (E1)*2	W - W-B	S shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
A38-25 (S) - C53-81 (E1)*1 A53-25 (S) - C54-81 (E1)*2	W - W-B	S shift position switch signal	• Engine switch on (IG) • Shift lever not in S	Below 1 V
A38-38 (SFTU) - C53-81 (E1)*1 A53-38 (SFTU) - C54-81 (E1)*2	Y - W-B	Up-shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
A38-38 (SFTU) - C53-81 (E1)*1 A53-38 (SFTU) - C54-81 (E1)*2	Y - W-B	Up-shift position switch signal	• Engine switch on (IG) • Shift lever "+" position (up-shift)	Below 1 V
A38-27 (SFTD) - C53-81 (E1)*1 A53-27 (SFTD) - C54-81 (E1)*2	L - W-B	Down-shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
A38-27 (SFTD) - C53-81 (E1)*1 A53-27 (SFTD) - C54-81 (E1)*2	L - W-B	Down-shift position switch signal	• Engine switch on (IG) • Shift lever "-" position (down-shift)	Below 1 V
A38-36 (STP) - C53-81 (E1)*1 A53-36 (STP) - C54-81 (E1)*2	R - W-B	Stop light switch signal	Brake pedal depressed	11 to 14 V
A38-36 (STP) - C53-81 (E1)*1				

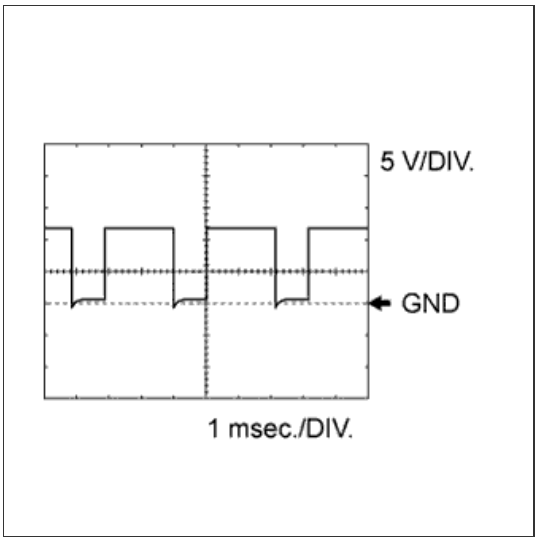
A53-36 (STP) - C54-81 (E1)*2	R - W-B	Stop light switch signal	Brake pedal released	Below 1.5 V
C53-7 (S1) - C53-81 (E1)*1 C54-7 (S1) - C54-81 (E1)*2	R - W-B	Shift solenoid valve S1 signal	1st gear	Below 1 V
C53-7 (S1) - C53-81 (E1)*1 C54-7 (S1) - C54-81 (E1)*2	R - W-B	Shift solenoid valve S1 signal	Not in 1st gear	11 to 14 V
C53-6 (S2) - C53-81 (E1)*1 C54-6 (S2) - C54-81 (E1)*2	W - W-B	Shift solenoid valve S2 signal	1st, 2nd or 6th gear	11 to 14 V
C53-6 (S2) - C53-81 (E1)*1 C54-6 (S2) - C54-81 (E1)*2	W - W-B	Shift solenoid valve S2 signal	3rd, 4th or 5th gear	Below 1 V
C53-3 (S3) - C53-81 (E1)*1 C54-3 (S3) - C54-81 (E1)*2	B-R - W-B	Shift solenoid valve S3 signal	1st, 2nd or 3rd gear	11 to 14 V
C53-3 (S3) - C53-81 (E1)*1 C54-3 (S3) - C54-81 (E1)*2	B-R - W-B	Shift solenoid valve S3 signal	4th, 5th or 6th gear	Below 1 V
C53-5 (S4) - C53-81 (E1)*1 C54-5 (S4) - C54-81 (E1)*2	G-R - W-B	Shift solenoid valve S4 signal	5th or 6th gear	11 to 14 V
C53-5 (S4) - C53-81 (E1)*1 C54-5 (S4) - C54-81 (E1)*2	G-R - W-B	Shift solenoid valve S4 signal	1st, 2nd, 3rd or 4th gear	Below 1 V
C53-4 (SR) - C53-81 (E1)*1 C54-4 (SR) - C54-81 (E1)*2	G - W-B	Shift solenoid valve SR signal	1st, 2nd, 3rd or 4th gear	11 to 14 V
C53-4 (SR) - C53-81 (E1)*1 C54-4 (SR) - C54-81 (E1)*2	G - W-B	Shift solenoid valve SR signal	5th or 6th gear	Below 1 V
C53-14 (SL1+) - C53-15 (SL1-)*1 C54-14 (SL1+) - C54-15 (SL1-)*2	Y - L	Shift solenoid valve SL1 signal	5th or 6th gear	Pulse generation (see waveform 1)
C53-12 (SL2+) - C53-13 (SL2-)*1 C54-12 (SL2+) - C54-13 (SL2-)*2	G-R - L-W	Shift solenoid valve SL2 signal	Engine idling	Pulse generation (see waveform 2)
C53-9 (SLT+) - C53-8 (SLT-)*1 C54-9 (SLT+) - C54-8 (SLT-)*2	B - G-B	Shift solenoid valve SLT signal	Engine idling	Pulse generation (see waveform 3)
C53-10 (SLU+) - C53-11 (SLU-)*1 C54-10 (SLU+) - C54-11 (SLU-)*2	L-Y - L-R	Shift solenoid valve SLU signal	5th (lock-up) gear or 6th (lock-up) gear	Pulse generation (see waveform 4)
C53-122 (THO1) - C53-98 (ETHA)*1 C54-122 (THO1) - C54-98 (ETHA)*2	G-Y - BR	No. 1 ATF temperature sensor signal	No. 1 ATF temperature: 115°C (239°F) or higher	Below 1.5 V
C53-99 (THO2) - C53-98 (ETHA)*1 C54-99 (THO2) - C54-98 (ETHA)*2	L - BR	No. 2 ATF temperature sensor signal	No. 2 ATF temperature: 115°C (239°F) or higher	Below 1.5 V
C53-101 (SP2+) - C53-100 (SP2-)*1 C54-101 (SP2+) - C54-100 (SP2-)*2	Y - B	Speed sensor SP2 signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (see waveform 5)
C53-124 (NT+) - C53-123 (NT-)*1 C54-124 (NT+) - C54-123 (NT-)*2	Y - B	Speed sensor NT signal	Engine idling (shift lever in P or N)	Pulse generation (see waveform 6)
A38-10 (CANH) - C53-81 (E1)*1 A53-10 (CANH) - C54-81 (E1)*2	P - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 7)
A38-11 (CANL) - C53-81 (E1)*1 A53-11 (CANL) - C54-81 (E1)*2	B - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 8)
A38-51 (PWR) - C53-81 (E1)*1 A53-51 (PWR) - C54-81 (E1)*2	L-B - W-B	Pattern select switch (PWR) signal	• Engine switch on (IG) • Pattern select switch (PWR) off	11 to 14 V
			• Engine switch	

A38-51 (PWR) - C53-81 (E1)*1 A53-51 (PWR) - C54-81 (E1)*2	L-B - W-B	Pattern select switch (PWR) signal	• on (IG) • Pattern select switch (PWR) on	Below 1.5 V
A38-4 (SNWI) - C53-81 (E1)*1 A53-4 (SNWI) - C54-81 (E1)*2	R - W-B	Pattern select switch (2ND) signal	• Engine switch on (IG) • Pattern select switch (2ND) off	11 to 14 V
A38-4 (SNWI) - C53-81 (E1)*1 A53-4 (SNWI) - C54-81 (E1)*2	R - W-B	Pattern select switch (2ND) signal	• Engine switch on (IG) • Pattern select switch (2ND) pressed and held	Below 1.5 V

a. Using an oscilloscope, check waveform 1.

Reference:

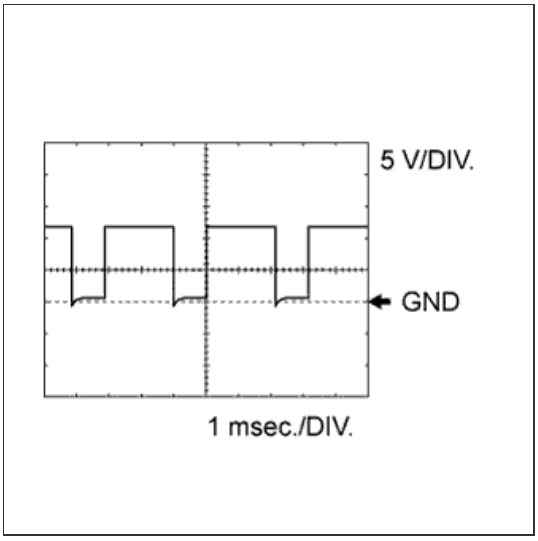
Terminal No. (Symbol)	Tool Setting	Condition
C53-14 (SL1+) - C53-15 (SL1-)*1 C54-14 (SL1+) - C54-15 (SL1-)*2	5 V/DIV., 1 msec./DIV.	5th or 6th gear



b. Using an oscilloscope, check waveform 2.

Reference:

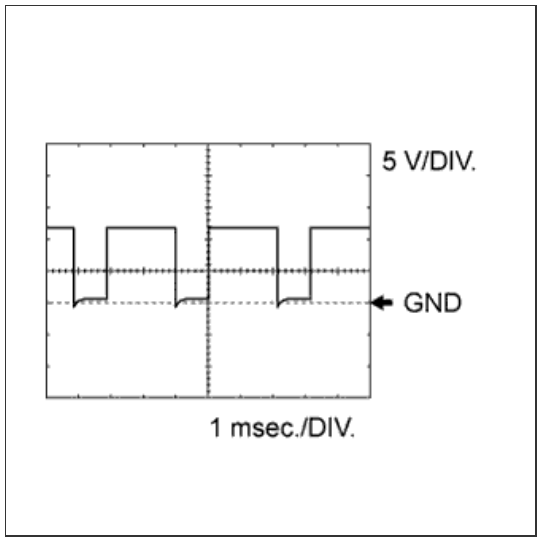
Terminal No. (Symbol)	Tool Setting	Condition
C53-12 (SL2+) - C53-13 (SL2-)*1 C54-12 (SL2+) - C54-13 (SL2-)*2	5 V/DIV., 1 msec./DIV.	Engine idling



c. Using an oscilloscope, check waveform 3.

Reference:

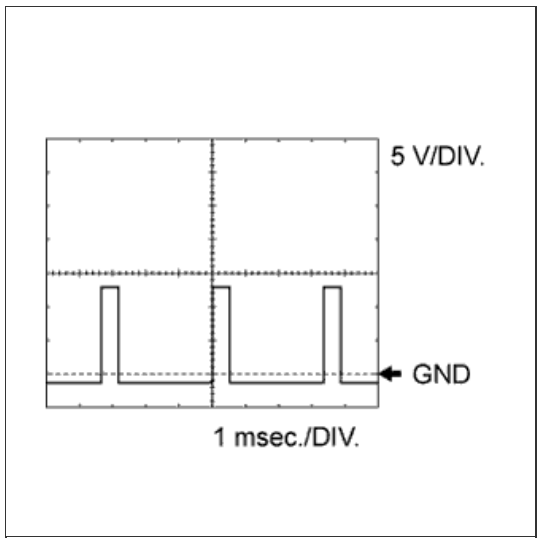
Terminal No. (Symbol)	Tool Setting	Condition
C53-9 (SLT+) - C53-8 (SLT-)*1 C54-9 (SLT+) - C54-8 (SLT-)*2	5 V/DIV., 1 msec./DIV.	Engine idling



d. Using an oscilloscope, check waveform 4.

Reference:

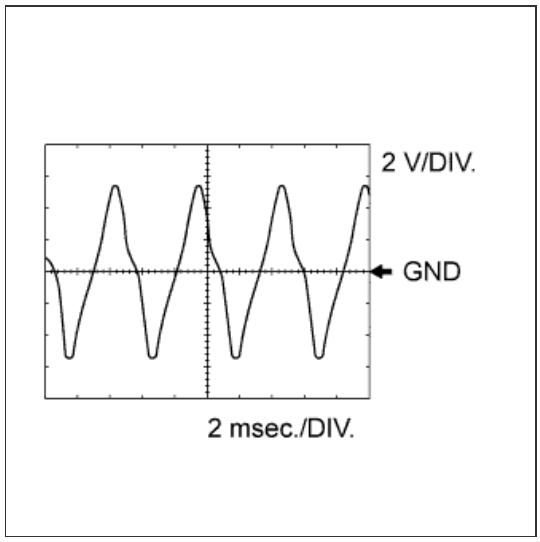
Terminal No. (Symbol)	Tool Setting	Condition
C53-10 (SLU+) - C53-11 (SLU-)*1 C54-10 (SLU+) - C54-11 (SLU-)*2	5 V/DIV., 1 msec./DIV.	5th (lock-up) gear or 6th (lock-up) gear



e. Using an oscilloscope, check waveform 5.

Reference:

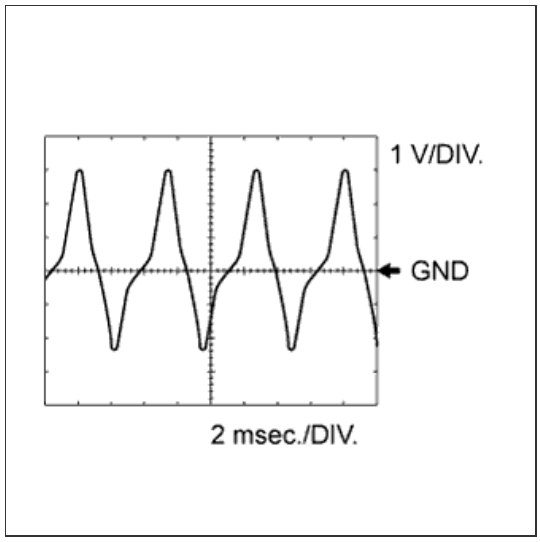
Terminal No. (Symbol)	Tool Setting	Condition
C53-101 (SP2+) - C53-100 (SP2-)*1 C54-101 (SP2+) - C54-100 (SP2-)*2	2 V/DIV., 2 msec./DIV.	Vehicle speed 20 km/h (12 mph)



f. Using an oscilloscope, check waveform 6.

Reference:

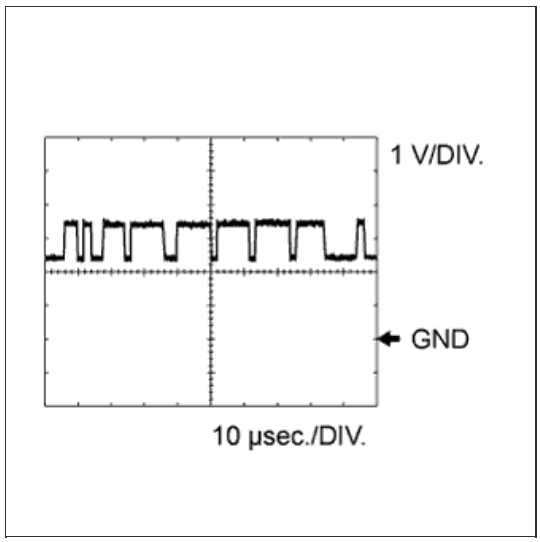
Terminal No. (Symbol)	Tool Setting	Condition
C53-124 (NT+) - C53-123 (NT-)*1 C54-124 (NT+) - C54-123 (NT-)*2	1 V/DIV., 2 msec./DIV.	Engine idling (shift lever in P or N)



g. Using an oscilloscope, check waveform 7.

Reference:

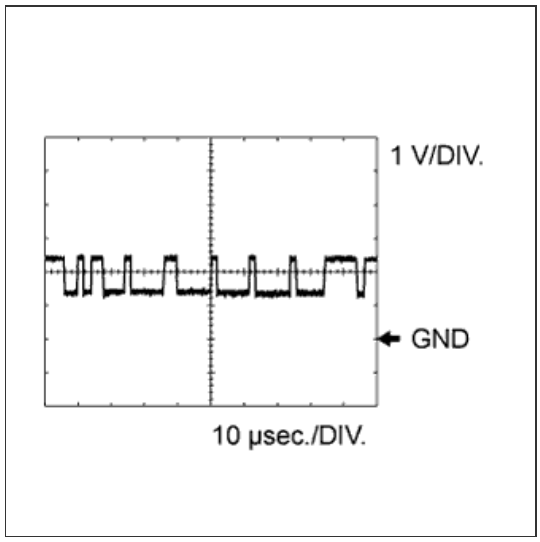
Terminal No. (Symbol)	Tool Setting	Condition
A38-10 (CANH) - C53-81 (E1)*1 A53-10 (CANH) - C54-81 (E1)*2	1 V/DIV., 10 µsec./DIV.	Engine switch on (IG)



h. Using an oscilloscope, check waveform 8.

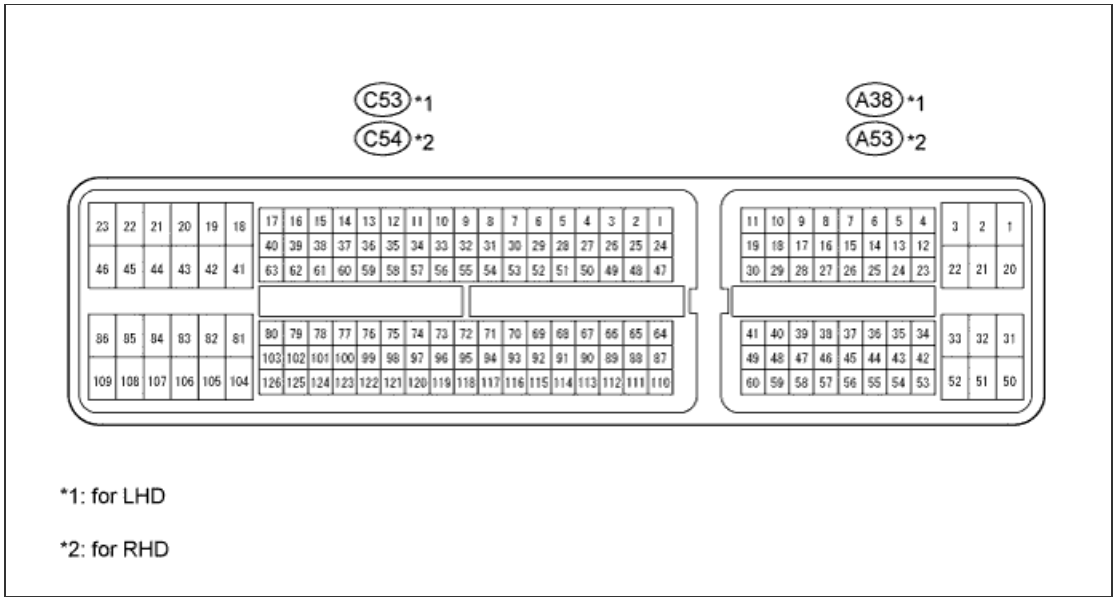
Reference:

Terminal No. (Symbol)	Tool Setting	Condition
A38-11 (CANL) - C53-81 (E1)*1 A53-11 (CANL) - C54-81 (E1)*2	1 V/DIV., 10 µsec./DIV.	Engine switch on (IG)



for Preparation Click here

CHECK ECM



HINT:

- **Each ECM terminal standard voltage is shown in the table below.**
  In the table, first follow the information under "Condition". Look under "Terminal No. (Symbol)" for the terminals to be inspected.
  The standard voltage between the terminals is shown under "Specified Condition".
  Use the illustration above as a reference for the ECM terminals.
- ***1: for LHD**
- ***2: for RHD**

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
A38-21 (L4) - C53-81 (E1)*1 A53-21 (L4) - C54-81 (E1)*2	BR-R - W-B	Transfer L4 position signal	• Engine switch on (IG) • Transfer position switch on L4	Below 1.5 V
			• Engine switch on (IG) • Transfer position switch not on L4	11 to 14 V
A38-5 (TFN) - C53-81 (E1)*1 A53-5 (TFN) - C54-81 (E1)*2	G - W-B	Transfer neutral position signal	• Engine switch on (IG) • Transfer position in neutral	Below 1.5 V
			• Engine switch on (IG) • Transfer position not in neutral	11 to 14 V
C53-120 (NSW) - C53-81 (E1)*1 C54-120 (NSW) - C54-81 (E1)*2	L - W-B	PNP switch signal	• Engine switch on (IG) • Shift lever in P or N	Below 1 V
			• Engine switch on (IG)	

			• Shift lever not in P or N	11 to 14 V
C53-2 (P) - C53-81 (E1)*1 C54-2 (P) - C54-81 (E1)*2	G-B - W-B	P shift position switch signal	• Engine switch on (IG) • Shift lever in P	11 to 14 V
			• Engine switch on (IG) • Shift lever not in P	Below 1 V
C53-26 (R) - C53-81 (E1)*1 C54-26 (R) - C54-81 (E1)*2	L-R - W-B	R shift position switch signal	• Engine switch on (IG) • Shift lever in R	11 to 14 V
			• Engine switch on (IG) • Shift lever not in R	Below 1 V
C53-25 (N) - C53-81 (E1)*1 C54-25 (N) - C54-81 (E1)*2	G-W - W-B	N shift position switch signal	• Engine switch on (IG) • Shift lever in N	11 to 14 V
			• Engine switch on (IG) • Shift lever not in N	Below 1 V
C53-27 (D) - C53-81 (E1)*1 C54-27 (D) - C54-81 (E1)*2	G - W-B	D shift position switch signal	• Engine switch on (IG) • Shift lever in D	11 to 14 V
			• Engine switch on (IG) • Shift lever not in D	Below 1 V
A38-25 (S) - C53-81 (E1)*1 A53-25 (S) - C54-81 (E1)*2	W - W-B	S shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
			• Engine switch on (IG) • Shift lever not in S	Below 1 V
A38-38 (SFTU) - C53-81 (E1)*1 A53-38 (SFTU) - C54-81 (E1)*2	Y - W-B	Up-shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
			• Engine switch on (IG) • Shift lever in "+" (up-shift) or "+" shift paddle operated and held (up-shift)	Below 1 V
A38-27 (SFTD) - C53-81 (E1)*1 A53-27 (SFTD) - C54-81 (E1)*2	L - W-B	Down-shift position switch signal	• Engine switch on (IG) • Shift lever in S	11 to 14 V
			• Engine switch on (IG) • Shift lever in "-" (down-shift) or "-" shift paddle operated and held (down-shift)	Below 1 V
A38-36 (STP) - C53-81 (E1)*1			Brake pedal depressed	11 to 14 V

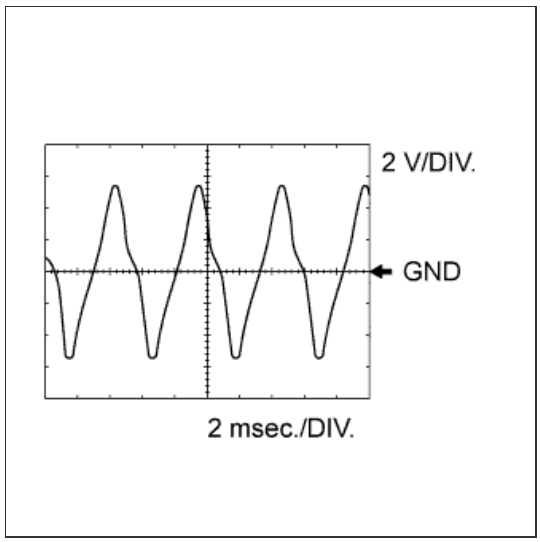
A53-36 (STP) - C54-81 (E1)*2	R - W-B	Stop light switch signal	Brake pedal released	Below 1.5 V
C53-7 (S1) - C53-81 (E1)*1 C54-7 (S1) - C54-81 (E1)*2	R - W-B	Shift solenoid valve S1 signal	1st gear	Below 1 V
			Not in 1st gear	11 to 14 V
C53-6 (S2) - C53-81 (E1)*1 C54-6 (S2) - C54-81 (E1)*2	W - W-B	Shift solenoid valve S2 signal	1st, 2nd or 6th gear	11 to 14 V
			3rd, 4th or 5th gear	Below 1 V
C53-3 (S3) - C53-81 (E1)*1 C54-3 (S3) - C54-81 (E1)*2	B-R - W-B	Shift solenoid valve S3 signal	1st, 2nd or 3rd gear	11 to 14 V
			4th, 5th or 6th gear	Below 1 V
C53-5 (S4) - C53-81 (E1)*1 C54-5 (S4) - C54-81 (E1)*2	G-R - W-B	Shift solenoid valve S4 signal	5th or 6th gear	11 to 14 V
			1st, 2nd, 3rd or 4th gear	Below 1 V
C53-4 (SR) - C53-81 (E1)*1 C54-4 (SR) - C54-81 (E1)*2	G - W-B	Shift solenoid valve SR signal	1st, 2nd, 3rd or 4th gear	11 to 14 V
			5th or 6th gear	Below 1 V
C53-14 (SL1+) - C53-15 (SL1-)*1 C54-14 (SL1+) - C54-15 (SL1-)*2	Y - L	Shift solenoid valve SL1 signal	5th or 6th gear	Pulse generation
C53-12 (SL2+) - C53-13 (SL2-)*1 C54-12 (SL2+) - C54-13 (SL2-)*2	G-R - L-W	Shift solenoid valve SL2 signal	Engine idling	Pulse generation
C53-9 (SLT+) - C53-8 (SLT-)*1 C54-9 (SLT+) - C54-8 (SLT-)*2	B - G-B	Shift solenoid valve SLT signal	Engine idling	Pulse generation
C53-10 (SLU+) - C53-11 (SLU-)*1 C54-10 (SLU+) - C54-11 (SLU-)*2	L-Y - L-R	Shift solenoid valve SLU signal	5th (lock-up) gear or 6th (lock-up) gear	Pulse generation
C53-122 (THO1) - C53-98 (ETHA)*1 C54-122 (THO1) - C54-98 (ETHA)*2	G-Y - BR	No. 1 ATF temperature sensor signal	No. 1 ATF temperature: 115°C (239°F) or higher	Below 1.5 V
C53-99 (THO2) - C53-98 (ETHA)*1 C54-99 (THO2) - C54-98 (ETHA)*2	L - BR	No. 2 ATF temperature sensor signal	No. 2 ATF temperature: 115°C (239°F) or higher	Below 1.5 V
C53-101 (SP2+) - C53-100 (SP2-)*1 C54-101 (SP2+) - C54-100 (SP2-)*2	Y - B	Speed sensor SP2 signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (see waveform 1)
C53-124 (NT+) - C53-123 (NT-)*1 C54-124 (NT+) - C54-123 (NT-)*2	Y - B	Speed sensor NT signal	Engine idling (shift lever in P or N)	Pulse generation (see waveform 2)
A38-10 (CANH) - C53-81 (E1)*1 A53-10 (CANH) - C54-81 (E1)*2	P - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 3)
A38-11 (CANL) - C53-81 (E1)*1 A53-11 (CANL) - C54-81 (E1)*2	B - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 4)
A38-51 (PWR) - C53-81 (E1)*1 A53-51 (PWR) - C54-81 (E1)*2	L-B - W-B	Pattern select switch (PWR) signal	• Engine switch on (IG) • Pattern select switch (PWR) off	11 to 14 V
			• Engine switch on (IG) • Pattern select switch (PWR) on	Below 1.5 V
A38-4 (SNWI) - C53-81			• Engine switch on (IG) • Pattern select switch (2ND) off	11 to 14 V

(E1)*1 A53-4 (SNWI) - C54-81 (E1)*2	P-L - W-B	Pattern select switch (2ND) signal	• Engine switch on (IG) • Pattern select switch (2ND) pressed and held	Below 1.5 V

a. Using an oscilloscope, check waveform 1.

Reference:

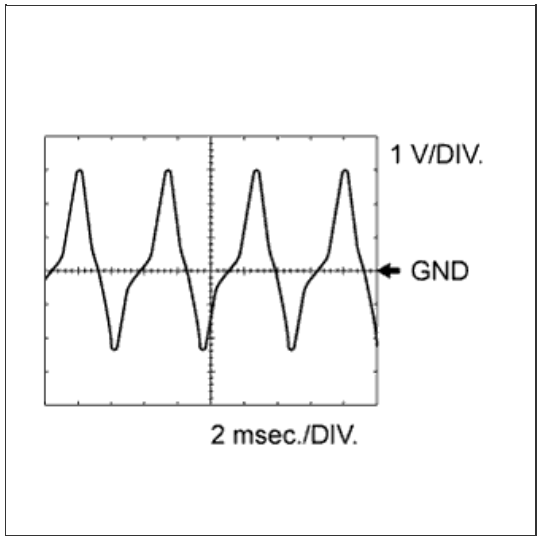
Terminal No. (Symbol)	Tool Setting	Condition
C53-101 (SP2+) - C53-100 (SP2-)*1 C54-101 (SP2+) - C54-100 (SP2-)*2	2 V/DIV., 2 msec./DIV.	Vehicle speed 20 km/h (12 mph)



b. Using an oscilloscope, check waveform 2.

Reference:

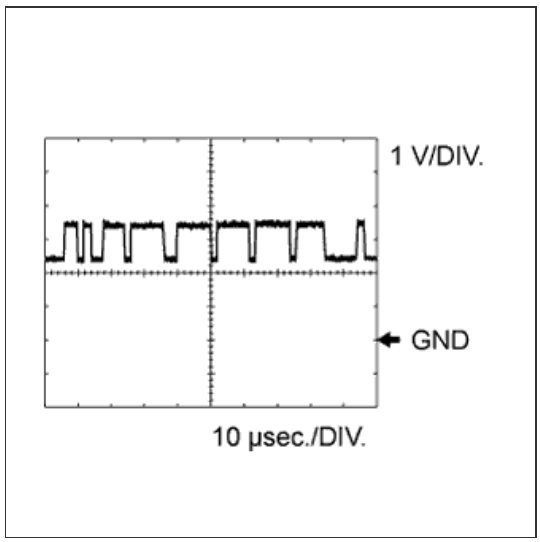
Terminal No. (Symbol)	Tool Setting	Condition
C53-124 (NT+) - C53-123 (NT-)*1 C54-124 (NT+) - C54-123 (NT-)*2	1 V/DIV., 2 msec./DIV.	Engine idling (shift lever in P or N)



c. Using an oscilloscope, check waveform 3.

Reference:

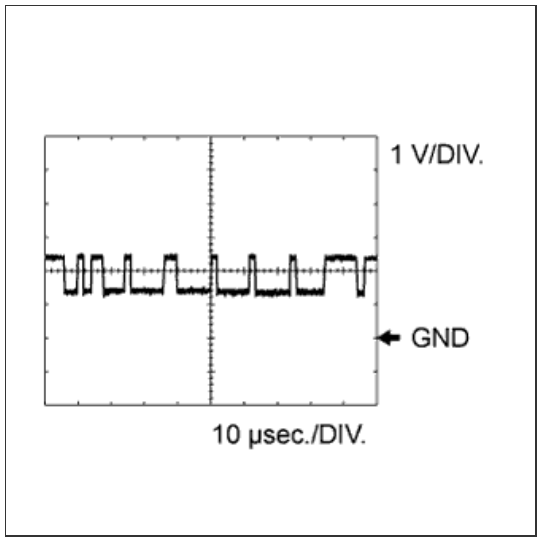
Terminal No. (Symbol)	Tool Setting	Condition
A38-10 (CANH) - C53-81 (E1)*1 A53-10 (CANH) - C54-81 (E1)*2	1 V/DIV., 10 µsec./DIV.	Engine switch on (IG)



d. Using an oscilloscope, check waveform 4.

Reference:

Terminal No. (Symbol)	Tool Setting	Condition
A38-11 (CANL) - C53-81 (E1)*1 A53-11 (CANL) - C54-81 (E1)*2	1 V/DIV., 10 µsec./DIV.	Engine switch on (IG)

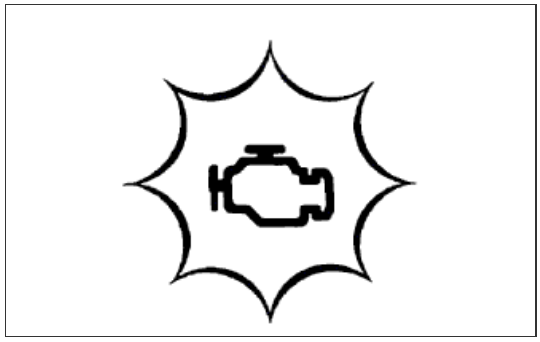


for Preparation Click here

DESCRIPTION

a. When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle ECM can then be read.

b. OBD II regulations require that the vehicle on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:



i. The emission control system/components

ii. The powertrain control components (which affect vehicle emissions)

iii. The computer
In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are stored in the ECM memory.
When the malfunction does not reoccur, the MIL stays illuminated until the engine switch is turned off, and the MIL turns off when the engine is started. However, the DTCs remain stored in the ECM memory.

c. To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester displays output DTCs, the freeze frame data and a variety of engine data.
The DTCs and freeze frame data can be cleared with the intelligent tester (Click here).

NORMAL MODE AND CHECK MODE

a. The diagnosis system operates in "normal mode" during normal vehicle use. In normal mode, "2 trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available to technicians as an option. In check mode, "1 trip detection logic" is used for simulating malfunction symptoms and increasing the system ability to detect malfunctions, including intermittent malfunctions.

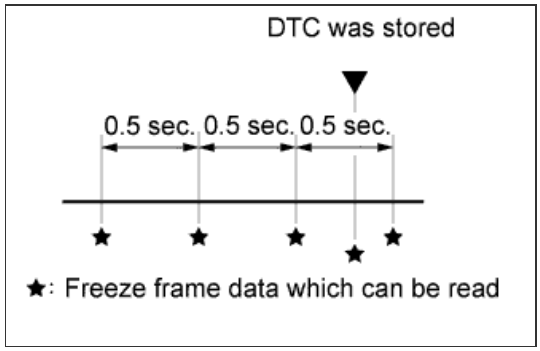
2 TRIP DETECTION LOGIC

a. When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next drive cycle, the MIL is illuminated (2nd trip).

FREEZE FRAME DATA

a. Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

b. The ECM records freeze frame data at 5 different times: 1) 3 times before the DTC is stored, 2) once when the DTC is stored, and 3) once after the DTC is stored. These data can be used to simulate the vehicle condition around the time when the malfunction occurred. The data may help find the cause of the malfunction, or judge if the DTC is being caused by a temporary malfunction or not.



CHECK DATA LINK CONNECTOR 3 (DLC3) (Click here)

CHECK MIL

a. Check that the MIL illuminates when turning the engine switch on (IG).
   If the MIL does not illuminate, there is a problem in the MIL circuit (Click here).

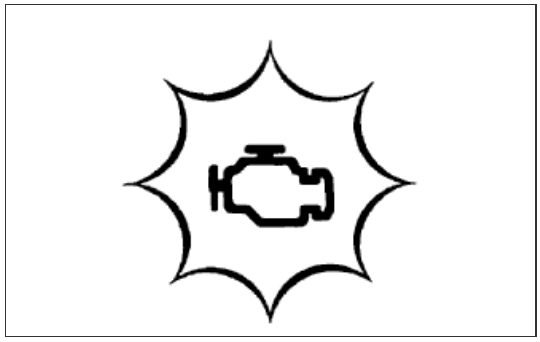
b. When the engine is started, the MIL should turn off.

for Preparation Click here

DESCRIPTION

a. When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle ECM can then be read.

b. OBD II regulations require that the vehicle on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:



i. The emission control system/components

ii. The powertrain control components (which affect vehicle emissions)

iii. The computer
In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are stored in the ECM memory.
When the malfunction does not reoccur, the MIL stays illuminated until the engine switch is turned off, and the MIL turns off when the engine is started. However, the DTCs remain stored in the ECM memory.

c. To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester displays output DTCs, the freeze frame data and a variety of engine data.
The DTCs and freeze frame data can be cleared with the intelligent tester (Click here).

NORMAL MODE AND CHECK MODE

a. The diagnosis system operates in "normal mode" during normal vehicle use. In normal mode, "2 trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available to technicians as an option. In check mode, "1 trip detection logic" is used for simulating malfunction symptoms and increasing the system ability to detect malfunctions, including intermittent malfunctions.

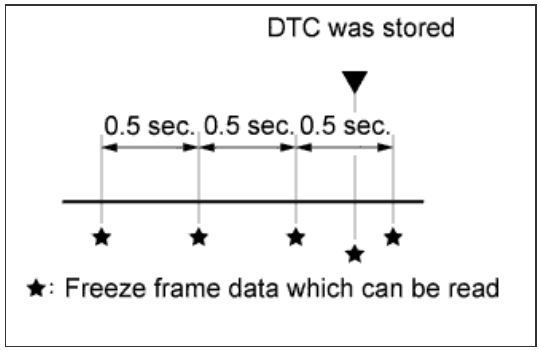
2 TRIP DETECTION LOGIC

a. When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next drive cycle, the MIL is illuminated (2nd trip).

FREEZE FRAME DATA

a. Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

b. The ECM records freeze frame data at 5 different times: 1) 3 times before the DTC is stored, 2) once when the DTC is stored, and 3) once after the DTC is stored. These data can be used to simulate the vehicle condition around the time when the malfunction occurred. The data may help find the cause of the malfunction, or judge if the DTC is being caused by a temporary malfunction or not.



CHECK DATA LINK CONNECTOR 3 (DLC3) (Click here)

CHECK MIL

a. Check that the MIL illuminates when turning the engine switch on (IG).
   If the MIL does not illuminate, there is a problem in the MIL circuit (Click here).

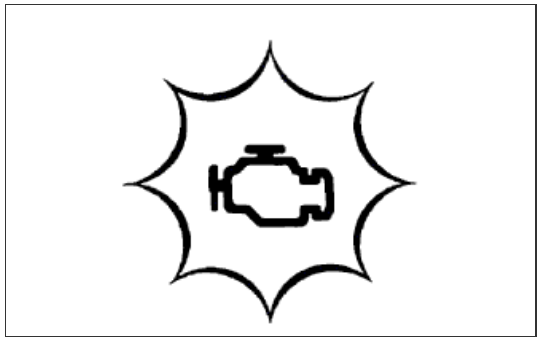
b. When the engine is started, the MIL should turn off.

for Preparation Click here

DESCRIPTION

a. When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle ECM can then be read.

b. OBD II regulations require that the vehicle on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:



i. The emission control system/components

ii. The powertrain control components (which affect vehicle emissions)

iii. The computer
In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are stored in the ECM memory.
When the malfunction does not reoccur, the MIL stays illuminated until the engine switch is turned off, and the MIL turns off when the engine is started. However, the DTCs remain stored in the ECM memory.

c. To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester displays output DTCs, the freeze frame data and a variety of engine data.
The DTCs and freeze frame data can be cleared with the intelligent tester (Click here).

NORMAL MODE AND CHECK MODE

a. The diagnosis system operates in "normal mode" during normal vehicle use. In normal mode, "2 trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available to technicians as an option. In check mode, "1 trip detection logic" is used for simulating malfunction symptoms and increasing the system ability to detect malfunctions, including intermittent malfunctions.

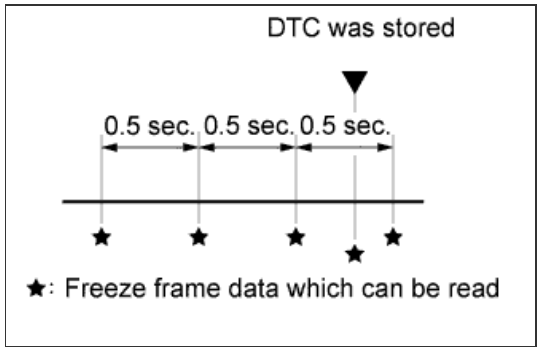
2 TRIP DETECTION LOGIC

a. When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next drive cycle, the MIL is illuminated (2nd trip).

FREEZE FRAME DATA

a. Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

b. The ECM records freeze frame data at 5 different times: 1) 3 times before the DTC is stored, 2) once when the DTC is stored, and 3) once after the DTC is stored. These data can be used to simulate the vehicle condition around the time when the malfunction occurred. The data may help find the cause of the malfunction, or judge if the DTC is being caused by a temporary malfunction or not.



CHECK DATA LINK CONNECTOR 3 (DLC3) (Click here)

CHECK MIL

a. Check that the MIL illuminates when turning the engine switch on (IG).
   If the MIL does not illuminate, there is a problem in the MIL circuit (Click here).

b. When the engine is started, the MIL should turn off.

for Preparation Click here

CHECK DTC

a. DTCs which are stored in the ECM can be output to the intelligent tester.
The intelligent tester can display pending DTCs and current DTCs. Some DTCs are not stored unless a malfunction is detected in consecutive driving cycles. When a malfunction is detected in only one driving cycle, it is stored as a pending DTC.

i. Connect the intelligent tester to the DLC3.

ii. Turn the engine switch on (IG).

iii. Turn the intelligent tester on.

iv. Enter the following menus: Powertrain / Engine and ECT / DTC.

v. Confirm the DTCs and freeze frame data, and then write them down.

vi. Confirm the details of the DTCs (Click here).

NOTICE:

When simulating a symptom with the scan tool to check for DTCs, use normal mode. For codes on the Diagnostic Trouble Code Chart subject to "2 trip detection logic", perform the following actions:

Turn the engine switch off after the symptom is simulated once. Then repeat the simulation process. When the symptom has been simulated twice, the MIL illuminates and the DTCs are stored in the ECM.

CLEAR DTC (using intelligent tester)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC / Clear.

CLEAR DTC (without using intelligent tester)

a. Perform either of the following operations.

i. Disconnect the cable from the negative (-) battery terminal for more than 1 minute.

ii. Remove the EFI NO. 1 fuse from the engine room relay block located inside the engine compartment for more than 1 minute.

for Preparation Click here

CHECK DTC

a. DTCs which are stored in the ECM can be output to the intelligent tester.
The intelligent tester can display pending DTCs and current DTCs. Some DTCs are not stored unless a malfunction is detected in consecutive driving cycles. When a malfunction is detected in only one driving cycle, it is stored as a pending DTC.

i. Connect the intelligent tester to the DLC3.

ii. Turn the engine switch on (IG).

iii. Turn the intelligent tester on.

iv. Enter the following menus: Powertrain / Engine and ECT / DTC.

v. Confirm the DTCs and freeze frame data, and then write them down.

vi. Confirm the details of the DTCs (Click here).

NOTICE:

When simulating a symptom with the scan tool to check for DTCs, use normal mode. For codes on the Diagnostic Trouble Code Chart subject to "2 trip detection logic", perform the following actions:

Turn the engine switch off after the symptom is simulated once. Then repeat the simulation process. When the symptom has been simulated twice, the MIL illuminates and the DTCs are stored in the ECM.

CLEAR DTC (using intelligent tester)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC / Clear.

CLEAR DTC (without using intelligent tester)

a. Perform either of the following operations.

i. Disconnect the cable from the negative (-) battery terminal for more than 1 minute.

ii. Remove the EFI MAIN and ETCS fuses from the engine room relay block located inside the engine compartment for more than 1 minute.

for Preparation Click here

DESCRIPTION

a. Check mode has a higher sensitivity to malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect. In check mode, DTCs are stored with 1 trip detection logic.

CHECK MODE PROCEDURE

a. Make sure that the following conditions are met:

   i. Battery positive voltage 11 V or higher.

   ii. Throttle valve fully closed.

   iii. Shift lever in P or N.

   iv. A/C turned off.

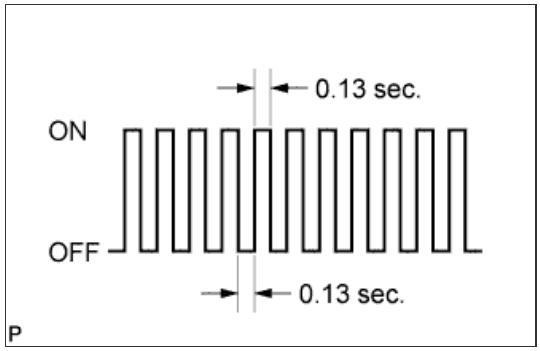
b. Connect the intelligent tester to the DLC3.

c. Turn the engine switch on (IG).

d. Turn the intelligent tester on.

e. Enter the following menus: Powertrain / Engine and ECT / Utility / Check Mode.

f. Check that the MIL flashes as shown in the illustration.



NOTICE:

- **All DTCs and freeze frame data will be cleared if: 1) the intelligent tester is used to change the ECM from normal mode to check mode or vice versa; or 2) during check mode, the engine switch is turned from on (IG) to on (ACC) or off.**
- **Before changing to check mode, make notes of the DTCs and freeze frame data.**

g. Start the engine. The MIL should turn off after the engine starts.

h. Perform the Monitor Drive Pattern for the ECT test (Click here).
(Or, simulate the conditions of the malfunction described by the customer).

i. After simulating the malfunction conditions, use the intelligent tester to check the DTC and freeze frame data.

for Preparation Click here

Fail-safe

This function minimizes the loss of the ECT functions when a malfunction occurs in each sensor or shift solenoid valve.

Fail-safe Control List

Malfunctioning Part	Function
DTC P0717: Input Speed Sensor NT	During an input speed sensor malfunction, shift control is performed through the output speed sensor SP2 signal. During an input speed sensor malfunction, up-shift to 5th and 6th, AI-SHIFT* and flex lock-up clutch control are prohibited.
DTC P0722: Output Speed Sensor SP2	During an output speed sensor malfunction, shift control is performed through the input speed sensor NT signal. During an output speed sensor malfunction, up-shift to 5th and 6th, AI-SHIFT* and flex lock-up clutch control are prohibited.
DTC P0710, P0712, P0713: ATF Temperature Sensor	During an ATF temperature sensor malfunction, up-shift to 5th and 6th and flex lock-up clutch control are prohibited.
Shift Solenoid Valve S1, S2, S3, S4 and SR	The current to the malfunctioning shift solenoid valve is cut off and control is performed by operating the other shift solenoid valves. Shift control is performed depending on the malfunctioning shift solenoid valve as described in the table below.
DTC P0748, P0778: Shift Solenoid Valve SL1 and SL2	During a shift solenoid valve SL1 or SL2 malfunction, up-shift to 5th and 6th and flex lock-up clutch control are prohibited.
DTC P2714, P2716: Shift Solenoid Valve SLT	During a shift solenoid valve SLT malfunction, the current to the shift solenoid valve is stopped. This stops line pressure optimal control, and shift shock increases. However, shifting is performed through normal clutch pressure control.
DTC P2757, P2759: Shift Solenoid Valve SLU	During a shift solenoid valve SLU malfunction, the current to the shift solenoid valve is stopped. This stops lock-up control and flex lock-up control, and fuel economy decreases.

HINT:

*: In addition to the switching of the shift pattern through the pattern select switch, Artificial Intelligence Shift (AI-SHIFT) control enables the ECM to estimate the road conditions and the driver intention in order to automatically select the optimal shift pattern.

Shift Solenoid Valve Normal Operation Chart

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
	5th	ON	OFF	OFF	ON	OFF	ON	OFF
	6th	ON	ON	OFF	ON	OFF	ON	OFF
S5	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
	5th	ON	OFF	OFF	ON	OFF	ON	OFF
S4	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
S3	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd (E/B)	ON	OFF	ON	OFF	ON	OFF	OFF

S2	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd (E/B)	ON	ON	ON	ON	ON	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	OFF	ON	OFF	OFF

a. Fail-safe operation for electronically malfunctioning shift solenoid valve (S1, S2, S3, S4 and SR).

i. Fail-safe function

If any of the shift solenoid valve circuits has an open or short failure, the ECM turns the other shift solenoid valves "ON" and "OFF" in order to shift into the gear positions shown in the table below. Also, the ECM stops sending current to the open or short circuited solenoid.

Even if starting the engine again in the fail-safe mode, the gear position remains in the same position.

HINT:

- ***: Actual gear shift (gear position) under fail-safe operation.**
- **X: OFF (the ECM stops sending current to the malfunctioning shift solenoid valve).**
- **Electrical malfunction: Condition is shown to the left of the "→".**
- **Fail-safe mode: Condition is shown to the right of the "→".**
- **E/B: Engine brake**

Shift Solenoid Valve S1 Electrical Malfunction (P0973, P0974)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
	5th	X	OFF	OFF	ON	OFF	ON	OFF
	N → 5th	X	ON → OFF	OFF	ON	OFF	ON	OFF
S5	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
	5th	X	OFF	OFF	ON	OFF	ON	OFF
S4	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
S3	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd (E/B) → 4th	X	OFF	ON → OFF	OFF	ON	OFF	OFF → ON
S2	1st	X	ON	ON	OFF	ON	OFF	ON
	2nd (E/B) → 4th	X	ON → OFF	ON → OFF	ON → OFF	ON	OFF	OFF → ON
S1	1st (E/B)	X	ON	ON	OFF	ON	OFF	OFF

Shift Solenoid Valve S2 Electrical Malfunction (P0976, P0977)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON

D, S6	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	4th	ON	X	OFF	OFF	ON	OFF	ON
	5th	ON	X	OFF	ON	OFF	ON	OFF
	5th	ON	X	OFF	ON	OFF	ON	OFF
S5	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	4th	ON	X	OFF	OFF	ON	OFF	ON
	5th	ON	X	OFF	ON	OFF	ON	OFF
S4	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	4th	ON	X	OFF	OFF	ON	OFF	ON
S3	3rd → 3rd (E/B)	OFF → ON	X	ON	OFF	ON	OFF	ON → OFF
	3rd → 3rd (E/B)	ON	X	ON	OFF	ON	OFF	ON → OFF
	3rd (E/B)	ON	X	ON	OFF	ON	OFF	OFF
S2	3rd → 3rd (E/B)	OFF → ON	X	ON	OFF	ON	ON → OFF	ON → OFF
	3rd (E/B)	ON	X	ON	ON → OFF	ON	OFF	OFF
S1	3rd (E/B)	OFF → ON	X	ON	OFF	ON	OFF	OFF

Shift Solenoid Valve S3 Electrical Malfunction (P0979, P0980)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	3rd → 4th	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	5th	ON	OFF	X	ON	OFF	ON	OFF
	6th	ON	ON	X	ON	OFF	ON	OFF
S5	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	5th	ON	OFF	X	ON	OFF	ON	OFF
S4	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
S3	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	OFF → ON
S2	3rd	OFF	ON	X	OFF	ON	OFF	ON
	6th → 4th	ON	ON → OFF	X	ON → OFF	ON	OFF	OFF → ON
S1	1st	OFF	ON	X	OFF	ON	OFF	OFF

Shift Solenoid Valve S4 Electrical Malfunction (P0982, P0983)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON
	4th	ON	ON → OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON
S5	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON
S4	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
S3	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd (E/B)	ON	OFF	ON	X	ON	OFF	OFF
S2	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd (E/B)	ON	ON	ON	X	ON	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	X	ON	OFF	OFF

Shift Solenoid Valve SR Electrical Malfunction (P0985, P0986)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
	5th	ON	OFF	OFF	ON	X	ON	OFF
	6th	ON	ON	OFF	ON	X	ON	OFF
S5	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
	5th	ON	OFF	OFF	ON	X	ON	OFF
S4	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
S3	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd (E/B)	ON	OFF	ON	OFF	X	OFF	OFF
S2	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd (E/B)	ON	ON	ON	ON	X	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	OFF	X	OFF	OFF

b. Fail-safe operation in the event of a mechanical system malfunction.

i. Fail-safe function

The ECM controls the gear position as shown in the table below when malfunctions occur.

DTC Code	Condition	Gear*1					
-	Normal	1st	2nd	3rd	4th	5th	6th
P0751	Shift solenoid valve S1: Stuck OFF malfunction	1st*2	1st*2	3rd	3rd	3rd	3rd
P0761	Shift solenoid valve S3: Stuck ON malfunction	1st	2nd	3rd	3rd	3rd	3rd
P0766 P0776	Shift solenoid valve S4, shift solenoid valve SL2 or valve body (brake control valve): Malfunction	1st	2nd	3rd	3rd	3rd	3rd
P0781	Valve body (1-2 shift valve): Malfunction	1st*2	1st*2	3rd	3rd	3rd	3rd
P0729	Valve body (sequence valve): Malfunction	1st	2nd	3rd	3rd	3rd	3rd

HINT:

- ***1: Actual gear shift (gear position) under fail-safe operation.**
- ***2: Under engine braking, downshifting to 1st or 2nd gear is prohibited.**

for Preparation Click here

Fail-safe

This function minimizes the loss of the ECT functions when a malfunction occurs in each sensor or shift solenoid valve.

Fail-safe Control List

Malfunctioning Part	Function
DTC P0717: Input Speed Sensor NT	During an input speed sensor malfunction, shift control is performed through the output speed sensor SP2 signal. During an input speed sensor malfunction, up-shift to 5th and 6th, AI-SHIFT* and flex lock-up clutch control are prohibited.
DTC P0722: Output Speed Sensor SP2	During an output speed sensor malfunction, shift control is performed through the input speed sensor NT signal. During an output speed sensor malfunction, up-shift to 5th and 6th, AI-SHIFT* and flex lock-up clutch control are prohibited.
DTC P0712, P0713: ATF Temperature Sensor	During an ATF temperature sensor malfunction, up-shift to 5th and 6th and flex lock-up clutch control are prohibited.
Shift Solenoid Valve S1, S2, S3, S4 and SR	The current to the malfunctioning shift solenoid valve is cut off and control is performed by operating the other shift solenoid valves. Shift control is performed depending on the malfunctioning shift solenoid valve as described in the table below.
DTC P0748, P0778: Shift Solenoid Valve SL1 and SL2	During a shift solenoid valve SL1 or SL2 malfunction, up-shift to 5th and 6th and flex lock-up clutch control are prohibited.
DTC P2714, P2716: Shift Solenoid Valve SLT	During a shift solenoid valve SLT malfunction, the current to the shift solenoid valve is stopped. This stops line pressure optimal control, and shift shock increases. However, shifting is performed through normal clutch pressure control.
DTC P2757, P2759: Shift Solenoid Valve SLU	During a shift solenoid valve SLU malfunction, the current to the shift solenoid valve is stopped. This stops lock-up control and flex lock-up control, and fuel economy decreases.

HINT:

*: In addition to the switching of the shift pattern through the pattern select switch, Artificial Intelligence Shift (AI-SHIFT) control enables the ECM to estimate the road conditions and the driver intention in order to automatically select the optimal shift pattern.

Shift Solenoid Valve Normal Operation Chart

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
	5th	ON	OFF	OFF	ON	OFF	ON	OFF
	6th	ON	ON	OFF	ON	OFF	ON	OFF
S5	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
	5th	ON	OFF	OFF	ON	OFF	ON	OFF
S4	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd	ON	OFF	ON	OFF	ON	OFF	ON
	4th	ON	OFF	OFF	OFF	ON	OFF	ON
S3	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd	ON	ON	ON	OFF	ON	OFF	ON
	3rd (E/B)	ON	OFF	ON	OFF	ON	OFF	OFF

S2	1st	OFF	ON	ON	OFF	ON	OFF	ON
	2nd (E/B)	ON	ON	ON	ON	ON	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	OFF	ON	OFF	OFF

a. Fail-safe operation for electronically malfunctioning shift solenoid valve (S1, S2, S3, S4 and SR).

i. Fail-safe function

If any of the shift solenoid valve circuits has an open or short failure, the ECM turns the other shift solenoid valves "ON" and "OFF" in order to shift into the gear positions shown in the table below. Also, the ECM stops sending current to the open or short circuited solenoid.

Even if starting the engine again in the fail-safe mode, the gear position remains in the same position.

HINT:

- ***: Actual gear shift (gear position) under fail-safe operation.**
- **X: OFF (the ECM stops sending current to the malfunctioning shift solenoid valve).**
- **Electrical malfunction: Condition is shown to the left of the "→".**
- **Fail-safe mode: Condition is shown to the right of the "→".**
- **E/B: Engine brake**

Shift Solenoid Valve S1 Electrical Malfunction (P0973, P0974)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
	5th	X	OFF	OFF	ON	OFF	ON	OFF
	N → 5th	X	ON → OFF	OFF	ON	OFF	ON	OFF
S5	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
	5th	X	OFF	OFF	ON	OFF	ON	OFF
S4	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd → 4th	X	OFF	ON → OFF	OFF	ON	OFF	ON
	4th	X	OFF	OFF	OFF	ON	OFF	ON
S3	1st	X	ON	ON	OFF	ON	OFF	ON
	1st → 4th	X	ON → OFF	ON → OFF	OFF	ON	OFF	ON
	3rd (E/B) → 4th	X	OFF	ON → OFF	OFF	ON	OFF	OFF → ON
S2	1st	X	ON	ON	OFF	ON	OFF	ON
	2nd (E/B) → 4th	X	ON → OFF	ON → OFF	ON → OFF	ON	OFF	OFF → ON
S1	1st (E/B)	X	ON	ON	OFF	ON	OFF	OFF

Shift Solenoid Valve S2 Electrical Malfunction (P0976, P0977)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON

D, S6	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	4th	ON	X	OFF	OFF	ON	OFF	ON
	5th	ON	X	OFF	ON	OFF	ON	OFF
	5th	ON	X	OFF	ON	OFF	ON	OFF
S5	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	4th	ON	X	OFF	OFF	ON	OFF	ON
	5th	ON	X	OFF	ON	OFF	ON	OFF
S4	3rd	OFF → ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	3rd	ON	X	ON	OFF	ON	OFF	ON
	4th	ON	X	OFF	OFF	ON	OFF	ON
S3	3rd → 3rd (E/B)	OFF → ON	X	ON	OFF	ON	OFF	ON → OFF
	3rd → 3rd (E/B)	ON	X	ON	OFF	ON	OFF	ON → OFF
	3rd (E/B)	ON	X	ON	OFF	ON	OFF	OFF
S2	3rd → 3rd (E/B)	OFF → ON	X	ON	OFF	ON	ON → OFF	ON → OFF
	3rd (E/B)	ON	X	ON	ON → OFF	ON	OFF	OFF
S1	3rd (E/B)	OFF → ON	X	ON	OFF	ON	OFF	OFF

Shift Solenoid Valve S3 Electrical Malfunction (P0979, P0980)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	3rd → 4th	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	5th	ON	OFF	X	ON	OFF	ON	OFF
	6th	ON	ON	X	ON	OFF	ON	OFF
S5	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	5th	ON	OFF	X	ON	OFF	ON	OFF
S4	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	ON
S3	3rd	OFF	ON	X	OFF	ON	OFF	ON
	4th	ON	ON → OFF	X	OFF	ON	OFF	ON
	4th	ON	OFF	X	OFF	ON	OFF	OFF → ON
S2	3rd	OFF	ON	X	OFF	ON	OFF	ON
	6th → 4th	ON	ON → OFF	X	ON → OFF	ON	OFF	OFF → ON
S1	1st	OFF	ON	X	OFF	ON	OFF	OFF

Shift Solenoid Valve S4 Electrical Malfunction (P0982, P0983)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON
	4th	ON	ON → OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON
S5	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	OFF → ON	ON → OFF	OFF → ON
S4	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd	ON	OFF	ON	X	ON	OFF	ON
	4th	ON	OFF	OFF	X	ON	OFF	ON
S3	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd	ON	ON	ON	X	ON	OFF	ON
	3rd (E/B)	ON	OFF	ON	X	ON	OFF	OFF
S2	1st	OFF	ON	ON	X	ON	OFF	ON
	2nd (E/B)	ON	ON	ON	X	ON	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	X	ON	OFF	OFF

Shift Solenoid Valve SR Electrical Malfunction (P0985, P0986)

Shift Lever Position	Gear*	Shift Solenoid Valve S1	Shift Solenoid Valve S2	Shift Solenoid Valve S3	Shift Solenoid Valve S4	Shift Solenoid Valve SR	Shift Solenoid Valve SL1	Shift Solenoid Valve SL2
D, S6	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
	5th	ON	OFF	OFF	ON	X	ON	OFF
	6th	ON	ON	OFF	ON	X	ON	OFF
S5	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
	5th	ON	OFF	OFF	ON	X	ON	OFF
S4	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd	ON	OFF	ON	OFF	X	OFF	ON
	4th	ON	OFF	OFF	OFF	X	OFF	ON
S3	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd	ON	ON	ON	OFF	X	OFF	ON
	3rd (E/B)	ON	OFF	ON	OFF	X	OFF	OFF
S2	1st	OFF	ON	ON	OFF	X	OFF	ON
	2nd (E/B)	ON	ON	ON	ON	X	OFF	OFF
S1	1st (E/B)	OFF	ON	ON	OFF	X	OFF	OFF

b. Fail-safe operation in the event of a mechanical system malfunction.

i. Fail-safe function

The ECM controls the gear position as shown in the table below when malfunctions occur.

DTC Code	Condition	Gear*1					
-	Normal	1st	2nd	3rd	4th	5th	6th
P0751	Shift solenoid valve S1: Stuck OFF malfunction	1st*2	1st*2	3rd	3rd	3rd	3rd
P0761	Shift solenoid valve S3: Stuck ON malfunction	1st	2nd	3rd	3rd	3rd	3rd
P0766 P0776	Shift solenoid valve S4, shift solenoid valve SL2 or valve body (brake control valve): Malfunction	1st	2nd	3rd	3rd	3rd	3rd
P0781	Valve body (1-2 shift valve): Malfunction	1st*2	1st*2	3rd	3rd	3rd	3rd
P0729	Valve body (sequence valve): Malfunction	1st	2nd	3rd	3rd	3rd	3rd

HINT:

- ***1: Actual gear shift (gear position) under fail-safe operation.**
- ***2: Under engine braking, downshifting to 1st or 2nd gear is prohibited.**

for Preparation Click here

READ DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPD (SP2)	Output shaft speed/ Min.: 0 km/h (0 mph) Max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph) (output shaft speed equal to vehicle speed)	-
SPD (NT)	Input shaft speed/ Min.: 0 rpm Max.: 12750 rpm	Lock-up: • ON (after warming up engine): Input turbine speed (NT) equal to engine speed • OFF (idling with shift lever in N): Input turbine speed (NT) nearly equal to engine speed	The data is displayed in increments of 50 rpm.
Neutral Position SW Signal	PNP switch status/ ON or OFF	Shift lever: • In P or N: ON • Not in P or N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Stop Light Switch	Stop light switch status/ ON or OFF	Brake pedal: • Depressed: ON • Released: OFF	-
Shift Status	ECM gear shift command/ 1st, 2nd, 3rd, 4th, 5th or 6th	Shift lever: • In D: 1st, 2nd, 3rd, 4th, 5th or 6th • In S: 1st, 2nd, 3rd, 4th, 5th or 6th	-
Shift SW Status (R	PNP switch status/	Shift lever: • In R: ON	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:**

Range)	ON or OFF	• Not in R: OFF	When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Shift SW Status (P Range)	PNP switch status/ ON or OFF	Shift lever: • In P: ON • Not in P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Shift SW Status (N Range)	PNP switch status/ ON or OFF	Shift lever: • In N: ON • Not in N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Shift SW Status (D Range)	PNP switch status/ ON or OFF	Shift lever: • In D: ON • Not in D: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Sports Shift Up SW	Sport shift up switch status/ ON or OFF	• ON: Shift lever held in "+" (up-shift) • OFF: Shift lever not held in "+" (up-shift)	-
Sports Shift Down SW	Sport shift down switch status/ ON or OFF	• ON: Shift lever held in "-" (down-shift) • OFF: Shift lever not held in "-" (down-shift)	-
Sports Mode Selection SW	Sport mode select switch status/ ON or OFF	Shift lever: • ON: In S, "+" or "-" • OFF: Not in S, "+" or "-"	-
Pattern Switch (PWR/M)	Pattern select switch (PWR) status/ ON or OFF	Pattern select switch (PWR): • Pushed: ON • Not pushed: OFF	-
Snow Switch Status	Pattern select switch (2ND) status/ ON or OFF	Pattern select switch (2ND): Pushed: ON ↓ Pattern select switch (2ND): Pushed: OFF	-
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.
A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.
AT Fluid	Flex lock-up judder judgment/ ON or OFF	• ON: Judder judgment occurs • OFF: Judder judgment does not occur	-
Lock Up	Lock-up/ ON or OFF	Lock-up: • Operating: ON • Not operating: OFF	-
Lock Up Solenoid	Lock-up solenoid	Lock-up solenoid: • Operating: ON	-

Status	status/ ON or OFF	• Not operating: OFF	
SLU Solenoid Status	Shift solenoid valve SLU status/ ON or OFF	Shift solenoid valve SLU: • Operating: ON • Not operating: OFF	-
SLT Solenoid Status	Shift solenoid valve SLT status/ ON or OFF	• Accelerator pedal depressed: OFF • Accelerator pedal released: ON	-

PERFORM ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Connect the TC and TE1	Turn on and off TC and TE1 connection	ON or OFF	• ON: TC and TE1 are connected. • OFF: TC and TE1 are disconnected.
Activate the Solenoid (SLU)	Operate shift solenoid valve SLU	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.
Activate the Solenoid (S1)	Operate shift solenoid valve S1	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (S2)	Operate shift solenoid valve S2	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid	Operate shift solenoid valve S3	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift

(S3)			lever is in P or N.
Activate the Solenoid (S4)	Operate shift solenoid valve S4	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Lock Up	Control shift solenoid valve SLU to set automatic transmission to lock-up condition	ON or OFF	It is possible to check the shift solenoid valve SLU operation. [Vehicle Condition] • The throttle valve opening angle is less than 35%. • The vehicle speed is 60 km/h (37 mph) or more.
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.
Activate the Solenoid (SR)	Operate shift solenoid valve SR	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (SL1)	Operate shift solenoid valve SL1	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (SL2)	Operate shift solenoid valve SL2	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

for Preparation Click here

READ DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
N Range Status	Shift lever N status/ ON or OFF	• ON: Shift lever in N • OFF: Shift lever not in N	-
Neutral Position SW Signal	PNP switch status/ ON or OFF	Shift lever: • In P or N: ON • Not in P or N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Transfer L4	Transfer status/ ON or OFF	• ON: Transfer in L4 • OFF: Transfer not in L4	-
Stop Light Switch	Stop light switch status/ ON or OFF	Brake pedal: • Depressed: ON • Released: OFF	-
SPD (NT)	Input shaft speed/ Min.: 0 rpm Max.: 12750 rpm	Lock-up: • ON (after warming up engine): Input turbine speed (NT) equal to engine speed • OFF (idling with shift lever in N): Input turbine speed (NT) nearly equal to engine speed	The data is displayed in increments of 50 rpm.
SPD (SP2)	Output shaft speed/ Min.: 0 km/h (0 mph) Max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph) (output shaft speed equal to vehicle speed)	-
Shift SW	PNP switch	Shift lever:	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.

Status (P Range)	status/ ON or OFF	• In P: ON • Not in P: OFF	**HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Pattern Switch (PWR/M)	Pattern switch (PWR) status/ ON or OFF	• ON: Pattern switch (PWR) is pushed • OFF: Pattern switch (PWR) is not pushed	-
Shift SW Status (R Range)	PNP switch status/ ON or OFF	Shift lever: • In R: ON • Not in R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Shift SW Status (N Range)	PNP switch status/ ON or OFF	Shift lever: • In N: ON • Not in N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
Shift SW Status (N,P Range) Supported	Status of PNP switch (N or P) support/ Supp or Unsupp	-	-
Shift SW Status (N,P Range)	PNP switch status/ ON or OFF	• ON: Shift lever not in P or N • OFF: Shift lever in P or N	-
Sports Shift Up SW	Sport shift up switch status/ ON or OFF	• ON: Shift lever held in "+" (up-shift) • OFF: Shift lever not held in "+" (up-shift)	-
		• ON: "+" shift paddle operated and held (up-shift) • OFF: "+" shift paddle not operated (up-shift)	-
Sports Shift Down SW	Sport shift down switch status/ ON or OFF	• ON: Shift lever held in "-" (down-shift) • OFF: Shift lever not held in "-" (down-shift)	-
		• ON: "-" shift paddle operated and held (down-shift) • OFF: "-" shift paddle not operated (down-shift)	-
Sports Mode Selection SW	Sport mode select switch status/ ON or OFF	Shift lever: • ON: In S, "+" or "-" • OFF: Not in S, "+" or "-"	-
Shift SW Status (D Range)	PNP switch status/ ON or OFF	Shift lever: • In D: ON • Not in D: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect. **HINT:** When failure still occurs even after adjusting these parts, refer to DTC P0705 (Click here).
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.
Lock Up	Lock-up/ ON or OFF	Lock-up: • Operating: ON • Not operating: OFF	-
Shift Status	ECM gear shift command/ 1st, 2nd, 3rd, 4th, 5th or 6th	Shift lever: • In D: 1st, 2nd, 3rd, 4th, 5th or 6th • In S: 1st, 2nd, 3rd, 4th, 5th or 6th	-
SLT Solenoid Status	Shift solenoid valve SLT status/ ON or OFF	• Accelerator pedal depressed: OFF • Accelerator pedal released: ON	-
SLU Solenoid Status	Shift solenoid valve SLU status/ ON or OFF	Shift solenoid valve SLU: • Operating: ON • Not operating: OFF	-
Pattern Switch (PWR/M)	Pattern select switch (PWR) status/ ON or OFF	Pattern select switch (PWR): • Pushed: ON • Not pushed: OFF	-
AT Fluid	Flex lock-up judder judgment/ ON or OFF	• ON: Judder judgment occurs • OFF: Judder judgment does not occur	-

PERFORM ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Connect the TC and TE1	Turn on and off TC and TE1 connection	ON or OFF	• ON: TC and TE1 are connected. • OFF: TC and TE1 are disconnected.
Activate the Solenoid (SLU)	Operate shift solenoid valve SLU	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate		ON or OFF **HINT:**	[Vehicle Condition]

the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	• **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	• The vehicle is stopped. • The engine is idling.
Activate the Solenoid (S1)	Operate shift solenoid valve S1	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (S2)	Operate shift solenoid valve S2	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (S3)	Operate shift solenoid valve S3	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (S4)	Operate shift solenoid valve S4	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Lock Up	Control shift solenoid valve SLU to set automatic transmission to lock-up condition	ON or OFF	It is possible to check the shift solenoid valve SLU operation. [Vehicle Condition] • The throttle valve opening angle is less than 35%. • The vehicle speed is 60 km/h (37 mph) or more.
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.
Activate the Solenoid (SR)	Operate shift solenoid valve SR	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (SL1)	Operate shift solenoid valve SL1	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.
Activate the Solenoid (SL2)	Operate shift solenoid valve SL2	ON or OFF	[Vehicle Condition] • The engine is stopped. • The shift lever is in P or N.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

for Preparation Click here

HINT:

- **If a DTC is output during the DTC check, check the parts listed in the table below and proceed to the "See page" given.**
- ***1: "Comes on" means the Malfunction Indicator Lamp (MIL) illuminates.**
- ***2: "DTC stored" means the ECM stores the trouble code if the ECM detects the DTC detection condition.**
- ***3: w/ OBD**
- ***4: w/o OBD**
- **These DTCs may be output when the clutch, brake, gear components, etc., inside the automatic transmission are damaged.**

Automatic Transmission System

DTC Code	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	- Park/neutral position switch assembly - Transmission control switch (transmission floor shift assembly) - Open or short in park/neutral position switch circuit - ECM	Comes on	DTC stored	Click here
P0710	Transmission Fluid Temperature Sensor "A" Circuit	- Open or short in No. 1 ATF temperature sensor circuit - No. 1 transmission wire (No. 1 ATF temperature sensor) - ECM	Comes on	DTC stored	Click here
P0711	Transmission Fluid Temperature Sensor "A" Performance	No. 1 transmission wire (No. 1 ATF temperature sensor)	Comes on	DTC stored	Click here
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	- Short in No. 1 ATF temperature sensor circuit - No. 1 transmission wire (No. 1 ATF temperature sensor) - ECM	Comes on	DTC stored	Click here
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	- Open in No. 1 ATF temperature sensor circuit - No. 1 transmission wire (No. 1 ATF temperature sensor) - ECM	Comes on	DTC stored	Click here
P0717	Turbine Speed Sensor Circuit No Signal	- Open or short in speed sensor NT circuit - Speed sensor NT - ECM - Automatic transmission (clutch, brake, gear, etc.)	Comes on	DTC stored	Click here
P0722	Output Speed Sensor Circuit No Signal	- Open or short in speed sensor SP2 circuit - Speed sensor SP2 - ECM - Automatic transmission (clutch, brake, gear, etc.)	Comes on	DTC stored	Click here
P0724	Brake Switch "B" Circuit High	- Short in stop light switch signal circuit - Stop light switch assembly - ECM	Comes on	DTC stored	Click here
P0729	Gear 6 Incorrect Ratio	- Valve body is blocked up or stuck (sequence valve) - Shift solenoid valve SLT remains open or closed - Automatic transmission (clutch, brake, gear, etc.)	Comes on*3 -*4	DTC stored	Click here
P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	- Open or short in shift solenoid valve SL1 circuit - Shift solenoid valve SL1 - ECM	Comes on	DTC stored	Click here
P0751	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	- Shift solenoid valve S1 remains open or closed - Shift solenoid valve SLT remains open or closed - Valve body is blocked - No. 2 brake malfunction (driving is difficult)	Comes on*3 -*4	DTC stored	Click here

		- Automatic transmission (clutch, brake, gear, etc.)			
P0756	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	- Shift solenoid valve S2 remains open or closed - Valve body is blocked - Automatic transmission (clutch, brake, gear, etc.)	Comes on	DTC stored	Click here
P0761	Shift Solenoid "C" Performance (Shift Solenoid Valve S3)	- Shift solenoid valve S3 remains open or closed - Shift solenoid valve SLT remains open or closed - Valve body is blocked - Automatic transmission (clutch, brake, gear, etc.)	Comes on*3 -*4	DTC stored	Click here
P0766	Shift Solenoid "D" Performance (Shift Solenoid Valve S4)	- Shift solenoid valve S4 remains closed - Shift solenoid valve SLT remains open or closed - Valve body is blocked (brake control valve) - Automatic transmission (clutch, brake, gear, etc.)	Comes on*3 -*4	DTC stored	Click here
P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	- Shift solenoid valve SL2 remains open - Shift solenoid valve SLT remains open or closed - Valve body is blocked (brake control valve) - Automatic transmission (clutch, brake, gear, etc.)	Comes on	DTC stored	Click here
P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	- Open or short in shift solenoid valve SL2 circuit - Shift solenoid valve SL2 - ECM	Comes on	DTC stored	Click here
P0781	1-2 Shift (1-2 Shift Valve)	- Valve body is blocked up or stuck (1-2 shift valve) - Shift solenoid valve SLT remains open or closed - Automatic transmission (clutch, brake, gear, etc.)	Comes on*3 -*4	DTC stored	Click here
P0818	Driveline Disconnect Switch Input Circuit	- Short in transfer neutral signal - Transfer shift actuator assembly (transfer system) - ECM	Comes on	DTC stored	Click here
P0894	Transmission Component Slipping	- Shift solenoid valve SLT remains open or closed - Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed - Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck - Valve body is blocked - Automatic transmission (clutch, brake, gear, etc.)	Comes on	DTC stored	Click here
P0973	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	- Short in shift solenoid valve S1 circuit - Shift solenoid valve S1 - ECM	Comes on	DTC stored	Click here
P0974	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)	- Open in shift solenoid valve S1 circuit - Shift solenoid valve S1 - ECM	Comes on	DTC stored	Click here
P0976	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	- Short in shift solenoid valve S2 circuit - Shift solenoid valve S2 - ECM	Comes on	DTC stored	Click here
P0977	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)	- Open in shift solenoid valve S2 circuit - Shift solenoid valve S2 - ECM	Comes on	DTC stored	Click here
P0979	Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)	- Short in shift solenoid valve S3 circuit - Shift solenoid valve S3 - ECM	Comes on	DTC stored	Click here
P0980	Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)	- Open in shift solenoid valve S3 circuit - Shift solenoid valve S3 - ECM	Comes on	DTC stored	Click here
P0982	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	- Short in shift solenoid valve S4 circuit - Shift solenoid valve S4 - ECM	Comes on	DTC stored	Click here
		- Open in shift solenoid valve S4 circuit			

P0983	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)	- Shift solenoid valve S4 - ECM	Comes on	DTC stored	Click here
P0985	Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)	- Short in shift solenoid valve SR circuit - Shift solenoid valve SR - ECM	Comes on	DTC stored	Click here
P0986	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)	- Open in shift solenoid valve SR circuit - Shift solenoid valve SR - ECM	Comes on	DTC stored	Click here
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	- Shift solenoid valve SLT remains open or closed - Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed - Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck - Valve body is blocked - Automatic transmission (clutch, brake, gear, etc.)	Comes on*3 -*4	DTC stored	Click here
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	- Open or short in shift solenoid valve SLT circuit - Shift solenoid valve SLT - ECM	Comes on	DTC stored	Click here
P2740	Transmission Fluid Temperature Sensor "B" Circuit	- Open or short in No. 2 ATF temperature sensor circuit - No. 1 transmission wire (No. 2 ATF temperature sensor) - ECM	Comes on	DTC stored	Click here
P2742	Transmission Fluid Temperature Sensor "B" Circuit Low Input	- Short in No. 2 ATF temperature sensor circuit - No. 1 transmission wire (No. 2 ATF temperature sensor) - ECM	Comes on	DTC stored	Click here
P2743	Transmission Fluid Temperature Sensor "B" Circuit High Input	- Open in No. 2 ATF temperature sensor circuit - No. 1 transmission wire (No. 2 ATF temperature sensor) - ECM	Comes on	DTC stored	Click here
P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	- Shift solenoid valve SLU remains open or closed - Shift solenoid valve SLU - Valve body is blocked - Torque converter clutch - Automatic transmission (clutch, brake, gear, etc.) - Line pressure is too low	Comes on	DTC stored	Click here
P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	- Open or short in shift solenoid valve SLU circuit - Shift solenoid valve SLU - ECM	Comes on	DTC stored	Click here
P2772	Four Wheel Drive (4WD) Low Switch Circuit Range / Performance	- Short in transfer L4 position switch circuit - Four wheel drive control ECU - ECM	Comes on	DTC stored	Click here

for Preparation Click here

HINT:

- **If a DTC is output during the DTC check, check the parts listed in the table below and proceed to the "See page" given.**
- ***1: "Comes on" means the Malfunction Indicator Lamp (MIL) illuminates.**
- ***2: "DTC stored" means the ECM stores the trouble code if the ECM detects the DTC detection condition.**
- ***3: w/ OBD**
- ***4: w/o OBD**
- ***5: The ATF temperature warning light blinks or a message is displayed in the combination meter.**
- **These DTCs may be output when the clutch, brake, gear components, etc., inside the automatic transmission are damaged.**

Automatic Transmission System

DTC Code	Detection Item	MIL*1	Memory*2	See page
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	Comes on	DTC stored	Click here
P0711	Transmission Fluid Temperature Sensor "A" Performance	Comes on	DTC stored	Click here
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	Comes on	DTC stored	Click here
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	Comes on	DTC stored	Click here
P0717	Turbine Speed Sensor Circuit No Signal	Comes on	DTC stored	Click here
P0722	Output Speed Sensor Circuit No Signal	Comes on	DTC stored	Click here
P0724	Brake Switch "B" Circuit High	Comes on	DTC stored	Click here
P0729	Gear 6 Incorrect Ratio	Comes on*3 -*4	DTC stored	Click here
P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	Comes on	DTC stored	Click here
P0751	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	Comes on*3 -*4	DTC stored	Click here
P0756	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	Comes on	DTC stored	Click here
P0761	Shift Solenoid "C" Performance (Shift Solenoid Valve S3)	Comes on*3 -*4	DTC stored	Click here
P0766	Shift Solenoid "D" Performance (Shift Solenoid Valve S4)	Comes on*3 -*4	DTC stored	Click here
P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	Comes on	DTC stored	Click here
P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	Comes on	DTC stored	Click here
P0781	1-2 Shift (1-2 Shift Valve)	Comes on*3 -*4	DTC stored	Click here
P0894	Transmission Component Slipping	Comes on	DTC stored	Click here
P0973	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	Comes on	DTC stored	Click here
P0974	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)	Comes on	DTC stored	Click here
P0976	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	Comes on	DTC stored	Click here
P0977	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)	Comes on	DTC stored	Click here

P0979	Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)	Comes on	DTC stored	Click here
P0980	Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)	Comes on	DTC stored	Click here
P0982	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	Comes on	DTC stored	Click here
P0983	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)	Comes on	DTC stored	Click here
P0985	Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)	Comes on	DTC stored	Click here
P0986	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)	Comes on	DTC stored	Click here
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	Comes on*3 -*4	DTC stored	Click here
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	Comes on	DTC stored	Click here
P2742	Transmission Fluid Temperature Sensor "B" Circuit Low Input	-*5	DTC stored	Click here
P2743	Transmission Fluid Temperature Sensor "B" Circuit High Input	-*5	DTC stored	Click here
P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	Comes on	DTC stored	Click here
P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	Comes on	DTC stored	Click here
P2772	Four Wheel Drive (4WD) Low Switch Circuit Range / Performance	Comes on	DTC stored	Click here

DTC P0705 Transmission Range Sensor Circuit Malfunction (PRNDL Input)

for Preparation Click here

DESCRIPTION

The Park/Neutral Position (PNP) switch detects the shift lever position and sends signals to the ECM.

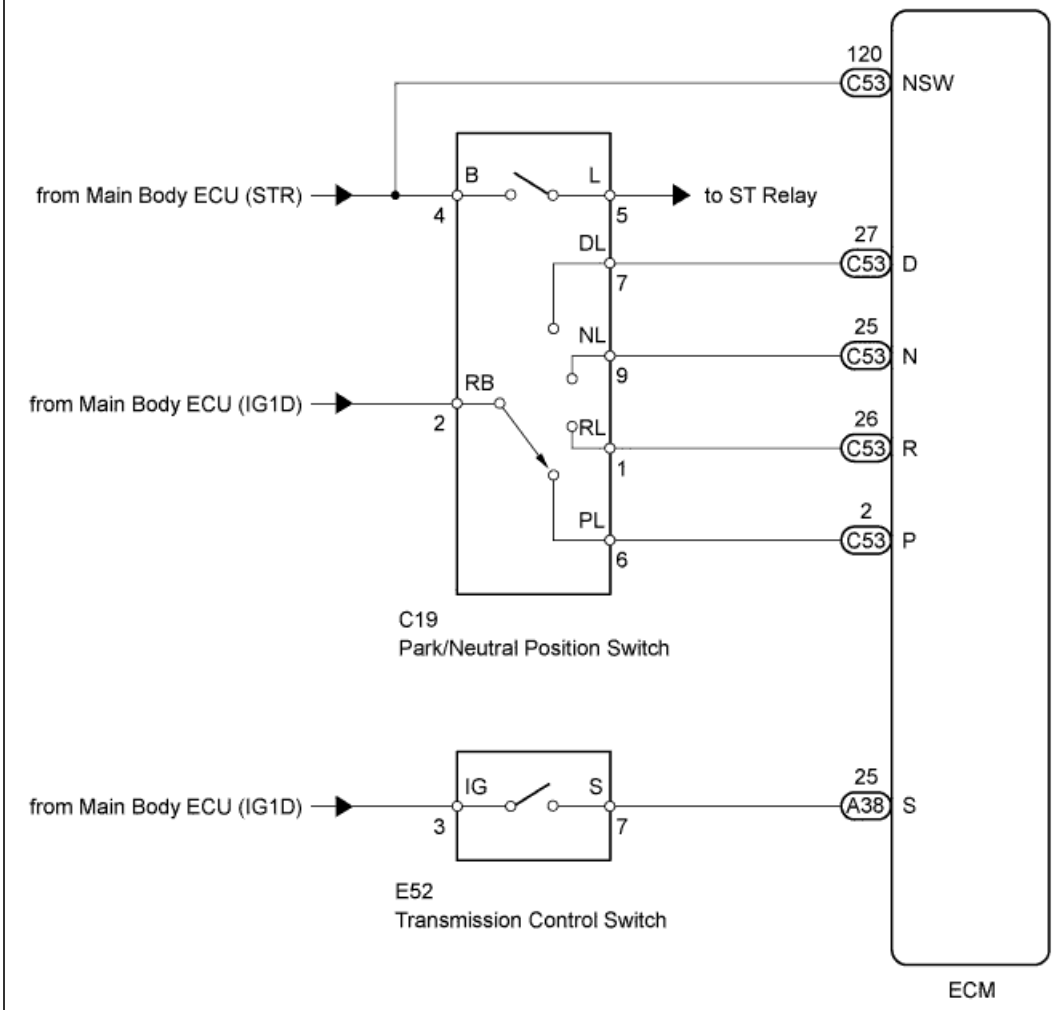
DTC Code	DTC Detection Condition	Trouble Area
P0705	When one of the following conditions is met: (A) Any 2 or more of the following signals are ON simultaneously (2 trip detection logic). • P input signal • N input signal • R input signal • D input signal (B) Any 2 or more of the following signals are ON simultaneously (2 trip detection logic). • NSW input signal • R input signal • D input signal (C) Any of the following signals are ON for 2.0 sec. or more when the shift lever is in S (2 trip detection logic). • NSW input signal • P input signal • N input signal • R input signal (D) All signals are OFF simultaneously for P, R, N, D and NSW (2 trip detection logic).	• Park/neutral position switch assembly • Transmission control switch (transmission floor shift assembly) • Open or short in park/neutral position switch circuit • ECM

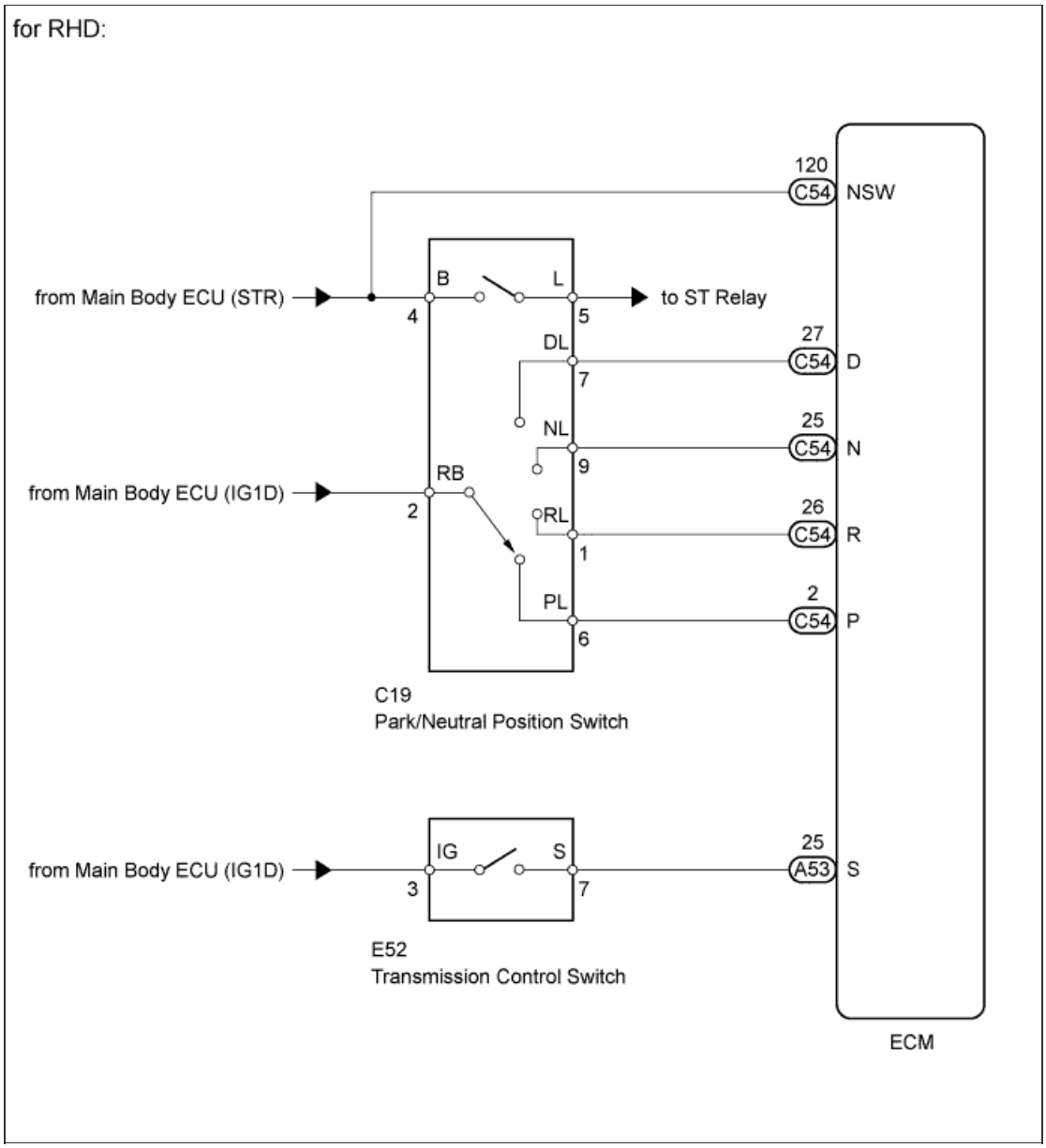
MONITOR DESCRIPTION

This DTC indicates a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.
The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that the engine can be started only when the shift lever is in P or N.
The park/neutral position switch sends a signal to the ECM according to the shift lever position (P, R, N, D or S).
The ECM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The ECM will illuminate the MIL and store the DTC.

WIRING DIAGRAM

for LHD:


120
C53
NSW
from Main Body ECU (STR)
B
L
to ST Relay
4
5
DL
27
C53
D
7
NL
25
C53
N
9
from Main Body ECU (IG1D)
RB
2
RL
26
C53
R
1
PL
2
C53
P
6
C19
Park/Neutral Position Switch
from Main Body ECU (IG1D)
IG
S
25
A38
S
3
7
E52
Transmission Control Switch
ECM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester	Measurement	Normal Condition	Diagnostic Note

Display	Item/Range		
Neutral Position SW Signal	PNP switch status/ ON or OFF	Shift lever: • In P or N: ON • Not in P or N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (R Range)	PNP switch status/ ON or OFF	Shift lever: • In R: ON • Not in R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (P Range)	PNP switch status/ ON or OFF	Shift lever: • In P: ON • Not in P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (N Range)	PNP switch status/ ON or OFF	Shift lever: • In N: ON • Not in N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (D Range)	PNP switch status/ ON or OFF	Shift lever: • In D: ON • Not in D: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Sports Shift Up SW	Sport shift up switch status/ ON or OFF	• ON: Shift lever held in "+" (up-shift) • OFF: Shift lever not held in "+" (up-shift)	-
Sports Shift Down SW	Sport shift down switch status/ ON or OFF	• ON: Shift lever held in "-" (down-shift) • OFF: Shift lever not held in "-" (down-shift)	-
Sports Mode Selection SW	Sport mode select switch status/ ON or OFF	Shift lever: • ON: In S, "+" or "-" • OFF: Not in S, "+" or "-"	-

1.INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

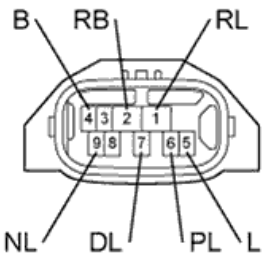
a. Disconnect the C19 park/neutral position switch connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
• 2 (RB) - 6 (PL) • 4 (B) - 5 (L)	Shift lever in P	Below 1 Ω
2 (RB) - 1 (RL)	Shift lever in R	Below 1 Ω
• 2 (RB) - 9 (NL) • 4 (B) - 5 (L)	Shift lever in N	Below 1 Ω
2 (RB) - 7 (DL)	• Shift lever in D • Shift lever in S,	Below 1 Ω

Component without harness connected:
(Park/Neutral Position Switch)



	"+" or "-"	
• 2 (RB) - 6 (PL) • 4 (B) - 5 (L)	Shift lever not in P	10 kΩ or higher
2 (RB) - 1 (RL)	Shift lever not in R	10 kΩ or higher
• 2 (RB) - 9 (NL) • 4 (B) - 5 (L)	Shift lever not in N	10 kΩ or higher
2 (RB) - 7 (DL)	• Shift lever not in D • Shift lever not in S, "+" or "-"	10 kΩ or higher

NG → REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY (Click here)

OK

2.INSPECT TRANSMISSION CONTROL SWITCH

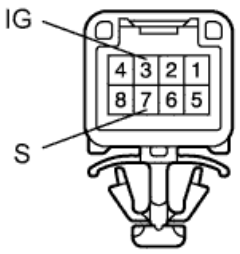
a. Disconnect the E52 transmission control switch connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 7 (S)	Shift lever in S, "+" or "-"	Below 1 Ω
3 (IG) - 7 (S)	Shift lever not in S, "+" or "-"	10 kΩ or higher

Component without harness connected:
(Transmission Control Switch)



P

NG → REPLACE TRANSMISSION CONTROL SWITCH (TRANSMISSION FLOOR SHIFT ASSEMBLY) (Click here)

OK

3.CHECK PARK/NEUTRAL POSITION SWITCH ASSEMBLY (POWER SOURCE)

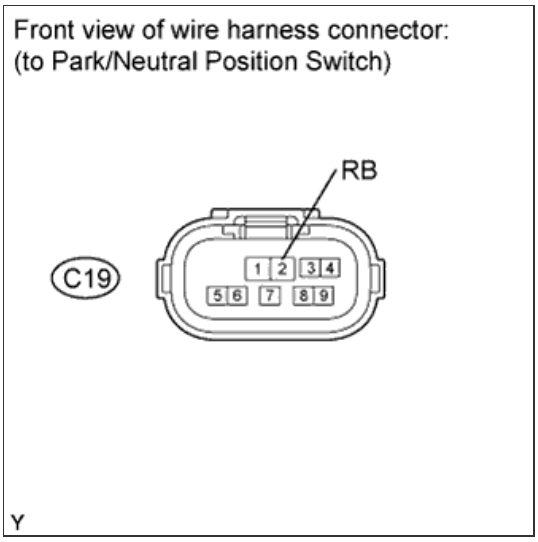
a. Disconnect the C19 park/neutral position switch connector.

b. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition

C19-2 (RB) - Body ground	Engine switch on (IG)	11 to 14 V
C19-2 (RB) - Body ground	Engine switch off	Below 1 V



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ENGINE SWITCH)

OK

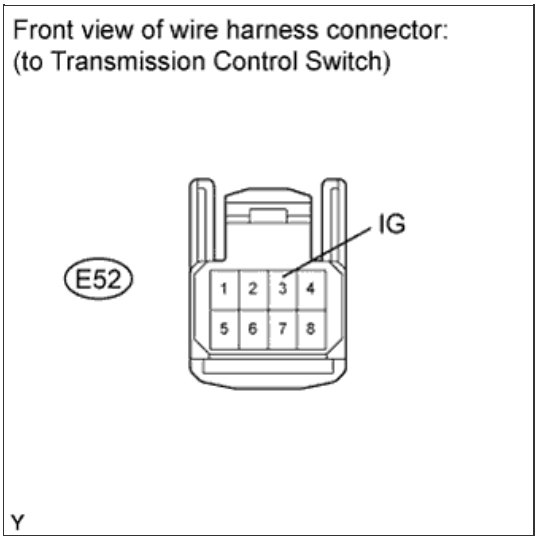
4.CHECK TRANSMISSION CONTROL SWITCH (POWER SOURCE)

a. Disconnect the E52 transmission control switch connector.

b. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E52-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V
E52-3 (IG) - Body ground	Engine switch off	Below 1 V



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (TRANSMISSION CONTROL SWITCH - ENGINE SWITCH)

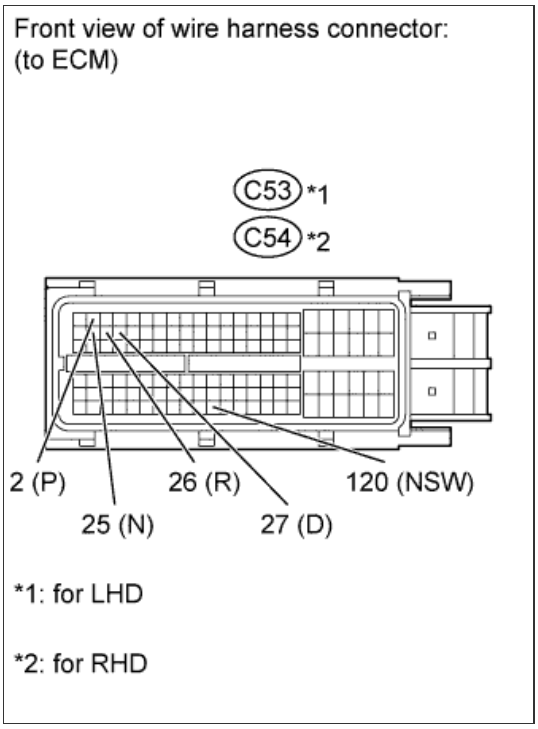
OK

5.CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the voltage according to the value(s) in the table below.



Standard Voltage:

for LHD

Tester Connection	Condition	Specified Condition
• C53-2 (P) - Body ground • C53-120 (NSW) - Body ground	• Engine switch on (IG) • Shift lever in P	11 to 14 V
C53-26 (R) - Body ground	• Engine switch on (IG) • Shift lever in R	11 to 14 V*
• C53-25 (N) - Body ground • C53-120 (NSW) - Body ground	• Engine switch on (IG) • Shift lever in N	11 to 14 V
C53-27 (D) - Body ground	• Engine switch on (IG) • Shift lever in D	11 to 14 V
• C53-2 (P) - Body ground • C53-120 (NSW) - Body ground	• Engine switch on (IG) • Shift lever not in P	Below 1 V
C53-26 (R) - Body ground	• Engine switch on (IG) • Shift lever not in R	Below 1 V
• C53-25 (N) - Body ground • C53-120 (NSW) - Body ground	• Engine switch on (IG) • Shift lever not in N	Below 1 V

C53-27 (D) - Body ground	• Engine switch on (IG) • Shift lever not in D	Below 1 V

for RHD

Tester Connection	Condition	Specified Condition
• C54-2 (P) - Body ground • C54-120 (NSW) - Body ground	• Engine switch on (IG) • Shift lever in P	11 to 14 V
C54-26 (R) - Body ground	• Engine switch on (IG) • Shift lever in R	11 to 14 V*
• C54-25 (N) - Body ground • C54-120 (NSW) - Body ground	• Engine switch on (IG) • Shift lever in N	11 to 14 V
C54-27 (D) - Body ground	• Engine switch on (IG) • Shift lever in D	11 to 14 V
• C54-2 (P) - Body ground • C54-120 (NSW) - Body ground	• Engine switch on (IG) • Shift lever not in P	Below 1 V
C54-26 (R) - Body ground	• Engine switch on (IG) • Shift lever not in R	Below 1 V
• C54-25 (N) - Body ground • C54-120 (NSW) - Body ground	• Engine switch on (IG) • Shift lever not in N	Below 1 V
C54-27 (D) - Body ground	• Engine switch on (IG) • Shift lever not in D	Below 1 V

HINT:

*: The voltage will drop slightly due to the turning on of the back up light.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

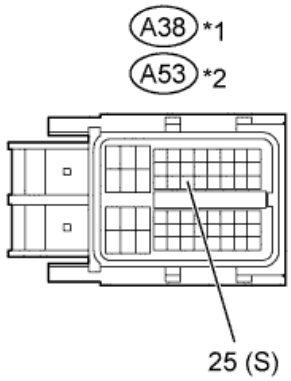
6.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - ECM)

a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Measure the voltage according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Voltage:

for LHD

Tester Connection	Condition	Specified Condition
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

for RHD

Tester Connection	Condition	Specified Condition
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

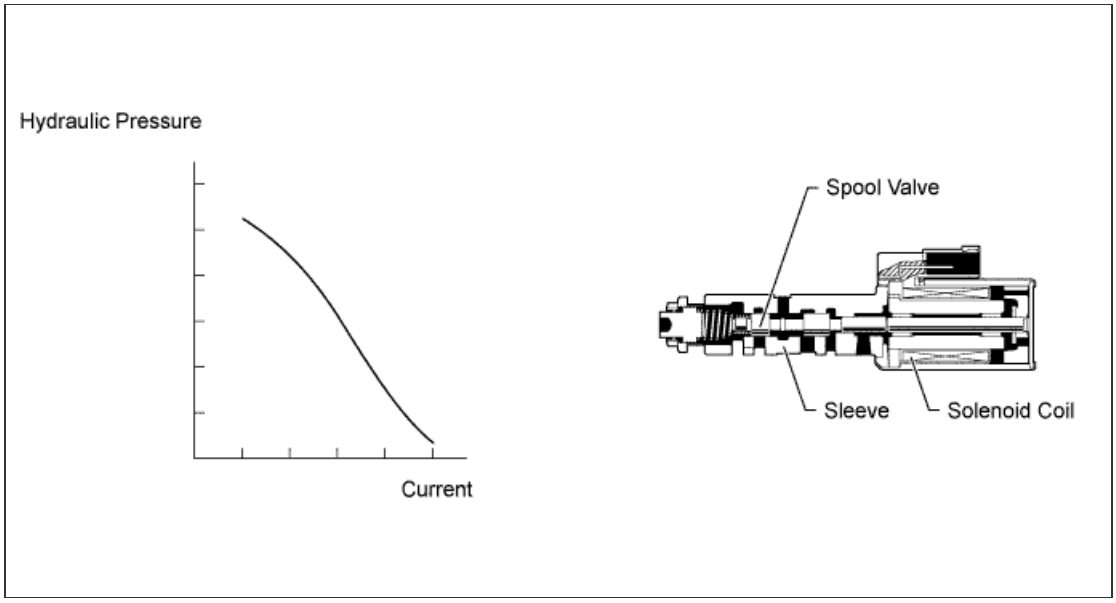
DTC P0894 Transmission Component Slipping

DTC P2714 Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

for Preparation Click here

DESCRIPTION

The shift solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and vehicle speed sensor. The ECM adjusts the current of shift solenoid valve SLT to control the hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.



DTC Code	DTC Detection Condition	Trouble Area
P0894	The ECM detects a malfunction of shift solenoid valve SLT, S1, S2, S3, S4, SL2, gear 6 incorrect ratio (sequence valve) or 1-2 shift valves according to the revolution difference of the turbine and output shaft, and also by the oil pressure (2 trip detection logic).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P2714	The ECM detects a malfunction of shift solenoid valve SLT (ON side) according to the revolution difference of the turbine and output shaft, and also by the oil pressure (2 trip detection logic*1, 1 trip detection logic*2).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

- *1: w/ OBD
- *2: w/o OBD

MONITOR DESCRIPTION

The ECM calculates the amount of heat absorbed by the friction material based on the difference in revolution (clutch slippage) between the turbine and output shaft. The ECM illuminates the MIL and stores these DTCs when the amount of heat absorption exceeds the specified value.
There are 2 causes of revolution difference.

- When shift solenoid valve SLT remains ON, oil pressure decreases, which causes the clutch engagement force to decrease.
- When the shift solenoid valve remains ON or OFF, the gear position commanded by the ECM and the actual gear position are not the same.

NOTICE:

If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0894 AND P2714)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
P0894 and/or P2714 is output	A
P0894, P2714 and other DTCs are output	B

HINT:

If any other codes besides P0894 and P2714 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

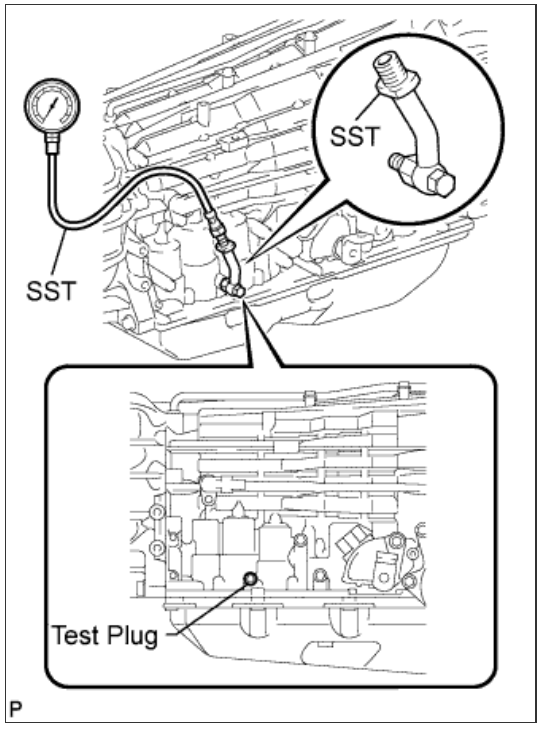
HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)



b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester			

Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → **Go to step 17**

OK

3.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the intelligent tester to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**

f. Compare the ECM gear shift command and the actual gear position.

OK:

Gear position changes in accordance with the intelligent tester command.

Result

System Condition			ECM Gear Shift Command						Proceed to
			1st	2nd	3rd	4th	5th	6th	
Malfunction	Shift solenoid valve S1	Stuck ON*1	2nd	2nd	3rd	4th	5th	6th	A
		Stuck OFF	1st	1st	3rd	4th	5th	N*2	
	Shift solenoid valve S2	Stuck ON	1st	2nd	2nd	4th	6th	6th	B
		Stuck OFF	3rd	3rd	3rd	4th	5th	5th	
	Shift solenoid valve S3	Stuck ON	1st	2nd	3rd	3rd	N*2	N*2	C
		Stuck OFF	3rd	4th	4th	4th	5th	6th	
	Shift solenoid valve S4	Stuck ON*3	1st	2nd	3rd	4th	5th	6th	D
		Stuck OFF	1st	2nd	3rd	4th	4th	4th	
Normal			1st	2nd	3rd	4th	5th	6th	E

HINT:

- ***1: When shift solenoid valve S1 is stuck ON, the vehicle cannot drive in reverse.**
- ***2: Neutral**
- ***3: When shift solenoid valve S4 is stuck ON, gear shifting is normal.**

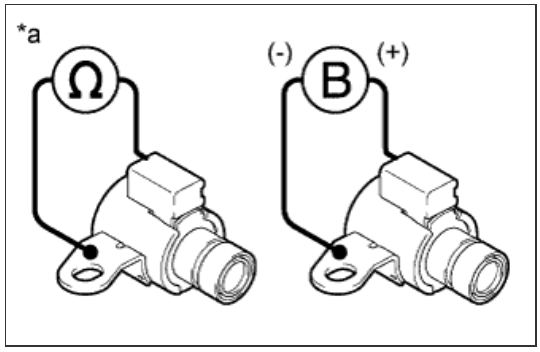
B	Go to step 7
C	Go to step 10
D	Go to step 13
E	Go to step 17

A

4.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

6.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

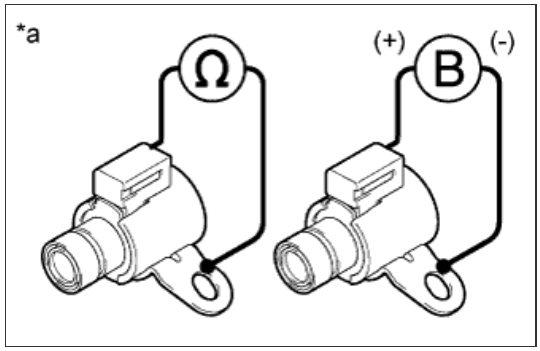
7.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK ↓

8.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK ↓

9.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

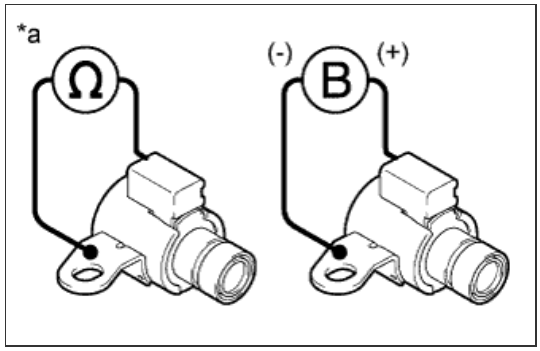
OK ↓

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

10.INSPECT SHIFT SOLENOID VALVE S3

a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

11.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

12.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

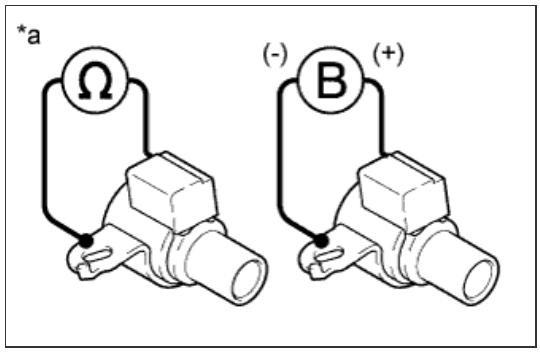
OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

13.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

14.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

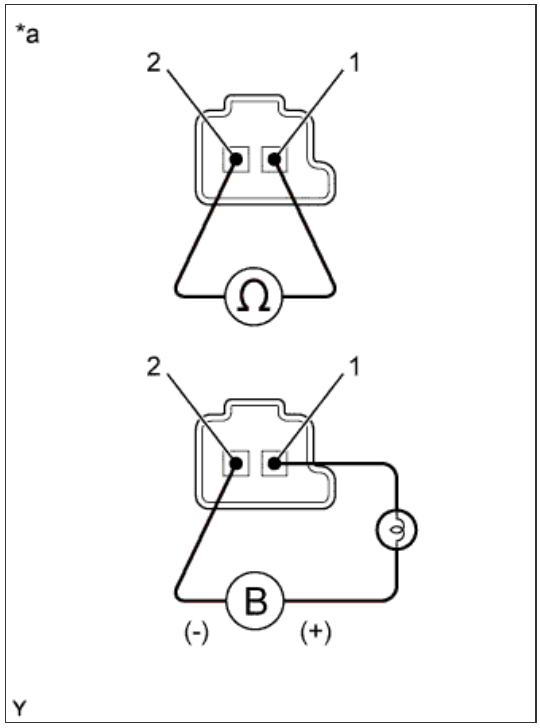
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)

NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

15.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

16.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

17.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

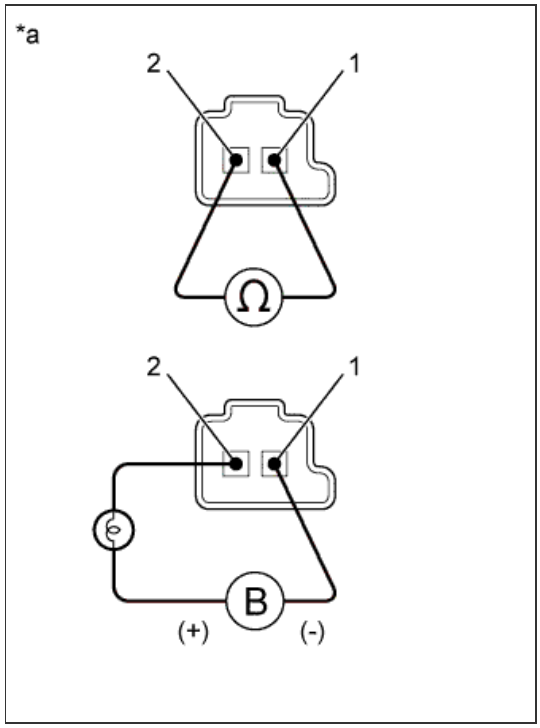
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLT)

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

18.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:
There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

19.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:
The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0705 Transmission Range Sensor Circuit Malfunction (PRNDL Input)

for Preparation Click here

DESCRIPTION

The Park/Neutral Position (PNP) switch detects the shift lever position and sends signals to the ECM.

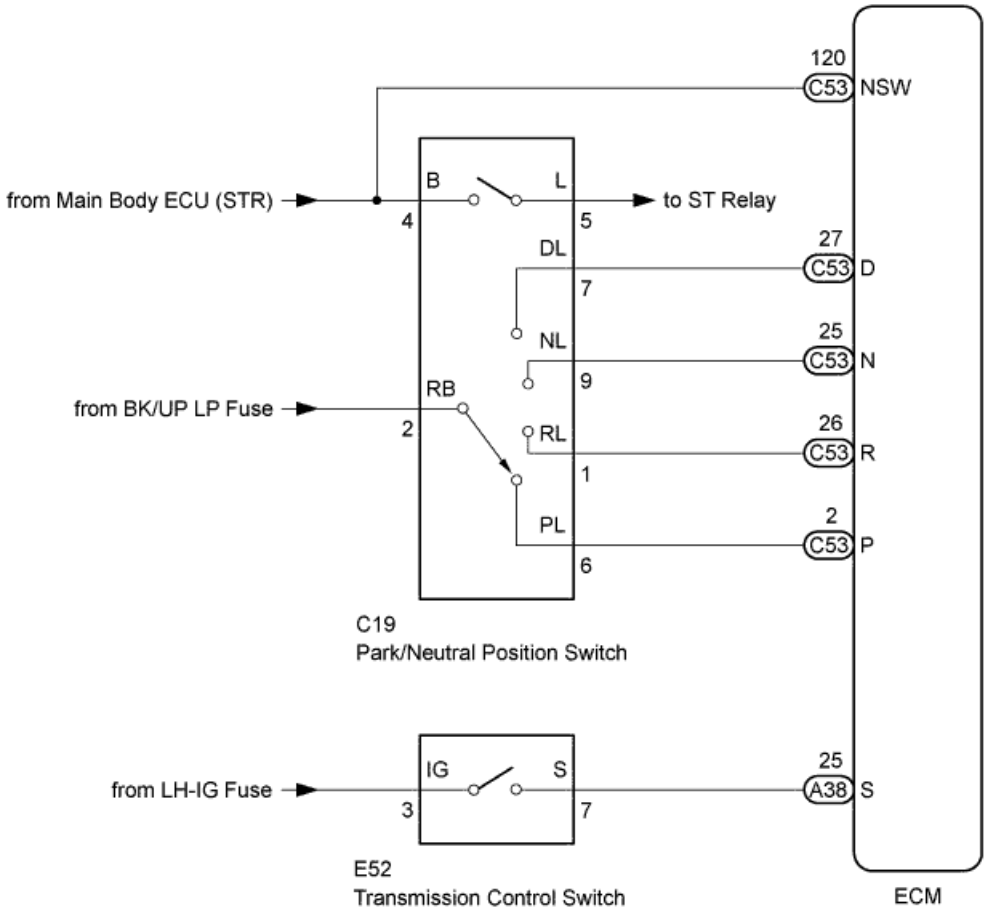
DTC Code	DTC Detection Condition	Trouble Area
P0705	When one of the following conditions is met: (A) Any 2 or more of the following signals are ON simultaneously (2 trip detection logic). • P input signal • N input signal • R input signal • D input signal (B) Any 2 or more of the following signals are ON simultaneously (2 trip detection logic). • NSW input signal • R input signal • D input signal (C) Any of the following signals are ON for 2.0 sec. or more when the shift lever is in S (2 trip detection logic). • NSW input signal • P input signal • N input signal • R input signal (D) All the signals are OFF simultaneously for the P, R, N and D positions (2 trip detection logic).	• Park/neutral position switch assembly • Transmission control switch (transmission floor shift assembly) • Open or short in park/neutral position switch circuit • ECM

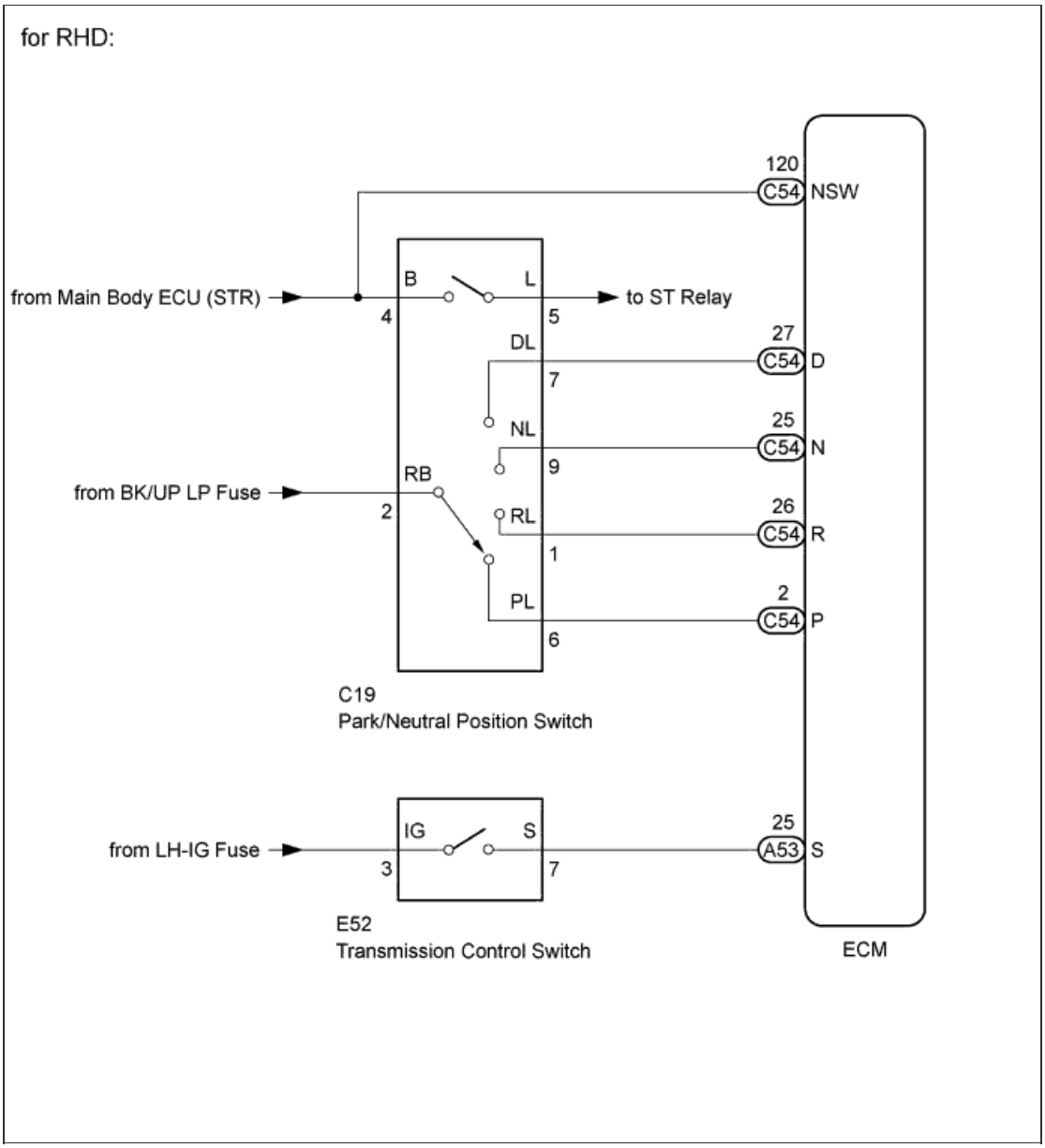
MONITOR DESCRIPTION

This DTC indicates a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.
The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that the engine can be started only when the shift lever is in P or N.
The park/neutral position switch sends a signal to the ECM according to the shift lever position (P, R, N, D or S).
The ECM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The ECM will illuminate the MIL and store the DTC.

WIRING DIAGRAM

for LHD:


120
C53
NSW
from Main Body ECU (STR)
B
L
to ST Relay
4
5
DL
27
C53
D
7
NL
25
C53
N
9
from BK/UP LP Fuse
RB
2
RL
26
C53
R
1
PL
2
C53
P
6
C19
Park/Neutral Position Switch
from LH-IG Fuse
IG
S
25
A38
S
3
7
E52
Transmission Control Switch
ECM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester	Measurement	Normal Condition	Diagnostic Note

Display	Item/Range		
Neutral Position SW Signal	PNP switch status/ ON or OFF	Shift lever: • In P or N: ON • Not in P or N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (R Range)	PNP switch status/ ON or OFF	Shift lever: • In R: ON • Not in R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (P Range)	PNP switch status/ ON or OFF	Shift lever: • In P: ON • Not in P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (N Range)	PNP switch status/ ON or OFF	Shift lever: • In N: ON • Not in N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Shift SW Status (D Range)	PNP switch status/ ON or OFF	Shift lever: • In D: ON • Not in D: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, the adjustment of the PNP switch or shift cable may be incorrect.
Sports Shift Up SW	Sport shift up switch status/ ON or OFF	• ON: Shift lever held in "+" (up-shift) • OFF: Shift lever not in "+" (up-shift)	-
		• ON: "+" shift paddle operated and held (up-shift) • OFF: "+" shift paddle not operated (up-shift)	
Sports Shift Down SW	Sport shift down switch status/ ON or OFF	• ON: Shift lever held in "-" (down-shift) • OFF: Shift lever not in "-" (down-shift)	-
		• ON: "-" shift paddle operated and held (down-shift) • OFF: "-" shift paddle not operated (down-shift)	

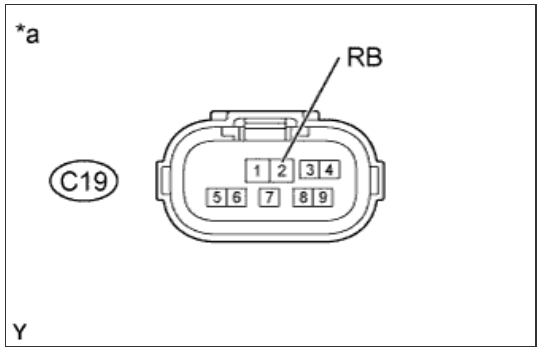
1.CHECK HARNESS AND CONNECTOR (BK/UP LP FUSE - PARK/NEUTRAL POSITION SWITCH)

a. Disconnect the park/neutral position switch connector.

b. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
C19-2 (RB) - Body ground	Engine switch on (IG)	11 to 14 V
C19-2 (RB) - Body ground	Engine switch off	Below 1 V



Text in Illustration

*a	Front view of wire harness connector (to Park/Neutral Position Switch)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

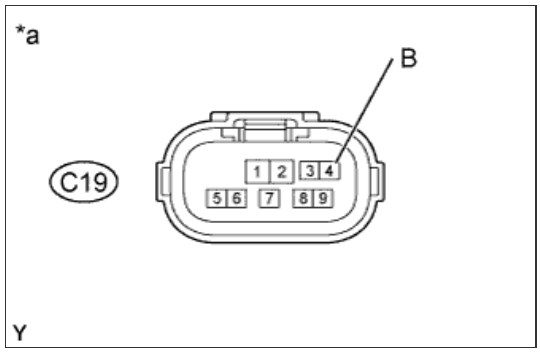
2.CHECK HARNESS AND CONNECTOR (NSW TERMINAL VOLTAGE)

a. Disconnect the park/neutral position switch connector.

b. Measure the voltage according to the value(s) in the table below.

Standard voltage:

Tester Connection	Condition	Specified Condition
C19-4 (B) - Body ground	Engine switch on (IG)	11 to 14 V
C19-4 (B) - Body ground	Engine switch off	Below 1 V



Text in Illustration

*a	Front view of wire harness connector (to Park/Neutral Position Switch)

NG → Go to step 7

OK

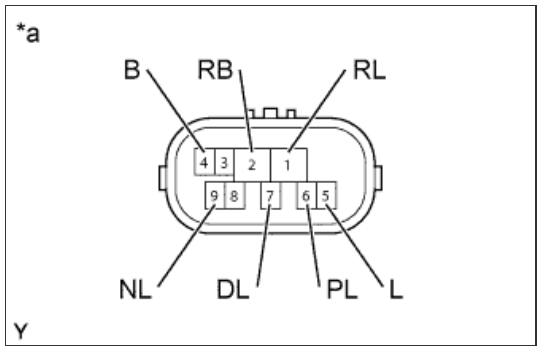
3.INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

a. Disconnect the park/neutral position switch connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
• 2 (RB) - 6 (PL) • 4 (B) - 5 (L)	Shift lever in P	Below 1 Ω
2 (RB) - 1 (RL)	Shift lever in R	Below 1 Ω
• 2 (RB) - 9 (NL) • 4 (B) - 5 (L)	Shift lever in N	Below 1 Ω
2 (RB) - 7 (DL)	• Shift lever in D • Shift lever in S, "+" or "-"	Below 1 Ω
• 2 (RB) - 6 (PL) • 4 (B) - 5 (L)	Shift lever not in P	10 kΩ or higher
2 (RB) - 1 (RL)	Shift lever not in R	10 kΩ or higher
• 2 (RB) - 9 (NL) • 4 (B) -	Shift lever not in N	10 kΩ or higher



5 (L)		
2 (RB) - 7 (DL)	• Shift lever not in D • Shift lever not in S, "+" or "-"	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (Park/Neutral Position Switch)

NG → REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY (Click here)

OK

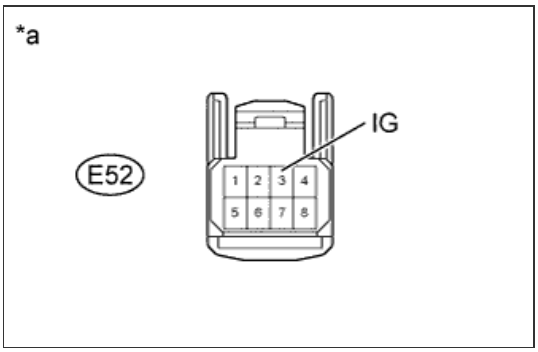
4.CHECK HARNESS AND CONNECTOR (LH-IG FUSE - TRANSMISSION CONTROL SWITCH)

a. Disconnect the transmission control switch connector.

b. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E52-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V
E52-3 (IG) - Body ground	Engine switch off	Below 1 V



Text in Illustration

*a	Front view of wire harness connector (to Transmission Control Switch)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

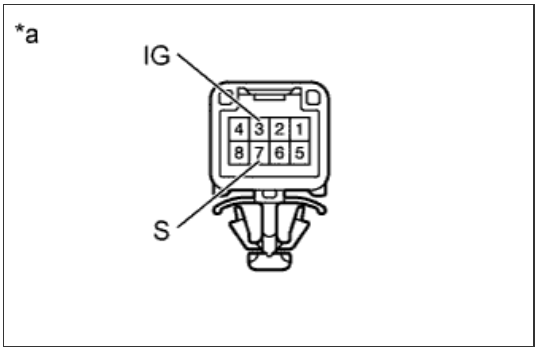
5.INSPECT TRANSMISSION CONTROL SWITCH

a. Disconnect the transmission control switch connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 7 (S)	Shift lever in S, "+" or "-"	Below 1 Ω
3 (IG) - 7 (S)	Shift lever not in S, "+" or "-"	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (Transmission Control Switch)

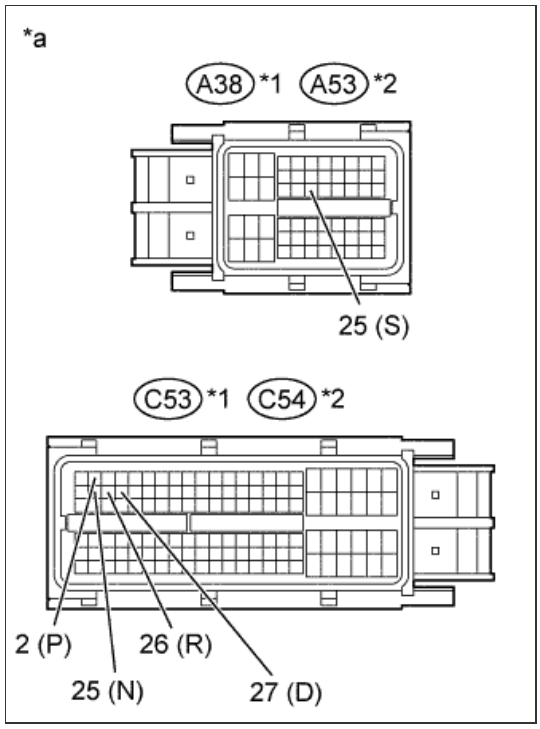
NG → REPLACE TRANSMISSION CONTROL SWITCH (TRANSMISSION FLOOR SHIFT ASSEMBLY) (Click here)

OK

6.CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH, TRANSMISSION CONTROL SWITCH - ECM)

a. Disconnect the ECM connector.

b. Measure the voltage according to the value(s) in the table below.



Standard Voltage:

for LHD

Tester Connection	Condition	Specified Condition
C53-2 (P) - Body ground	• Engine switch on (IG) • Shift lever in P	11 to 14 V
C53-26 (R) - Body ground	• Engine switch on (IG) • Shift lever in R	11 to 14 V*
C53-25 (N) - Body ground	• Engine switch on (IG) • Shift lever in N	11 to 14 V
C53-27 (D) - Body ground	• Engine switch on (IG) • Shift lever in D	11 to 14 V
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
C53-2 (P) - Body ground	• Engine switch on (IG) • Shift lever not in P	Below 1 V
C53-26 (R) - Body ground	• Engine switch on (IG) • Shift lever not in R	Below 1 V
C53-25 (N) - Body ground	• Engine switch on (IG) • Shift lever not in N	Below 1 V
C53-27 (D) - Body ground	• Engine switch on (IG) • Shift lever not	Below 1 V

	in D	
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

for RHD

Tester Connection	Condition	Specified Condition
C54-2 (P) - Body ground	• Engine switch on (IG) • Shift lever in P	11 to 14 V
C54-26 (R) - Body ground	• Engine switch on (IG) • Shift lever in R	11 to 14 V*
C54-25 (N) - Body ground	• Engine switch on (IG) • Shift lever in N	11 to 14 V
C54-27 (D) - Body ground	• Engine switch on (IG) • Shift lever in D	11 to 14 V
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
C54-2 (P) - Body ground	• Engine switch on (IG) • Shift lever not in P	Below 1 V
C54-26 (R) - Body ground	• Engine switch on (IG) • Shift lever not in R	Below 1 V
C54-25 (N) - Body ground	• Engine switch on (IG) • Shift lever not in N	Below 1 V
C54-27 (D) - Body ground	• Engine switch on (IG) • Shift lever not in D	Below 1 V
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

HINT:

*: The voltage will drop slightly due to the turning on of the back up light.

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

7.CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)

a. Disconnect the C19 park/neutral position switch connector.

b. Disconnect the C53 ECM connector (for LHD).

c. Disconnect the C54 ECM connector (for RHD).

d. Measure the voltage according to the value(s) in the table below.

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C19-4 (B) - C53-120 (NSW)	Always	Below 1 Ω
C19-4 (B) or C53-120 (NSW) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C19-4 (B) - C54-120 (NSW)	Always	Below 1 Ω
C19-4 (B) or C54-120 (NSW) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

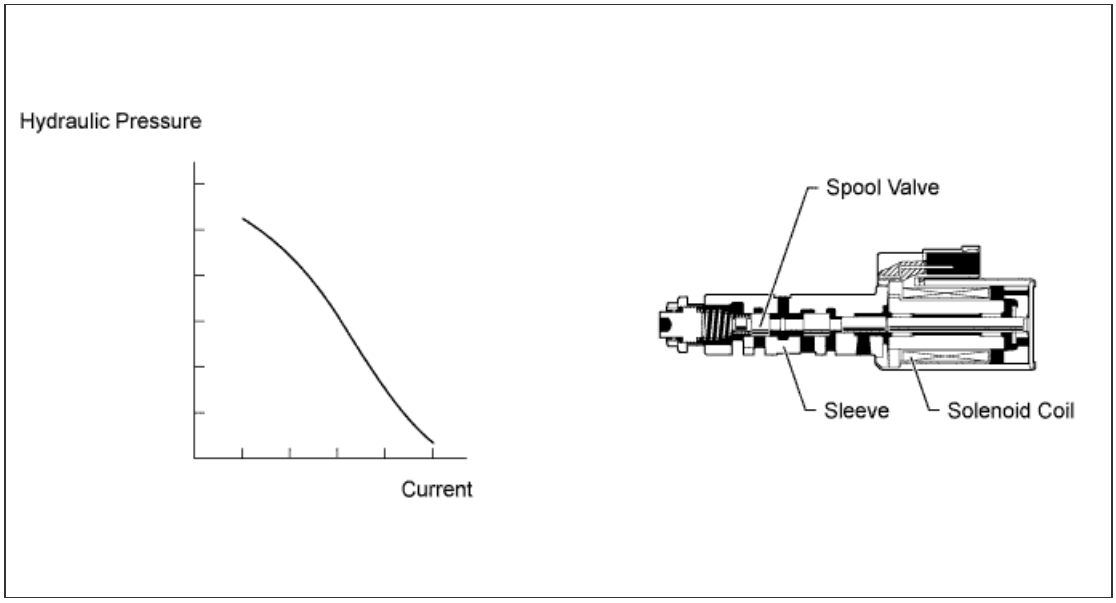
DTC P0894 Transmission Component Slipping

DTC P2714 Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

for Preparation Click here

DESCRIPTION

The shift solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and vehicle speed sensor. The ECM adjusts the current of shift solenoid valve SLT to control the hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.



DTC Code	DTC Detection Condition	Trouble Area
P0894	The ECM detects a malfunction of shift solenoid valve SLT, S1, S2, S3, S4, SL2, gear 6 incorrect ratio (sequence valve) or 1-2 shift valves according to the revolution difference of the turbine and output shaft, and also by the oil pressure (2 trip detection logic).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P2714	The ECM detects a malfunction of shift solenoid valve SLT (ON side) according to the revolution difference of the turbine and output shaft, and also by the oil pressure (2 trip detection logic*1, 1 trip detection logic*2).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

- *1: w/ OBD
- *2: w/o OBD

MONITOR DESCRIPTION

The ECM calculates the amount of heat absorbed by the friction material based on the difference in revolution (clutch slippage) between the turbine and output shaft. The ECM illuminates the MIL and stores these DTCs when the amount of heat absorption exceeds the specified value.
There are 2 causes of revolution difference.

- When shift solenoid valve SLT remains ON, oil pressure decreases, which causes the clutch engagement force to decrease.
- When the shift solenoid valve remains ON or OFF, the gear position commanded by the ECM and the actual gear position are not the same.

NOTICE:

If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0894 AND P2714)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
P0894 and/or P2714 is output	A
P0894, P2714 and other DTCs are output	B

HINT:

If any other codes besides P0894 and P2714 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

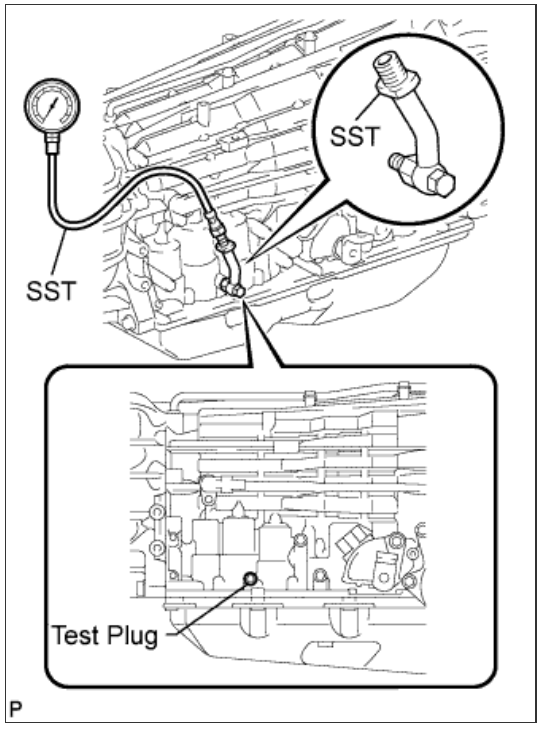
HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)



b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester			

Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → **Go to step 17**

OK

3.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the intelligent tester to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**

f. Compare the ECM gear shift command and the actual gear position.

OK:

Gear position changes in accordance with the intelligent tester command.

Result

System Condition			ECM Gear Shift Command						Proceed to
			1st	2nd	3rd	4th	5th	6th	
Malfunction	Shift solenoid valve S1	Stuck ON*1	2nd	2nd	3rd	4th	5th	6th	A
		Stuck OFF	1st	1st	3rd	4th	5th	N*2	
	Shift solenoid valve S2	Stuck ON	1st	2nd	2nd	4th	6th	6th	B
		Stuck OFF	3rd	3rd	3rd	4th	5th	5th	
	Shift solenoid valve S3	Stuck ON	1st	2nd	3rd	3rd	N*2	N*2	C
		Stuck OFF	3rd	4th	4th	4th	5th	6th	
	Shift solenoid valve S4	Stuck ON*3	1st	2nd	3rd	4th	5th	6th	D
		Stuck OFF	1st	2nd	3rd	4th	4th	4th	
Normal			1st	2nd	3rd	4th	5th	6th	E

HINT:

- ***1: When shift solenoid valve S1 is stuck ON, the vehicle cannot drive in reverse.**
- ***2: Neutral**
- ***3: When shift solenoid valve S4 is stuck ON, gear shifting is normal.**

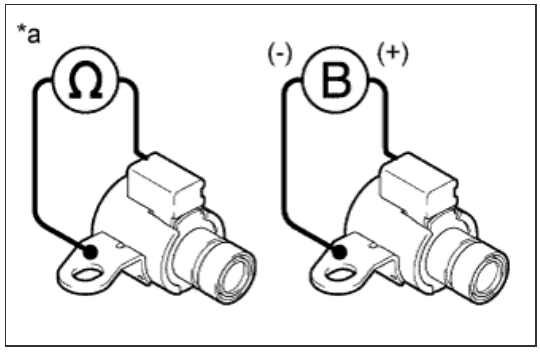
B	Go to step 7
C	Go to step 10
D	Go to step 13
E	Go to step 17

A

4.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

6.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

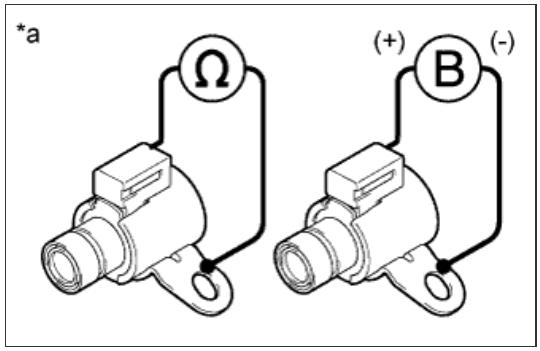
7.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK ↓

8.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK ↓

9.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

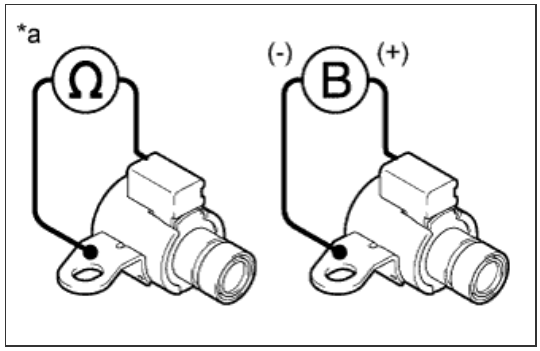
OK ↓

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

10.INSPECT SHIFT SOLENOID VALVE S3

a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

11.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

12.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

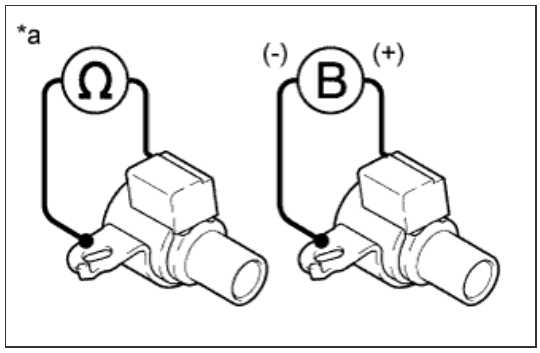
OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

13.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

14.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

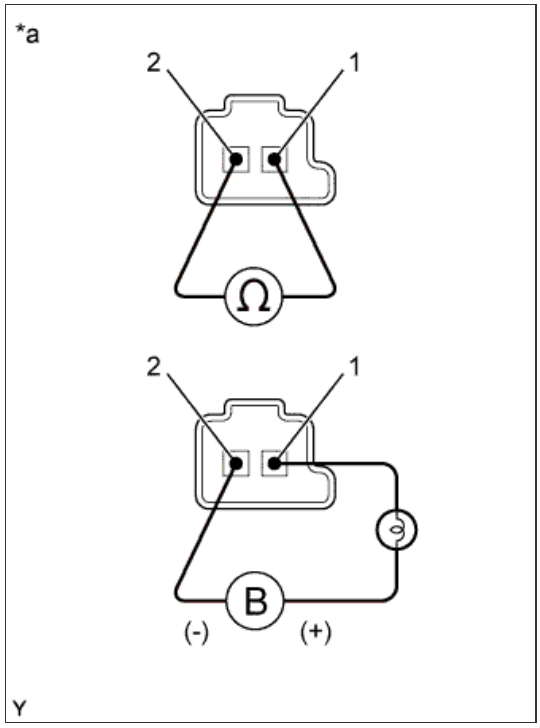
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)

NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

15.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

16.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

17.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

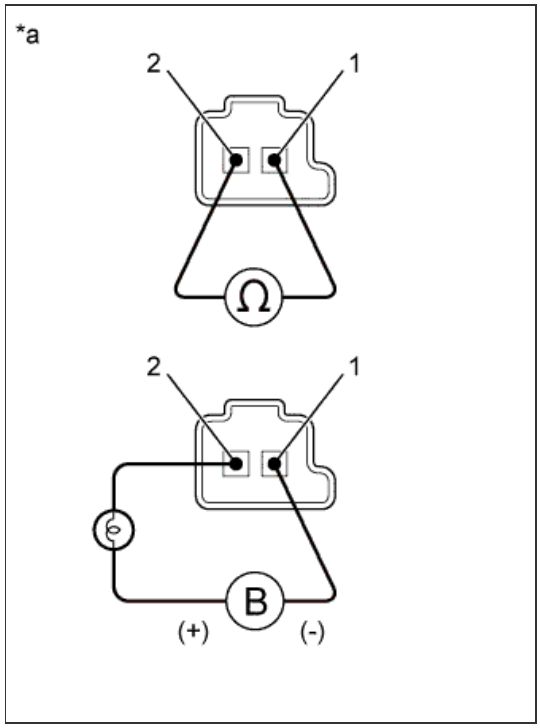
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLT)

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

18.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:
There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

19.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:
The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0710 Transmission Fluid Temperature Sensor "A" Circuit

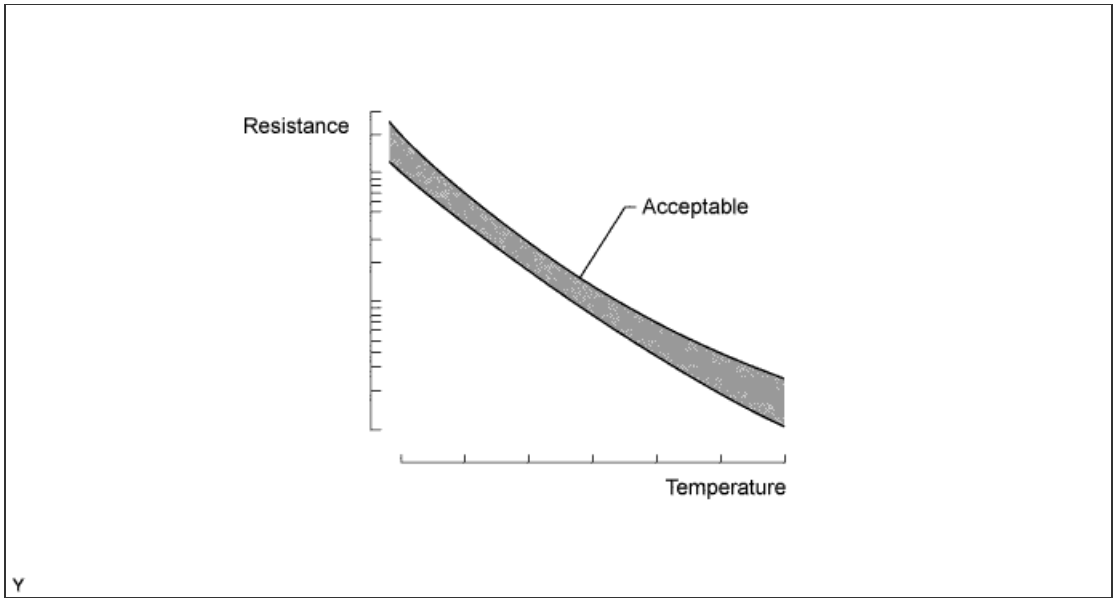
DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC P0713 Transmission Fluid Temperature Sensor "A" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies voltage to the temperature sensor through the ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.



DTC Code	DTC Detection Condition	Trouble Area
P0710	(a) and (b) are detected momentarily within 0.5 sec. when neither P0712 nor P0713 are stored (1-trip detection logic). (a) The No. 1 ATF temperature sensor resistance is below 79 Ω. (b) The No. 1 ATF temperature sensor resistance is higher than 156 kΩ. **HINT:** Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a).	• Open or short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0712	The No. 1 ATF temperature sensor resistance is below 79 Ω for 0.5 sec. or more (1-trip detection logic).	• Short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0713	When 15 min. or more have elapsed after the engine is started, the No. 1 ATF temperature sensor resistance is higher than 156 kΩ for 0.5 sec. or more (1-trip detection logic).	• Open in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM

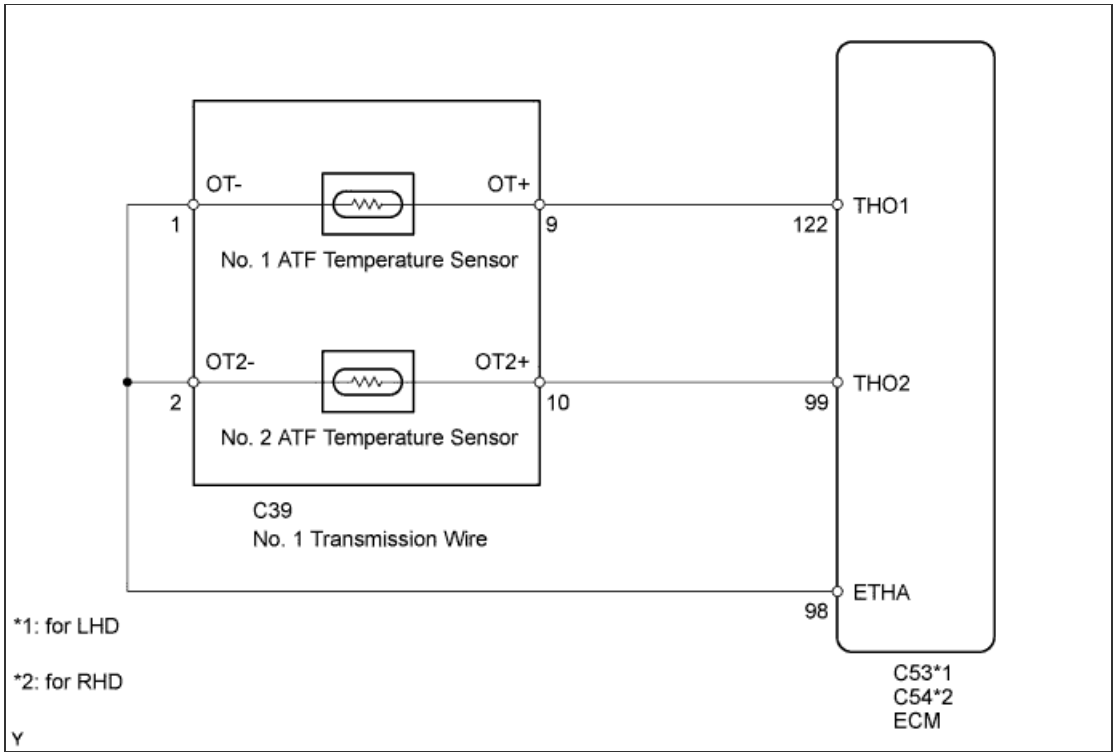
MONITOR DESCRIPTION

These DTCs indicate an open or short in the Automatic Transmission Fluid (ATF) temperature sensor circuit. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 79 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

HINT:

- **The ATF temperature can be checked on the intelligent tester display.**
- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 1 ATF TEMPERATURE SENSOR)

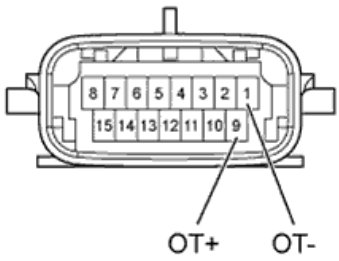
a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
9 (OT+) - 1 (OT-)	Always	79 Ω to 156 kΩ
9 (OT+) - Body ground	Always	10 kΩ or higher
1 (OT-) - Body ground	Always	10 kΩ or higher

Component without harness connected:
(No. 1 Transmission Wire)



Y

HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

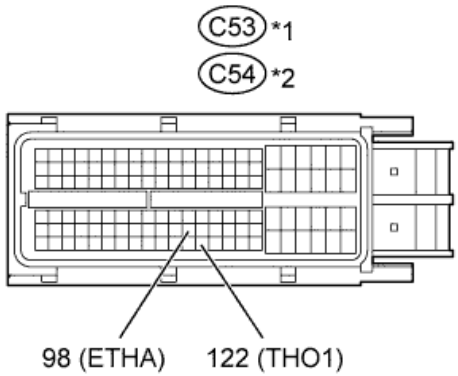
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-122 (THO1) - C53-98 (ETHA)	Always	79 Ω to 156 kΩ
C53-122 (THO1) - Body ground	Always	10 kΩ or higher
C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-122 (THO1) - C54-98 (ETHA)	Always	79 Ω to 156 kΩ
C54-122 (THO1) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE ECM (Click here)

DTC P0973 Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)

DTC P0974 Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

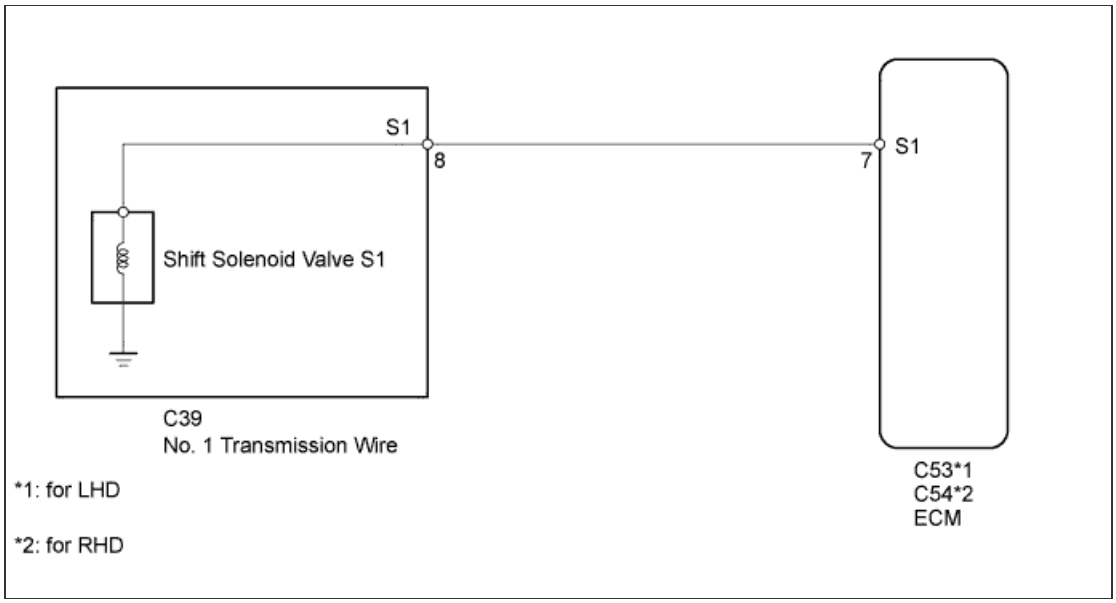
Shifting from 1st to 6th is performed in combination with ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0973	The ECM detects a short in the shift solenoid valve S1 circuit 2 times when shift solenoid valve S1 is operated (1 trip detection logic).	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	The ECM detects an open in the shift solenoid valve S1 circuit 2 times when shift solenoid valve S1 is not operated (1 trip detection logic).	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S1 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S1 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S1 circuit.
When shift solenoid valve S1 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S1 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve S1 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

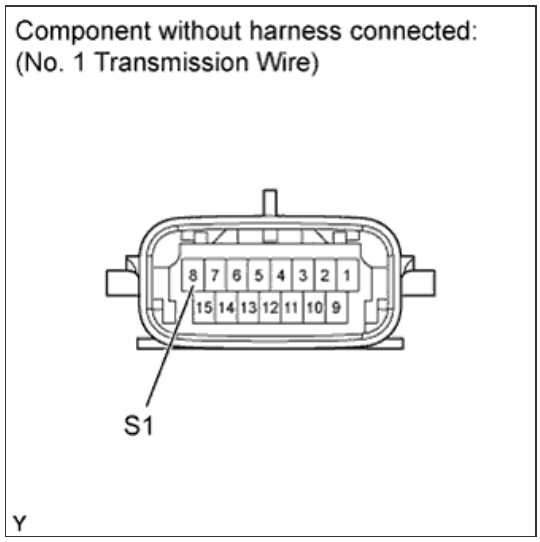
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
8 (S1) - Body ground	20°C (68°F)	11 to 15 Ω



NG → Go to step 3

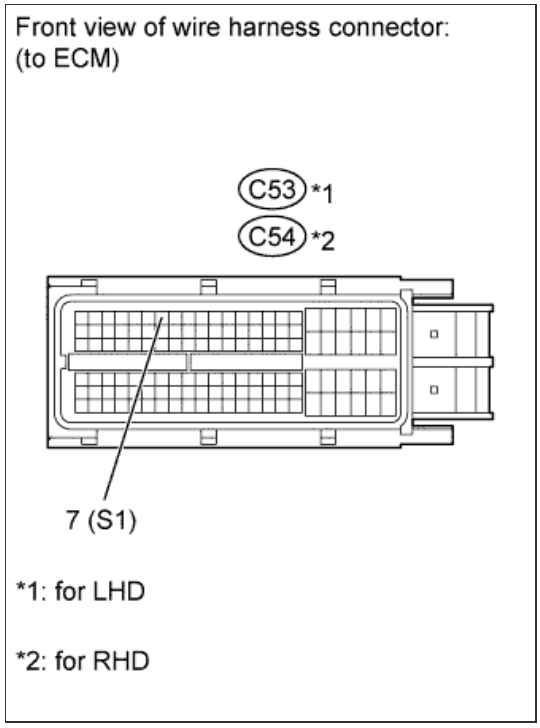
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

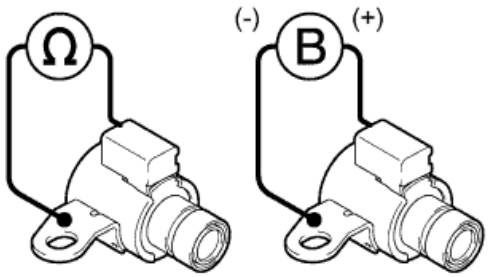
Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Shift Solenoid Valve S1:



P

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0710 Transmission Fluid Temperature Sensor "A" Circuit

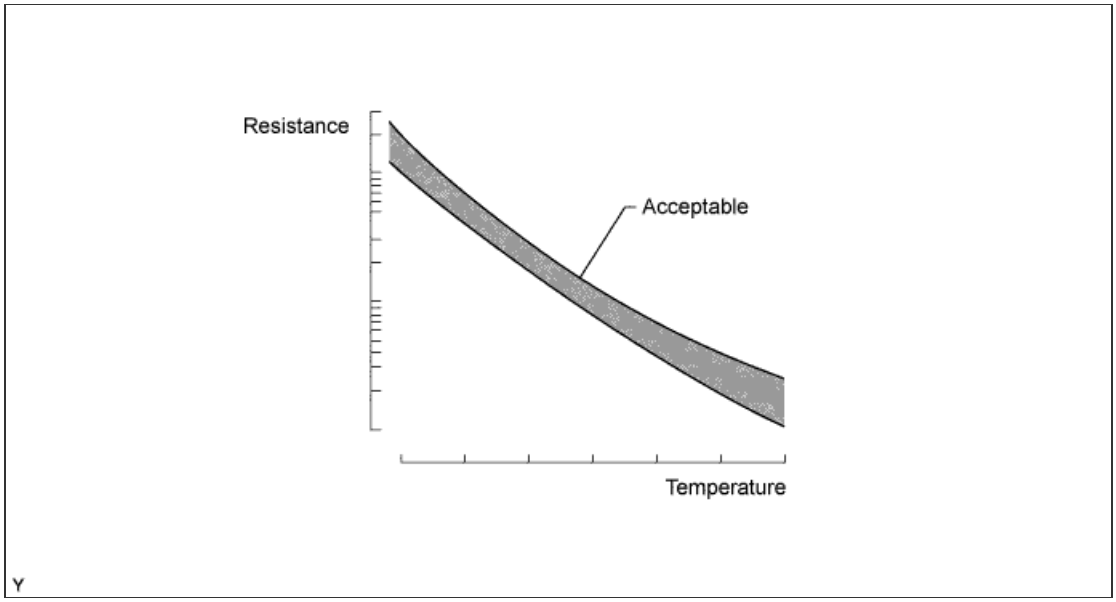
DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC P0713 Transmission Fluid Temperature Sensor "A" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies voltage to the temperature sensor through the ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.



DTC Code	DTC Detection Condition	Trouble Area
P0710	(a) and (b) are detected momentarily within 0.5 sec. when neither P0712 nor P0713 are stored (1-trip detection logic). (a) The No. 1 ATF temperature sensor resistance is below 79 Ω. (b) The No. 1 ATF temperature sensor resistance is higher than 156 kΩ. **HINT:** Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a).	• Open or short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0712	The No. 1 ATF temperature sensor resistance is below 79 Ω for 0.5 sec. or more (1-trip detection logic).	• Short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0713	When 15 min. or more have elapsed after the engine is started, the No. 1 ATF temperature sensor resistance is higher than 156 kΩ for 0.5 sec. or more (1-trip detection logic).	• Open in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM

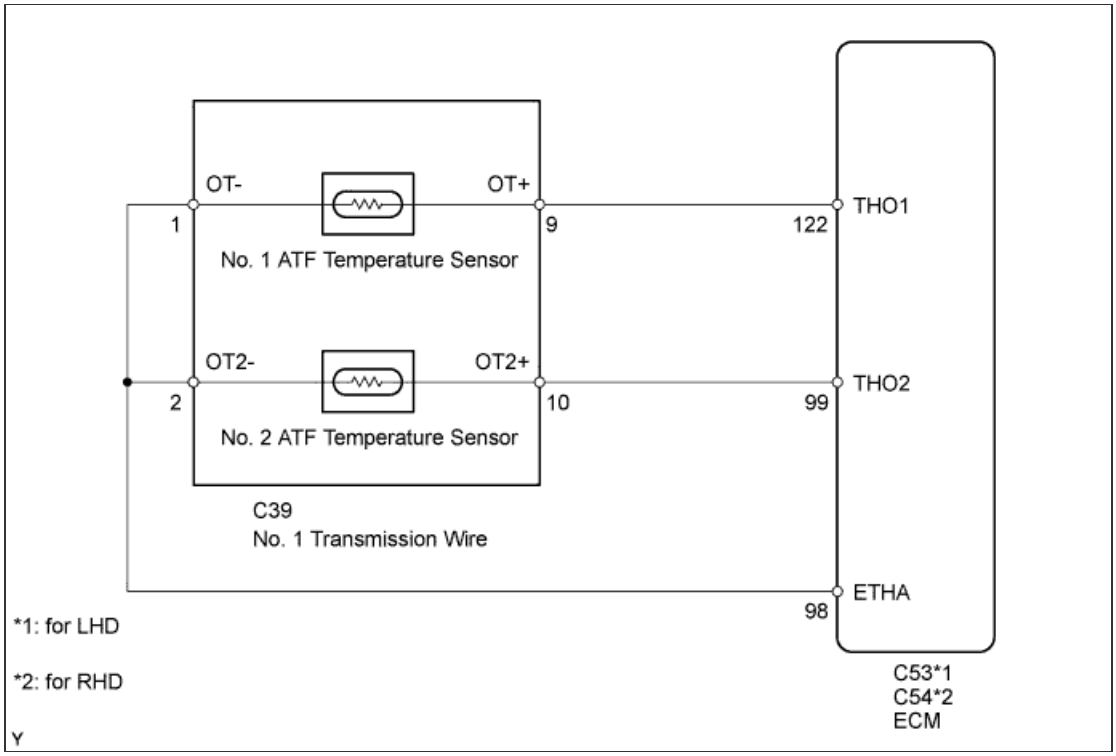
MONITOR DESCRIPTION

These DTCs indicate an open or short in the Automatic Transmission Fluid (ATF) temperature sensor circuit. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 79 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

HINT:

- **The ATF temperature can be checked on the intelligent tester display.**
- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 1 ATF TEMPERATURE SENSOR)

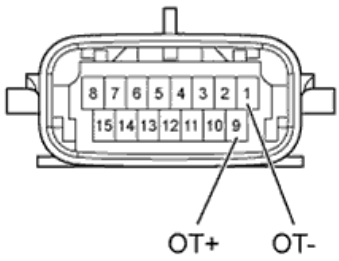
a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
9 (OT+) - 1 (OT-)	Always	79 Ω to 156 kΩ
9 (OT+) - Body ground	Always	10 kΩ or higher
1 (OT-) - Body ground	Always	10 kΩ or higher

Component without harness connected:
(No. 1 Transmission Wire)



Y

HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

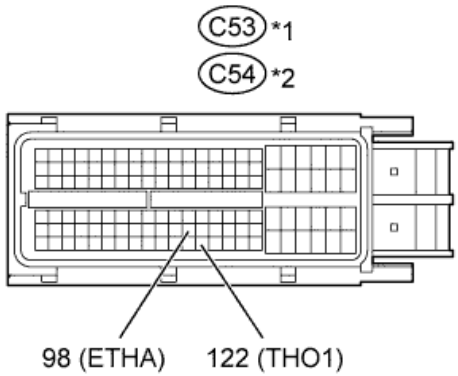
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-122 (THO1) - C53-98 (ETHA)	Always	79 Ω to 156 kΩ
C53-122 (THO1) - Body ground	Always	10 kΩ or higher
C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-122 (THO1) - C54-98 (ETHA)	Always	79 Ω to 156 kΩ
C54-122 (THO1) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE ECM (Click here)

DTC P0973 Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)

DTC P0974 Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

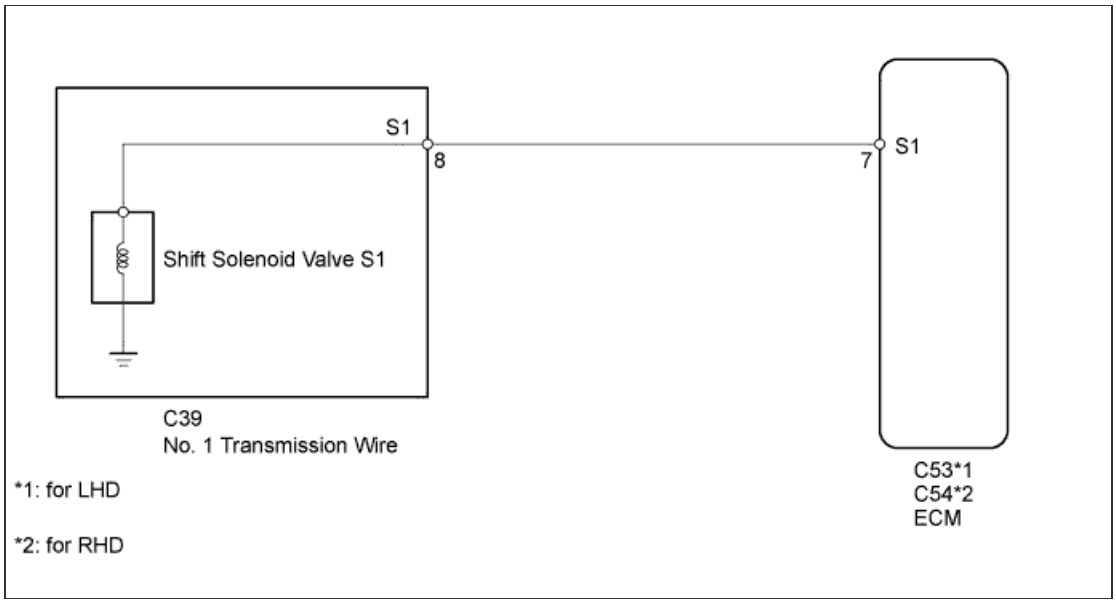
Shifting from 1st to 6th is performed in combination with ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0973	The ECM detects a short in the shift solenoid valve S1 circuit 2 times when shift solenoid valve S1 is operated (1 trip detection logic).	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	The ECM detects an open in the shift solenoid valve S1 circuit 2 times when shift solenoid valve S1 is not operated (1 trip detection logic).	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S1 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S1 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S1 circuit.
When shift solenoid valve S1 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S1 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve S1 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

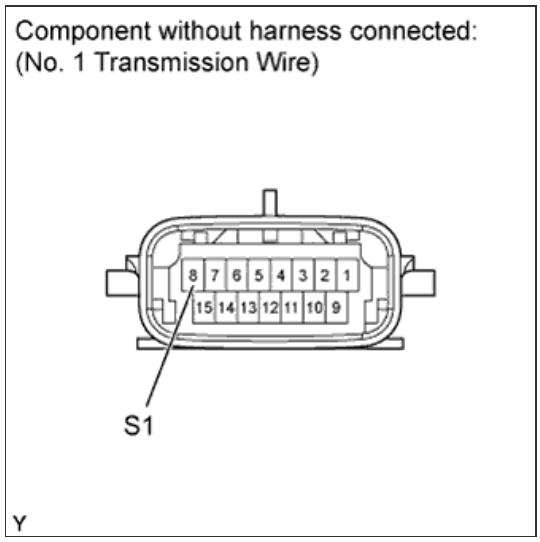
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
8 (S1) - Body ground	20°C (68°F)	11 to 15 Ω



NG → Go to step 3

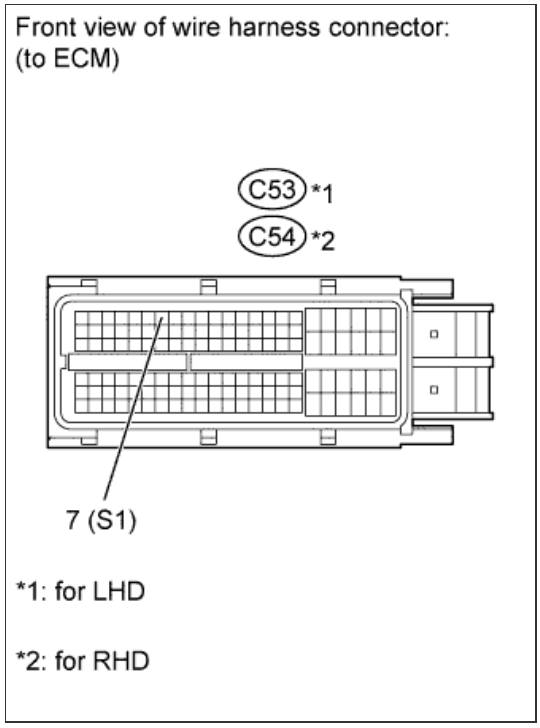
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

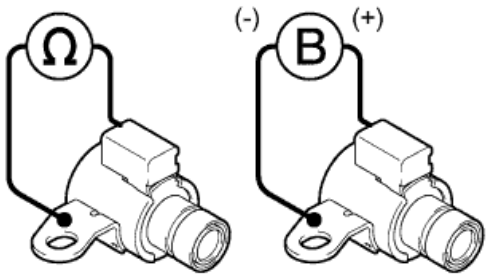
Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Shift Solenoid Valve S1:



P

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0710 Transmission Fluid Temperature Sensor "A" Circuit

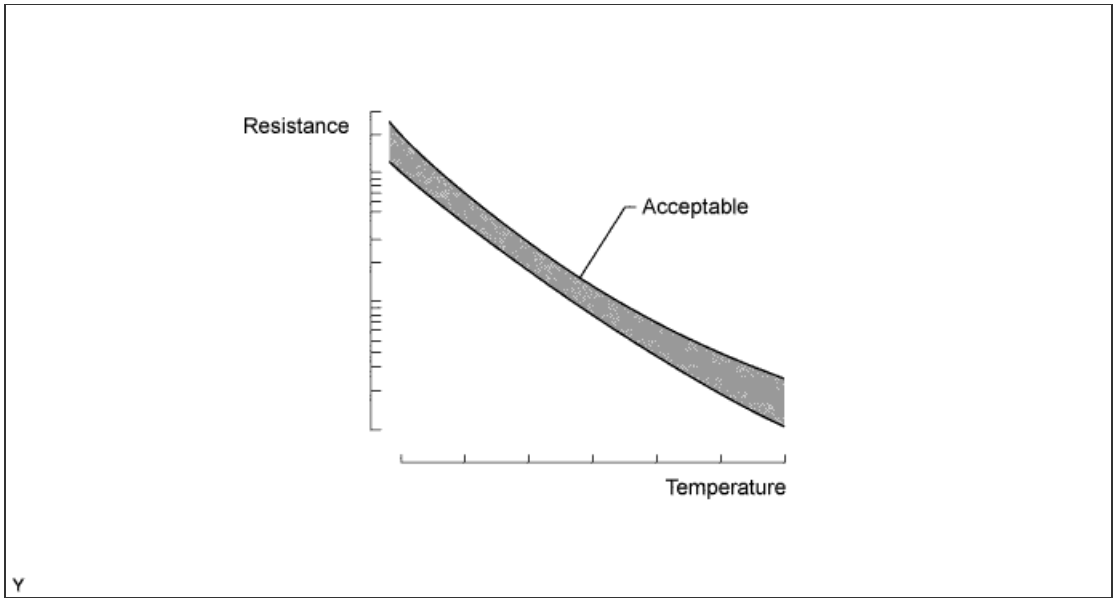
DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC P0713 Transmission Fluid Temperature Sensor "A" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies voltage to the temperature sensor through the ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.



DTC Code	DTC Detection Condition	Trouble Area
P0710	(a) and (b) are detected momentarily within 0.5 sec. when neither P0712 nor P0713 are stored (1-trip detection logic). (a) The No. 1 ATF temperature sensor resistance is below 79 Ω. (b) The No. 1 ATF temperature sensor resistance is higher than 156 kΩ. **HINT:** Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a).	• Open or short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0712	The No. 1 ATF temperature sensor resistance is below 79 Ω for 0.5 sec. or more (1-trip detection logic).	• Short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0713	When 15 min. or more have elapsed after the engine is started, the No. 1 ATF temperature sensor resistance is higher than 156 kΩ for 0.5 sec. or more (1-trip detection logic).	• Open in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM

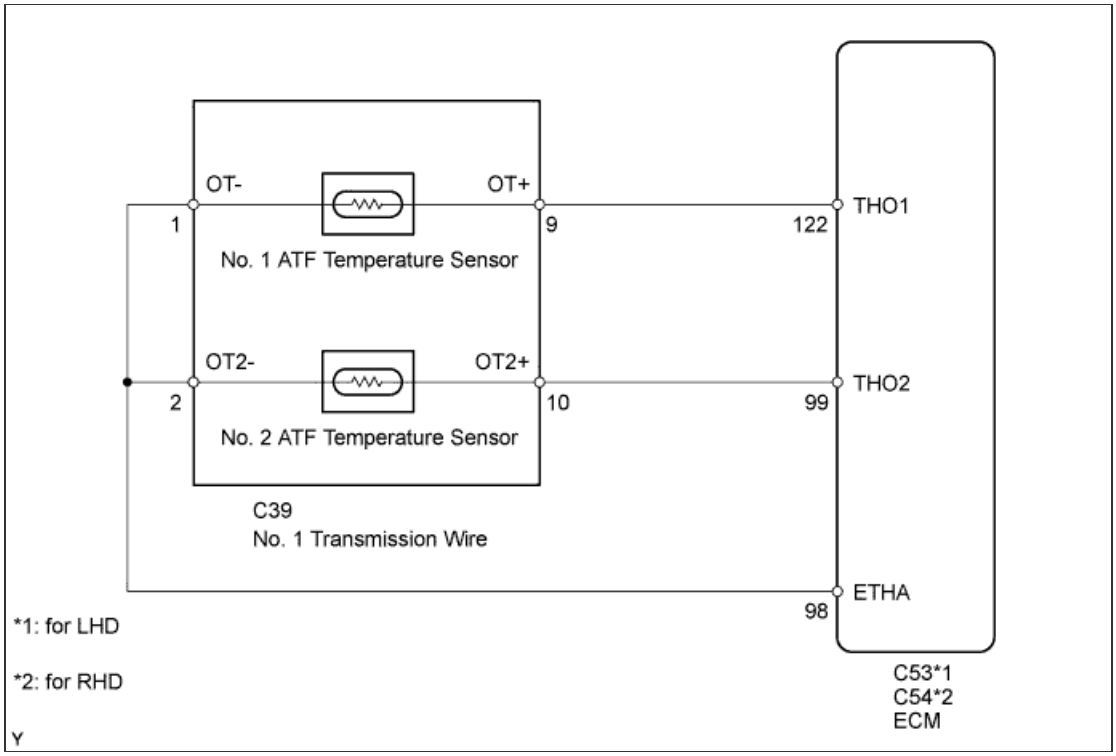
MONITOR DESCRIPTION

These DTCs indicate an open or short in the Automatic Transmission Fluid (ATF) temperature sensor circuit. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 79 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

HINT:

- **The ATF temperature can be checked on the intelligent tester display.**
- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 1 ATF TEMPERATURE SENSOR)

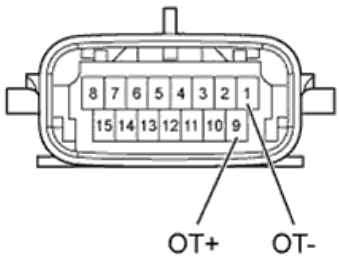
a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
9 (OT+) - 1 (OT-)	Always	79 Ω to 156 kΩ
9 (OT+) - Body ground	Always	10 kΩ or higher
1 (OT-) - Body ground	Always	10 kΩ or higher

Component without harness connected:
(No. 1 Transmission Wire)



Y

HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

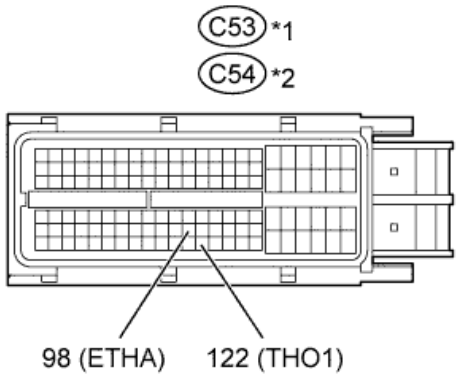
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-122 (THO1) - C53-98 (ETHA)	Always	79 Ω to 156 kΩ
C53-122 (THO1) - Body ground	Always	10 kΩ or higher
C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-122 (THO1) - C54-98 (ETHA)	Always	79 Ω to 156 kΩ
C54-122 (THO1) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE ECM (Click here)

DTC P0973 Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)

DTC P0974 Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

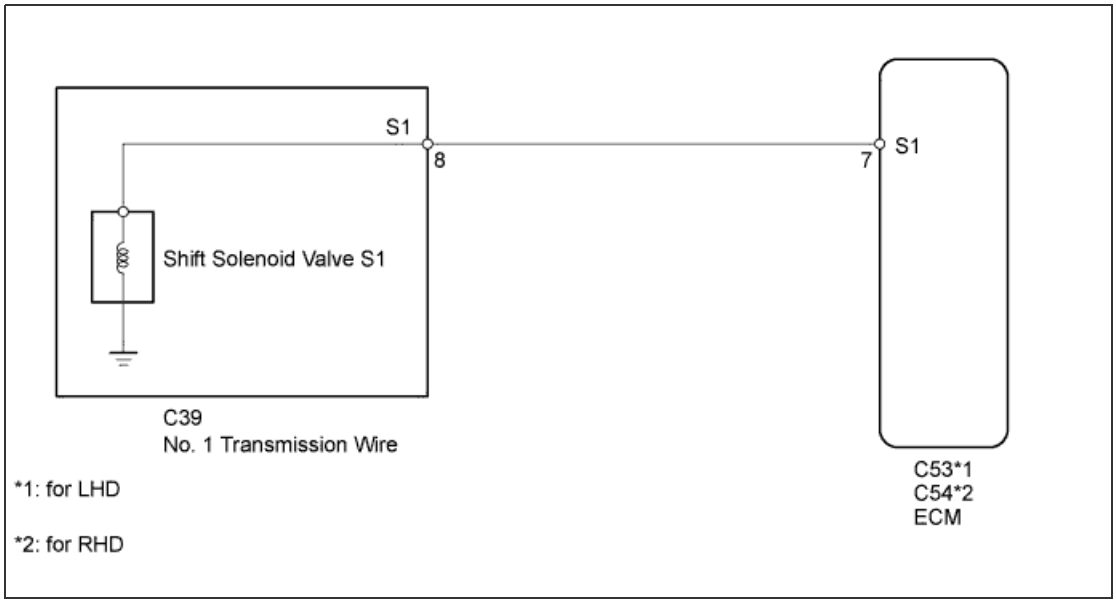
Shifting from 1st to 6th is performed in combination with ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0973	The ECM detects a short in the shift solenoid valve S1 circuit 2 times when shift solenoid valve S1 is operated (1 trip detection logic).	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	The ECM detects an open in the shift solenoid valve S1 circuit 2 times when shift solenoid valve S1 is not operated (1 trip detection logic).	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S1 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S1 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S1 circuit.
When shift solenoid valve S1 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S1 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

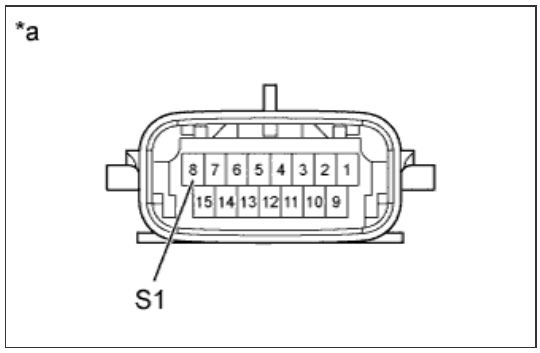
Shift solenoid valve S1 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
8 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

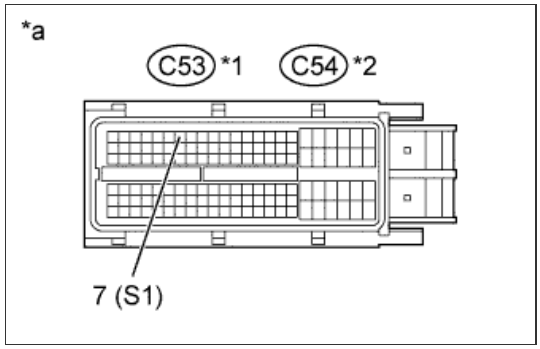
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

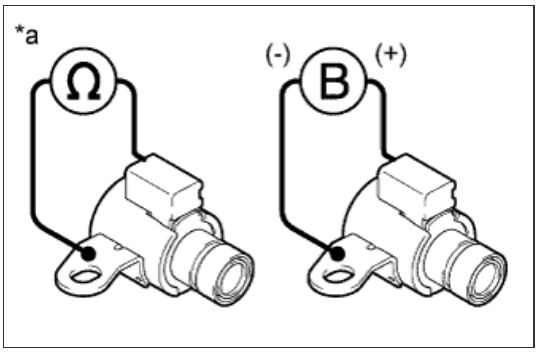
3.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0711 Transmission Fluid Temperature Sensor "A" Performance

for Preparation Click here

DESCRIPTION

Refer to DTC P0710 (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0711	Either of the following conditions (A) or (B) is met: Condition (A) Both (a) and (b) are detected (2-trip detection logic): (a) The intake air and engine coolant temperatures are higher than -10°C (14°F) at engine start. (b) After normal driving for 21 min. and 40 sec. or more and 9 km (5.6 miles) or more, the ATF temperature is below 20°C (68°F). Condition (B) Both (a) and (b) are detected (2-trip detection logic): (a) The engine coolant temperature is below 35°C (95°F) at engine start. (b) The ATF temperature is 105°C (221°F) or higher when the engine coolant temperature reaches 60°C (140°F).	No. 1 transmission wire (No. 1 ATF temperature sensor)

MONITOR DESCRIPTION

This DTC indicates that there is a problem with the signal from the Automatic Transmission Fluid (ATF) temperature sensor and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an open or short in the ATF temperature circuit or a fault in the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 20°C (68°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.

WIRING DIAGRAM

Refer to DTC P0710 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
	No. 1 ATF	• After stall test:	

A/T Oil Temperature 1	temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0711)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0711 is output	A
P0711 and other DTCs are output	B

HINT:

If any other codes besides P0711 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.CHECK TRANSMISSION FLUID LEVEL

a. Check the transmission fluid level (Click here).

OK:

Automatic transmission fluid level is correct.

NG → **ADD FLUID (Click here)**

OK

REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

DTC P0973 Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)

DTC P0974 Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

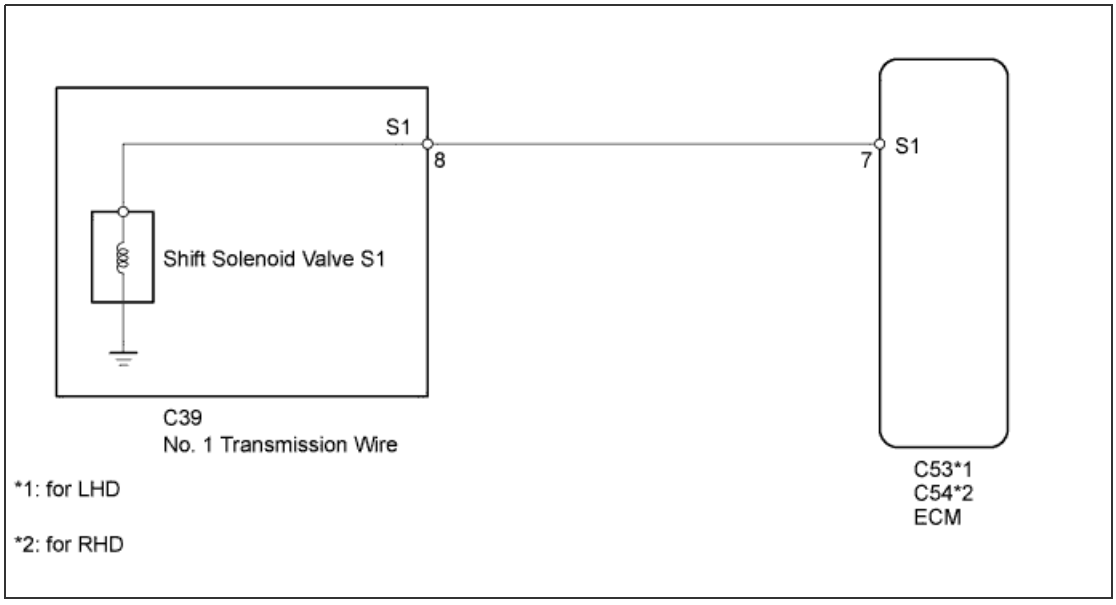
Shifting from 1st to 6th is performed in combination with ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0973	The ECM detects a short in the shift solenoid valve S1 circuit 2 times when shift solenoid valve S1 is operated (1 trip detection logic).	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	The ECM detects an open in the shift solenoid valve S1 circuit 2 times when shift solenoid valve S1 is not operated (1 trip detection logic).	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S1 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S1 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S1 circuit.
When shift solenoid valve S1 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S1 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

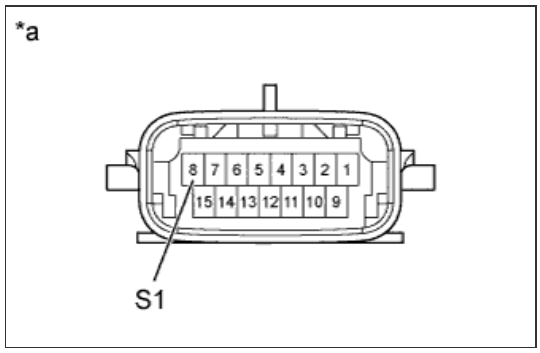
Shift solenoid valve S1 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
8 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

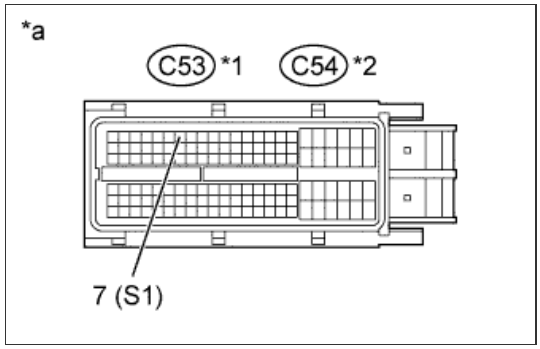
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-7 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

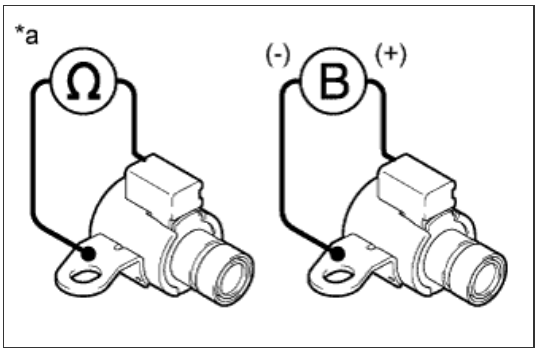
3.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0711 Transmission Fluid Temperature Sensor "A" Performance

for Preparation Click here

DESCRIPTION

Refer to DTC P0712 (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0711	Either of the following conditions (A) or (B) is met: Condition (A) Both (a) and (b) are detected (2-trip detection logic): (a) The intake air and engine coolant temperatures are higher than -10°C (14°F) at engine start. (b) After normal driving for 21 min. and 40 sec. or more and 9 km (5.6 miles) or more, the ATF temperature is below 20°C (68°F). Condition (B) Both (a) and (b) are detected (2-trip detection logic): (a) The engine coolant temperature is below 35°C (95°F) at engine start. (b) The ATF temperature is 105°C (221°F) or higher when the engine coolant temperature reaches 60°C (140°F).	No. 1 transmission wire (No. 1 ATF temperature sensor)

MONITOR DESCRIPTION

This DTC indicates that there is a problem with the signal from the Automatic Transmission Fluid (ATF) temperature sensor and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an open or short in the ATF temperature circuit or a fault in the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 20°C (68°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.

WIRING DIAGRAM

Refer to DTC P0712 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

	(419°F)	temperature	

HINT:

When DTC P0712 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0711)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0711 is output	A
P0711 and other DTCs are output	B

HINT:

If any other codes besides P0711 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.CHECK TRANSMISSION FLUID LEVEL

a. Check the transmission fluid level (Click here).

OK:

Automatic transmission fluid level is correct.

NG → **ADD FLUID (Click here)**

OK

REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

DTC P0976 Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)

DTC P0977 Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

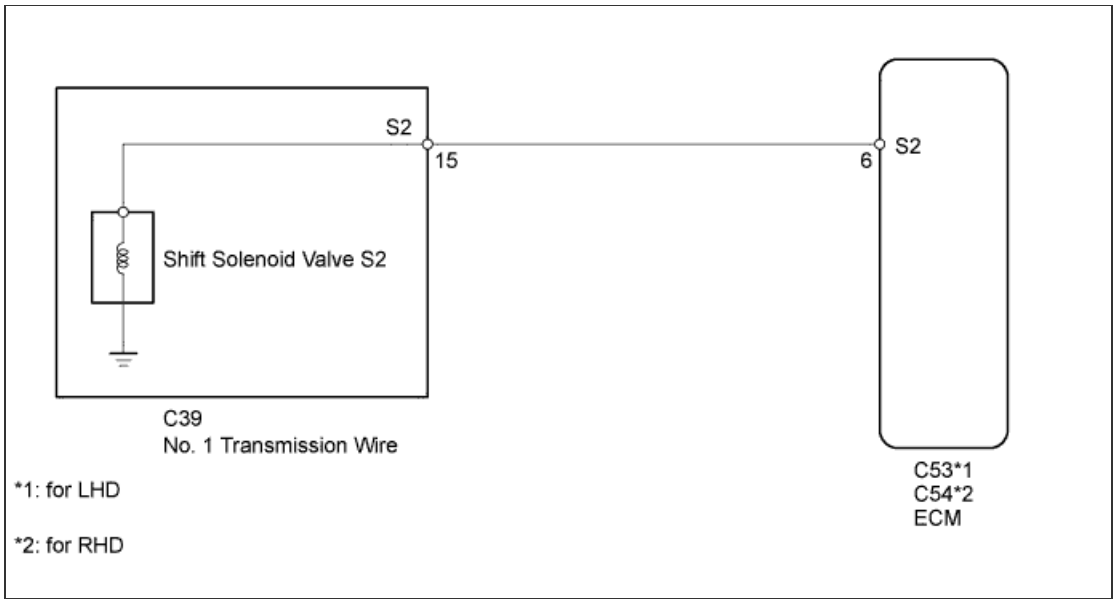
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0976	The ECM detects a short in the shift solenoid valve S2 circuit 2 times when shift solenoid valve S2 is operated (1 trip detection logic).	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	The ECM detects an open in the shift solenoid valve S2 circuit 2 times when shift solenoid valve S2 is not operated (1 trip detection logic).	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S2 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S2 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S2 circuit.
When shift solenoid valve S2 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S2 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve S2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)

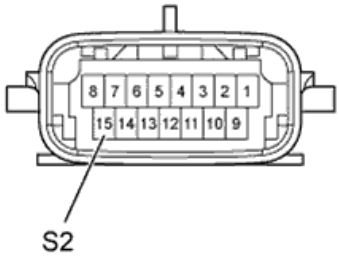
a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
15 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Component without harness connected:
(No. 1 Transmission Wire)



Y

NG → Go to step 3

OK

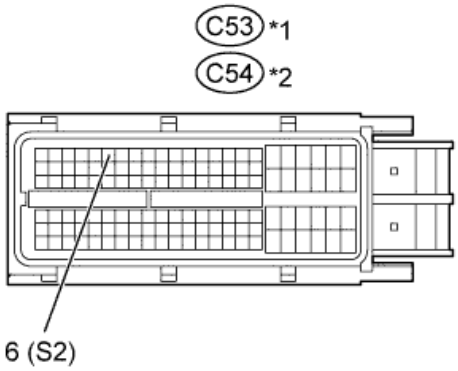
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

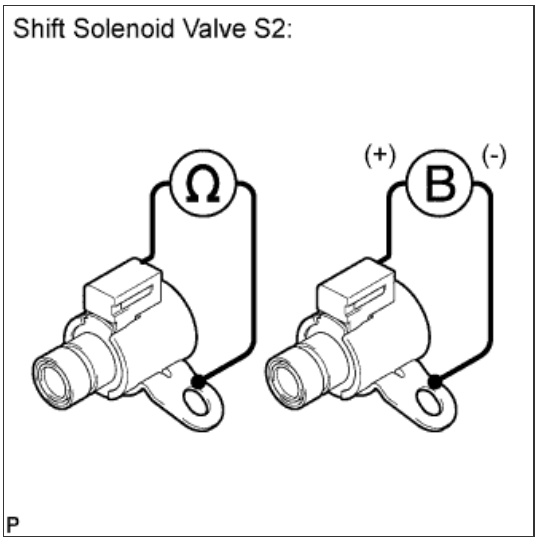
Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Shift Solenoid Valve S2:



P

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC P0713 Transmission Fluid Temperature Sensor "A" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies voltage to the temperature sensor through the ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.

DTC Code	DTC Detection Condition	Trouble Area
P0712	The No. 1 ATF temperature sensor resistance is below 79 Ω for 0.5 sec. or more (1-trip detection logic).	• Short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0713	When 15 min. or more have elapsed after the engine is started, the No. 1 ATF temperature sensor resistance is higher than 156 kΩ for 0.5 sec. or more (1-trip detection logic).	• Open in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM

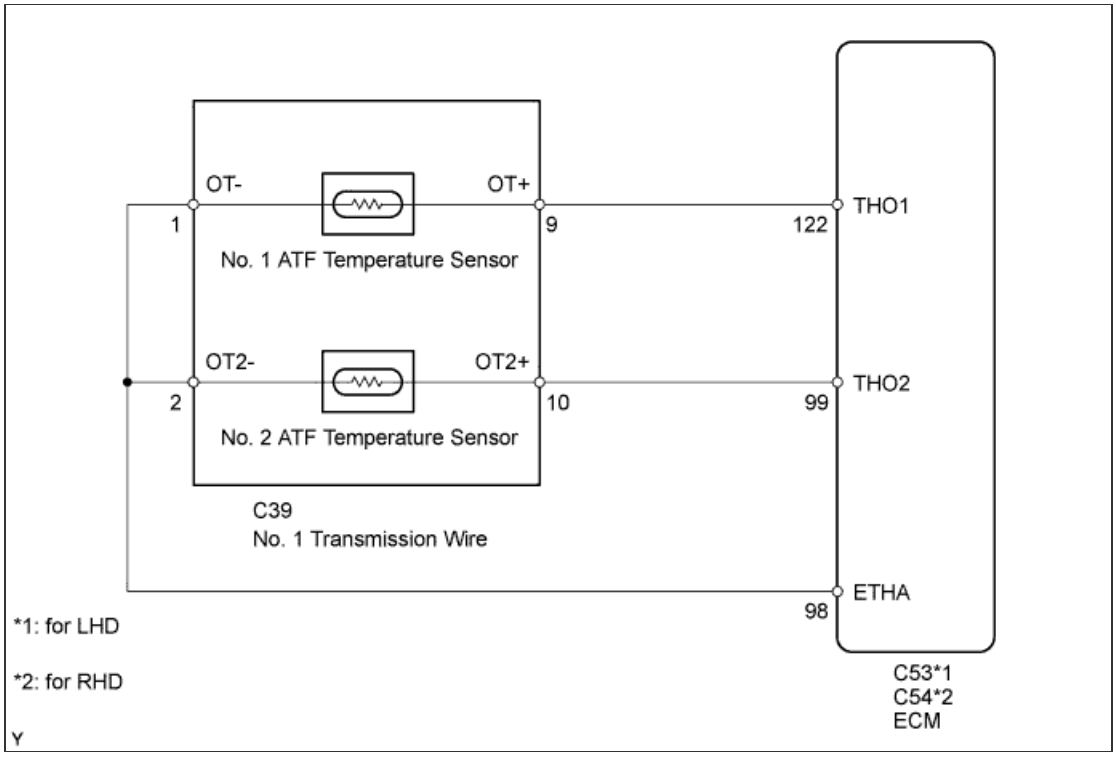
MONITOR DESCRIPTION

These DTCs indicate an open or short in the Automatic Transmission Fluid (ATF) temperature sensor circuit. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 79 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

HINT:

- **The ATF temperature can be checked on the intelligent tester display.**
- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

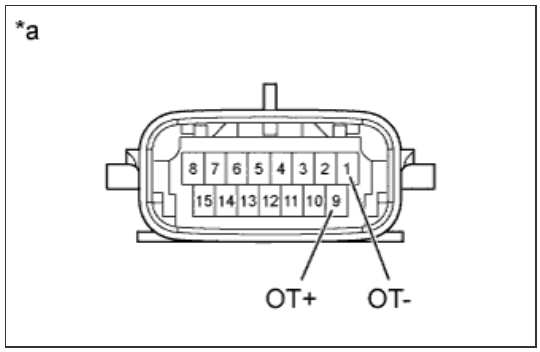
Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 1 ATF TEMPERATURE SENSOR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
9 (OT+) - 1 (OT-)	Always	79 Ω to 156 kΩ
9 (OT+) - Body ground	Always	10 kΩ or higher
1 (OT-) - Body ground	Always	10 kΩ or higher

HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

Text in Illustration

*a	Component without harness connected (No. 1 transmission wire)

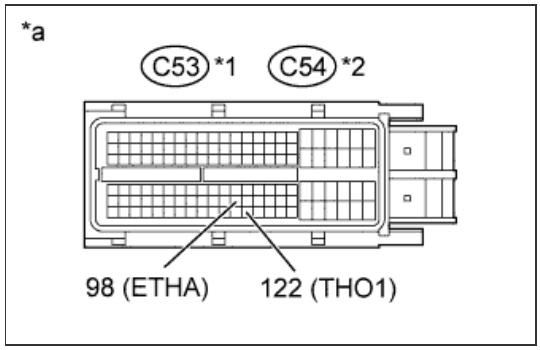
NG → REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-122 (THO1) - C53-98 (ETHA)	Always	79 Ω to 156 kΩ
C53-122 (THO1) - Body ground	Always	10 kΩ or higher
C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-122 (THO1) - C54-98 (ETHA)	Always	79 Ω to 156 kΩ
C54-122 (THO1) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0976 Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)

DTC P0977 Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

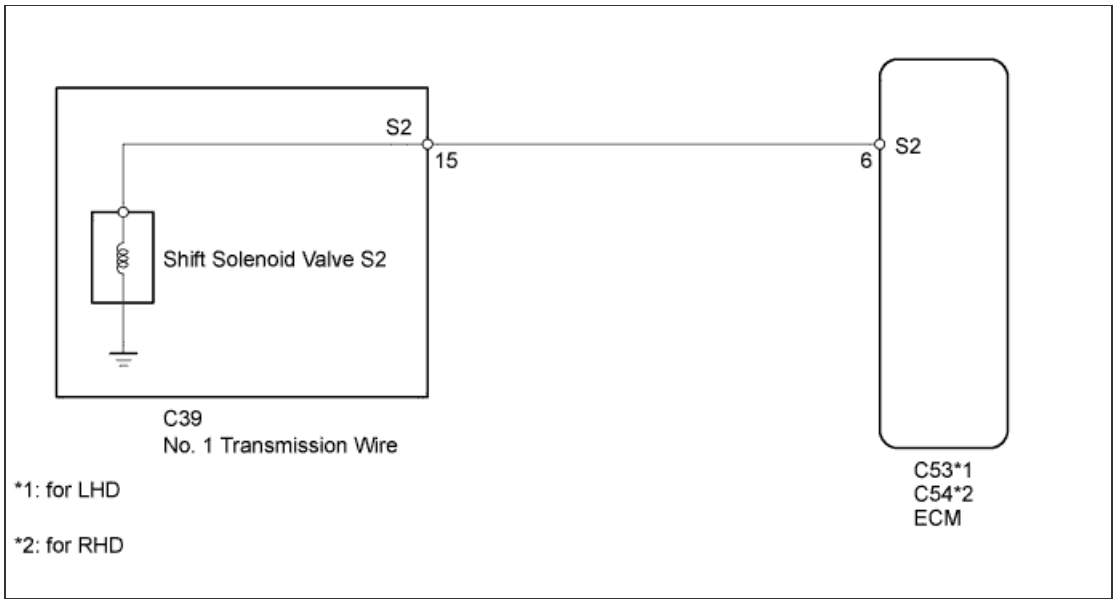
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0976	The ECM detects a short in the shift solenoid valve S2 circuit 2 times when shift solenoid valve S2 is operated (1 trip detection logic).	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	The ECM detects an open in the shift solenoid valve S2 circuit 2 times when shift solenoid valve S2 is not operated (1 trip detection logic).	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S2 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S2 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S2 circuit.
When shift solenoid valve S2 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S2 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve S2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)

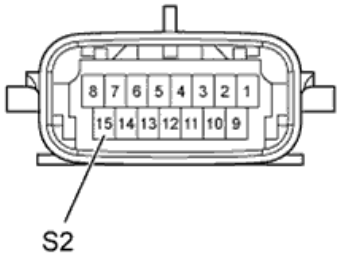
a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
15 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Component without harness connected:
(No. 1 Transmission Wire)



Y

NG → Go to step 3

OK

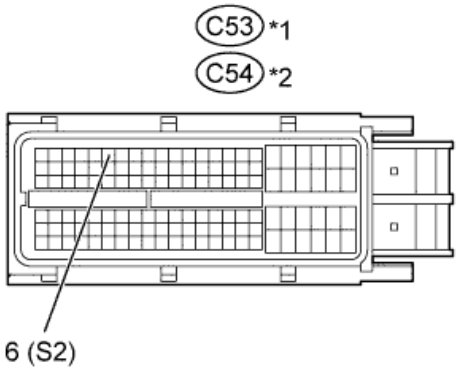
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

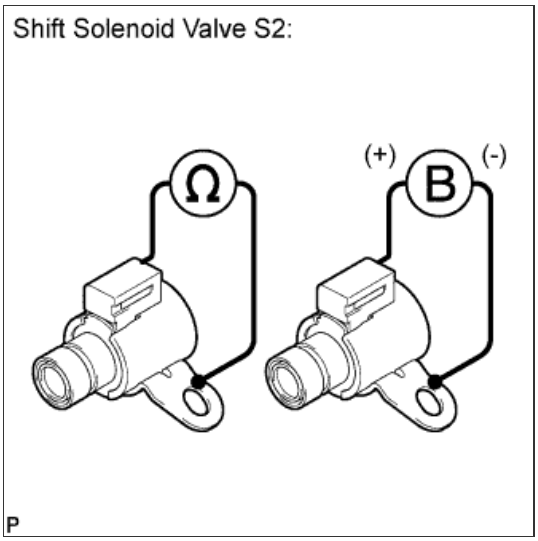
Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Shift Solenoid Valve S2:



P

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC P0713 Transmission Fluid Temperature Sensor "A" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies voltage to the temperature sensor through the ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.

DTC Code	DTC Detection Condition	Trouble Area
P0712	The No. 1 ATF temperature sensor resistance is below 79 Ω for 0.5 sec. or more (1-trip detection logic).	• Short in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM
P0713	When 15 min. or more have elapsed after the engine is started, the No. 1 ATF temperature sensor resistance is higher than 156 kΩ for 0.5 sec. or more (1-trip detection logic).	• Open in No. 1 ATF temperature sensor circuit • No. 1 transmission wire (No. 1 ATF temperature sensor) • ECM

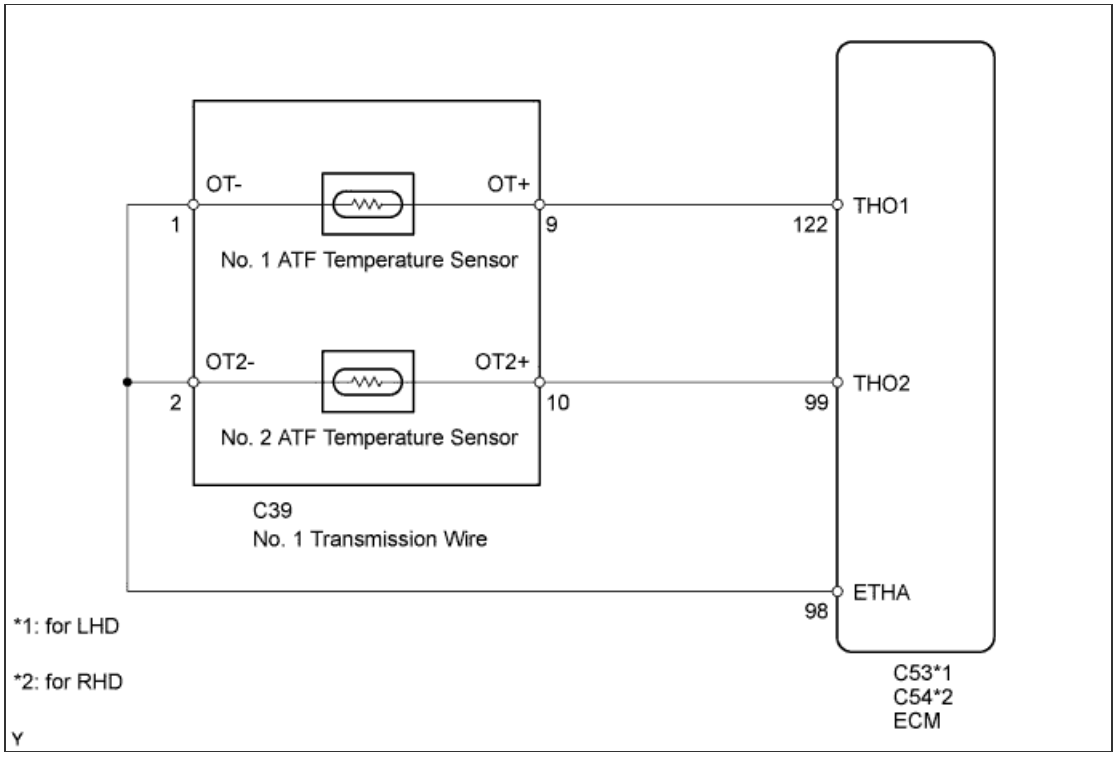
MONITOR DESCRIPTION

These DTCs indicate an open or short in the Automatic Transmission Fluid (ATF) temperature sensor circuit. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 79 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

HINT:

- **The ATF temperature can be checked on the intelligent tester display.**
- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 1	No. 1 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 1 ATF temperature sensor circuit is open or shorted.

HINT:

When DTC P0712 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.

When DTC P0713 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.

Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

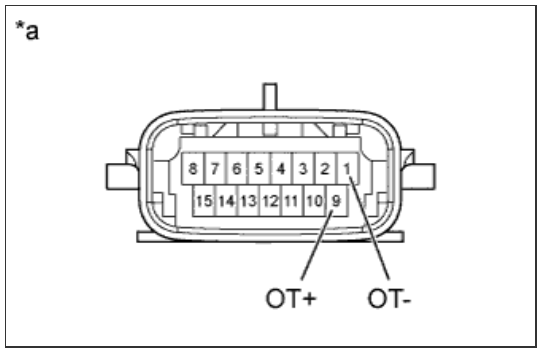
Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately stored (in 0.5 seconds). When P0713 is stored, P0711 cannot be stored. It is not necessary to inspect the circuit when P0711 is stored.

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 1 ATF TEMPERATURE SENSOR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
9 (OT+) - 1 (OT-)	Always	79 Ω to 156 kΩ
9 (OT+) - Body ground	Always	10 kΩ or higher
1 (OT-) - Body ground	Always	10 kΩ or higher

HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

Text in Illustration

*a	Component without harness connected (No. 1 transmission wire)

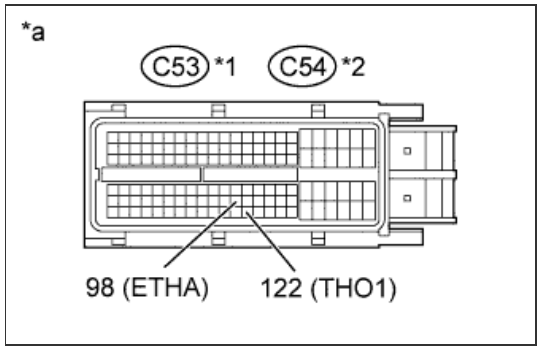
NG → REPAIR OR REPLACE NO. 1 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-122 (THO1) - C53-98 (ETHA)	Always	79 Ω to 156 kΩ
C53-122 (THO1) - Body ground	Always	10 kΩ or higher
C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-122 (THO1) - C54-98 (ETHA)	Always	79 Ω to 156 kΩ
C54-122 (THO1) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0976 Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)

DTC P0977 Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

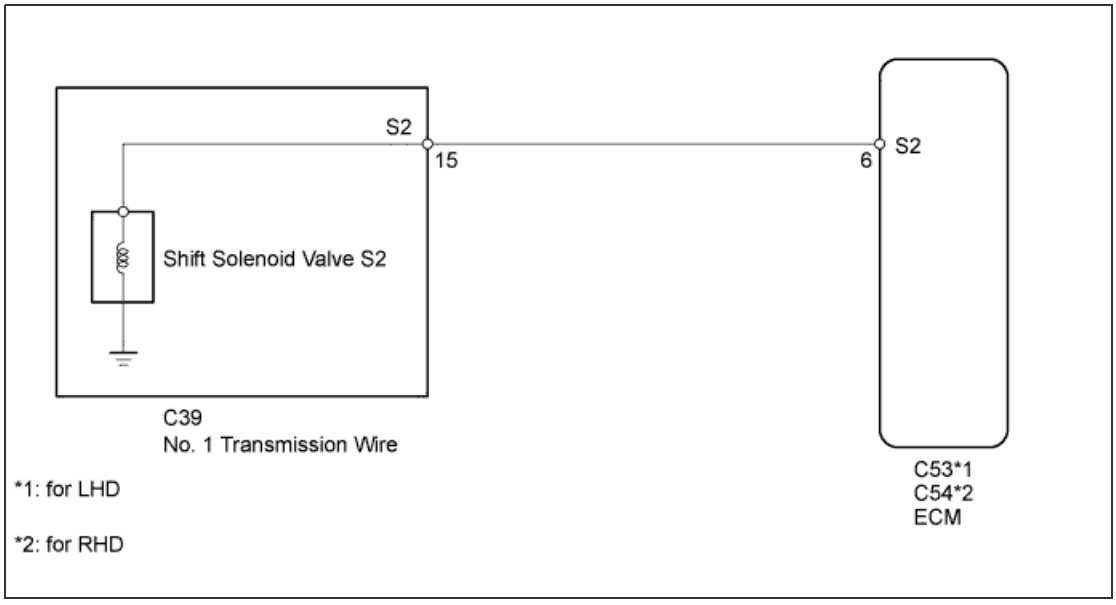
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0976	The ECM detects a short in the shift solenoid valve S2 circuit 2 times when shift solenoid valve S2 is operated (1 trip detection logic).	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	The ECM detects an open in the shift solenoid valve S2 circuit 2 times when shift solenoid valve S2 is not operated (1 trip detection logic).	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S2 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S2 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S2 circuit.
When shift solenoid valve S2 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S2 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

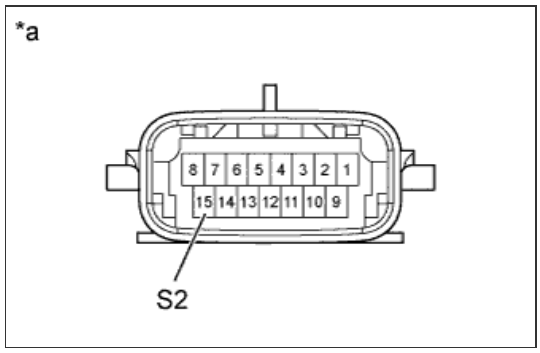
Shift solenoid valve S2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
15 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

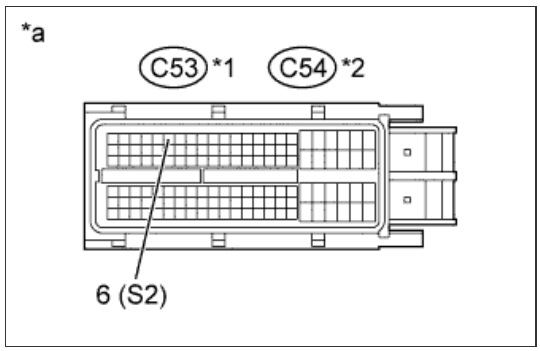
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

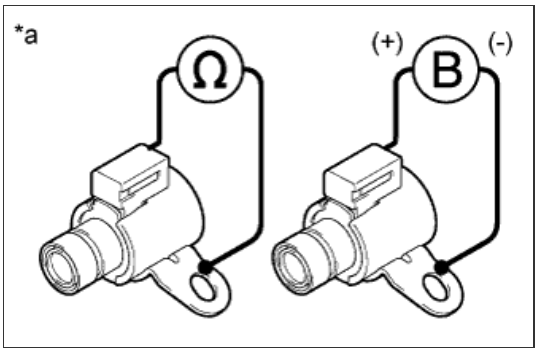
3.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

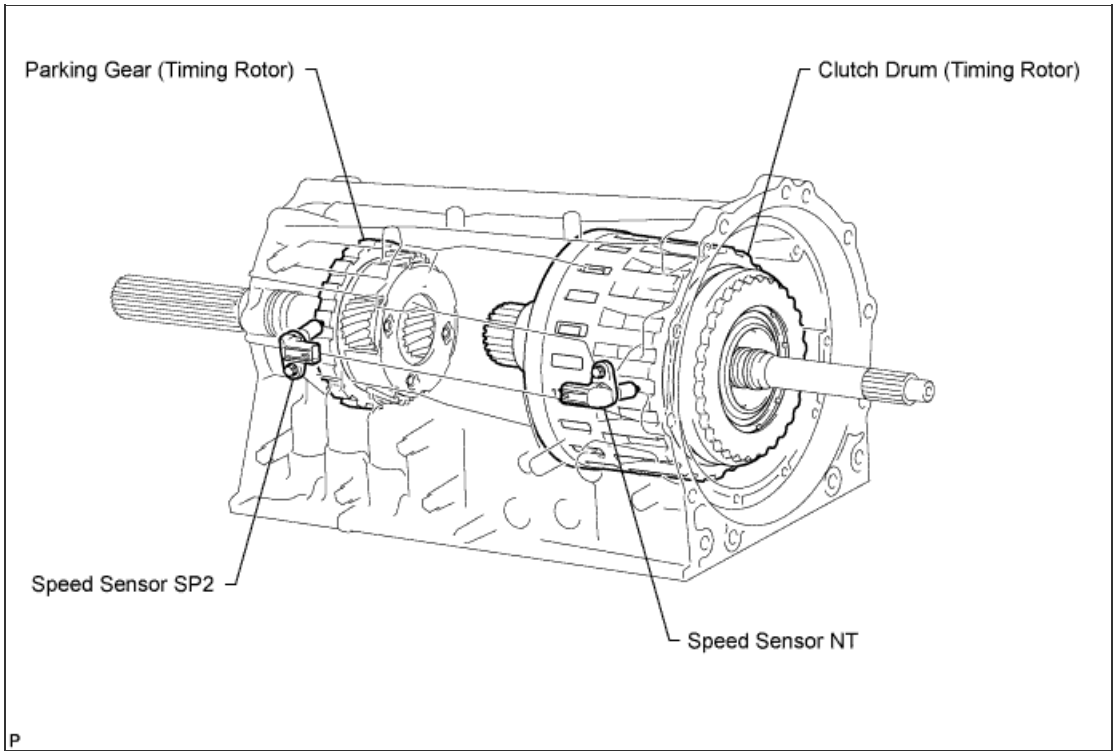
OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0717 Turbine Speed Sensor Circuit No Signal

for Preparation Click here

DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input revolution of the transmission. By comparing the input turbine speed signal NT with the counter gear speed sensor signal SP2, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. As a result, the gears shift smoothly.



DTC Code	DTC Detection Condition	Trouble Area
P0717	All the conditions below are detected for 5 sec. or more (1-trip detection logic). (a) Gear change is not performed. (b) The gear position is 4th, 5th or 6th. (c) The T/M input shaft rpm is 300 rpm or less. (d) The T/M output shaft rpm is 1000 rpm or more. (e) The park/neutral position switch: • The NSW input signal is OFF. • The R input signal is OFF. (f) The shift solenoid valves and park/neutral position switch are operating normally.	• Open or short in speed sensor NT circuit • Speed sensor NT • ECM • Automatic transmission (clutch, brake, gear, etc.)

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

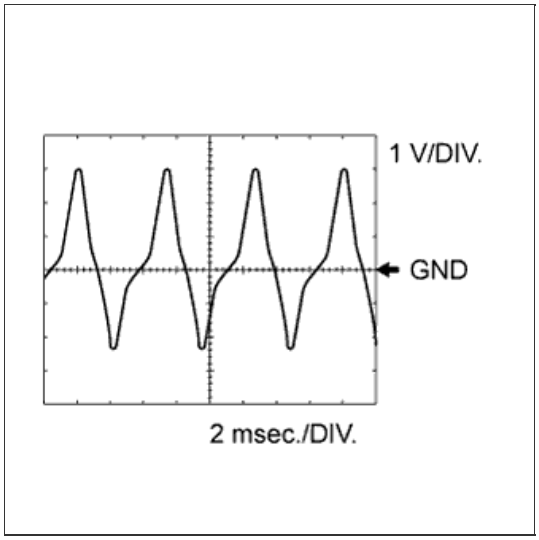
Standard:

for LHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C53-124 (NT+) - C53-123 (NT-)	1 V/DIV., 2 msec./DIV.	Engine idling (shift lever in P or N)	Refer to illustration

for RHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-124 (NT+) - C54-123 (NT-)	1 V/DIV., 2 msec./DIV.	Engine idling (shift lever in P or N)	Refer to illustration



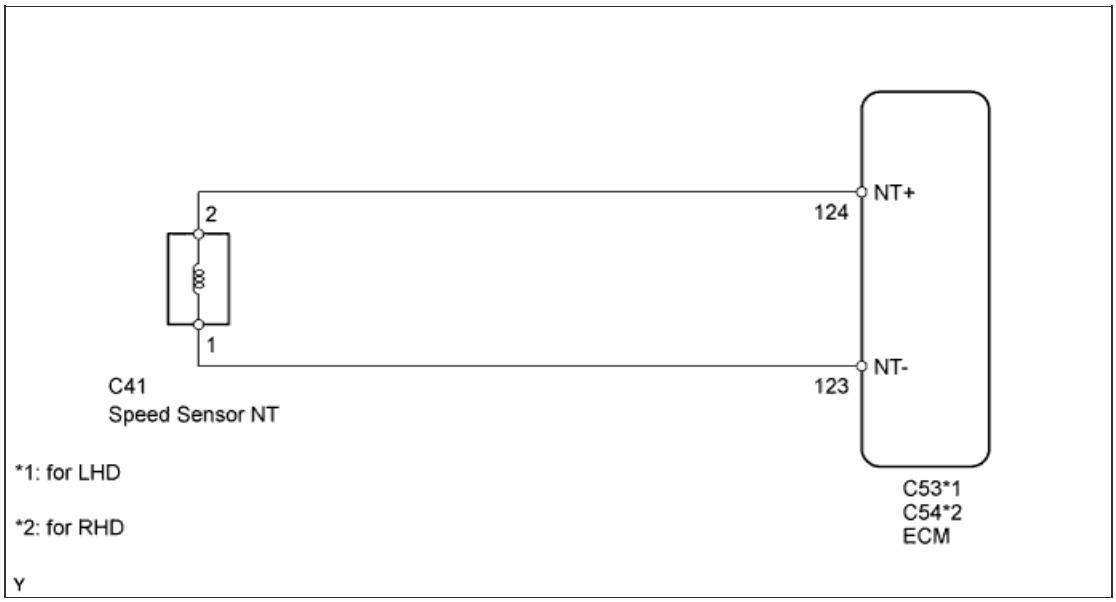
MONITOR DESCRIPTION

This DTC indicates that a pulse is not output from the speed sensor NT (turbine (input) speed sensor) or is output only a little. The NT terminal of the ECM detects the pulse signal from the speed sensor NT (input RPM). The ECM outputs a gear shift signal comparing the input speed sensor NT with the output speed sensor SP2.
While the vehicle is operating in 4th, 5th or 6th gear with the shift lever in D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is 1000 rpm or more*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

HINT:

- ***1: A pulse is not output or is irregularly output.**
- ***2: The vehicle speed is approximately 50 km/h (31 mph) or more.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPD (NT)	Input shaft speed/ Min.: 0 rpm Max.: 12750 rpm	Lock-up: • ON (after warming up engine): Input turbine speed (NT) equal to engine speed • OFF (idling with shift lever in N): Input turbine speed (NT) nearly equal to engine speed	The data is displayed in increments of 50 rpm.

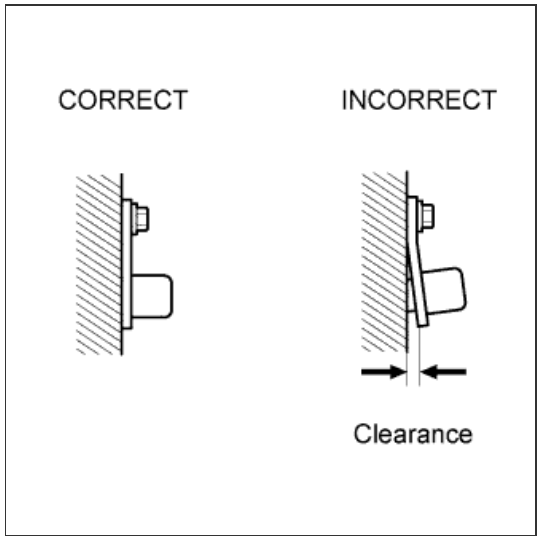
HINT:

- **SPD (NT) is always 0 while driving:**
  Open or short in the sensor or circuit.
- **SPD (NT) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:**
  Sensor trouble, improper installation, or intermittent connection trouble in the circuit.

1.INSPECT SPEED SENSOR NT INSTALLATION

a. Check the speed sensor NT installation.

OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transmission case.



NG → SECURELY INSTALL OR REPLACE SPEED SENSOR NT (Click here)

OK

2.INSPECT SPEED SENSOR NT

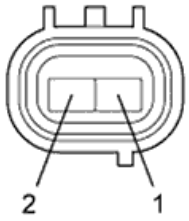
a. Disconnect the C41 speed sensor connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

Component without harness connected:
(Speed Sensor NT)



NG → REPLACE SPEED SENSOR NT (Click here)

OK

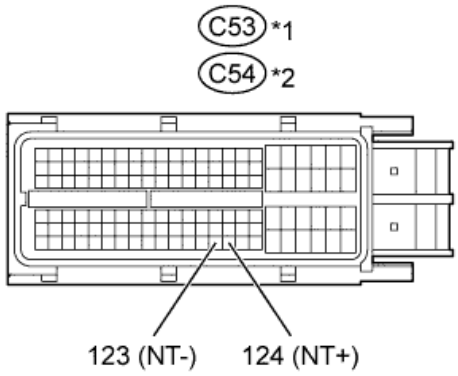
3.CHECK HARNESS AND CONNECTOR (SPEED SENSOR NT - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-124 (NT+) - C53-123 (NT-)	20°C (68°F)	560 to 680 Ω
C53-124 (NT+) - Body ground	Always	10 kΩ or higher
C53-123 (NT-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-124 (NT+) - C54-123 (NT-)	20°C (68°F)	560 to 680 Ω

C54-124 (NT+) - Body ground	Always	10 kΩ or higher
C54-123 (NT-) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE ECM (Click here)

DTC P0976 Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)

DTC P0977 Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

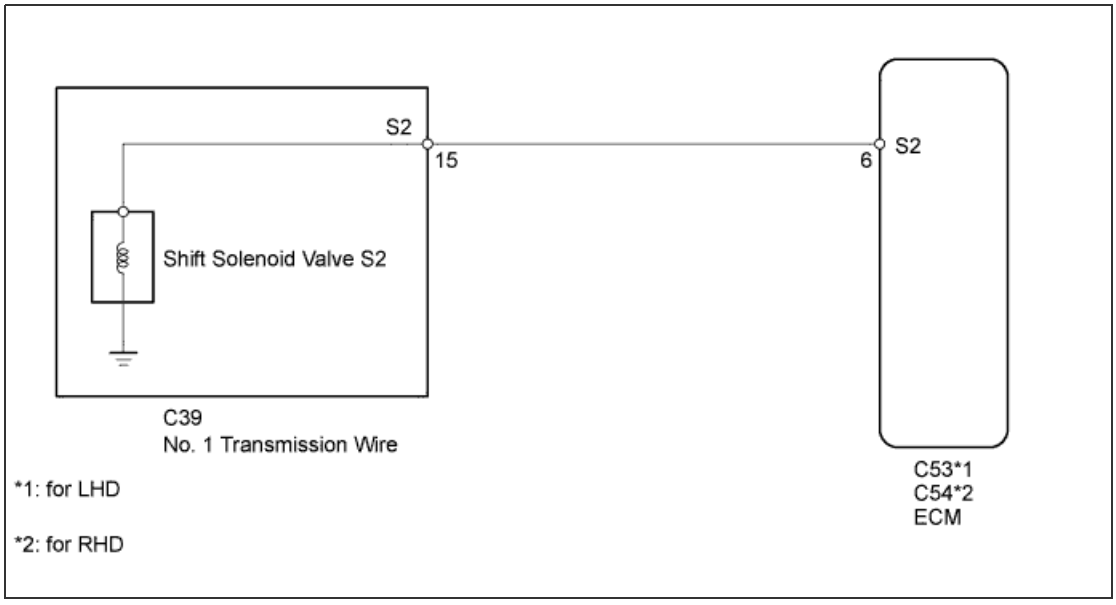
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0976	The ECM detects a short in the shift solenoid valve S2 circuit 2 times when shift solenoid valve S2 is operated (1 trip detection logic).	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	The ECM detects an open in the shift solenoid valve S2 circuit 2 times when shift solenoid valve S2 is not operated (1 trip detection logic).	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S2 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S2 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S2 circuit.
When shift solenoid valve S2 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S2 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

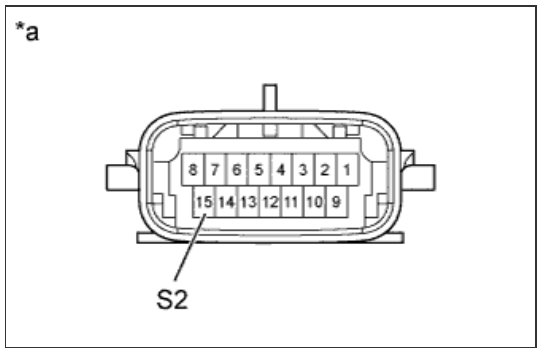
Shift solenoid valve S2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
15 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

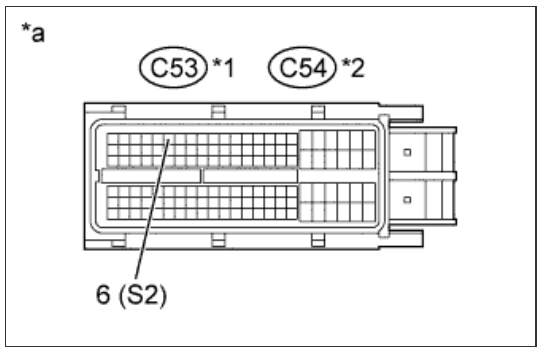
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-6 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

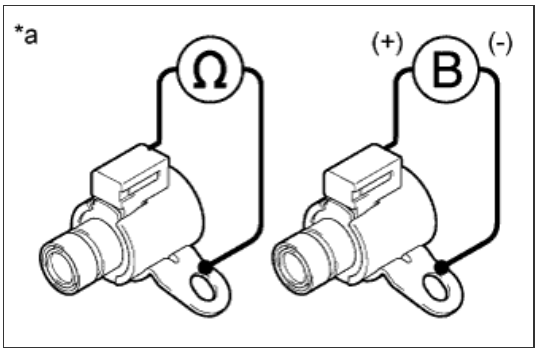
3.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0717 Turbine Speed Sensor Circuit No Signal

for Preparation Click here

DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input revolution of the transmission. By comparing the input turbine speed signal NT with the counter gear speed sensor signal SP2, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. As a result, the gears shift smoothly.

DTC Code	DTC Detection Condition	Trouble Area
P0717	All the conditions below are detected for 5 sec. or more (1-trip detection logic). (a) Gear change is not performed. (b) The gear position is 4th, 5th or 6th. (c) The T/M input shaft rpm is 300 rpm or less. (d) The T/M output shaft rpm is 1000 rpm or more. (e) The park/neutral position switch: • The NSW input signal is OFF. • The R input signal is OFF. (f) The shift solenoid valves and park/neutral position switch are operating normally.	• Open or short in speed sensor NT circuit • Speed sensor NT • ECM • Automatic transmission (clutch, brake, gear, etc.)

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

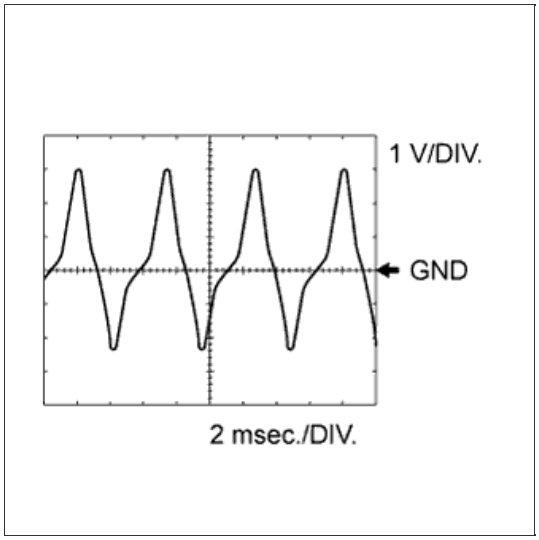
Standard:

for LHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C53-124 (NT+) - C53-123 (NT-)	1 V/DIV., 2 msec./DIV.	Engine idling (shift lever in P or N)	Refer to illustration

for RHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-124 (NT+) - C54-123 (NT-)	1 V/DIV., 2 msec./DIV.	Engine idling (shift lever in P or N)	Refer to illustration



MONITOR DESCRIPTION

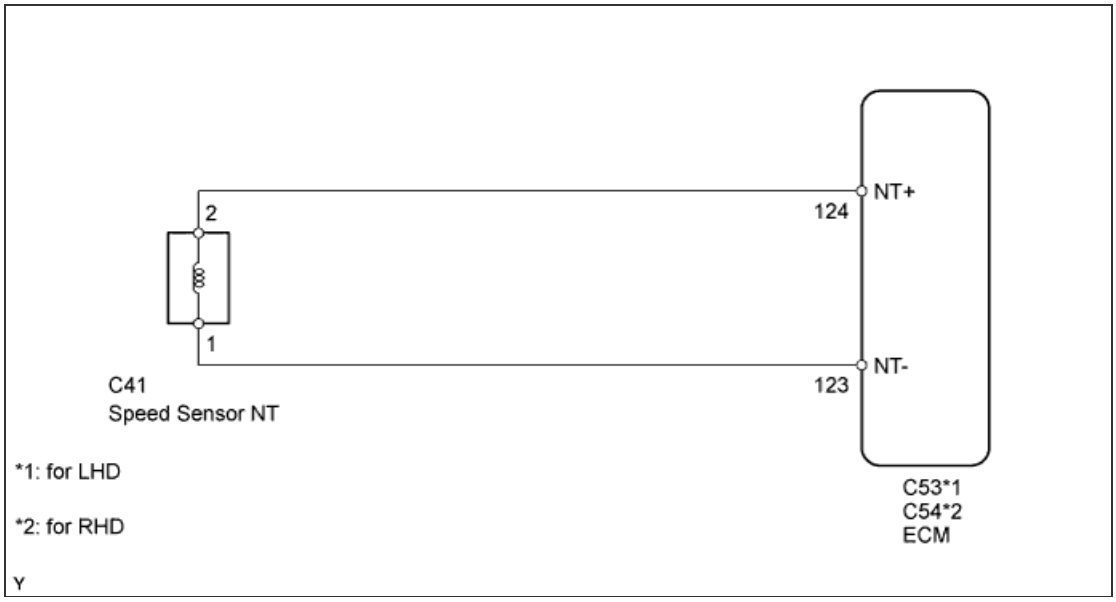
This DTC indicates that a pulse is not output from the speed sensor NT (turbine (input) speed sensor) or is output only a little. The NT terminal of the ECM detects the pulse signal from the speed sensor NT (input RPM). The ECM outputs a gear shift signal comparing the input speed sensor NT with the output speed sensor SP2.
While the vehicle is operating in 4th, 5th or 6th gear with the shift lever in D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is 1000 rpm or more*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

HINT:

- ***1: A pulse is not output or is irregularly output.**

- ***2: The vehicle speed is approximately 50 km/h (31 mph) or more.**

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPD (NT)	Input shaft speed/ Min.: 0 rpm Max.: 12750 rpm	Lock-up: • ON (after warming up engine): Input turbine speed (NT) equal to engine speed • OFF (idling with shift lever in N): Input turbine speed (NT) nearly equal to engine speed	The data is displayed in increments of 50 rpm.

HINT:

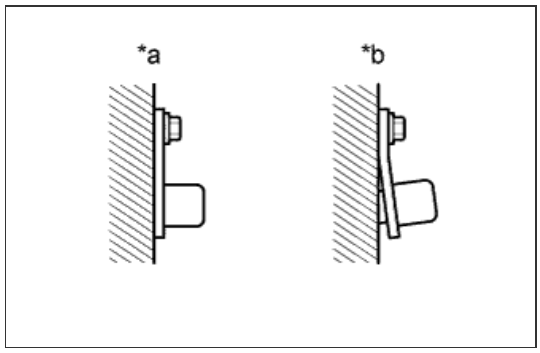
- **SPD (NT) is always 0 while driving:**
  Open or short in the sensor or circuit.
- **SPD (NT) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:**
  Sensor trouble, improper installation, or intermittent connection trouble in the circuit.

1.INSPECT SPEED SENSOR NT INSTALLATION

a. Check the speed sensor NT installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transmission case.



Text in Illustration

*a	CORRECT
*b	INCORRECT

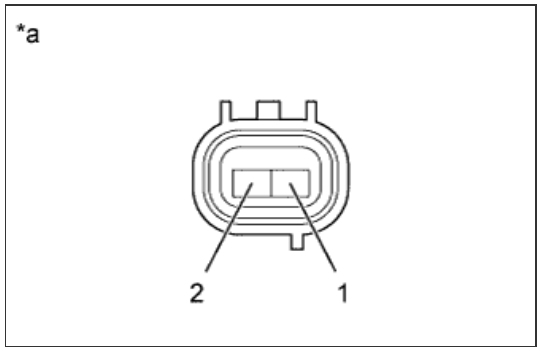
NG → SECURELY INSTALL OR REPLACE SPEED SENSOR NT (Click here)

OK ↓

2.INSPECT SPEED SENSOR NT

a. Disconnect the speed sensor connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

Text in Illustration

*a	Component without harness connected (Speed Sensor NT)

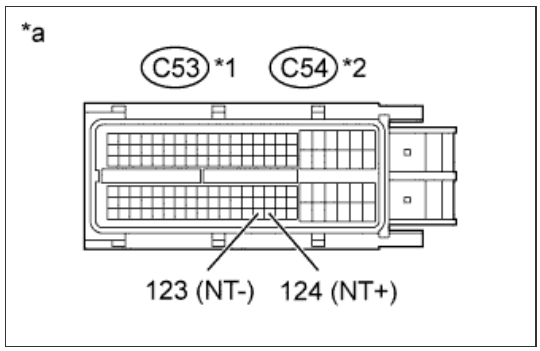
NG → REPLACE SPEED SENSOR NT (Click here)

OK ↓

3.CHECK HARNESS AND CONNECTOR (SPEED SENSOR NT - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-124 (NT+) - C53-123 (NT-)	20°C (68°F)	560 to 680 Ω
C53-124 (NT+) - Body	Always	10 kΩ or higher

ground		
C53-123 (NT-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-124 (NT+) - C54-123 (NT-)	20°C (68°F)	560 to 680 Ω
C54-124 (NT+) - Body ground	Always	10 kΩ or higher
C54-123 (NT-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0979 Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)

DTC P0980 Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

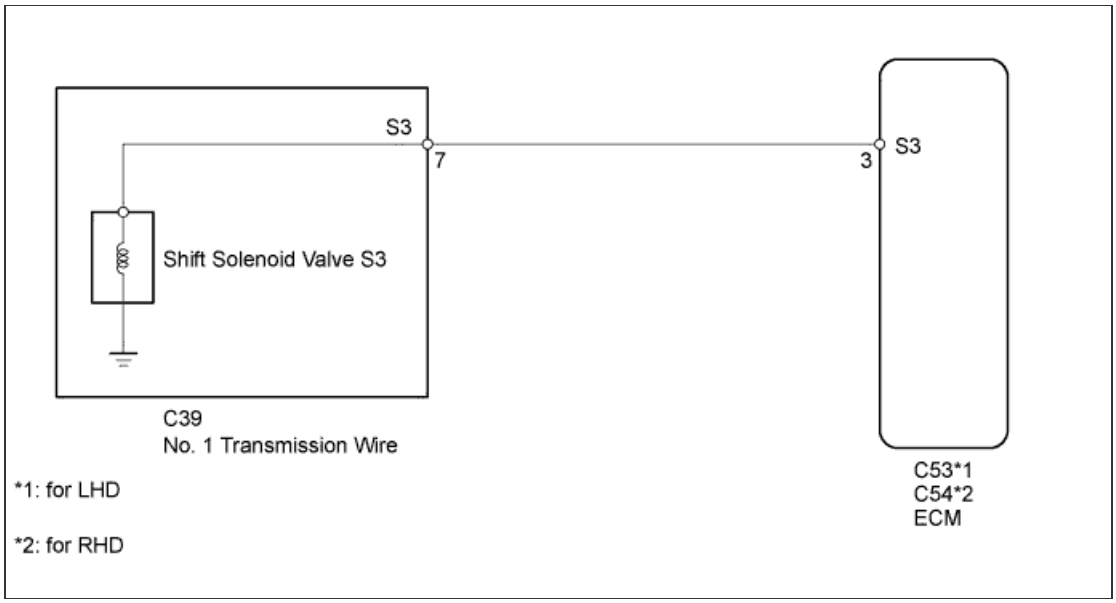
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0979	The ECM detects a short in the shift solenoid valve S3 circuit 2 times when shift solenoid valve S3 is operated (1 trip detection logic).	• Short in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM
P0980	The ECM detects an open in the shift solenoid valve S3 circuit 2 times when shift solenoid valve S3 is not operated (1 trip detection logic).	• Open in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S3 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S3 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S3 circuit.
When shift solenoid valve S3 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S3 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve S3 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

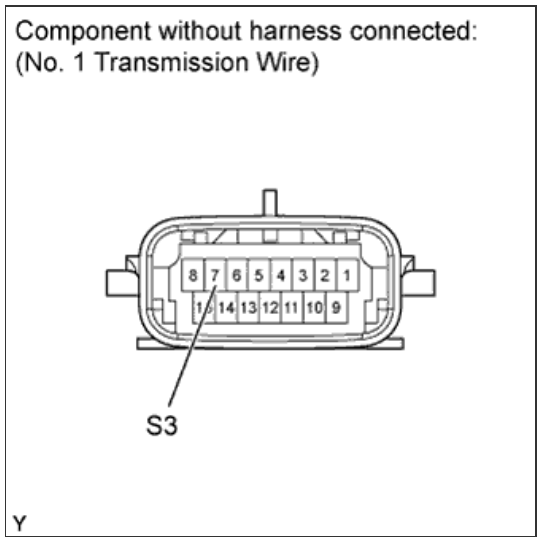
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S3)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
7 (S3) - Body ground	20°C (68°F)	11 to 15 Ω



NG → Go to step 3

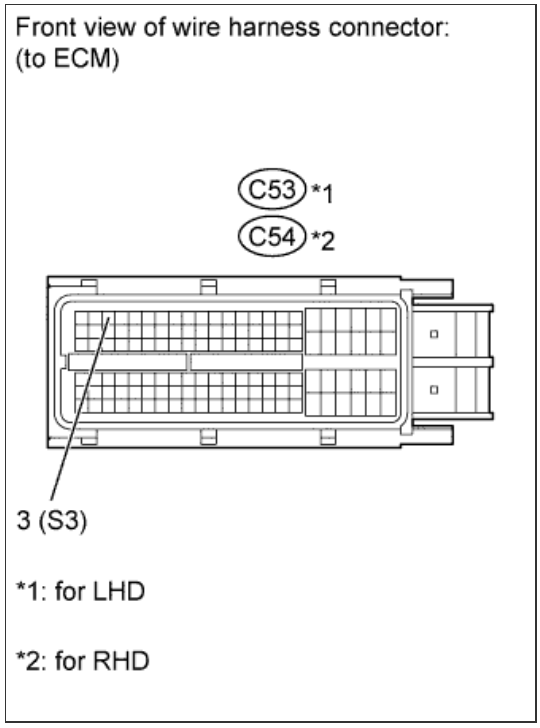
OK →

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

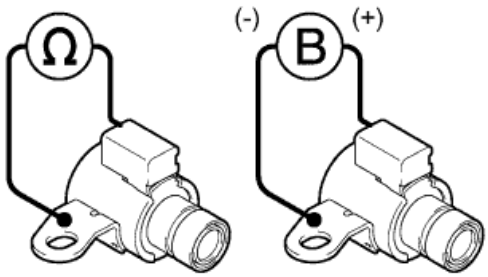
Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Shift Solenoid Valve S3:



P

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

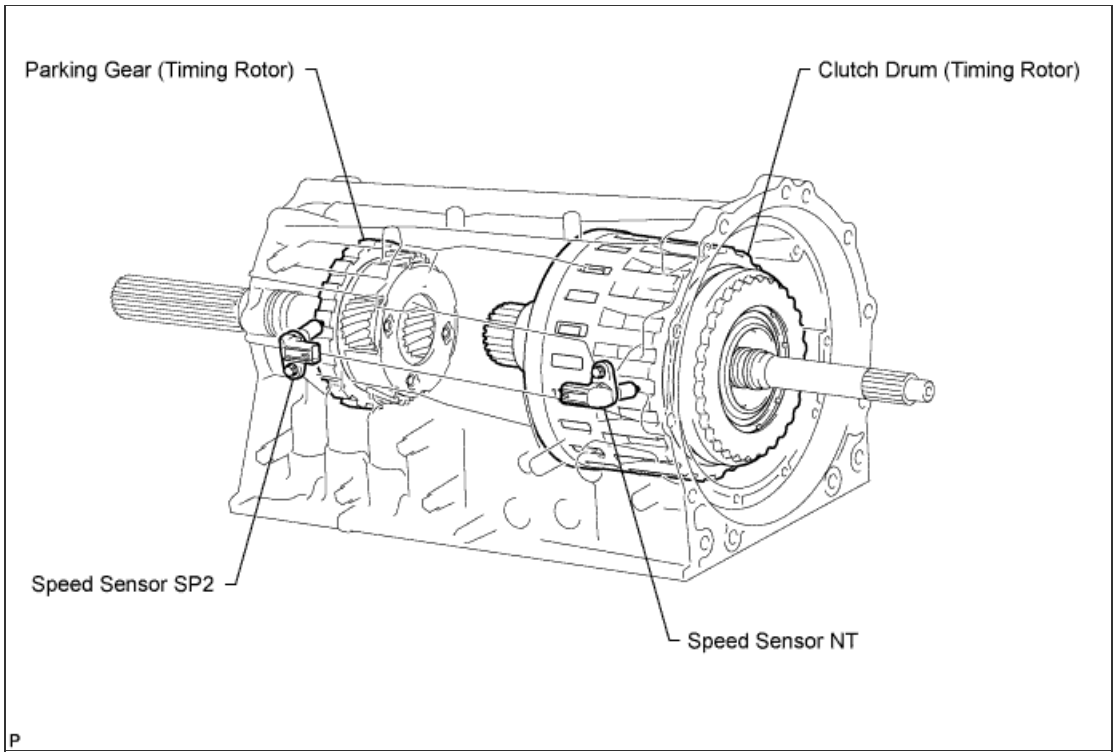
REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0722 Output Speed Sensor Circuit No Signal

for Preparation Click here

DESCRIPTION

The speed sensor SP2 detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals. An AC voltage is generated in the speed sensor SP2 coil as the parking gear mounted on the rear planetary gear assembly rotates, and this voltage is sent to the ECM. The parking gear on the rear planetary gear is used as the timing rotor for this sensor.
The gear shift point and lock-up timing are controlled by the ECM based on the signals from this vehicle speed sensor and the throttle position sensor signal.



DTC Code	DTC Detection Condition	Trouble Area
P0722	All the conditions below are detected 500 times or more continuously (2-trip detection logic). (a) No signal from the speed sensor SP2 is input to the ECM while 4 pulses of the No. 1 vehicle speed sensor signal are sent. (b) The vehicle speed is 9 km/h (6 mph) or more for at least 5 sec. (c) The park/neutral position switch is off. (d) The transfer is not in neutral.	• Open or short in speed sensor SP2 circuit • Speed sensor SP2 • ECM • Automatic transmission (clutch, brake, gear, etc.)

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

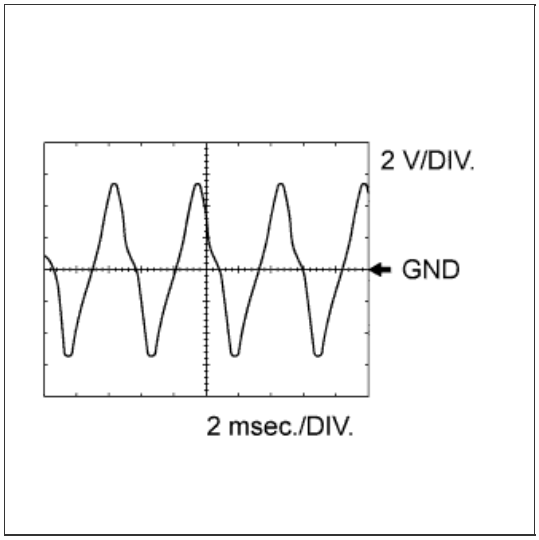
Standard:

for LHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C53-101 (SP2+) - C53-100 (SP2-)	2 V/DIV., 2 msec./DIV	Vehicle speed 20 km/h (12 mph)	Refer to illustration

for RHD

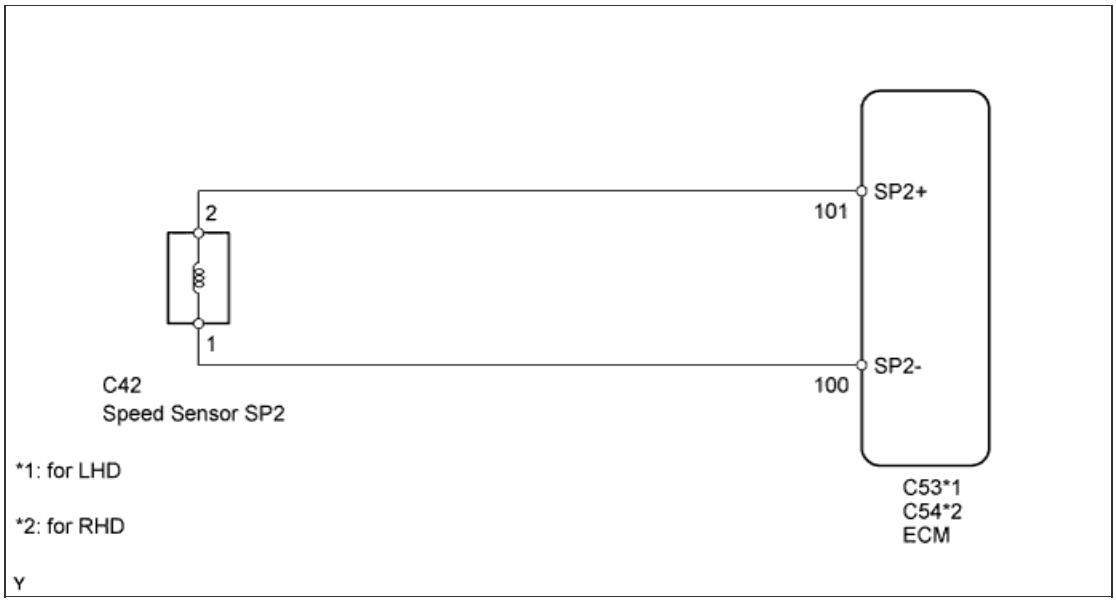
Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-101 (SP2+) - C54-100 (SP2-)	2 V/DIV., 2 msec./DIV	Vehicle speed 20 km/h (12 mph)	Refer to illustration



MONITOR DESCRIPTION

The output speed sensor SP2 monitors the output shaft speed. The ECM controls the gear shift point and the lock-up timing based on the signals from the output speed sensor SP2 and throttle position sensor.
If the ECM detects no signal from the output speed sensor SP2 even while the vehicle is moving, it will conclude that there is a malfunction of the output speed sensor SP2. The ECM will illuminate the MIL and store a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPD (SP2)	Output shaft speed/ Min.: 0 km/h (0 mph) Max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph) (output shaft speed equal to vehicle speed)	-

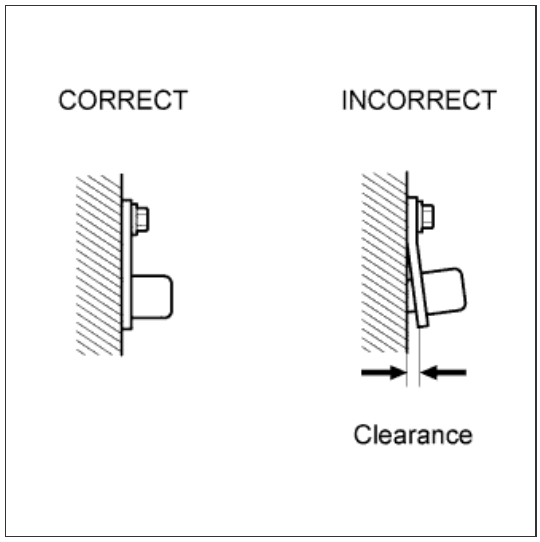
HINT:

- **SPD (SP2) is always 0 while driving:**
  Open or short in the sensor or circuit.
- **The SPD (SP2) value displayed on the intelligent tester is much less than the actual vehicle speed:**
  Sensor trouble, improper installation, or intermittent connection trouble in the circuit.

1.INSPECT SPEED SENSOR SP2 INSTALLATION

a. Check the speed sensor SP2 installation.

OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transmission case.



NG → SECURELY INSTALL OR REPLACE SPEED SENSOR SP2 (Click here)

OK

2.INSPECT SPEED SENSOR SP2

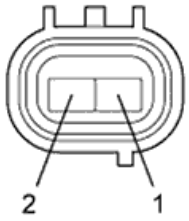
a. Disconnect the C42 speed sensor connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

Component without harness connected:
(Speed Sensor SP2)



NG → REPLACE SPEED SENSOR SP2 (Click here)

OK

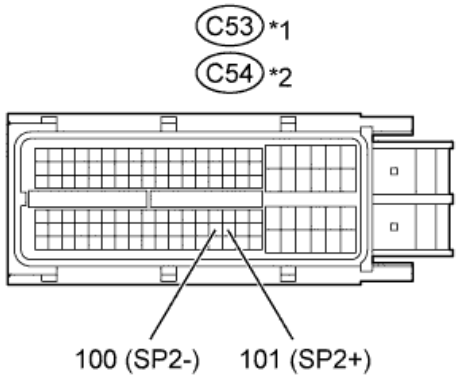
3.CHECK HARNESS AND CONNECTOR (SPEED SENSOR SP2 - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-101 (SP2+) - C53-100 (SP2-)	20°C (68°F)	560 to 680 Ω
C53-101 (SP2+) - Body ground	Always	10 kΩ or higher
C53-100 (SP2-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-101 (SP2+) - C54-100 (SP2-)	20°C (68°F)	560 to 680 Ω

C54-101 (SP2+) - Body ground	Always	10 kΩ or higher
C54-100 (SP2-) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE ECM (Click here)

DTC P0979 Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)

DTC P0980 Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

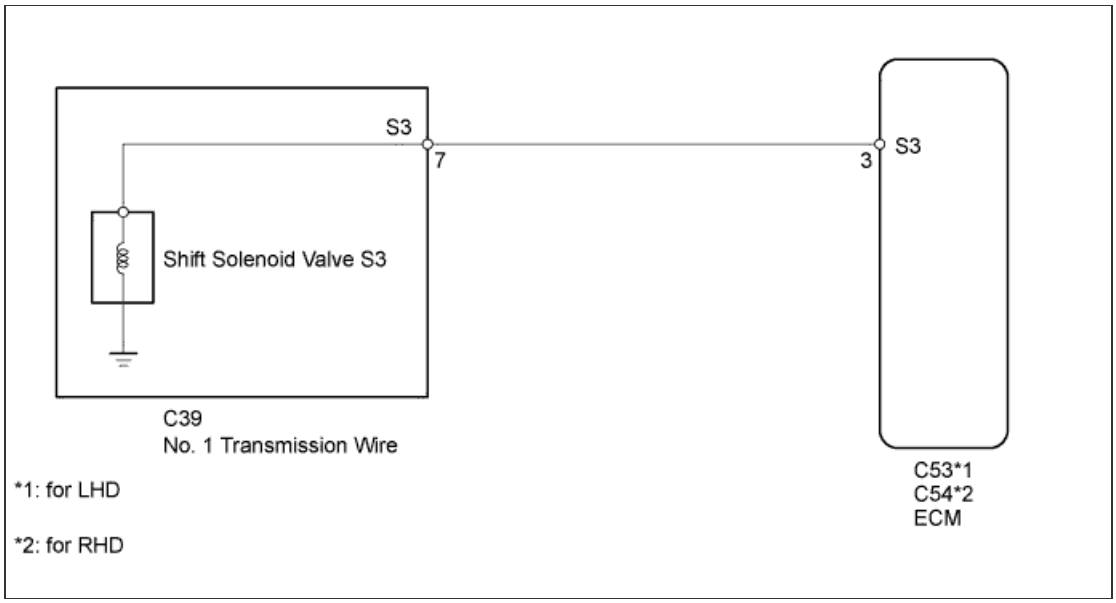
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0979	The ECM detects a short in the shift solenoid valve S3 circuit 2 times when shift solenoid valve S3 is operated (1 trip detection logic).	• Short in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM
P0980	The ECM detects an open in the shift solenoid valve S3 circuit 2 times when shift solenoid valve S3 is not operated (1 trip detection logic).	• Open in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S3 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S3 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S3 circuit.
When shift solenoid valve S3 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S3 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve S3 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

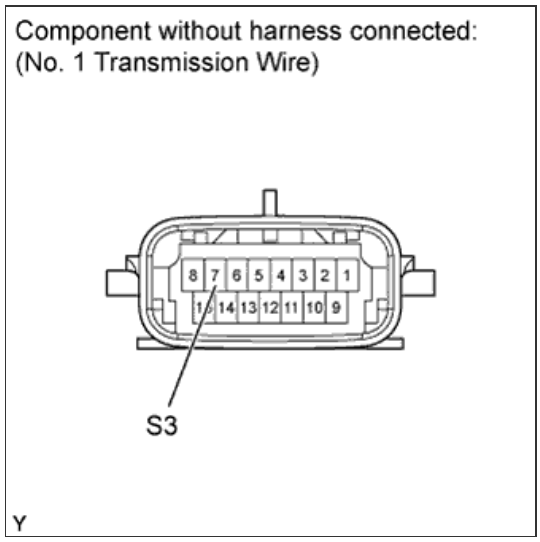
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S3)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
7 (S3) - Body ground	20°C (68°F)	11 to 15 Ω



NG → Go to step 3

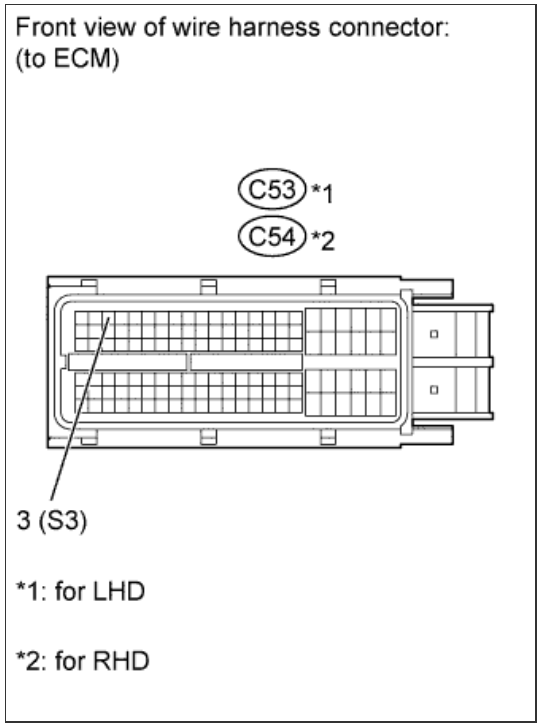
OK →

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

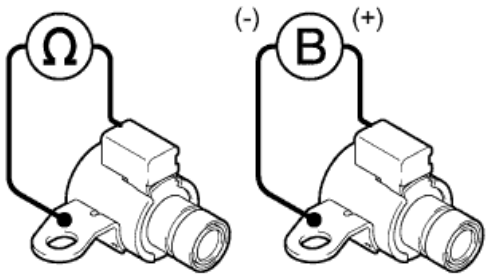
Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Shift Solenoid Valve S3:



P

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0722 Output Speed Sensor Circuit No Signal

for Preparation Click here

DESCRIPTION

The speed sensor SP2 detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals. An AC voltage is generated in the speed sensor SP2 coil as the parking gear mounted on the rear planetary gear assembly rotates, and this voltage is sent to the ECM. The parking gear on the rear planetary gear is used as the timing rotor for this sensor.
The gear shift point and lock-up timing are controlled by the ECM based on the signals from this vehicle speed sensor and the throttle position sensor signal.

DTC Code	DTC Detection Condition	Trouble Area
P0722	All the conditions below are detected 500 times or more continuously (2-trip detection logic). (a) No signal from the speed sensor SP2 is input to the ECM while 4 pulses of the No. 1 vehicle speed sensor signal are sent. (b) The vehicle speed is 9 km/h (6 mph) or more for at least 5 sec. (c) The park/neutral position switch is off. (d) The transfer is not in neutral.	• Open or short in speed sensor SP2 circuit • Speed sensor SP2 • ECM • Automatic transmission (clutch, brake, gear, etc.)

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

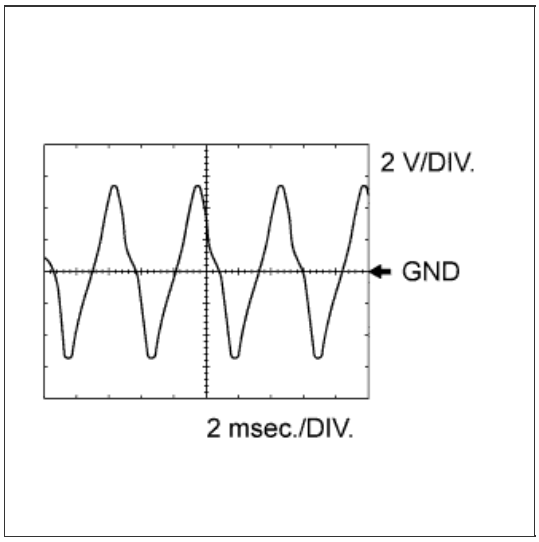
Standard:

for LHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C53-101 (SP2+) - C53-100 (SP2-)	2 V/DIV., 2 msec./DIV	Vehicle speed 20 km/h (12 mph)	Refer to illustration

for RHD

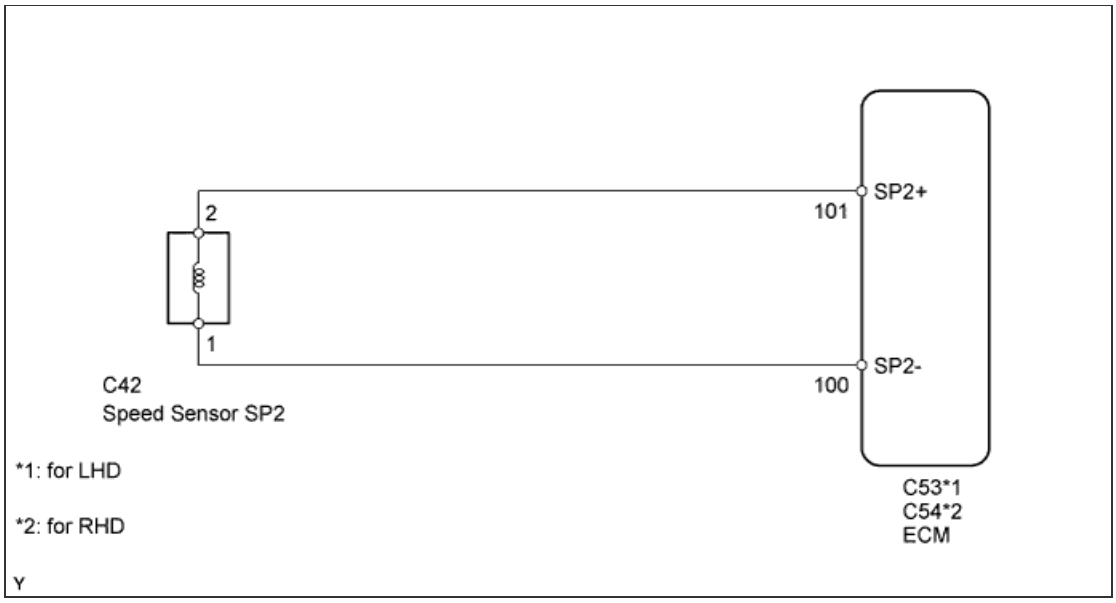
Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-101 (SP2+) - C54-100 (SP2-)	2 V/DIV., 2 msec./DIV	Vehicle speed 20 km/h (12 mph)	Refer to illustration



MONITOR DESCRIPTION

The output speed sensor SP2 monitors the output shaft speed. The ECM controls the gear shift point and the lock-up timing based on the signals from the output speed sensor SP2 and throttle position sensor.
If the ECM detects no signal from the output speed sensor SP2 even while the vehicle is moving, it will conclude that there is a malfunction of the output speed sensor SP2. The ECM will illuminate the MIL and store a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPD (SP2)	Output shaft speed/ Min.: 0 km/h (0 mph) Max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph) (output shaft speed equal to vehicle speed)	-

HINT:

- **SPD (SP2) is always 0 while driving:**
  Open or short in the sensor or circuit.
- **The SPD (SP2) value displayed on the intelligent tester is much less than the actual vehicle speed:**
  Sensor trouble, improper installation, or intermittent connection trouble in the circuit.

1.INSPECT SPEED SENSOR SP2 INSTALLATION

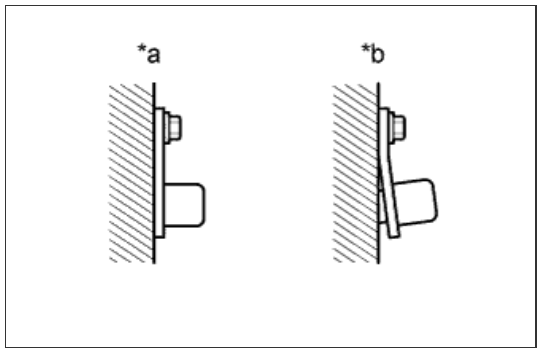
a. Check the speed sensor SP2 installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transmission case.

Text in Illustration

*a	CORRECT
*b	INCORRECT



NG → SECURELY INSTALL OR REPLACE SPEED SENSOR SP2 (Click here)

OK

2.INSPECT SPEED SENSOR SP2

a. Disconnect the speed sensor connector.

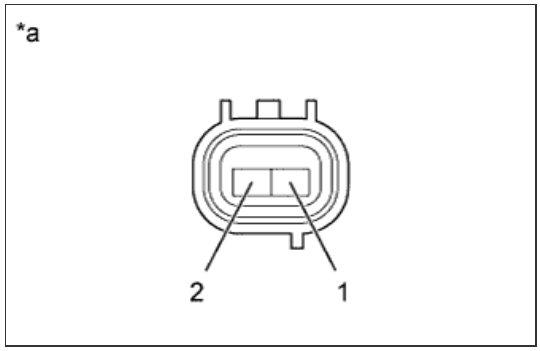
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

Text in Illustration

*a	Component without harness connected (Speed Sensor SP2)



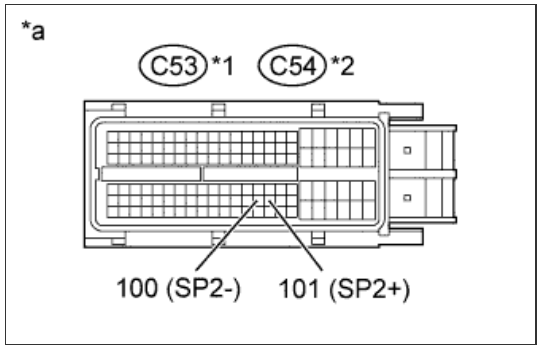
NG → REPLACE SPEED SENSOR SP2 (Click here)

OK

3.CHECK HARNESS AND CONNECTOR (SPEED SENSOR SP2 - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-101 (SP2+) - C53-100 (SP2-)	20°C (68°F)	560 to 680 Ω
C53-101 (SP2+) - Body ground	Always	10 kΩ or higher
C53-100 (SP2-) - Body	Always	10 kΩ or higher

ground		

for RHD

Tester Connection	Condition	Specified Condition
C54-101 (SP2+) - C54-100 (SP2-)	20°C (68°F)	560 to 680 Ω
C54-101 (SP2+) - Body ground	Always	10 kΩ or higher
C54-100 (SP2-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0979 Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)

DTC P0980 Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

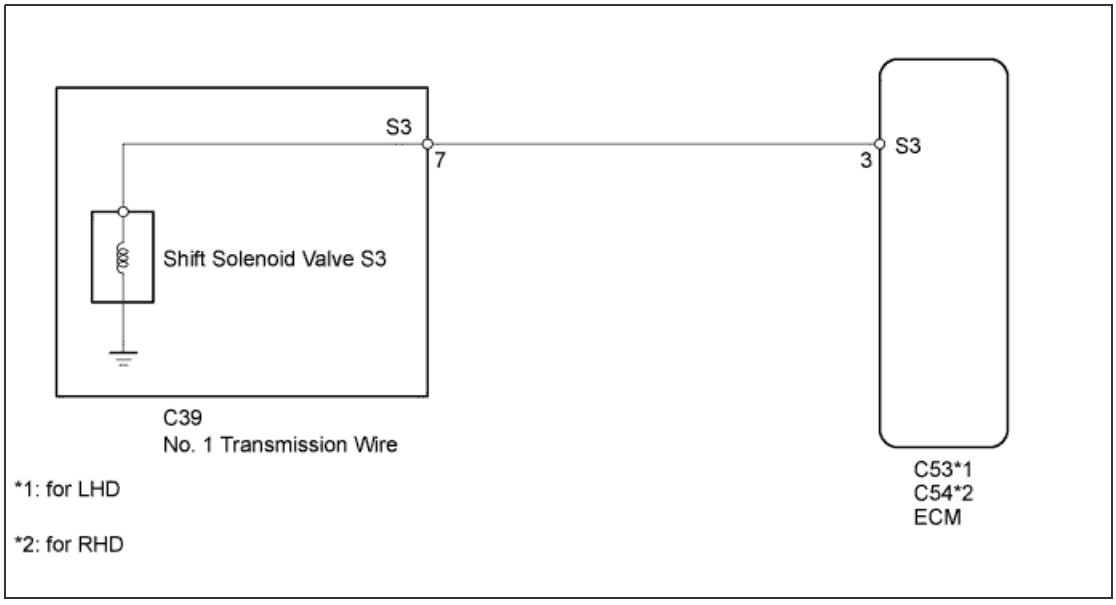
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0979	The ECM detects a short in the shift solenoid valve S3 circuit 2 times when shift solenoid valve S3 is operated (1 trip detection logic).	• Short in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM
P0980	The ECM detects an open in the shift solenoid valve S3 circuit 2 times when shift solenoid valve S3 is not operated (1 trip detection logic).	• Open in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S3 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S3 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S3 circuit.
When shift solenoid valve S3 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S3 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

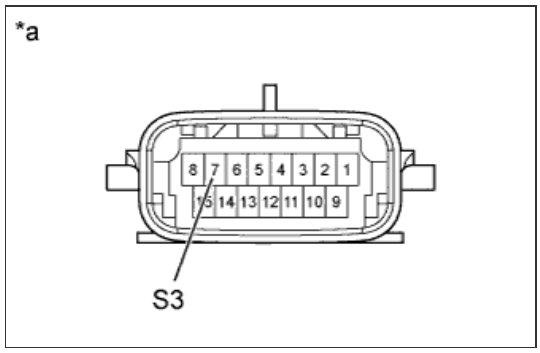
Shift solenoid valve S3 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S3)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
7 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

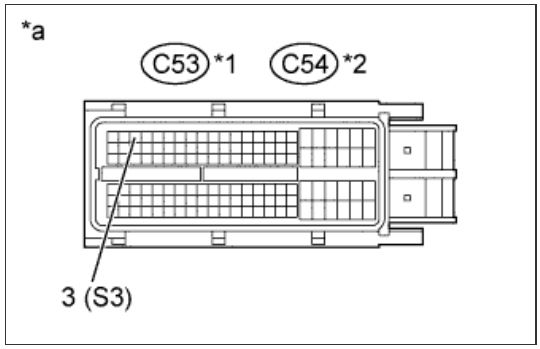
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

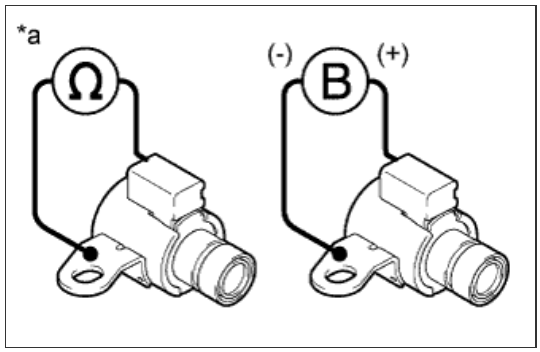
3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0724 Brake Switch "B" Circuit High

for Preparation Click here

DESCRIPTION

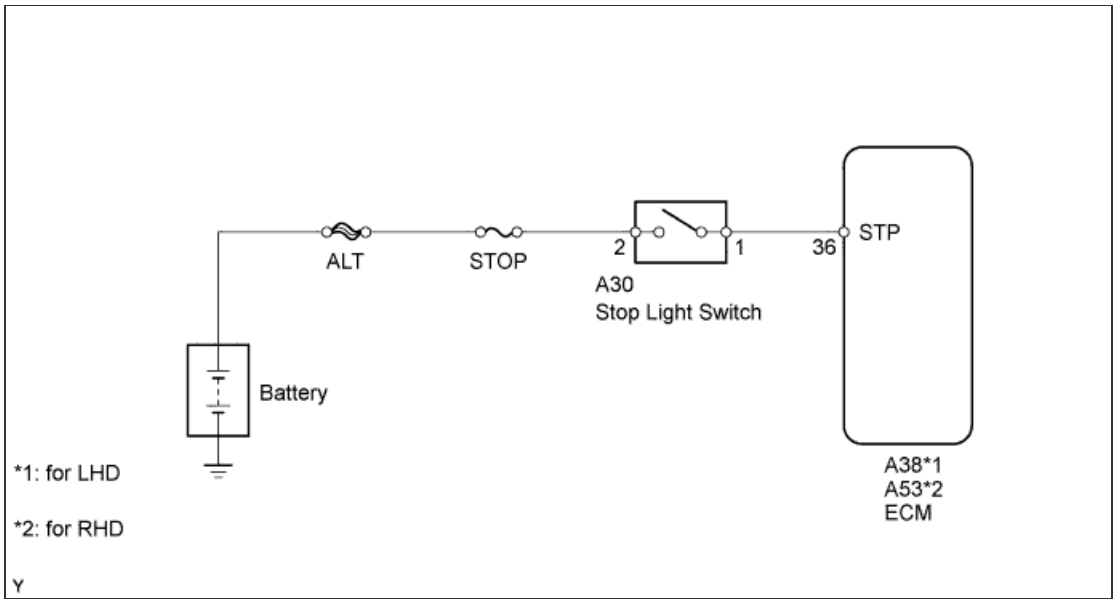
The purpose of this circuit is to prevent the engine from stalling while driving in the lock-up condition when the brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC Code	DTC Detection Condition	Trouble Area
P0724	The stop light switch remains on even when the vehicle is driven in a STOP (less than 3 km/h (2 mph)) and GO (30 km/h (19 mph) or more) pattern 5 times (2-trip detection logic).	• Short in stop light switch signal circuit • Stop light switch assembly • ECM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains on. When the stop light switch remains on during "stop and go" driving, the ECM interprets this as a fault in the stop light switch, the MIL comes on and the ECM stores the DTC. The vehicle must stop (less than 3 km/h (2 mph)) and go (30 km/h (19 mph) or more) 5 times for 2 driving cycles in order to detect a malfunction.

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Light Switch	Stop light switch status/ ON or OFF	Brake pedal: • Depressed: ON • Released: OFF	-

1.INSPECT STOP LIGHT SWITCH ASSEMBLY

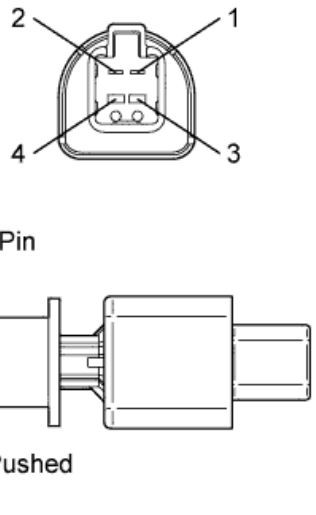
a. Remove the stop light switch (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
1 - 2	Pin not pushed	Below 1 Ω
3 - 4	Pin pushed	Below 1 Ω
1 - 2	Pin pushed	10 kΩ or higher
3 - 4	Pin not pushed	10 kΩ or higher

Component without harness connected:
(Stop Light Switch)



NG → REPLACE STOP LIGHT SWITCH ASSEMBLY (Click here)

OK

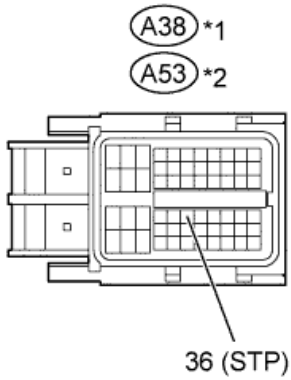
2.CHECK HARNESS AND CONNECTOR (BATTERY - ECM)

a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Measure the voltage according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Voltage:

for LHD

Tester Connection	Condition	Specified Condition
A38-36 (STP) - Body ground	Brake pedal depressed	11 to 14 V
A38-36 (STP) - Body ground	Brake pedal released	Below 1 V

for RHD

Tester Connection	Condition	Specified Condition
A53-36 (STP) - Body ground	Brake pedal depressed	11 to 14 V
A53-36 (STP) - Body ground	Brake pedal released	Below 1 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0979 Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)

DTC P0980 Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

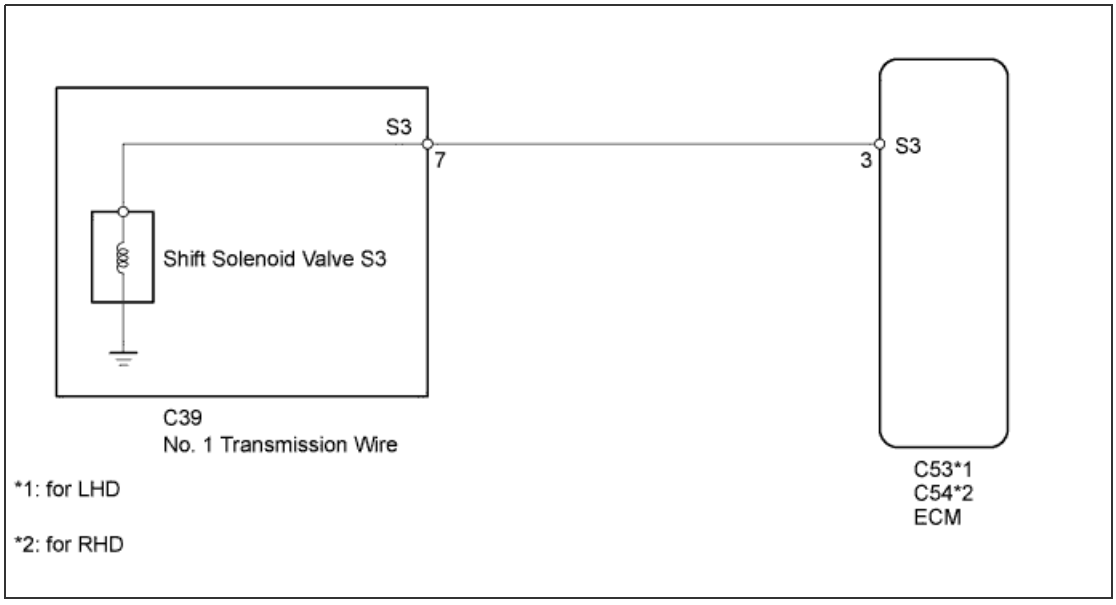
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0979	The ECM detects a short in the shift solenoid valve S3 circuit 2 times when shift solenoid valve S3 is operated (1 trip detection logic).	• Short in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM
P0980	The ECM detects an open in the shift solenoid valve S3 circuit 2 times when shift solenoid valve S3 is not operated (1 trip detection logic).	• Open in shift solenoid valve S3 circuit • Shift solenoid valve S3 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S3 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S3 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S3 circuit.
When shift solenoid valve S3 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S3 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

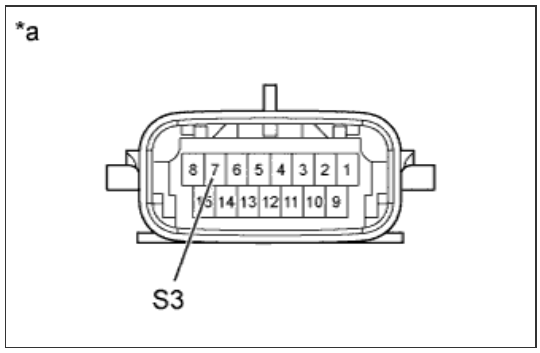
Shift solenoid valve S3 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S3)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
7 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

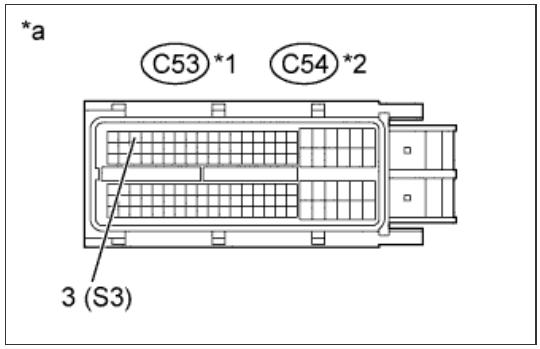
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-3 (S3) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

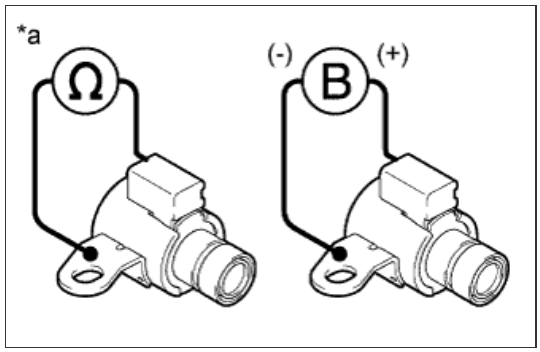
3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0724 Brake Switch "B" Circuit High

for Preparation Click here

DESCRIPTION

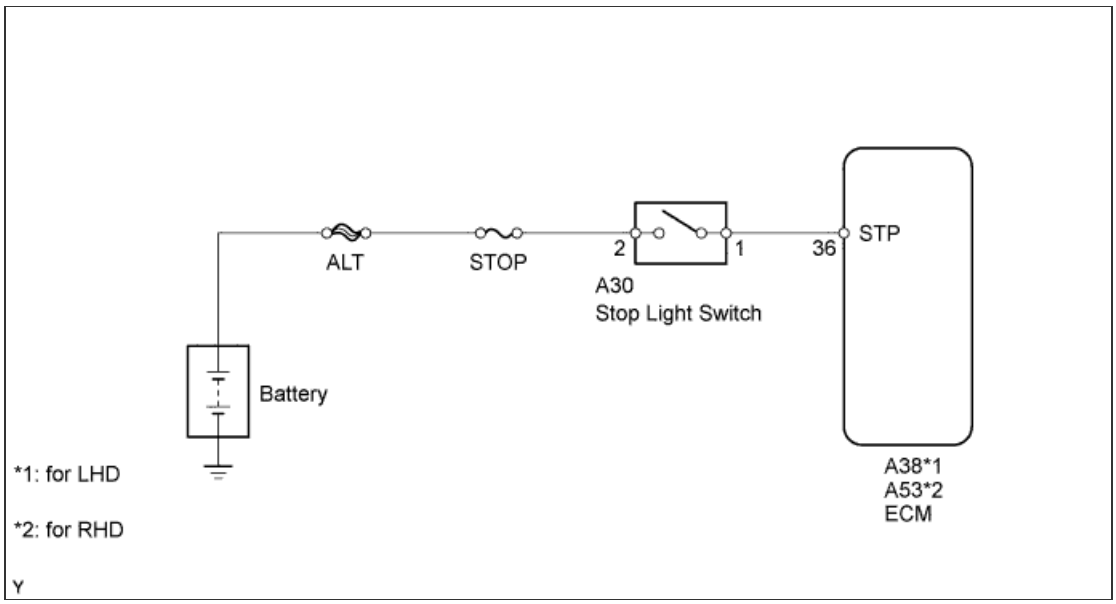
The purpose of this circuit is to prevent the engine from stalling while driving in the lock-up condition when the brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC Code	DTC Detection Condition	Trouble Area
P0724	The stop light switch remains on even when the vehicle is driven in a STOP (less than 3 km/h (2 mph)) and GO (30 km/h (19 mph) or more) pattern 5 times (2-trip detection logic).	• Short in stop light switch signal circuit • Stop light switch assembly • ECM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains on. When the stop light switch remains on during "stop and go" driving, the ECM interprets this as a fault in the stop light switch, the MIL comes on and the ECM stores the DTC. The vehicle must stop (less than 3 km/h (2 mph)) and go (30 km/h (19 mph) or more) 5 times for 2 driving cycles in order to detect a malfunction.

WIRING DIAGRAM



INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Light Switch	Stop light switch status/ ON or OFF	Brake pedal: • Depressed: ON • Released: OFF	-

1.INSPECT STOP LIGHT SWITCH ASSEMBLY

a. Remove the stop light switch (Click here).

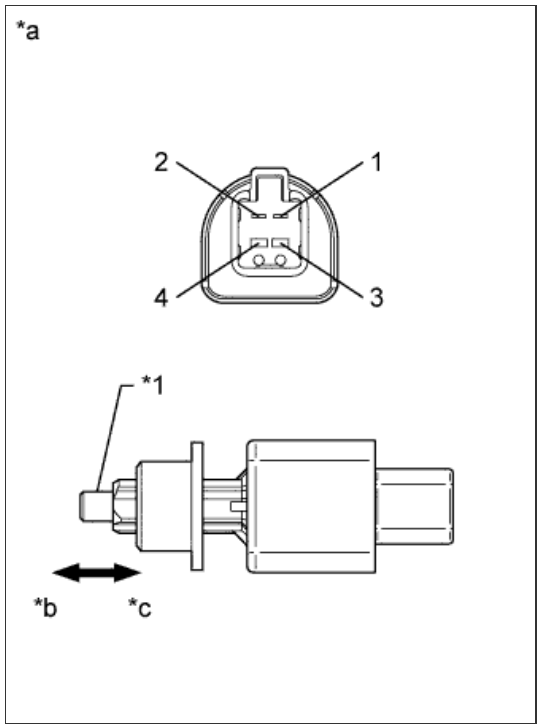
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
1 - 2	Pin not pushed	Below 1 Ω
3 - 4	Pin pushed	Below 1 Ω
1 - 2	Pin pushed	10 kΩ or higher
3 - 4	Pin not pushed	10 kΩ or higher

Text in Illustration

*1	Pin
*a	Component without harness connected (Stop Light Switch)
*b	Not pushed
*c	Pushed



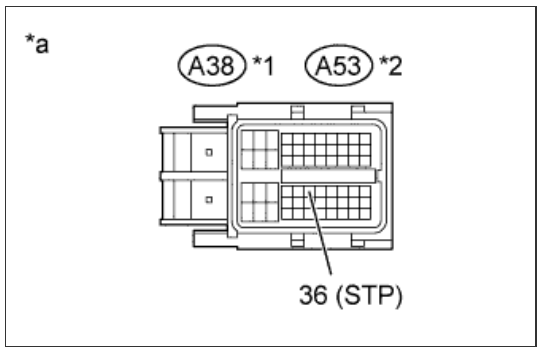
NG → REPLACE STOP LIGHT SWITCH ASSEMBLY (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (BATTERY - ECM)

a. Disconnect the ECM connector.

b. Measure the voltage according to the value(s) in the table below.



Standard Voltage:

for LHD

Tester Connection	Condition	Specified Condition
A38-36 (STP) - Body ground	Brake pedal depressed	11 to 14 V
A38-36 (STP) - Body ground	Brake pedal released	Below 1 V

for RHD

Tester Connection	Condition	Specified Condition
A53-36 (STP) - Body ground	Brake pedal depressed	11 to 14 V
A53-36 (STP) - Body ground	Brake pedal released	Below 1 V

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0982 Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)

DTC P0983 Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)

for Preparation Click here

DESCRIPTION

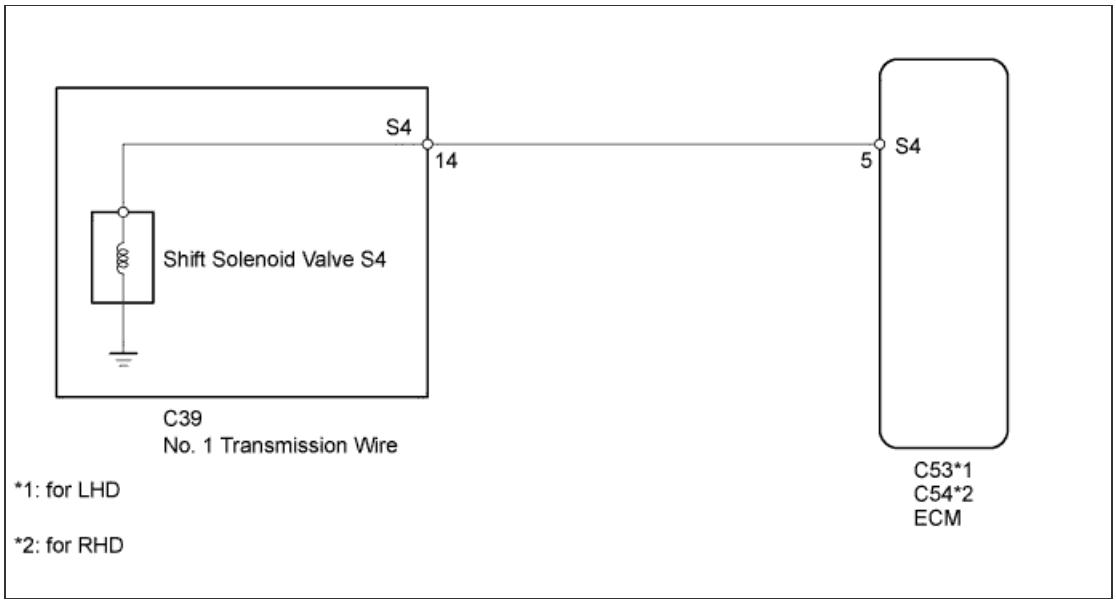
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0982	The ECM detects a short in the shift solenoid valve S4 circuit 2 times when shift solenoid valve S4 is operated (1 trip detection logic).	• Short in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM
P0983	The ECM detects an open in the shift solenoid valve S4 circuit 2 times when shift solenoid valve S4 is not operated (1 trip detection logic).	• Open in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S4 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S4 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S4 circuit.
When shift solenoid valve S4 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S4 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve S4 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON

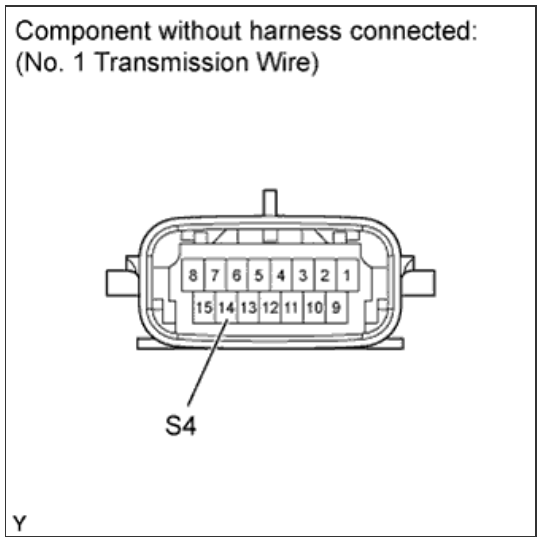
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S4)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
14 (S4) - Body ground	20°C (68°F)	11 to 15 Ω



NG → Go to step 3

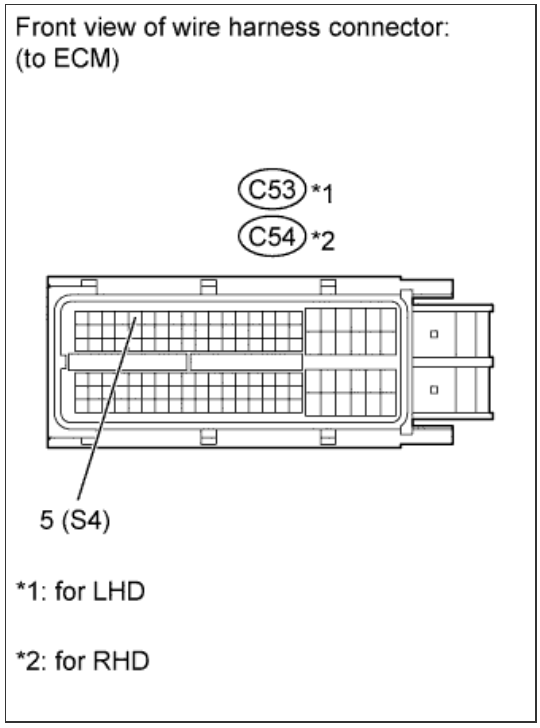
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

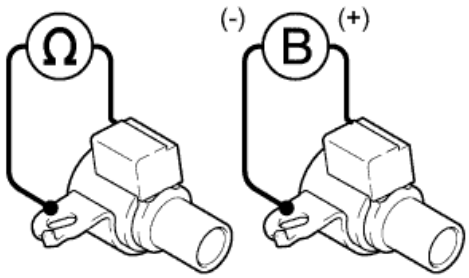
Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Shift Solenoid Valve S4:



P

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

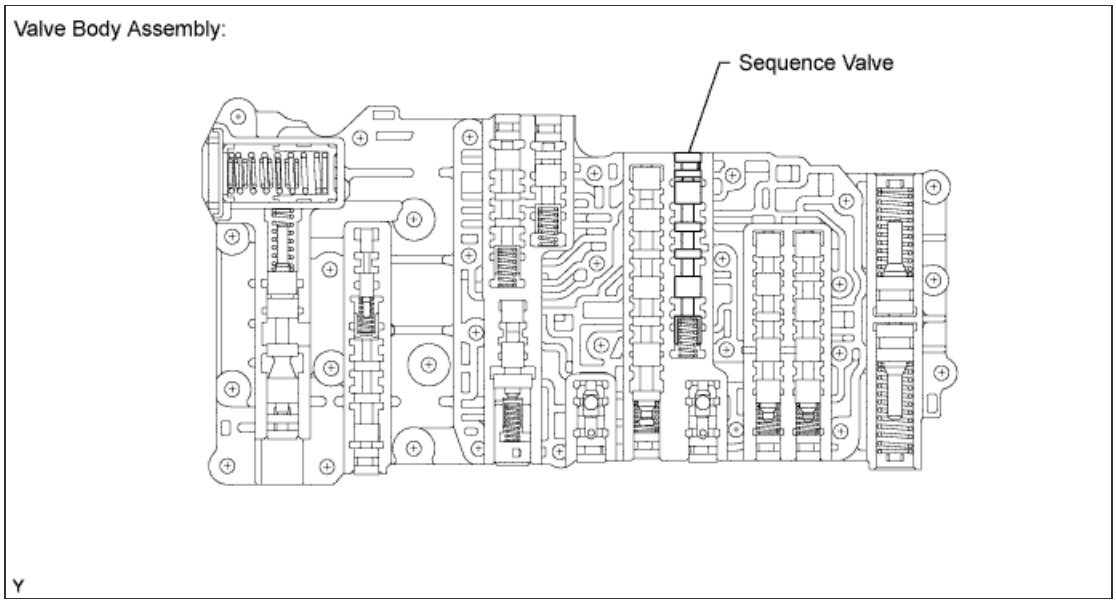
REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0729 Gear 6 Incorrect Ratio

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output speed sensor SP2 and input speed sensor NT to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).



DTC Code	DTC Detection Condition	Trouble Area
P0729	A 6th gear shift malfunction: The ECM determines there is a malfunction when both of the following conditions are met (2-trip detection logic*1, 1-trip detection logic*2). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Valve body is blocked up or stuck (sequence valve) • Shift solenoid valve SLT remains open or closed • Automatic transmission (clutch, brake, gear, etc.)

- *1: w/ OBD
- *2: w/o OBD

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	2nd	3rd	4th	5th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF and switching oil pressure to the valves in the valve body.
The DTC indicates that the sequence valve is locked in the direction the spring stretches and that shifting to 6th gear is impossible.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0729)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0729 is output	A
P0729 and other DTCs are output	B

HINT:

If any other codes besides P0729 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the intelligent tester to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**

- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Gear positions in the event of a shift solenoid valve mechanical problem:**

Intelligent tester gear shift command	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	2nd	3rd	4th	5th	4th

OK:

Gear position changes in accordance with the intelligent tester command.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

3.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

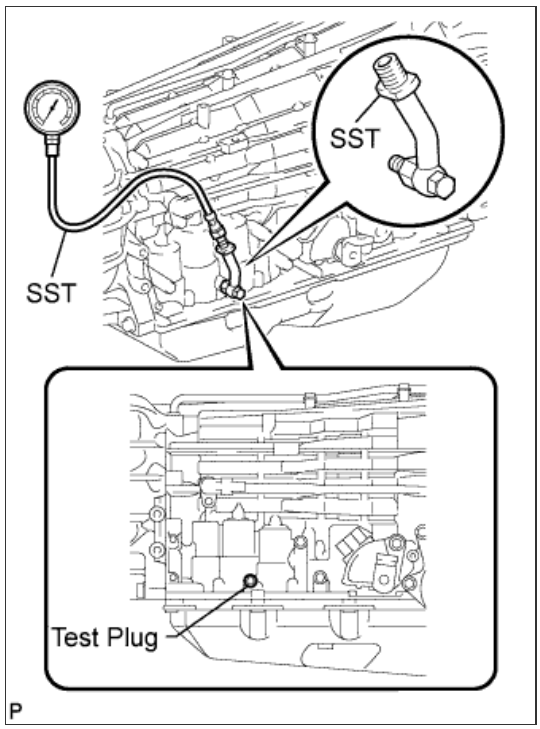
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)**	[Vehicle Condition] • The vehicle is stopped. • The engine

		• **ON: No action (normal operation)**	is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (**Click here**)

OK

4.CLEAR DTC AND PERFORM RUNNING TEST

a. Clear the DTC (Click here).

b. Check for DTC again after conducting the Monitor Drive Pattern (Click here).

OK:

No DTC output.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (**Click here**)

OK

END

DTC P0982 Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)

DTC P0983 Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)

for Preparation Click here

DESCRIPTION

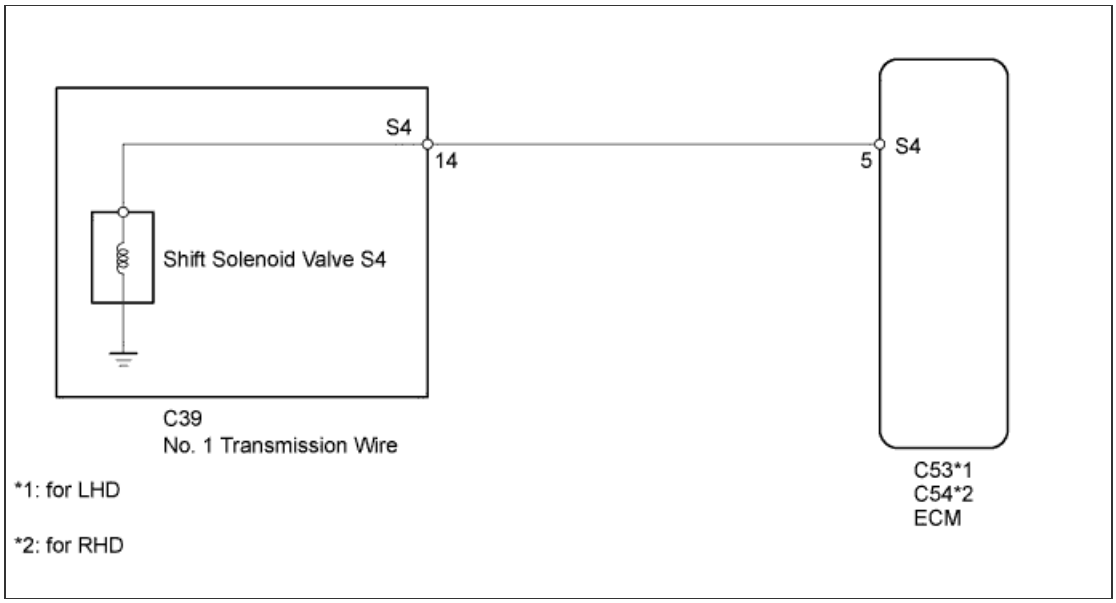
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0982	The ECM detects a short in the shift solenoid valve S4 circuit 2 times when shift solenoid valve S4 is operated (1 trip detection logic).	• Short in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM
P0983	The ECM detects an open in the shift solenoid valve S4 circuit 2 times when shift solenoid valve S4 is not operated (1 trip detection logic).	• Open in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S4 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S4 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S4 circuit.
When shift solenoid valve S4 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S4 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve S4 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON

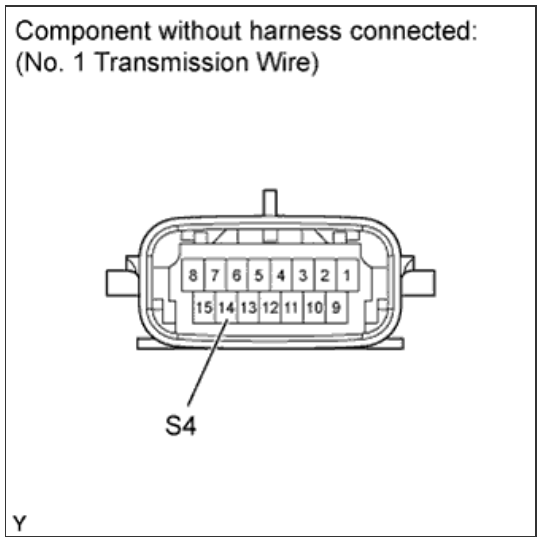
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S4)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
14 (S4) - Body ground	20°C (68°F)	11 to 15 Ω



NG → Go to step 3

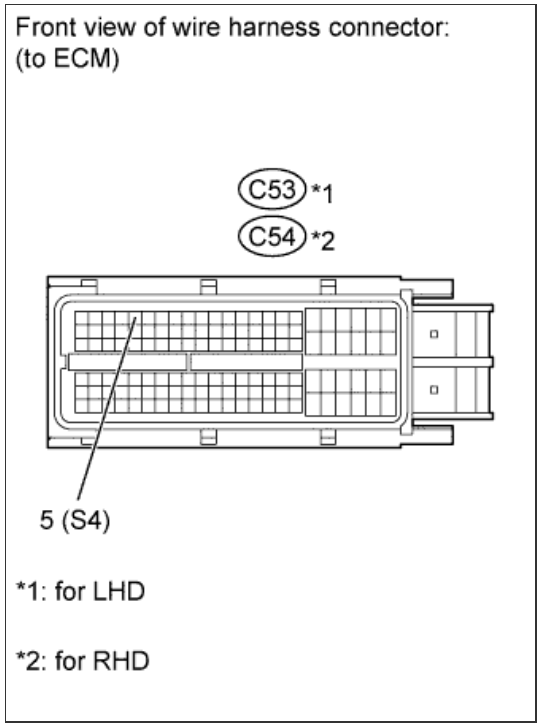
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

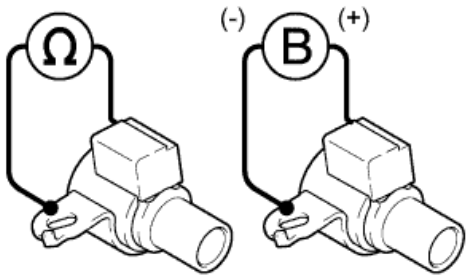
Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Shift Solenoid Valve S4:



P

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0729 Gear 6 Incorrect Ratio

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output speed sensor SP2 and input speed sensor NT to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0729	A 6th gear shift malfunction: The ECM determines there is a malfunction when both of the following conditions are met (2-trip detection logic*1, 1-trip detection logic*2). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Valve body is blocked up or stuck (sequence valve) • Shift solenoid valve SLT remains open or closed • Automatic transmission (clutch, brake, gear, etc.)

- *1: w/ OBD
- *2: w/o OBD

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	2nd	3rd	4th	5th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF and switching oil pressure to the valves in the valve body. The DTC indicates that the sequence valve is locked in the direction the spring stretches and that shifting to 6th gear is impossible.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0729)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0729 is output	A
P0729 and other DTCs are output	B

HINT:

If any other codes besides P0729 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the intelligent tester to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Gear positions in the event of a shift solenoid valve mechanical problem:**

Intelligent tester gear shift command	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	2nd	3rd	4th	5th	4th

OK:

Gear position changes in accordance with the intelligent tester command.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

3.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**

- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

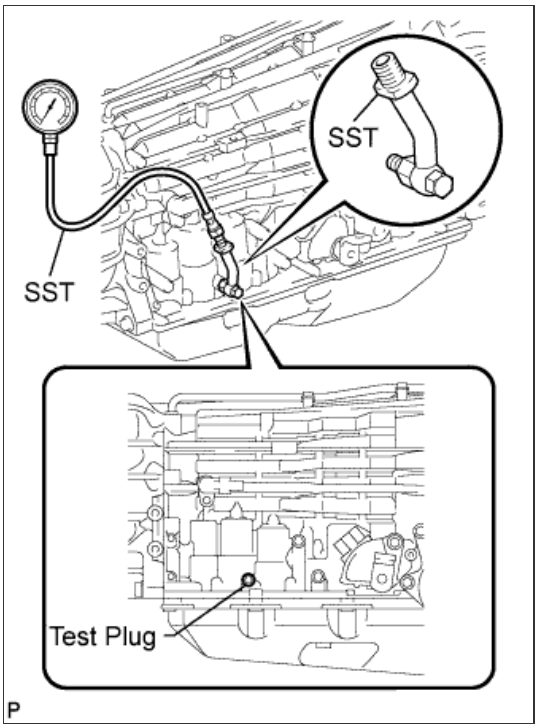
HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)



b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (**Click here**)

OK

4.CLEAR DTC AND PERFORM RUNNING TEST

a. Clear the DTC (Click here).

b. Check for DTC again after conducting the Monitor Drive Pattern (Click here).

OK:

No DTC output.

NG

REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

END

DTC P0982 Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)

DTC P0983 Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)

for Preparation Click here

DESCRIPTION

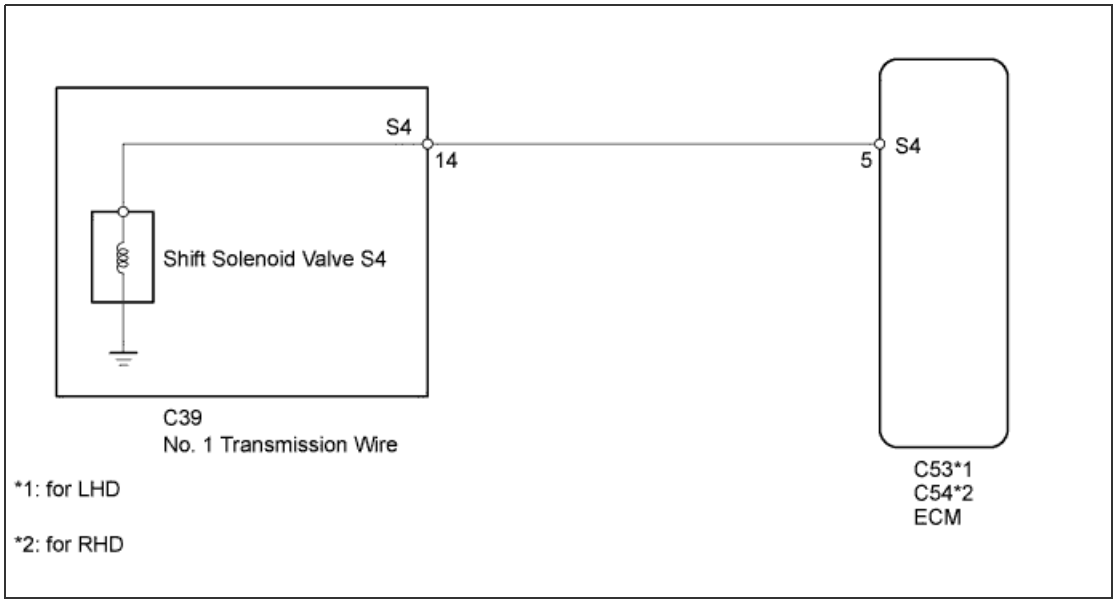
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0982	The ECM detects a short in the shift solenoid valve S4 circuit 2 times when shift solenoid valve S4 is operated (1 trip detection logic).	• Short in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM
P0983	The ECM detects an open in the shift solenoid valve S4 circuit 2 times when shift solenoid valve S4 is not operated (1 trip detection logic).	• Open in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S4 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S4 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S4 circuit.
When shift solenoid valve S4 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S4 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

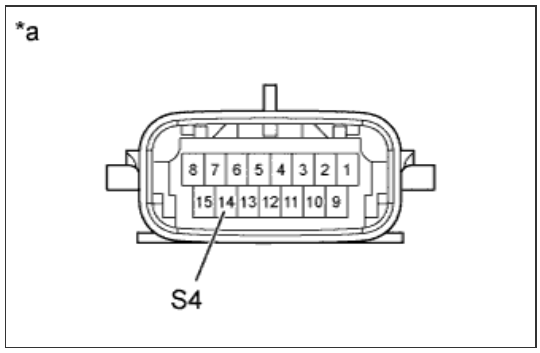
Shift solenoid valve S4 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S4)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
14 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

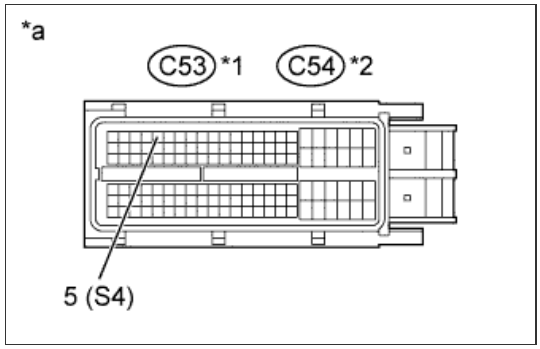
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE ECM (Click here)

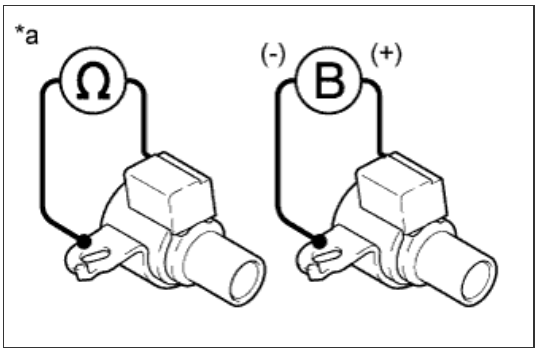
3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0748 Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)

for Preparation Click here

DESCRIPTION

Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0748	The ECM checks for an open or short in the shift solenoid valve SL1 circuit while driving and shifting between 4th and 5th gear (1 trip detection logic). The output signal duty equals 100%. **HINT:** The SL1 output signal duty is less than 100% under normal conditions.	• Open or short in shift solenoid valve SL1 circuit • Shift solenoid valve SL1 • ECM

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

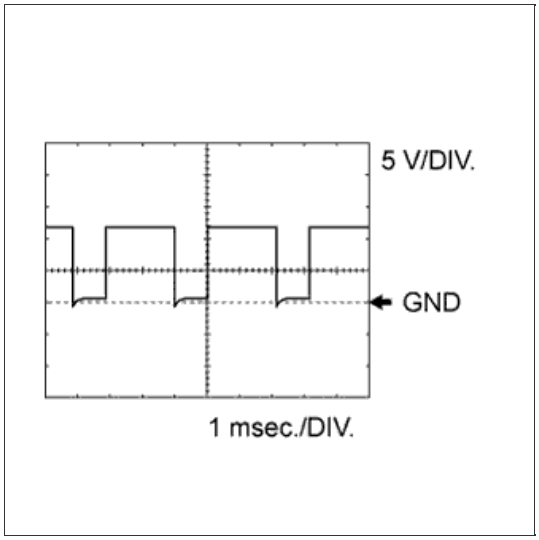
Standard:

for LHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C53-14 (SL1+) - C53-15 (SL1-)	5 V/DIV., 1 msec./DIV.	Engine idling	Refer to illustration

for RHD

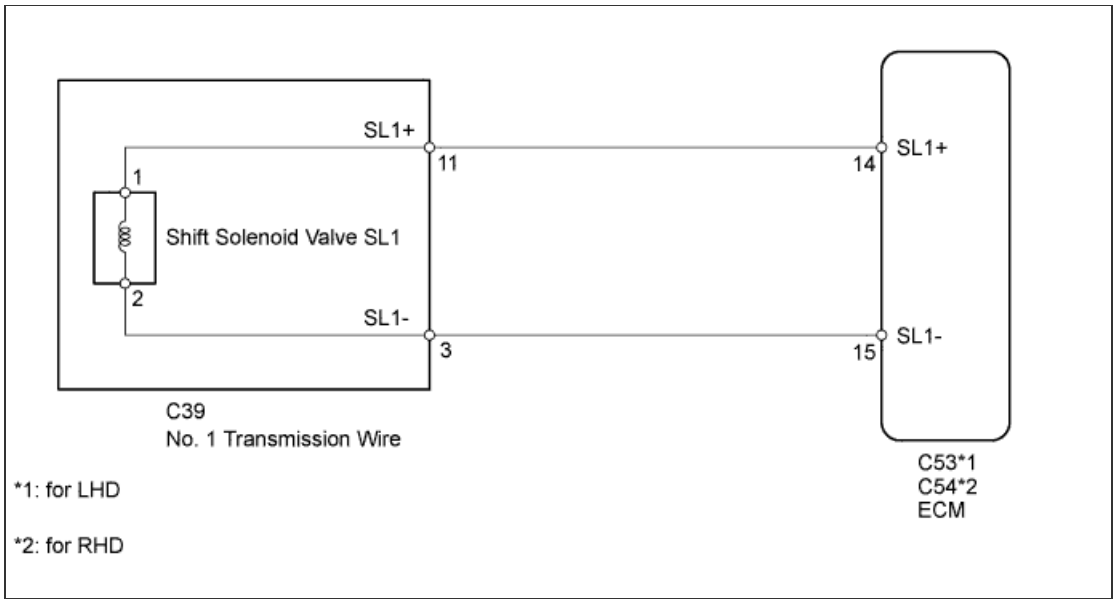
Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-14 (SL1+) - C54-15 (SL1-)	5 V/DIV., 1 msec./DIV.	Engine idling	Refer to illustration



MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL1 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the open or short circuited solenoid.
While driving and shifting between 4th and 5th gears, if the ECM detects an open or short in the shift solenoid valve SL1 circuit, the ECM determines that there is a malfunction (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve SL1 turns ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL1	OFF	OFF	OFF	OFF	ON	ON

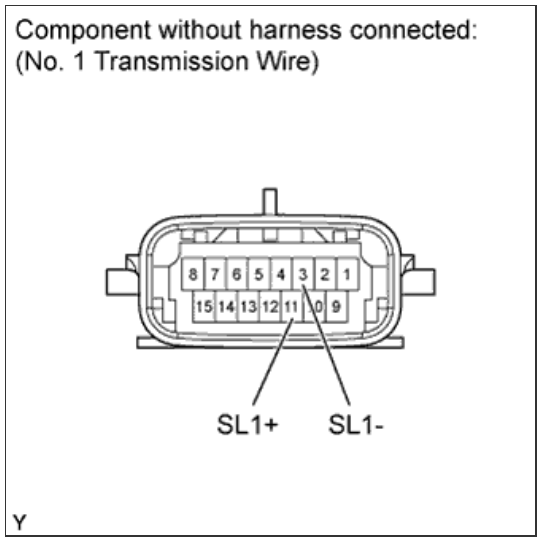
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL1)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
11 (SL1+) - 3 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
11 (SL1+) - Body ground	Always	10 kΩ or higher
3 (SL1-) - Body ground	Always	10 kΩ or higher



NG → Go to step 3

OK

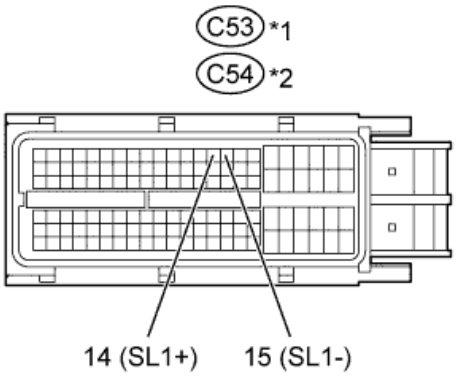
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-14 (SL1+) - C53-15 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
C53-14 (SL1+) - Body ground	Always	10 kΩ or higher
C53-15 (SL1-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-14 (SL1+) - C54-15 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
C54-14 (SL1+) - Body ground	Always	10 kΩ or higher
C54-15 (SL1-) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SL1

a. Remove shift solenoid valve SL1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

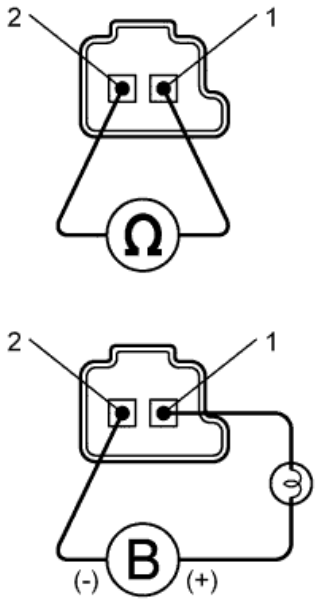
c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition

• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SL1)



NG → REPLACE SHIFT SOLENOID VALVE SL1 (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0982 Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)

DTC P0983 Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)

for Preparation Click here

DESCRIPTION

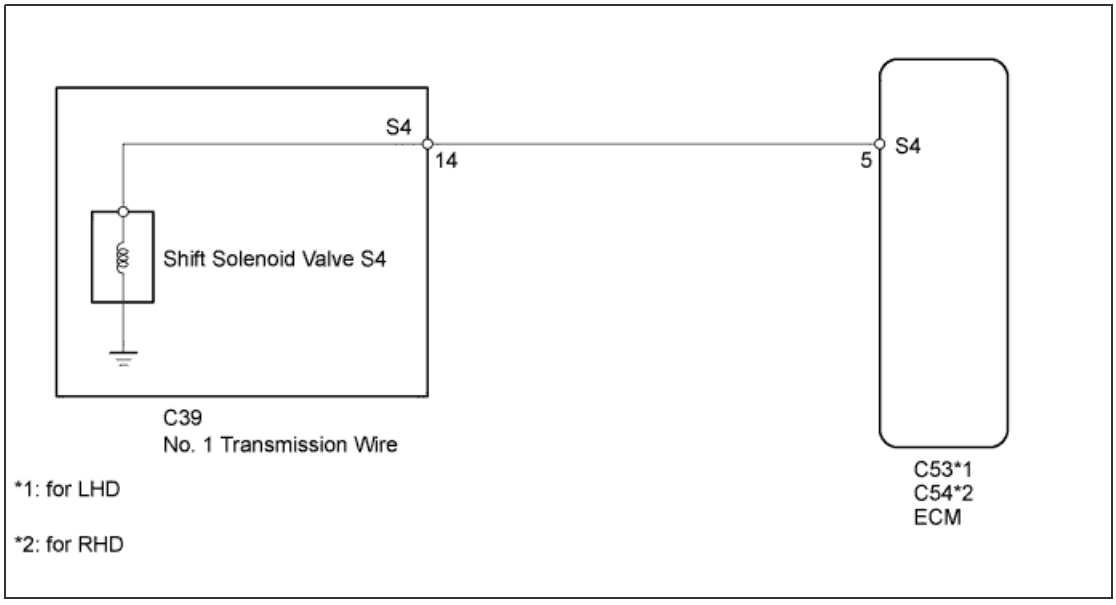
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0982	The ECM detects a short in the shift solenoid valve S4 circuit 2 times when shift solenoid valve S4 is operated (1 trip detection logic).	• Short in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM
P0983	The ECM detects an open in the shift solenoid valve S4 circuit 2 times when shift solenoid valve S4 is not operated (1 trip detection logic).	• Open in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S4 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve S4 is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S4 circuit.
When shift solenoid valve S4 is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve S4 circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

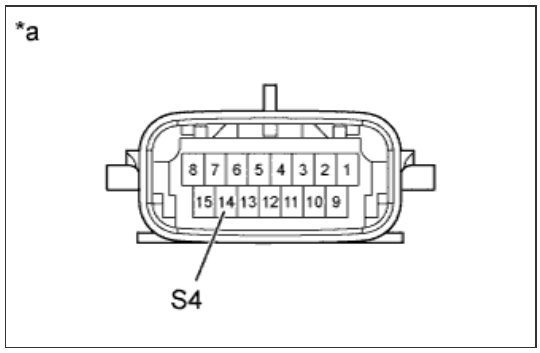
Shift solenoid valve S4 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE S4)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
14 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

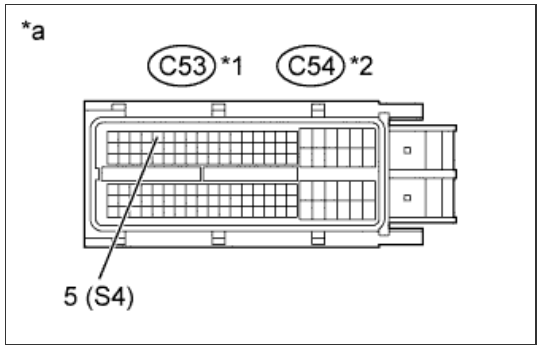
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-5 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE ECM (Click here)

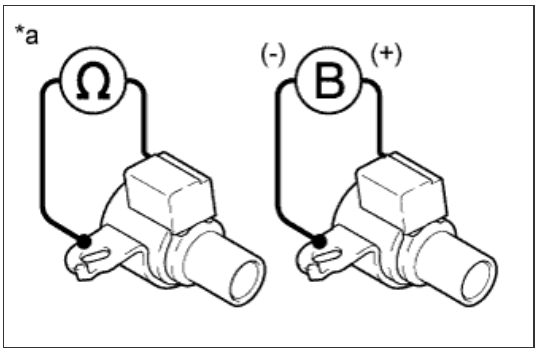
3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0748 Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)

for Preparation Click here

DESCRIPTION

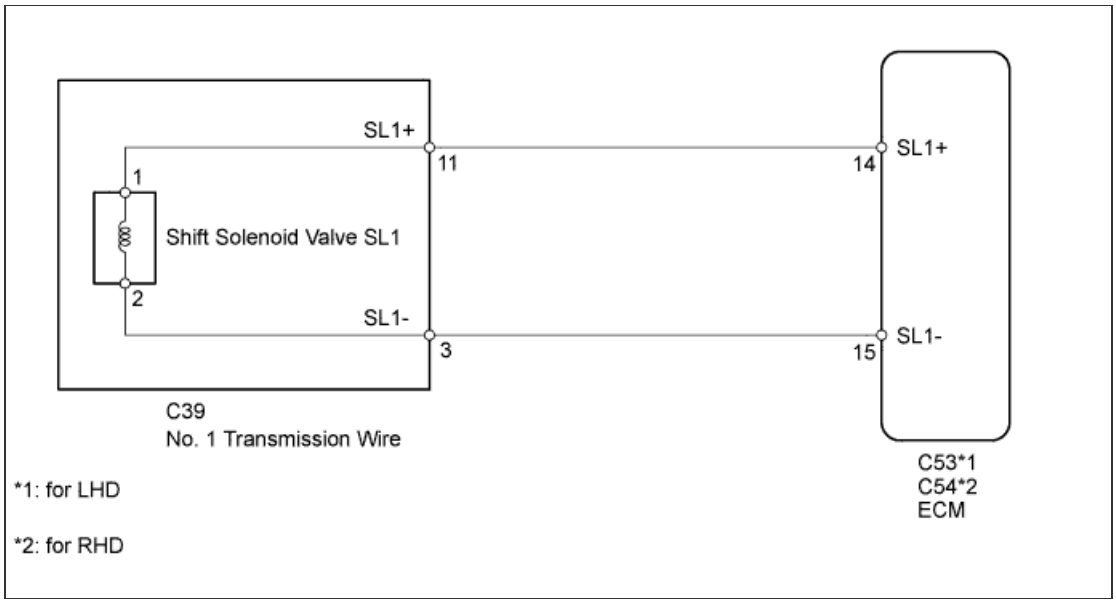
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0748	The ECM checks for an open or short in the shift solenoid valve SL1 circuit while driving and shifting between 4th and 5th gear (1 trip detection logic). The output signal duty equals 100%. **HINT:** The SL1 output signal duty is less than 100% under normal conditions.	• Open or short in shift solenoid valve SL1 circuit • Shift solenoid valve SL1 • ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL1 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the open or short circuited solenoid.
While driving and shifting between 4th and 5th gears, if the ECM detects an open or short in the shift solenoid valve SL1 circuit, the ECM determines that there is a malfunction (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

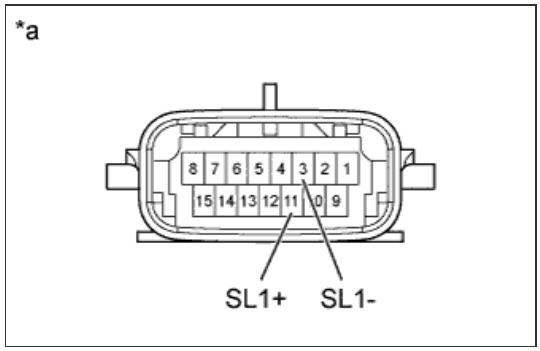
Shift solenoid valve SL1 turns ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL1	OFF	OFF	OFF	OFF	ON	ON

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL1)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
11 (SL1+) - 3 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
11 (SL1+) - Body ground	Always	10 kΩ or higher
3 (SL1-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

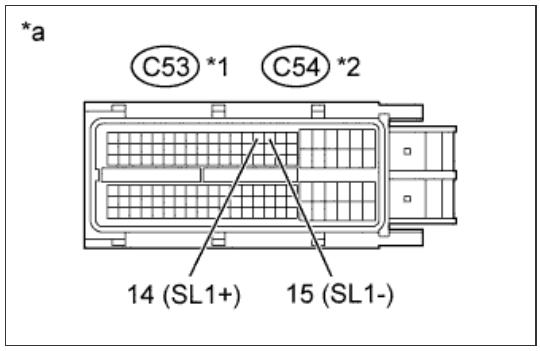
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-14 (SL1+) - C53-15 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
C53-14 (SL1+) - Body ground	Always	10 kΩ or higher
C53-15 (SL1-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-14 (SL1+) - C54-15 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
C54-14 (SL1+) - Body ground	Always	10 kΩ or higher
C54-15 (SL1-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SL1

a. Remove shift solenoid valve SL1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

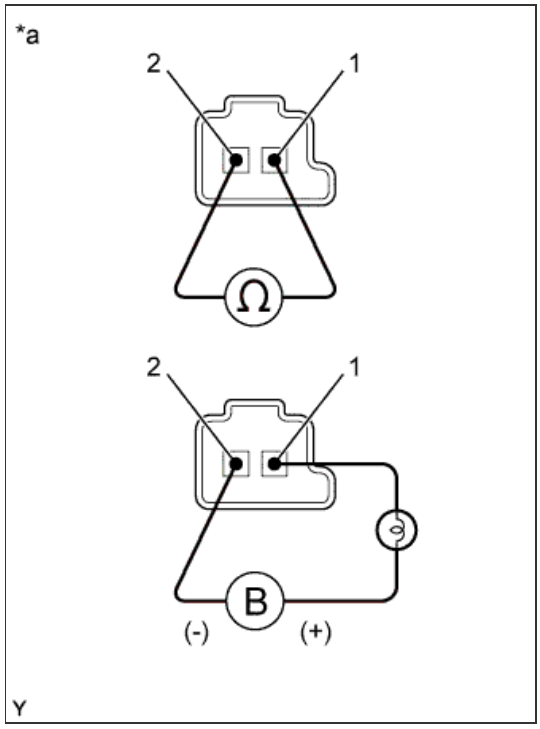
c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL1)



NG → REPLACE SHIFT SOLENOID VALVE SL1 (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0985 Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)

DTC P0986 Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)

for Preparation Click here

DESCRIPTION

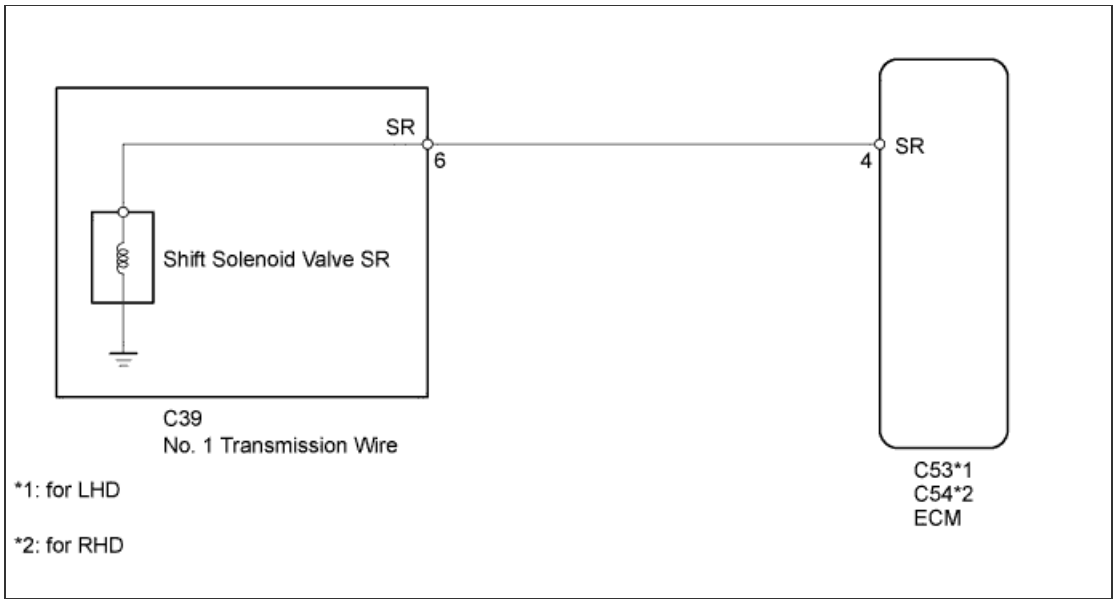
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0985	The ECM detects a short in the shift solenoid valve SR circuit 2 times when shift solenoid valve SR is operated (1 trip detection logic).	• Short in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM
P0986	The ECM detects an open in the shift solenoid valve SR circuit 2 times when shift solenoid valve SR is not operated (1 trip detection logic).	• Open in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve SR circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve SR is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve SR circuit.
When shift solenoid valve SR is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve SR circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve SR is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SR	ON	ON	ON	ON	OFF	OFF

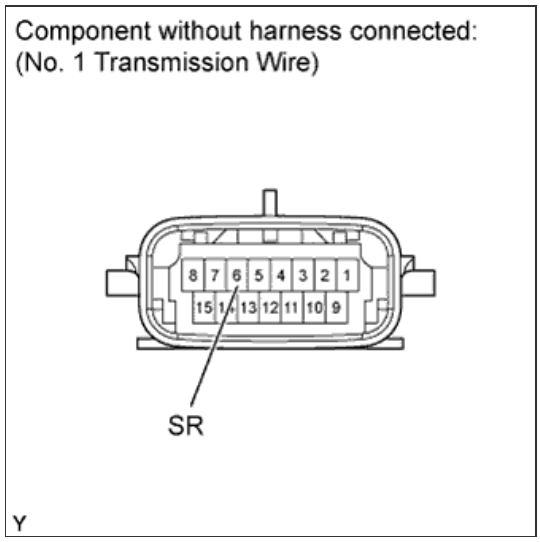
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SR)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
6 (SR) - Body ground	20°C (68°F)	11 to 15 Ω



NG → Go to step 3

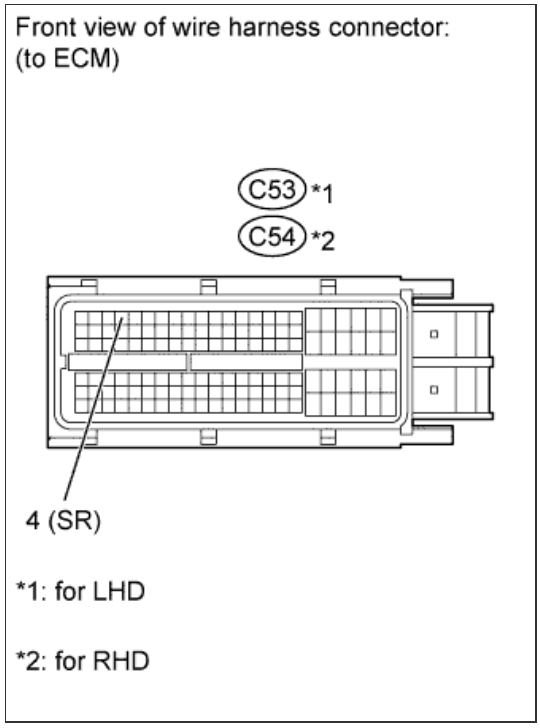
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SR

a. Remove shift solenoid valve SR.

b. Measure the resistance according to the value(s) in the table below.

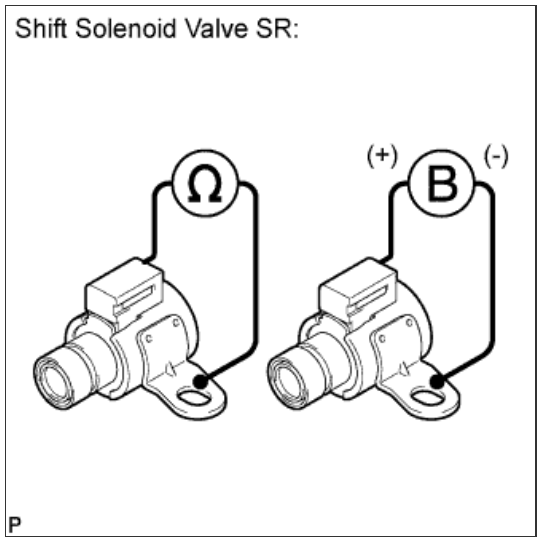
Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve SR connector terminal - Shift solenoid valve SR body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve SR connector • Battery negative (-) → Shift solenoid valve SR body	Valve moves and makes an operating noise



NG → REPLACE SHIFT SOLENOID VALVE SR (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0751 Shift Solenoid "A" Performance (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0751	A shift solenoid valve S1 stuck ON malfunction*1: The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic*3, 1-trip detection logic*4). (a) When the ECM directs the transmission to switch to 1st gear, the actual gear is shifted to 2nd. (b) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th.	• Shift solenoid valve S1 remains open • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0751	A shift solenoid valve S1 stuck OFF malfunction*2: The ECM determines there is a malfunction when conditions (a) and (b), or (a) and (c) are met (2-trip detection logic*3, 1-trip detection logic*4). (a) When the ECM directs the transmission to switch to 2nd gear, the actual gear is shifted to 1st. (b) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th. (c) When the ECM directs the transmission to switch to 6th gear, the engine overruns (clutch slips).	• Shift solenoid valve S1 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked • No. 2 brake malfunction (Driving is difficult.) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under shift solenoid valve S1 stuck ON malfunction	2nd	2nd	3rd	4th	5th	6th
*2: Actual gear position under shift solenoid valve S1 stuck OFF malfunction	1st	1st	3rd	4th	5th	N*

N*: Neutral

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode when shift solenoid valve S1 stuck ON malfunction	2nd	2nd	3rd	4th	5th	6th
*2: Actual gear position under fail-safe mode when shift solenoid valve	1st*	1st*	3rd	3rd	3rd	3rd

S1 stuck OFF malfunction						

1st*: Under engine braking, downshifting to 1st or 2nd gear is prohibited.

- ***3: w/ OBD**
- ***4: w/o OBD**

MONITOR DESCRIPTION

This DTC indicates a "stuck ON malfunction" or "stuck OFF malfunction" of shift solenoid valve S1.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve S1 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0751)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0751 is output	A
P0751 and other DTCs are output	B

HINT:

If any other codes besides P0751 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST
09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

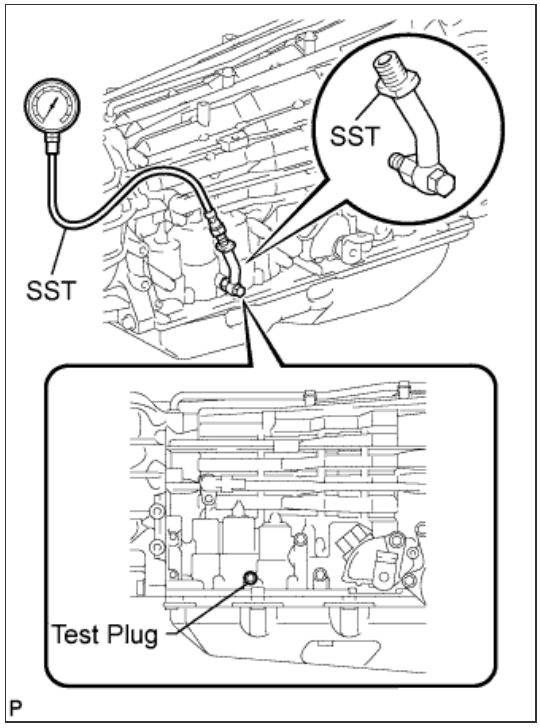
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic

transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

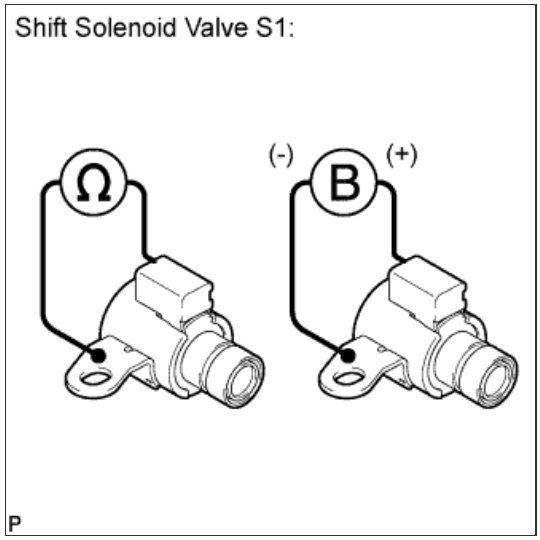
3.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

4.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0985 Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)

DTC P0986 Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)

for Preparation Click here

DESCRIPTION

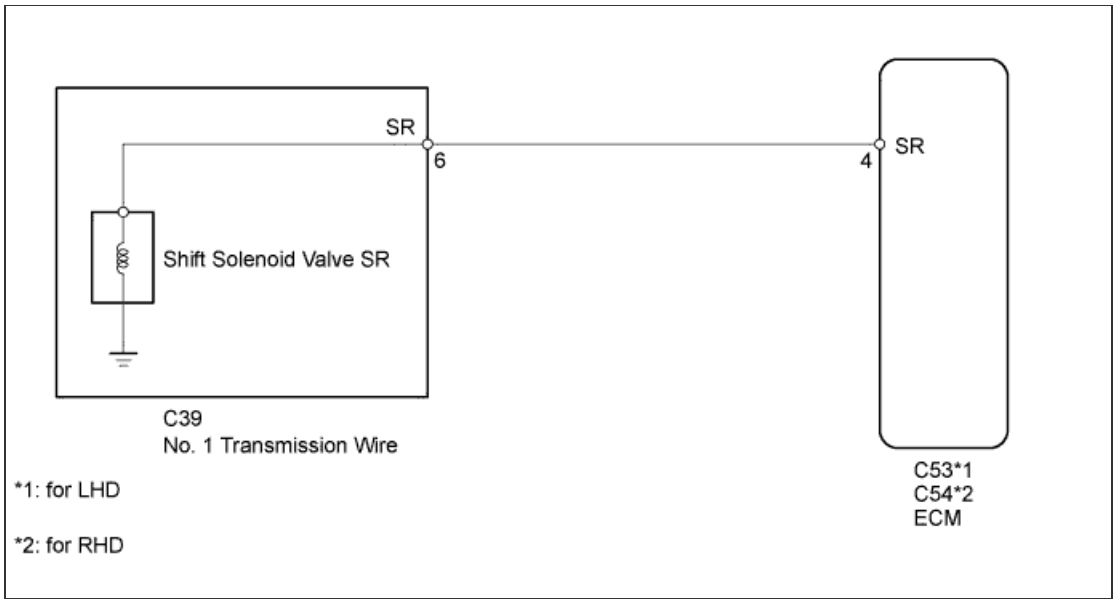
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0985	The ECM detects a short in the shift solenoid valve SR circuit 2 times when shift solenoid valve SR is operated (1 trip detection logic).	• Short in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM
P0986	The ECM detects an open in the shift solenoid valve SR circuit 2 times when shift solenoid valve SR is not operated (1 trip detection logic).	• Open in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve SR circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve SR is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve SR circuit.
When shift solenoid valve SR is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve SR circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve SR is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SR	ON	ON	ON	ON	OFF	OFF

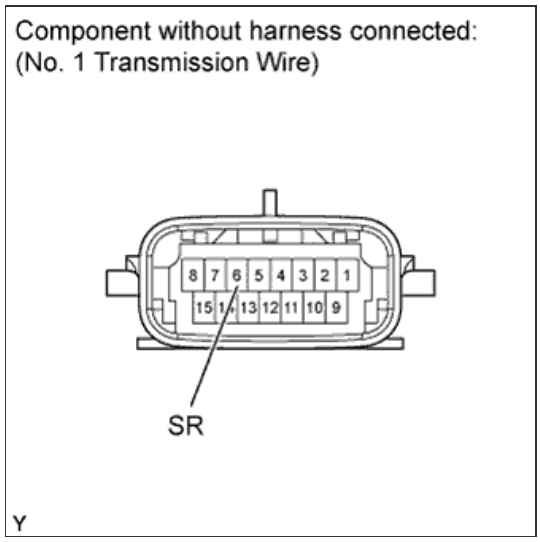
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SR)

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
6 (SR) - Body ground	20°C (68°F)	11 to 15 Ω



NG → Go to step 3

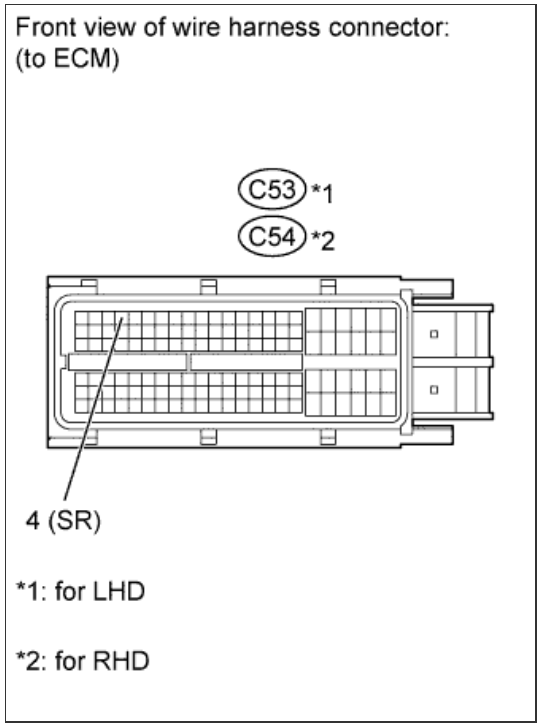
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SR

a. Remove shift solenoid valve SR.

b. Measure the resistance according to the value(s) in the table below.

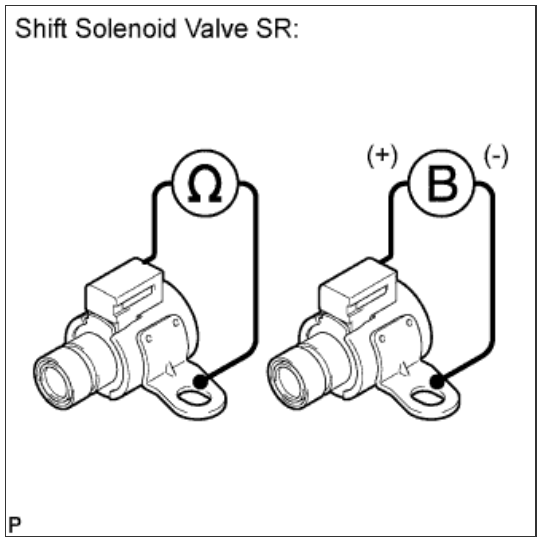
Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve SR connector terminal - Shift solenoid valve SR body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve SR connector • Battery negative (-) → Shift solenoid valve SR body	Valve moves and makes an operating noise



NG → REPLACE SHIFT SOLENOID VALVE SR (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0751 Shift Solenoid "A" Performance (Shift Solenoid Valve S1)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0751	A shift solenoid valve S1 stuck ON malfunction*1: The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic*3, 1-trip detection logic*4). (a) When the ECM directs the transmission to switch to 1st gear, the actual gear is shifted to 2nd. (b) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th.	• Shift solenoid valve S1 remains open • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0751	A shift solenoid valve S1 stuck OFF malfunction*2: The ECM determines there is a malfunction when conditions (a) and (b), or (a) and (c) are met (2-trip detection logic*3, 1-trip detection logic*4). (a) When the ECM directs the transmission to switch to 2nd gear, the actual gear is shifted to 1st. (b) When the ECM directs the transmission to switch to 5th gear, the actual gear is also shifted to 5th. (c) When the ECM directs the transmission to switch to 6th gear, the engine overruns (clutch slips).	• Shift solenoid valve S1 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked • No. 2 brake malfunction (Driving is difficult.) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under shift solenoid valve S1 stuck ON malfunction	2nd	2nd	3rd	4th	5th	6th
*2: Actual gear position under shift solenoid valve S1 stuck OFF malfunction	1st	1st	3rd	4th	5th	N*

N*: Neutral

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode when shift solenoid valve S1 stuck ON malfunction	2nd	2nd	3rd	4th	5th	6th
*2: Actual gear position under fail-safe mode when shift solenoid valve S1 stuck OFF malfunction	1st*	1st*	3rd	3rd	3rd	3rd

1st*: Under engine braking, downshifting to 1st or 2nd gear is prohibited.

- ***3: w/ OBD**
- ***4: w/o OBD**

MONITOR DESCRIPTION

This DTC indicates a "stuck ON malfunction" or "stuck OFF malfunction" of shift solenoid valve S1.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve S1 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S1	OFF	ON	ON	ON	ON	ON

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0751)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0751 is output	A
P0751 and other DTCs are output	B

HINT:

If any other codes besides P0751 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST
09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

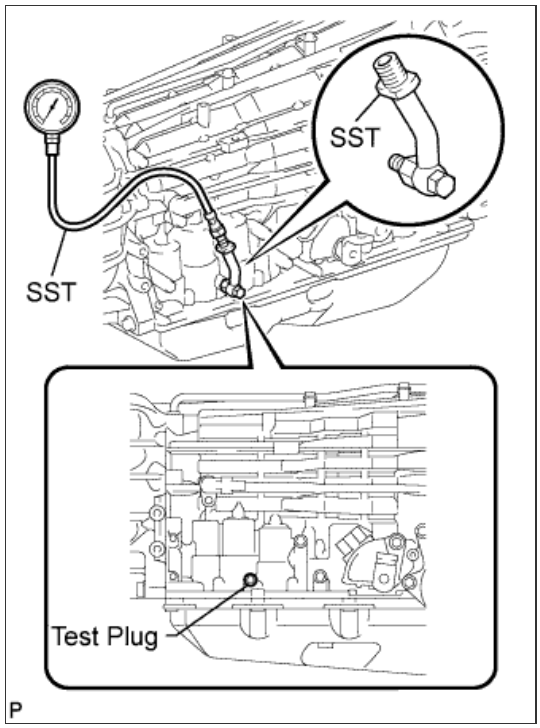
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:
The line pressure changes as specified when performing the Active Test.

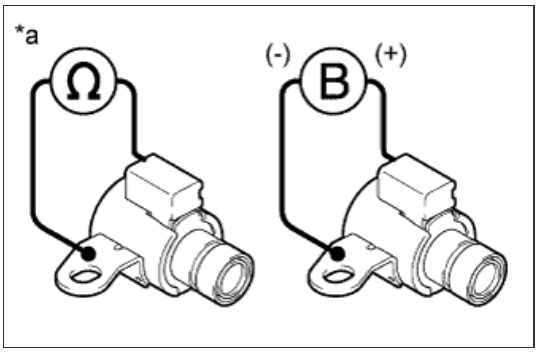
NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

3.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S1)

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

4.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0985 Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)

DTC P0986 Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)

for Preparation Click here

DESCRIPTION

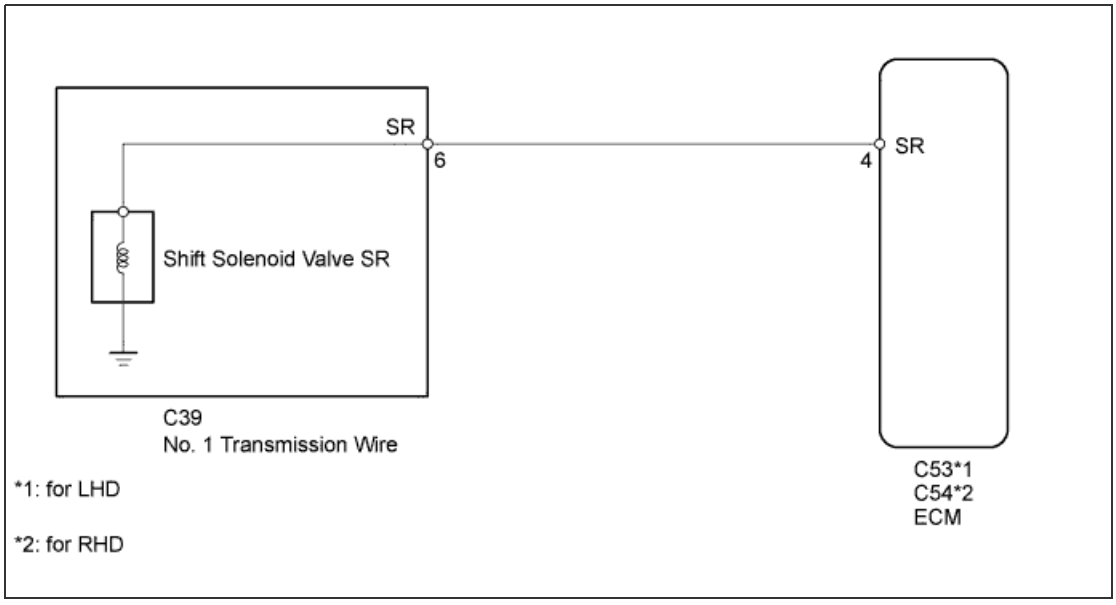
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0985	The ECM detects a short in the shift solenoid valve SR circuit 2 times when shift solenoid valve SR is operated (1 trip detection logic).	• Short in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM
P0986	The ECM detects an open in the shift solenoid valve SR circuit 2 times when shift solenoid valve SR is not operated (1 trip detection logic).	• Open in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve SR circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve SR is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve SR circuit.
When shift solenoid valve SR is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve SR circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

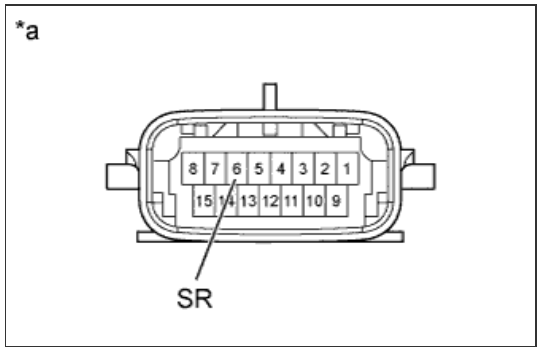
Shift solenoid valve SR is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SR	ON	ON	ON	ON	OFF	OFF

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
6 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

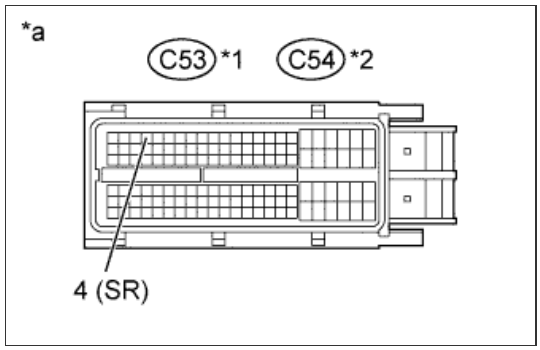
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

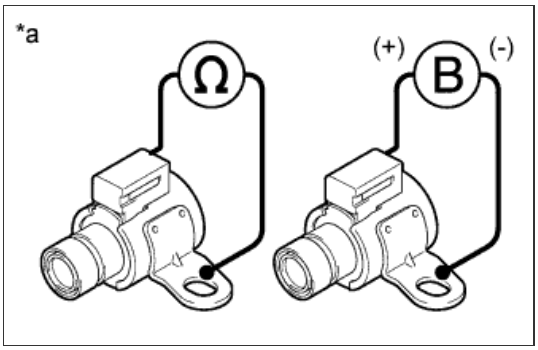
OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SR

a. Remove shift solenoid valve SR.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve SR connector terminal - Shift solenoid valve SR body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve SR connector • Battery negative (-) → Shift solenoid valve SR body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SR)

NG → REPLACE SHIFT SOLENOID VALVE SR (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0756 Shift Solenoid "B" Performance (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0756	A shift solenoid valve S2 stuck ON malfunction*1: Shifting to 3rd and 5th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 6th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 6th.	• Shift solenoid valve S2 remains open • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0756	A shift solenoid valve S2 stuck OFF malfunction*2: The vehicle starts in 3rd gear and shifting to 6th gear is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic). (a) When the ECM directs the transmission to switch to 1st gear, the actual gear is shifted to 3rd. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 5th.	• Shift solenoid valve S2 remains closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

HINT:

Gear positions in the event of a shift solenoid valve mechanical problem:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under shift solenoid valve S2 stuck ON malfunction	1st	2nd	2nd	4th	6th	6th
*2: Actual gear position under shift solenoid valve S2 stuck OFF malfunction	3rd	3rd	3rd	4th	5th	5th

MONITOR DESCRIPTION

This DTC indicates a stuck ON malfunction or stuck OFF malfunction of shift solenoid valve S2.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve S2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0756)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0756 is output	A
P0756 and other DTCs are output	B

HINT:

If any other codes besides P0756 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

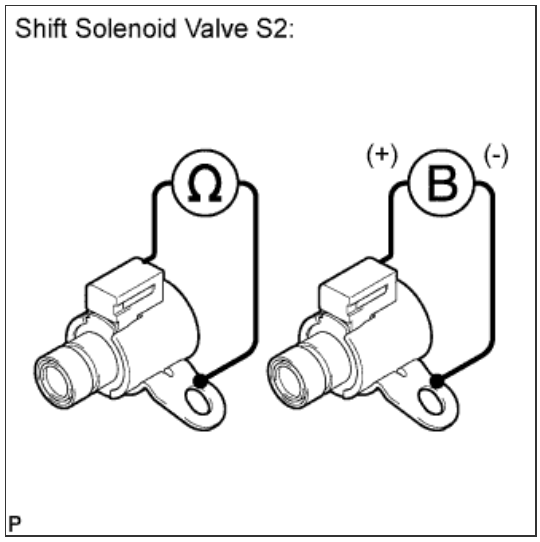
2.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

3.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0985 Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)

DTC P0986 Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)

for Preparation Click here

DESCRIPTION

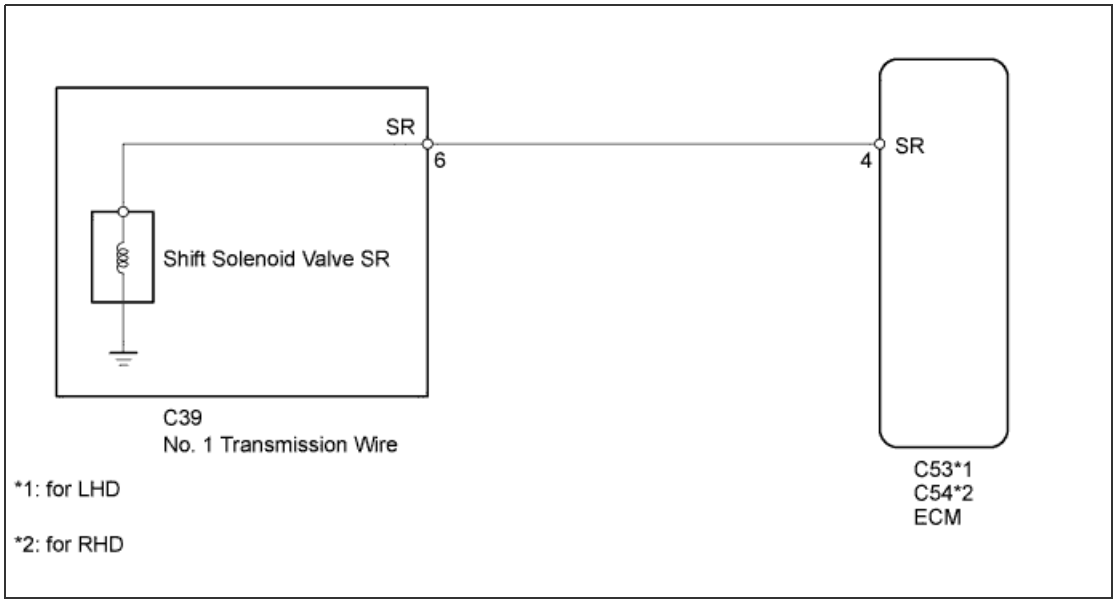
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely. Also, the ECM stops sending current to the open or short circuited shift solenoid valve (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0985	The ECM detects a short in the shift solenoid valve SR circuit 2 times when shift solenoid valve SR is operated (1 trip detection logic).	• Short in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM
P0986	The ECM detects an open in the shift solenoid valve SR circuit 2 times when shift solenoid valve SR is not operated (1 trip detection logic).	• Open in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve SR circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. When shift solenoid valve SR is ON, if its resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve SR circuit.
When shift solenoid valve SR is OFF, if its resistance is 100 kΩ or higher, the ECM determines there is an open in the shift solenoid valve SR circuit (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

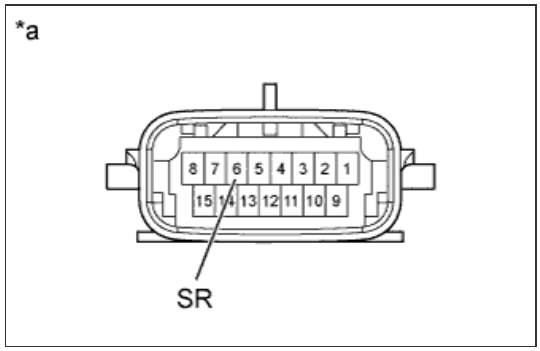
Shift solenoid valve SR is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SR	ON	ON	ON	ON	OFF	OFF

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
6 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

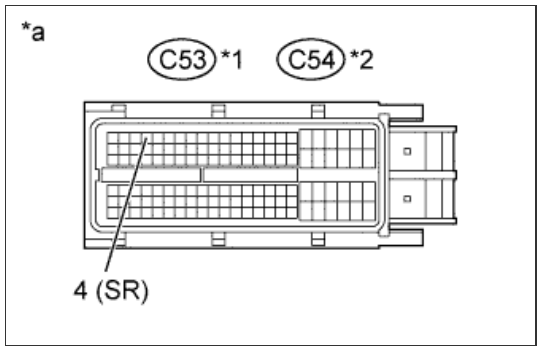
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

for RHD

Tester Connection	Condition	Specified Condition
C54-4 (SR) - Body ground	20°C (68°F)	11 to 15 Ω

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

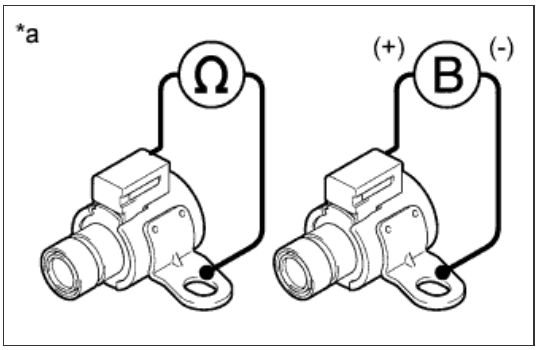
OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SR

a. Remove shift solenoid valve SR.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve SR connector terminal - Shift solenoid valve SR body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve SR connector • Battery negative (-) → Shift solenoid valve SR body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SR)

NG → REPLACE SHIFT SOLENOID VALVE SR (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0756 Shift Solenoid "B" Performance (Shift Solenoid Valve S2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0756	A shift solenoid valve S2 stuck ON malfunction*1: Shifting to 3rd and 5th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 6th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 6th.	• Shift solenoid valve S2 remains open • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0756	A shift solenoid valve S2 stuck OFF malfunction*2: The vehicle starts in 3rd gear and shifting to 6th gear is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic). (a) When the ECM directs the transmission to switch to 1st gear, the actual gear is shifted to 3rd. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 5th.	• Shift solenoid valve S2 remains closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

HINT:

Gear positions in the event of a shift solenoid valve mechanical problem:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under shift solenoid valve S2 stuck ON malfunction	1st	2nd	2nd	4th	6th	6th
*2: Actual gear position under shift solenoid valve S2 stuck OFF malfunction	3rd	3rd	3rd	4th	5th	5th

MONITOR DESCRIPTION

This DTC indicates a stuck ON malfunction or stuck OFF malfunction of shift solenoid valve S2.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve S2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S2	ON	ON	OFF	OFF	OFF	ON

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0756)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0756 is output	A
P0756 and other DTCs are output	B

HINT:

If any other codes besides P0756 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.INSPECT SHIFT SOLENOID VALVE S2

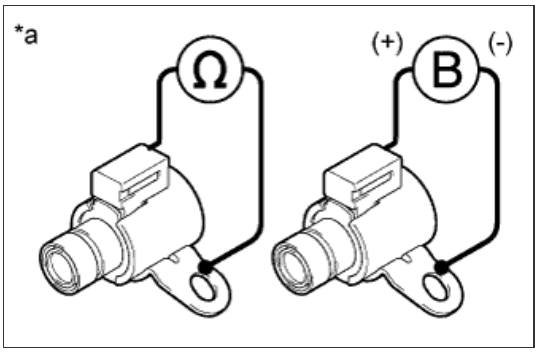
a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift	20°C (68°F)	11 to 15 Ω

solenoid valve S2 body		



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S2)

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

3.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2716 Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)

for Preparation Click here

DESCRIPTION

Refer to DTC P0894 (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P2716	Conditions (a) or (b) below are detected for 1 sec. or more (1 trip detection logic). (a) Shift solenoid valve SLT - terminal: 0 V. (b) Shift solenoid valve SLT - terminal: 12 V.	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

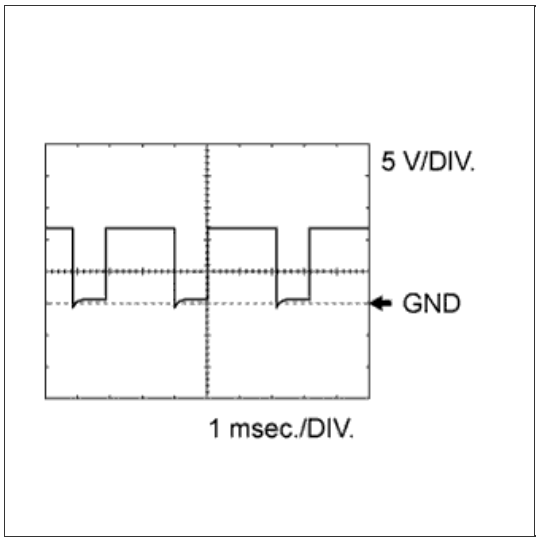
Standard:

for LHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C53-9 (SLT+) - C53-8 (SLT-)	5 V/DIV., 1 msec./DIV.	Engine idling	Refer to illustration

for RHD

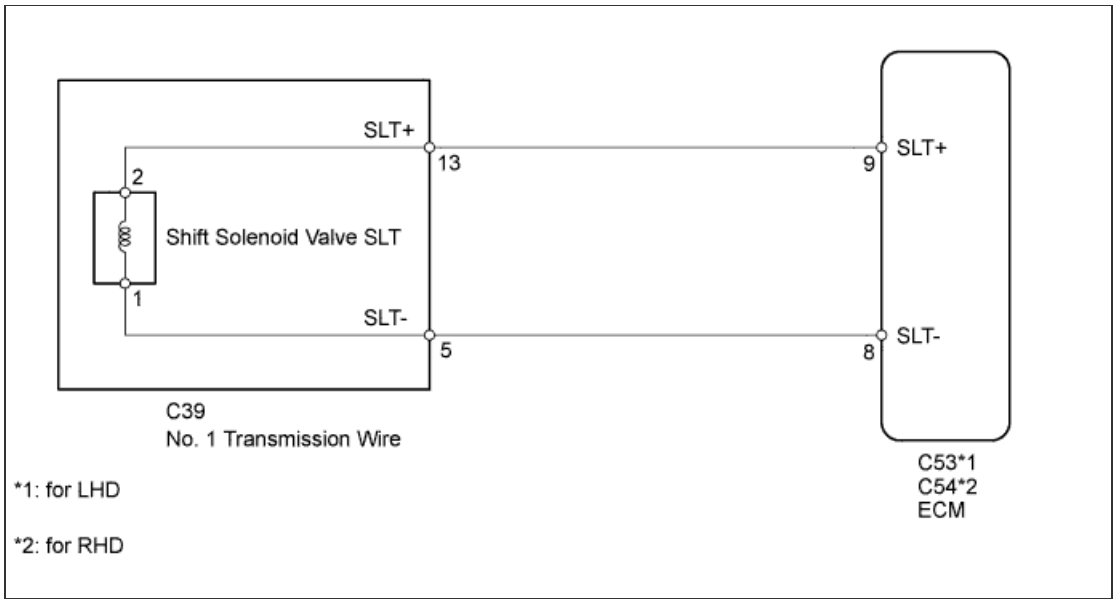
Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-9 (SLT+) - C54-8 (SLT-)	5 V/DIV., 1 msec./DIV.	Engine idling	Refer to illustration



MONITOR DESCRIPTION

When an open or short in the shift solenoid valve SLT circuit is detected, the ECM interprets this as a fault. The ECM will turn on the MIL and store the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLT)

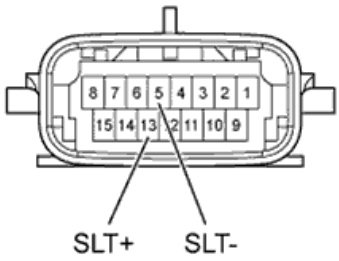
a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
13 (SLT+) - 5 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
13 (SLT+) - Body ground	Always	10 kΩ or higher
5 (SLT-) - Body ground	Always	10 kΩ or higher

Component without harness connected:
(No. 1 Transmission Wire)



Y

NG → Go to step 3

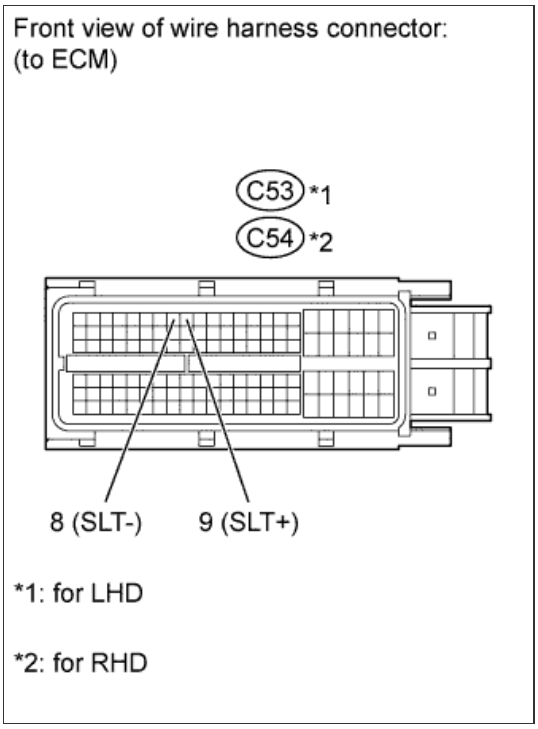
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-9 (SLT+) - C53-8 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
C53-9 (SLT+) - Body ground	Always	10 kΩ or higher
C53-8 (SLT-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-9 (SLT+) - C54-8 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
C54-9 (SLT+) - Body ground	Always	10 kΩ or higher
C54-8 (SLT-) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

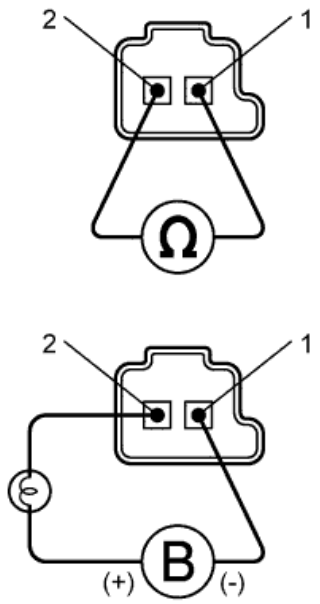
c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition

• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SLT)



NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK → REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0761 Shift Solenoid "C" Performance (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0761	A shift solenoid valve S3 stuck ON malfunction*1: When the ECM directs the transmission to switch to 5th or 6th gear, the engine overruns (clutch slips). The ECM determines there is a malfunction when either of the following conditions is met (2-trip detection logic*3, 1-trip detection logic*4). (a) When the ECM directs the transmission to switch to 4th gear, the actual gear is shifted to 3rd. (b) When the ECM directs the transmission to switch to 5th gear, the engine overruns (clutch slips).	• Shift solenoid valve S3 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0761	A shift solenoid valve S3 stuck OFF malfunction*2: Shifting to 1st, 2nd, and 3rd gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic*3, 1-trip detection logic*4). (a) When the ECM directs the transmission to switch to 2nd gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 6th.	• Shift solenoid valve S3 remains closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under shift solenoid valve S3 stuck ON malfunction	1st	2nd	3rd	3rd	N*	N*
*2: Actual gear position under shift solenoid valve S3 stuck OFF malfunction	3rd	4th	4th	4th	5th	6th

N*: Neutral

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode when shift solenoid valve S3 stuck ON malfunction	1st	2nd	3rd	3rd	3rd	3rd
*2: Actual gear position under fail-safe mode when shift solenoid valve	3rd	4th	4th	4th	5th	6th

S3 stuck OFF malfunction						

- ***3: w/ OBD**
- ***4: w/o OBD**

MONITOR DESCRIPTION

This DTC indicates a "stuck ON malfunction" or "stuck OFF malfunction" of shift solenoid valve S3.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0761)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0761 is output	A
P0761 and other DTCs are output	B

HINT:

If any other codes besides P0761 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST
09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

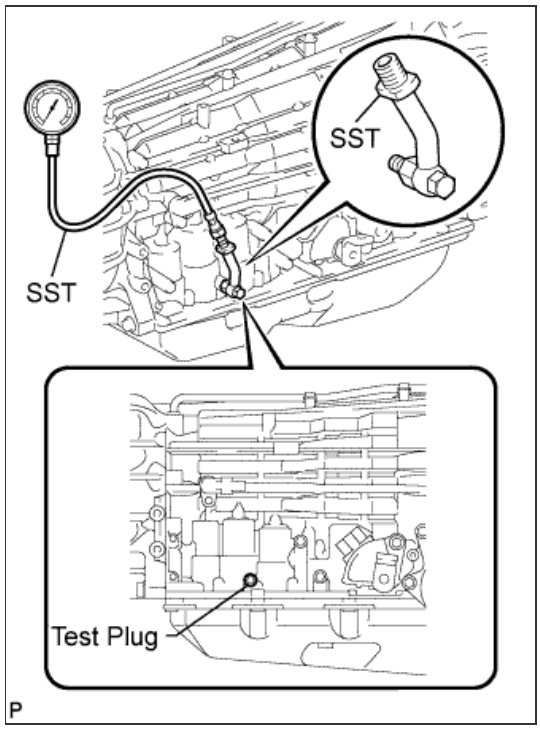
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test

are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

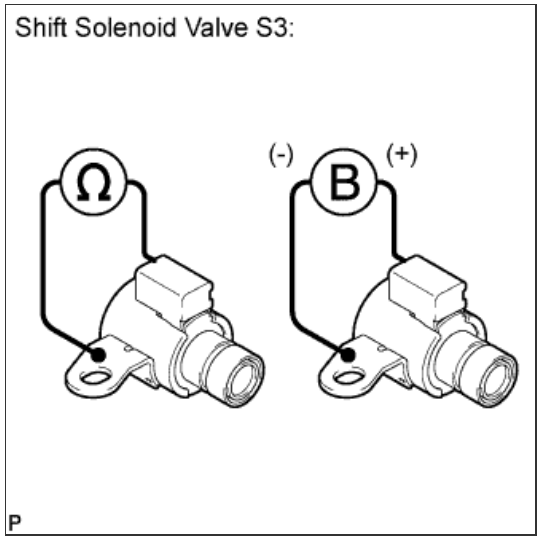
Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Shift Solenoid Valve S3:



NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

4.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2716 Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)

for Preparation Click here

DESCRIPTION

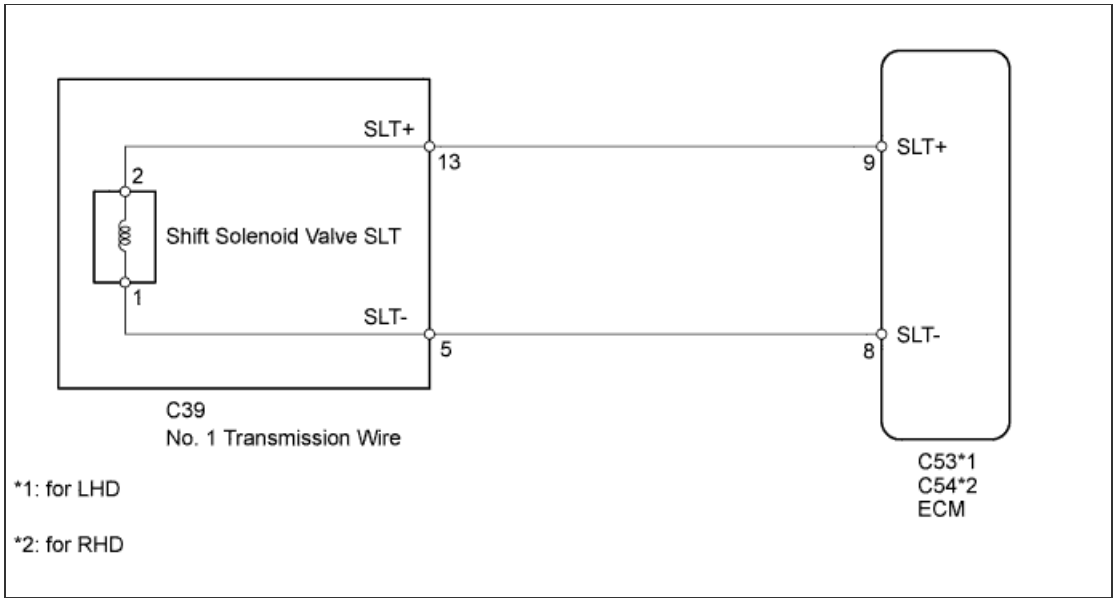
Refer to DTC P0894 (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P2716	Open or short is detected in shift solenoid valve SLT circuit for 1 second or more while driving (1 trip detection logic)	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM

MONITOR DESCRIPTION

When an open or short in the shift solenoid valve SLT circuit is detected, the ECM interprets this as a fault. The ECM will turn on the MIL and store the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

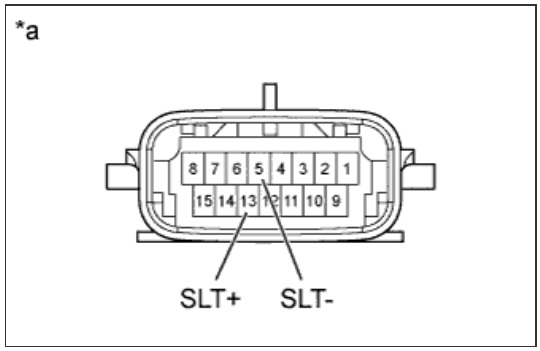
1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLT)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
13 (SLT+) - 5 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
13 (SLT+) - Body ground	Always	10 kΩ or higher
5 (SLT-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

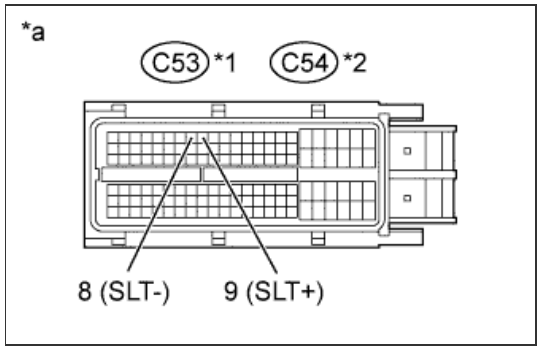
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-9 (SLT+) - C53-8 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
C53-9 (SLT+) - Body ground	Always	10 kΩ or higher
C53-8 (SLT-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-9 (SLT+) - C54-8 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
C54-9 (SLT+) - Body ground	Always	10 kΩ or higher
C54-8 (SLT-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

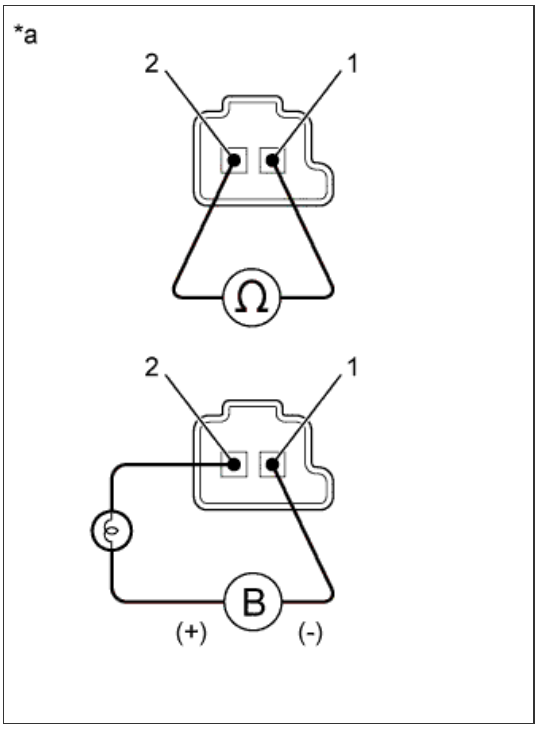
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLT)

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0761 Shift Solenoid "C" Performance (Shift Solenoid Valve S3)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0761	A shift solenoid valve S3 stuck ON malfunction*1: When the ECM directs the transmission to switch to 5th or 6th gear, the engine overruns (clutch slips). The ECM determines there is a malfunction when either of the following conditions is met (2-trip detection logic*3, 1-trip detection logic*4). (a) When the ECM directs the transmission to switch to 4th gear, the actual gear is shifted to 3rd. (b) When the ECM directs the transmission to switch to 5th gear, the engine overruns (clutch slips).	• Shift solenoid valve S3 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P0761	A shift solenoid valve S3 stuck OFF malfunction*2: Shifting to 1st, 2nd, and 3rd gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic*3, 1-trip detection logic*4). (a) When the ECM directs the transmission to switch to 2nd gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 6th.	• Shift solenoid valve S3 remains closed • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under shift solenoid valve S3 stuck ON malfunction	1st	2nd	3rd	3rd	N*	N*
*2: Actual gear position under shift solenoid valve S3 stuck OFF malfunction	3rd	4th	4th	4th	5th	6th

N*: Neutral

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode when shift solenoid valve S3 stuck ON malfunction	1st	2nd	3rd	3rd	3rd	3rd
*2: Actual gear position under fail-safe mode when shift solenoid valve S3 stuck OFF malfunction	3rd	4th	4th	4th	5th	6th

- ***3: w/ OBD**
- ***4: w/o OBD**

MONITOR DESCRIPTION

This DTC indicates a "stuck ON malfunction" or "stuck OFF malfunction" of shift solenoid valve S3.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S3	ON	ON	ON	OFF	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0761)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0761 is output	A
P0761 and other DTCs are output	B

HINT:

If any other codes besides P0761 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST
09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

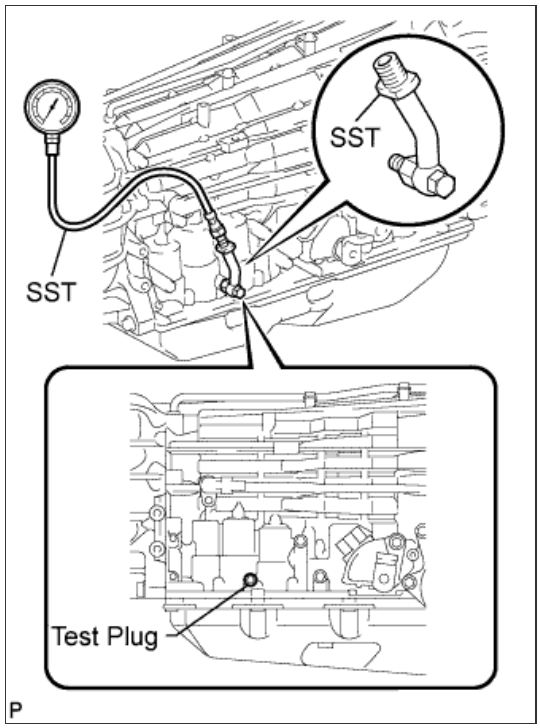
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:
The line pressure changes as specified when performing the Active Test.

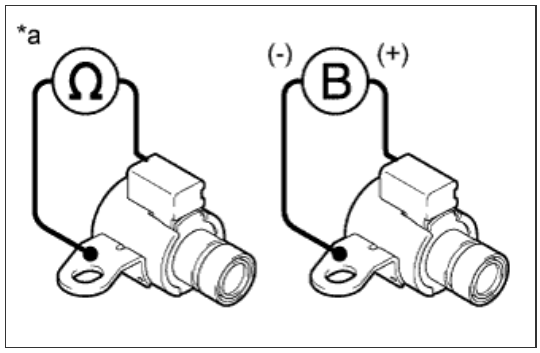
NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

3.INSPECT SHIFT SOLENOID VALVE S3

a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S3)

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

4.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2740 Transmission Fluid Temperature Sensor "B" Circuit

DTC P2742 Transmission Fluid Temperature Sensor "B" Circuit Low Input

DTC P2743 Transmission Fluid Temperature Sensor "B" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor is on the transmission, just in front of the oil cooler inlet pipeline.
If the ECM detects an abnormally high ATF temperature near this sensor, it illuminates the warning light.

HINT:

- **The temperature of ATF easily rises when towing, climbing hills, in traffic, etc.**
- **If the ATF temperature sensor becomes short-circuited, the signal that indicates that the ATF temperature is 150°C (302°F) or higher is input into the ECM.**

Vehicle conditions when the sensor is normal and when the sensor is short-circuited are indicated in the table below.

No. 2 ATF Temperature Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	ATF temperature higher than 150°C (302°F)	ATF temperature warning indicator remains on	ATF temperature below 135°C (275°F)*1
	ATF temperature higher than 130°C (266°F)	Shift point too high	ATF temperature below 110°C (230°F)
	When conditions (a) and (b) are satisfied: (a) ATF temperature higher than 130°C (266°F) (b) Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	ATF temperature below 110°C (230°F)*1 and engine coolant temperature higher than 95°C (203°F)
Sensor is short-circuited	Any conditions	• ATF temperature warning indicator remains on • Shift point too high	Symptoms still occur
	Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	Symptoms still occur

HINT:

*1: When ATF temperature is in the normal range, it decreases to below 135°C (275°F) within 5 minutes with the shift lever in P or N in an idling state.

*2: When ATF temperature is normal, transmission lock-up occurs in 5th or 6th gear with the shift lever in D or the S6 range, in 5th gear with the shift lever in the S5 range, and 4th gear with the shift lever in the S4 range.

DTC Code	DTC Detection Condition	Trouble Area
P2740	(a) and (b) are detected momentarily within 0.5 sec. when neither P2742 nor P2743 are stored (1-trip detection logic). (a) The No. 2 ATF temperature sensor resistance is below 25 Ω (0.046 V). (b) The No. 2 ATF temperature sensor resistance is higher than 156 kΩ (4.915 V). **HINT:** Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a).	• Open or short in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM
P2742	The No. 2 ATF temperature sensor resistance is below 25 Ω (0.046 V) for 0.5 sec. or more (1-trip detection logic).	• Short in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM
	When 15 min. or more have elapsed after the	• Open in No. 2 ATF temperature sensor circuit

P2743	engine is started, the No. 2 ATF temperature sensor resistance is higher than 156 kΩ (4.915 V) for 0.5 sec. or more (1-trip detection logic).	• No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 25 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will illuminate the MIL and store the DTC.

HINT:

- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**
- **The ATF temperature can be checked on the intelligent tester display.**

WIRING DIAGRAM

Refer to DTC P0710 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.

HINT:

- **When DTC P2742 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.**
- **When DTC P2743 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.**
  Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 2 ATF TEMPERATURE SENSOR)

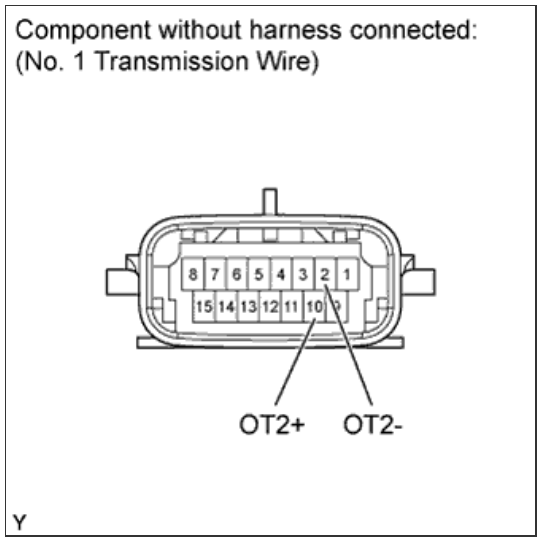
a. Disconnect the C39 No. 1 transmission wire connector.

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
10 (OT2+) - 2 (OT2-)	Always	25 Ω to 156 kΩ
10 (OT2+) - Body ground	Always	10 kΩ or higher
2 (OT2-) - Body ground	Always	10 kΩ or higher



HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → REPAIR OR REPLACE NO. 2 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

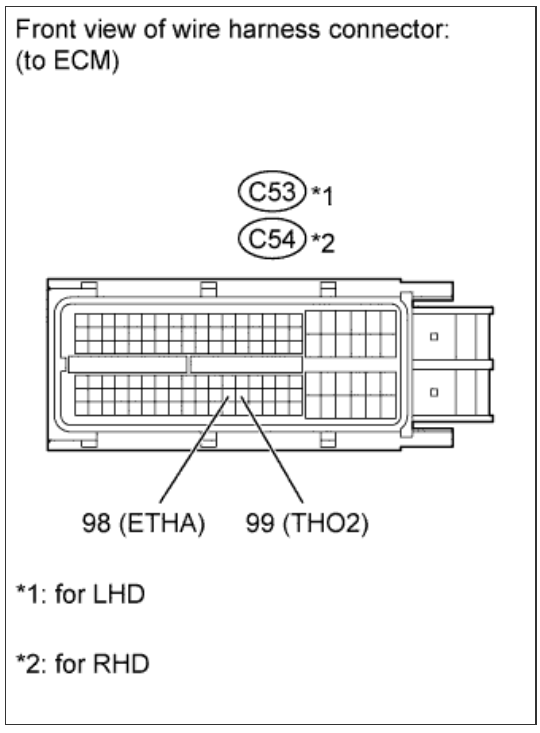
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-99 (THO2) - C53-98 (ETHA)	Always	25 Ω to 156 kΩ
C53-99 (THO2) - Body ground	Always	10 kΩ or higher

C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-99 (THO2) - C54-98 (ETHA)	Always	25 Ω to 156 kΩ
C54-99 (THO2) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0766 Shift Solenoid "D" Performance (Shift Solenoid Valve S4)

DTC P0776 Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0766	A shift solenoid valve S4 stuck OFF malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic*2, 1-trip detection logic*3). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve S4 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked (brake control valve) • Automatic transmission (clutch, brake, gear, etc.)
P0776	A shift solenoid valve SL2 stuck ON malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve SL2 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked (brake control valve) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under malfunction	1st	2nd	3rd	4th	4th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

- ***2: w/ OBD**
- ***3: w/o OBD**

MONITOR DESCRIPTION

This DTC indicates a "stuck OFF malfunction" of shift solenoid valve S4, "stuck ON malfunction" of shift solenoid valve SL2, or brake control valve malfunction. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0766 AND P0776)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
P0766 and/or P0776 is output	A
P0766, P0776 and other DTCs are output	B

HINT:

If any other codes besides P0766 and P0776 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

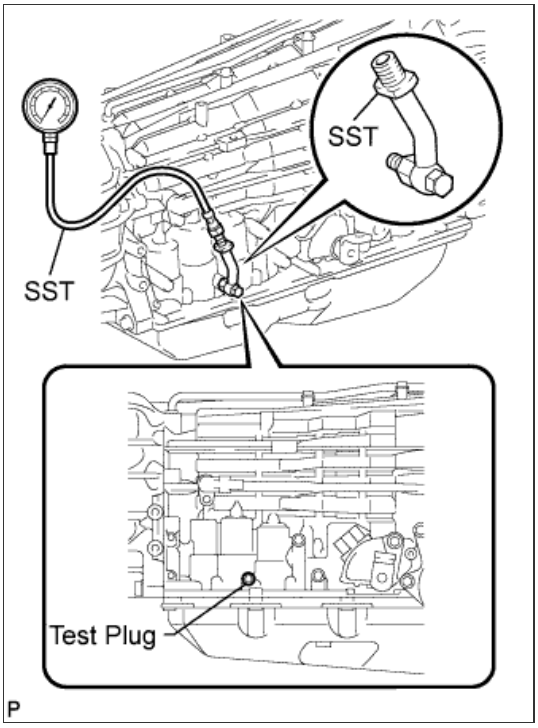
- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST
09992-00095 (09992-00231, 09992-00271)



b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:
The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

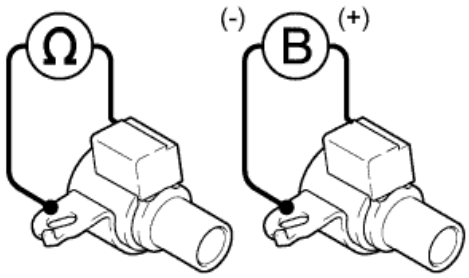
Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Shift Solenoid Valve S4:



P

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

4.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

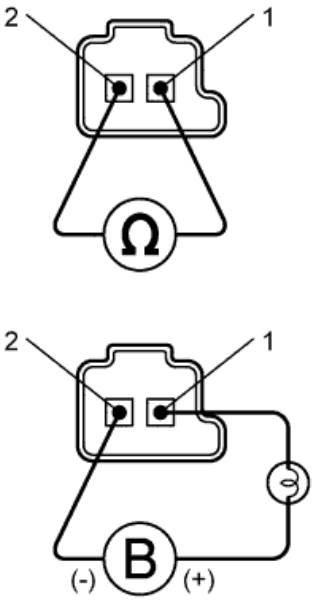
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SL2)



NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (**Click here**)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (**Click here**)

DTC P2740 Transmission Fluid Temperature Sensor "B" Circuit

DTC P2742 Transmission Fluid Temperature Sensor "B" Circuit Low Input

DTC P2743 Transmission Fluid Temperature Sensor "B" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor is on the transmission, just in front of the oil cooler inlet pipeline.
If the ECM detects an abnormally high ATF temperature near this sensor, it illuminates the warning light.

HINT:

- **The temperature of ATF easily rises when towing, climbing hills, in traffic, etc.**
- **If the ATF temperature sensor becomes short-circuited, the signal that indicates that the ATF temperature is 150°C (302°F) or higher is input into the ECM.**

Vehicle conditions when the sensor is normal and when the sensor is short-circuited are indicated in the table below.

No. 2 ATF Temperature Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	ATF temperature higher than 150°C (302°F)	ATF temperature warning indicator remains on	ATF temperature below 135°C (275°F)*1
	ATF temperature higher than 130°C (266°F)	Shift point too high	ATF temperature below 110°C (230°F)
	When conditions (a) and (b) are satisfied: (a) ATF temperature higher than 130°C (266°F) (b) Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	ATF temperature below 110°C (230°F)*1 and engine coolant temperature higher than 95°C (203°F)
Sensor is short-circuited	Any conditions	• ATF temperature warning indicator remains on • Shift point too high	Symptoms still occur
	Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	Symptoms still occur

HINT:

*1: When ATF temperature is in the normal range, it decreases to below 135°C (275°F) within 5 minutes with the shift lever in P or N in an idling state.

*2: When ATF temperature is normal, transmission lock-up occurs in 5th or 6th gear with the shift lever in D or the S6 range, in 5th gear with the shift lever in the S5 range, and 4th gear with the shift lever in the S4 range.

DTC Code	DTC Detection Condition	Trouble Area
P2740	(a) and (b) are detected momentarily within 0.5 sec. when neither P2742 nor P2743 are stored (1-trip detection logic). (a) The No. 2 ATF temperature sensor resistance is below 25 Ω (0.046 V). (b) The No. 2 ATF temperature sensor resistance is higher than 156 kΩ (4.915 V). **HINT:** Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a).	• Open or short in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM
P2742	The No. 2 ATF temperature sensor resistance is below 25 Ω (0.046 V) for 0.5 sec. or more (1-trip detection logic).	• Short in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM
	When 15 min. or more have elapsed after the	• Open in No. 2 ATF temperature sensor circuit

P2743	engine is started, the No. 2 ATF temperature sensor resistance is higher than 156 kΩ (4.915 V) for 0.5 sec. or more (1-trip detection logic).	• No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 25 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will illuminate the MIL and store the DTC.

HINT:

- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**
- **The ATF temperature can be checked on the intelligent tester display.**

WIRING DIAGRAM

Refer to DTC P0710 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.

HINT:

- **When DTC P2742 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.**
- **When DTC P2743 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.**
  Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 2 ATF TEMPERATURE SENSOR)

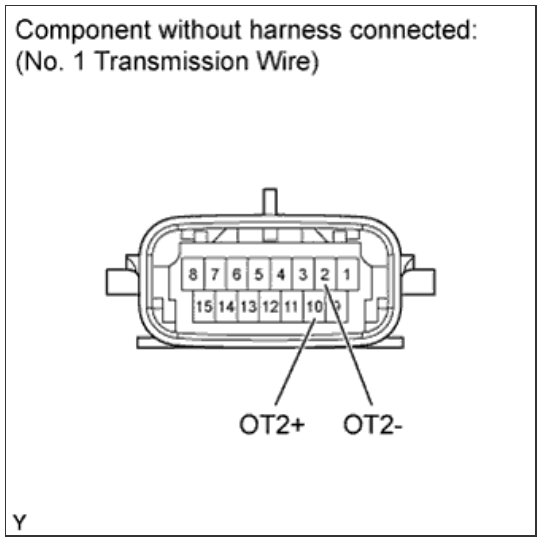
a. Disconnect the C39 No. 1 transmission wire connector.

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
10 (OT2+) - 2 (OT2-)	Always	25 Ω to 156 kΩ
10 (OT2+) - Body ground	Always	10 kΩ or higher
2 (OT2-) - Body ground	Always	10 kΩ or higher



HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → REPAIR OR REPLACE NO. 2 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

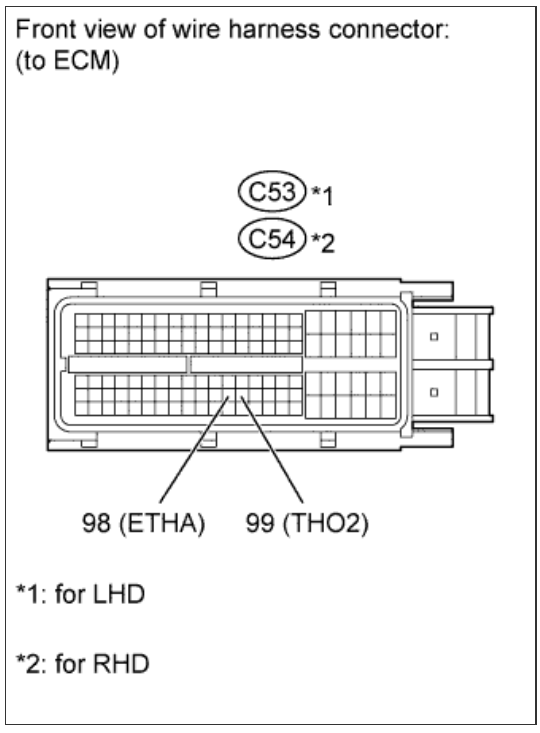
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-99 (THO2) - C53-98 (ETHA)	Always	25 Ω to 156 kΩ
C53-99 (THO2) - Body ground	Always	10 kΩ or higher

C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-99 (THO2) - C54-98 (ETHA)	Always	25 Ω to 156 kΩ
C54-99 (THO2) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0766 Shift Solenoid "D" Performance (Shift Solenoid Valve S4)

DTC P0776 Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0766	A shift solenoid valve S4 stuck OFF malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic*2, 1-trip detection logic*3). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve S4 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked (brake control valve) • Automatic transmission (clutch, brake, gear, etc.)
P0776	A shift solenoid valve SL2 stuck ON malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve SL2 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked (brake control valve) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under malfunction	1st	2nd	3rd	4th	4th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

- ***2: w/ OBD**
- ***3: w/o OBD**

MONITOR DESCRIPTION

This DTC indicates a "stuck OFF malfunction" of shift solenoid valve S4, "stuck ON malfunction" of shift solenoid valve SL2, or brake control valve malfunction. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0766 AND P0776)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
P0766 and/or P0776 is output	A
P0766, P0776 and other DTCs are output	B

HINT:

If any other codes besides P0766 and P0776 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

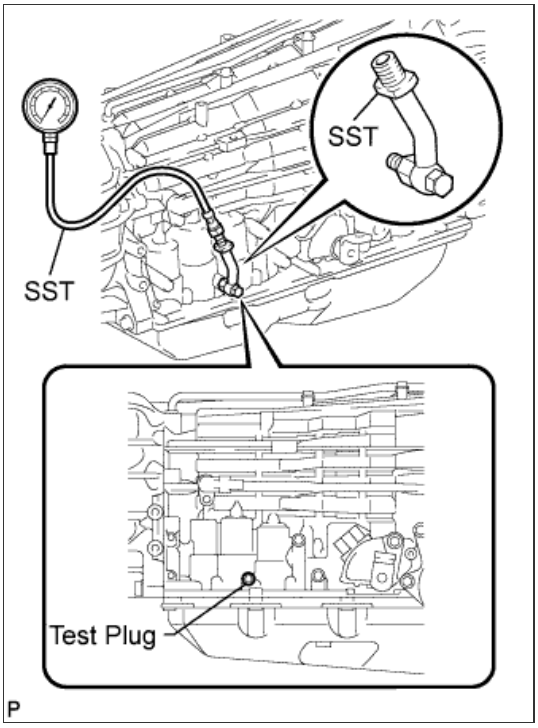
- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST
09992-00095 (09992-00231, 09992-00271)



b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:
The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

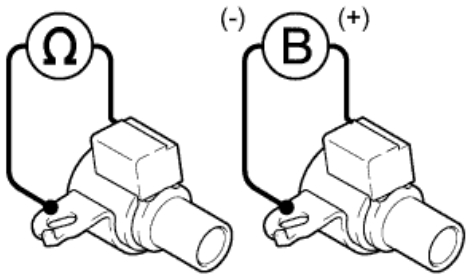
Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Shift Solenoid Valve S4:



P

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

4.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

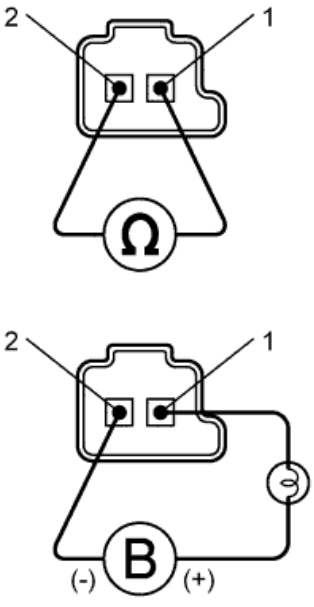
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SL2)



NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (**Click here**)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (**Click here**)

DTC P2740 Transmission Fluid Temperature Sensor "B" Circuit

DTC P2742 Transmission Fluid Temperature Sensor "B" Circuit Low Input

DTC P2743 Transmission Fluid Temperature Sensor "B" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor is on the transmission, just in front of the oil cooler inlet pipeline.
If the ECM detects an abnormally high ATF temperature near this sensor, it illuminates the warning light.

HINT:

- **The temperature of ATF easily rises when towing, climbing hills, in traffic, etc.**
- **If the ATF temperature sensor becomes short-circuited, the signal that indicates that the ATF temperature is 150°C (302°F) or higher is input into the ECM.**

Vehicle conditions when the sensor is normal and when the sensor is short-circuited are indicated in the table below.

No. 2 ATF Temperature Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	ATF temperature higher than 150°C (302°F)	ATF temperature warning indicator remains on	ATF temperature below 135°C (275°F)*1
	ATF temperature higher than 130°C (266°F)	Shift point too high	ATF temperature below 110°C (230°F)
	When conditions (a) and (b) are satisfied: (a) ATF temperature higher than 130°C (266°F) (b) Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	ATF temperature below 110°C (230°F)*1 and engine coolant temperature higher than 95°C (203°F)
Sensor is short-circuited	Any conditions	• ATF temperature warning indicator remains on • Shift point too high	Symptoms still occur
	Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	Symptoms still occur

HINT:

*1: When ATF temperature is in the normal range, it decreases to below 135°C (275°F) within 5 minutes with the shift lever in P or N in an idling state.

*2: When ATF temperature is normal, transmission lock-up occurs in 5th or 6th gear with the shift lever in D or the S6 range, in 5th gear with the shift lever in the S5 range, and 4th gear with the shift lever in the S4 range.

DTC Code	DTC Detection Condition	Trouble Area
P2740	(a) and (b) are detected momentarily within 0.5 sec. when neither P2742 nor P2743 are stored (1-trip detection logic). (a) The No. 2 ATF temperature sensor resistance is below 25 Ω (0.046 V). (b) The No. 2 ATF temperature sensor resistance is higher than 156 kΩ (4.915 V). **HINT:** Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a).	• Open or short in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM
P2742	The No. 2 ATF temperature sensor resistance is below 25 Ω (0.046 V) for 0.5 sec. or more (1-trip detection logic).	• Short in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM
	When 15 min. or more have elapsed after the	• Open in No. 2 ATF temperature sensor circuit

P2743	engine is started, the No. 2 ATF temperature sensor resistance is higher than 156 kΩ (4.915 V) for 0.5 sec. or more (1-trip detection logic).	• No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 25 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will illuminate the MIL and store the DTC.

HINT:

- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**
- **The ATF temperature can be checked on the intelligent tester display.**

WIRING DIAGRAM

Refer to DTC P0710 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.

HINT:

- **When DTC P2742 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.**
- **When DTC P2743 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.**
  Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 2 ATF TEMPERATURE SENSOR)

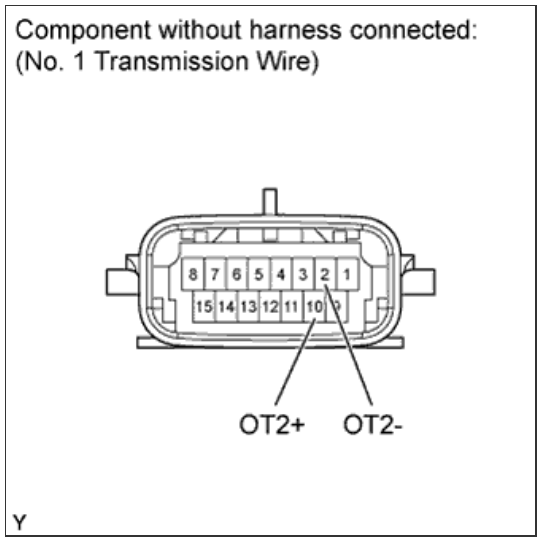
a. Disconnect the C39 No. 1 transmission wire connector.

a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
10 (OT2+) - 2 (OT2-)	Always	25 Ω to 156 kΩ
10 (OT2+) - Body ground	Always	10 kΩ or higher
2 (OT2-) - Body ground	Always	10 kΩ or higher



HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → REPAIR OR REPLACE NO. 2 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

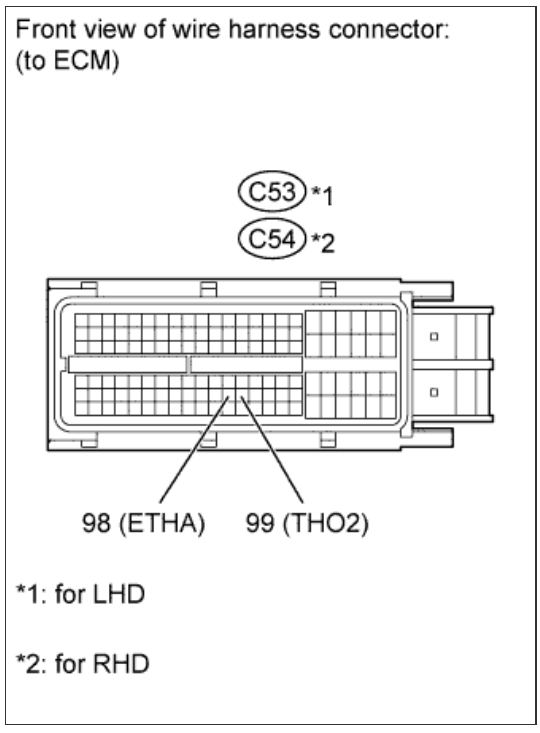
OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-99 (THO2) - C53-98 (ETHA)	Always	25 Ω to 156 kΩ
C53-99 (THO2) - Body ground	Always	10 kΩ or higher

C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-99 (THO2) - C54-98 (ETHA)	Always	25 Ω to 156 kΩ
C54-99 (THO2) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0766 Shift Solenoid "D" Performance (Shift Solenoid Valve S4)

DTC P0776 Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0766	A shift solenoid valve S4 stuck OFF malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic*2, 1-trip detection logic*3). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve S4 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked (brake control valve) • Automatic transmission (clutch, brake, gear, etc.)
P0776	A shift solenoid valve SL2 stuck ON malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve SL2 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked (brake control valve) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under malfunction	1st	2nd	3rd	4th	4th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

- ***2: w/ OBD**
- ***3: w/o OBD**

MONITOR DESCRIPTION

This DTC indicates a "stuck OFF malfunction" of shift solenoid valve S4, "stuck ON malfunction" of shift solenoid valve SL2, or brake control valve malfunction. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0766 AND P0776)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
P0766 and/or P0776 is output	A
P0766, P0776 and other DTCs are output	B

HINT:

If any other codes besides P0766 and P0776 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**

- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

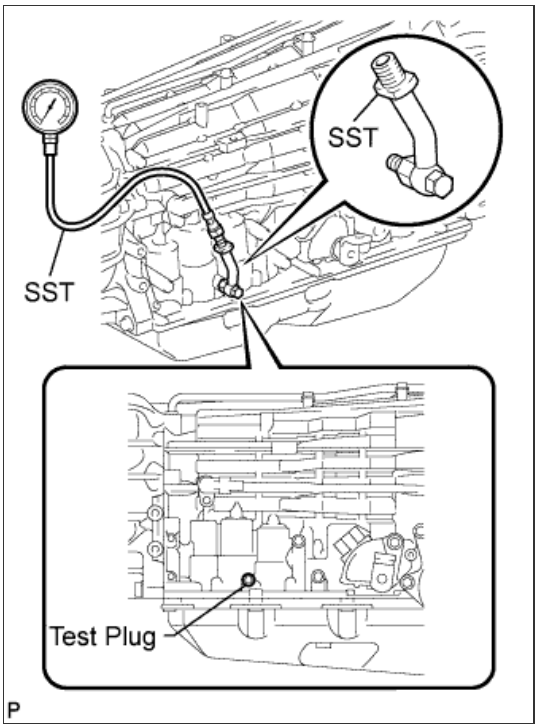
HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)



b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → **REPLACE SHIFT SOLENOID VALVE SLT (Click here)**

OK

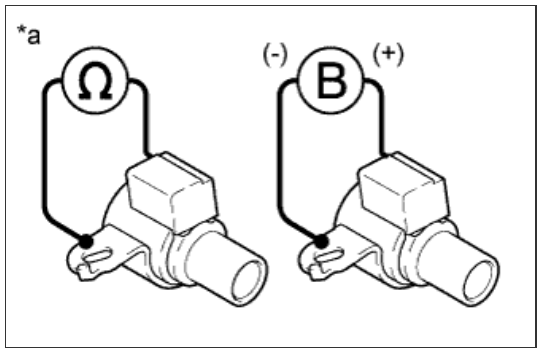
3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

4.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

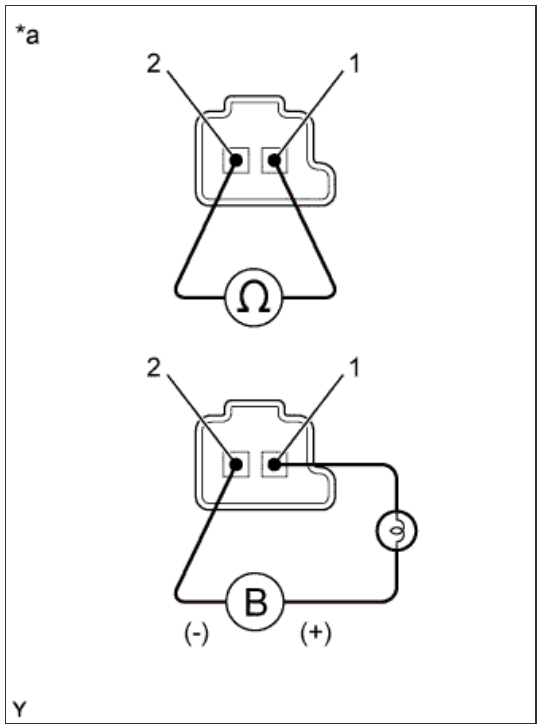
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)

NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)**

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2742 Transmission Fluid Temperature Sensor "B" Circuit Low Input

DTC P2743 Transmission Fluid Temperature Sensor "B" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor is on the transmission, just in front of the oil cooler inlet pipeline.
If the ECM detects an abnormally high ATF temperature near this sensor, it illuminates the warning light.

HINT:

- **The temperature of ATF easily rises when towing, climbing hills, in traffic, etc.**
- **If the ATF temperature sensor becomes short-circuited, the signal that indicates that the ATF temperature is 150°C (302°F) or higher is input into the ECM.**

Vehicle conditions when the sensor is normal and when the sensor is short-circuited are indicated in the table below.

No. 2 ATF Temperature Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	ATF temperature higher than 150°C (302°F)	ATF temperature warning indicator remains on	ATF temperature below 135°C (275°F)*1
	ATF temperature higher than 130°C (266°F)	Shift point too high	ATF temperature below 110°C (230°F)
	When conditions (a) and (b) are satisfied: (a) ATF temperature higher than 130°C (266°F) (b) Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	ATF temperature below 110°C (230°F)*1 and engine coolant temperature higher than 95°C (203°F)
Sensor is short-circuited	Any conditions	• ATF temperature warning light blinks or message is displayed in combination meter • Shift point too high	Symptoms still occur
	Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	Symptoms still occur

HINT:

*1: When ATF temperature is in the normal range, it decreases to below 135°C (275°F) within 5 minutes with the shift lever in P or N in an idling state.

*2: When ATF temperature is normal, transmission lock-up occurs in 5th or 6th gear with the shift lever in D or the S6 range, in 5th gear with the shift lever in the S5 range, and 4th gear with the shift lever in the S4 range.

DTC Code	DTC Detection Condition	Trouble Area
P2742	The No. 2 ATF temperature sensor resistance is below 25 Ω (0.046 V) for 0.5 sec. or more (1-trip detection logic).	• Short in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM
P2743	When 15 min. or more have elapsed after the engine is started, the No. 2 ATF temperature sensor resistance is higher than 156 kΩ (4.915 V) for 0.5 sec. or more (1-trip detection logic).	• Open in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 25 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM stores a DTC, and the ATF temperature warning light blinks or a message is displayed in the combination meter.

HINT:

- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**
- **The ATF temperature can be checked on the intelligent tester display.**

WIRING DIAGRAM

Refer to DTC P0712 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.

HINT:

- **When DTC P2742 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.**
- **When DTC P2743 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.**
  Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

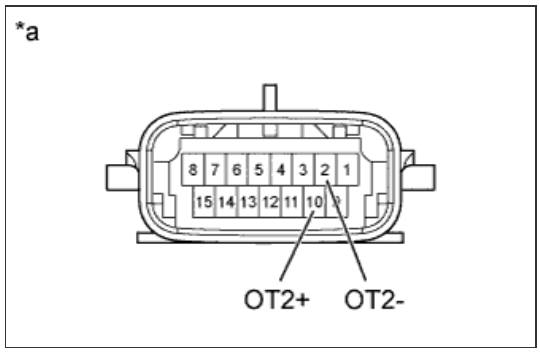
1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 2 ATF TEMPERATURE SENSOR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
10 (OT2+) - 2 (OT2-)	Always	25 Ω to 156 kΩ
10 (OT2+) - Body ground	Always	10 kΩ or higher
2 (OT2-) - Body ground	Always	10 kΩ or higher



HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

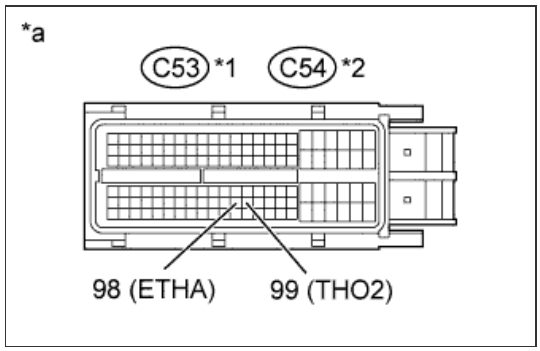
NG → REPAIR OR REPLACE NO. 2 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-99 (THO2) - C53-98 (ETHA)	Always	25 Ω to 156 kΩ
C53-99 (THO2) - Body ground	Always	10 kΩ or higher
C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-99 (THO2) - C54-98 (ETHA)	Always	25 Ω to 156 kΩ
C54-99 (THO2) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0766 Shift Solenoid "D" Performance (Shift Solenoid Valve S4)

DTC P0776 Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems with the shift solenoid valves, valve body or automatic transmission (clutch, brake, gear, etc.).

DTC Code	DTC Detection Condition	Trouble Area
P0766	A shift solenoid valve S4 stuck OFF malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic*2, 1-trip detection logic*3). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve S4 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked (brake control valve) • Automatic transmission (clutch, brake, gear, etc.)
P0776	A shift solenoid valve SL2 stuck ON malfunction or brake control valve malfunction*1: Shifting to 5th and 6th gears is impossible. The ECM determines there is a malfunction when the following conditions are both met (2-trip detection logic). (a) When the ECM directs the transmission to switch to 5th gear, the actual gear is shifted to 4th. (b) When the ECM directs the transmission to switch to 6th gear, the actual gear is shifted to 4th.	• Shift solenoid valve SL2 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked (brake control valve) • Automatic transmission (clutch, brake, gear, etc.)

HINT:

- **Gear positions in the event of a shift solenoid valve mechanical problem:**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under malfunction	1st	2nd	3rd	4th	4th	4th

- **Gear position during fail-safe operation:**
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
*1: Actual gear position under fail-safe mode	1st	2nd	3rd	3rd	3rd	3rd

- ***2: w/ OBD**
- ***3: w/o OBD**

MONITOR DESCRIPTION

This DTC indicates a "stuck OFF malfunction" of shift solenoid valve S4, "stuck ON malfunction" of shift solenoid valve SL2, or brake control valve malfunction. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Shift solenoid valve SL2 turns ON/OFF normally when the shift lever is in D.**

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve S4	OFF	OFF	OFF	OFF	ON	ON
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0766 AND P0776)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
P0766 and/or P0776 is output	A
P0766, P0776 and other DTCs are output	B

HINT:

If any other codes besides P0766 and P0776 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART (Click here)**

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**

- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

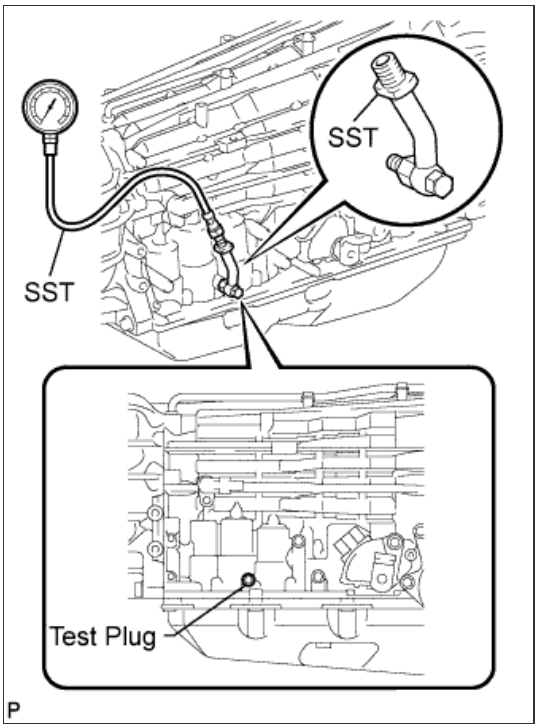
HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)



b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → **REPLACE SHIFT SOLENOID VALVE SLT (Click here)**

OK

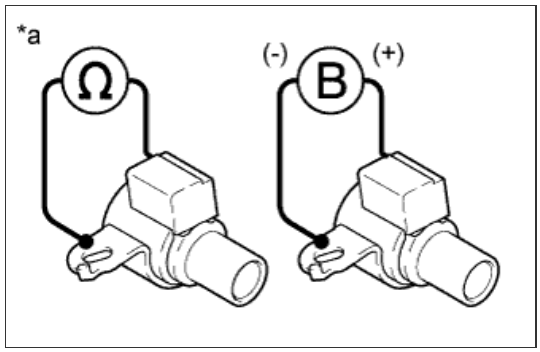
3.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve S4)

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

4.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

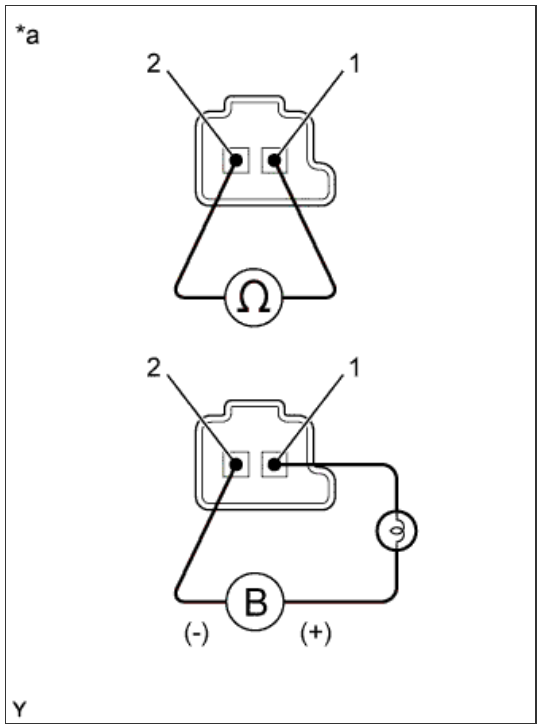
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)

NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)**

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2742 Transmission Fluid Temperature Sensor "B" Circuit Low Input

DTC P2743 Transmission Fluid Temperature Sensor "B" Circuit High Input

for Preparation Click here

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor is on the transmission, just in front of the oil cooler inlet pipeline.
If the ECM detects an abnormally high ATF temperature near this sensor, it illuminates the warning light.

HINT:

- **The temperature of ATF easily rises when towing, climbing hills, in traffic, etc.**
- **If the ATF temperature sensor becomes short-circuited, the signal that indicates that the ATF temperature is 150°C (302°F) or higher is input into the ECM.**

Vehicle conditions when the sensor is normal and when the sensor is short-circuited are indicated in the table below.

No. 2 ATF Temperature Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	ATF temperature higher than 150°C (302°F)	ATF temperature warning indicator remains on	ATF temperature below 135°C (275°F)*1
	ATF temperature higher than 130°C (266°F)	Shift point too high	ATF temperature below 110°C (230°F)
	When conditions (a) and (b) are satisfied: (a) ATF temperature higher than 130°C (266°F) (b) Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	ATF temperature below 110°C (230°F)*1 and engine coolant temperature higher than 95°C (203°F)
Sensor is short-circuited	Any conditions	• ATF temperature warning light blinks or message is displayed in combination meter • Shift point too high	Symptoms still occur
	Engine coolant temperature higher than 95°C (203°F)	Lock-up at 3rd gear*2	Symptoms still occur

HINT:

*1: When ATF temperature is in the normal range, it decreases to below 135°C (275°F) within 5 minutes with the shift lever in P or N in an idling state.

*2: When ATF temperature is normal, transmission lock-up occurs in 5th or 6th gear with the shift lever in D or the S6 range, in 5th gear with the shift lever in the S5 range, and 4th gear with the shift lever in the S4 range.

DTC Code	DTC Detection Condition	Trouble Area
P2742	The No. 2 ATF temperature sensor resistance is below 25 Ω (0.046 V) for 0.5 sec. or more (1-trip detection logic).	• Short in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM
P2743	When 15 min. or more have elapsed after the engine is started, the No. 2 ATF temperature sensor resistance is higher than 156 kΩ (4.915 V) for 0.5 sec. or more (1-trip detection logic).	• Open in No. 2 ATF temperature sensor circuit • No. 1 transmission wire (No. 2 ATF temperature sensor) • ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is below 25 Ω*1 or higher than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM stores a DTC, and the ATF temperature warning light blinks or a message is displayed in the combination meter.

HINT:

- ***1: 150°C (302°F) or higher is indicated regardless of the actual ATF temperature.**
- ***2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.**
- **The ATF temperature can be checked on the intelligent tester display.**

WIRING DIAGRAM

Refer to DTC P0712 (Click here).

INSPECTION PROCEDURE

DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Data List.

g. According to the display on the intelligent tester, read the Data List.

Engine and ECT

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/T Oil Temperature 2	No. 2 ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • With engine cold: Equal to ambient temperature	If the value is -40°C (-40°F) or 215°C (419°F), the No. 2 ATF temperature sensor circuit is open or shorted.

HINT:

- **When DTC P2742 is stored and the intelligent tester output is 150°C (302°F) or higher, there is a short circuit.**
- **When DTC P2743 is stored and the intelligent tester output is -40°C (-40°F), there is an open circuit.**
  Check the temperature displayed on the intelligent tester in order to check if a malfunction exists.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or higher	Short circuit

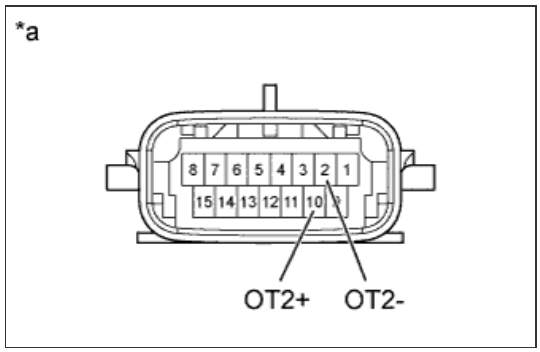
1.INSPECT NO. 1 TRANSMISSION WIRE (NO. 2 ATF TEMPERATURE SENSOR)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
10 (OT2+) - 2 (OT2-)	Always	25 Ω to 156 kΩ
10 (OT2+) - Body ground	Always	10 kΩ or higher
2 (OT2-) - Body ground	Always	10 kΩ or higher



HINT:

If the resistance is out of the specified range at one of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Resistance (Reference):

ATF Temperature	Specified Condition
10°C (50°F)	5 to 8 kΩ
25°C (77°F)	2.5 to 4.5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

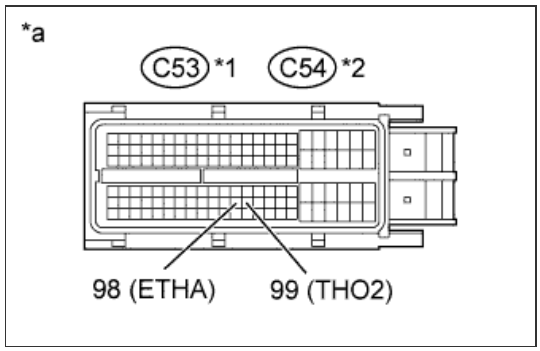
NG → REPAIR OR REPLACE NO. 2 ATF TEMPERATURE SENSOR (NO. 1 TRANSMISSION WIRE) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-99 (THO2) - C53-98 (ETHA)	Always	25 Ω to 156 kΩ
C53-99 (THO2) - Body ground	Always	10 kΩ or higher
C53-98 (ETHA) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-99 (THO2) - C54-98 (ETHA)	Always	25 Ω to 156 kΩ
C54-99 (THO2) - Body ground	Always	10 kΩ or higher
C54-98 (ETHA) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0778 Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0778	The ECM checks for an open or short in the shift solenoid valve SL2 circuit while driving and shifting gears (1 trip detection logic). The output signal duty ratio equals 100% (the SL2 output signal duty ratio is less than 100% under normal conditions).	• Open or short in shift solenoid valve SL2 circuit • Shift solenoid valve SL2 • ECM

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

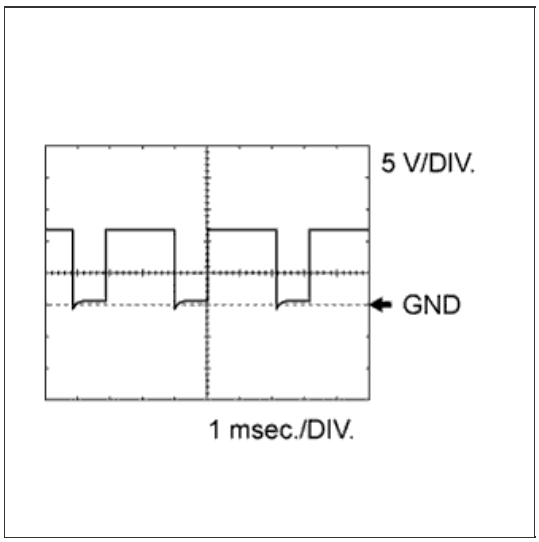
Standard:

for LHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C53-12 (SL2+) - C53-13 (SL2-)	5 V/DIV., 1 msec./DIV.	Engine idling	Refer to illustration

for RHD

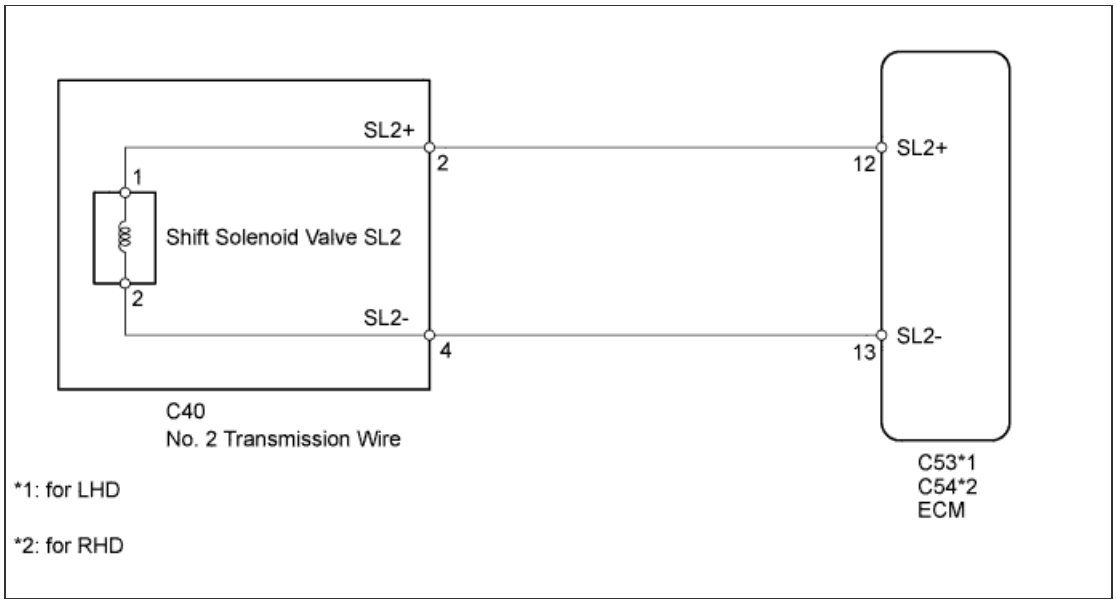
Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-12 (SL2+) - C54-13 (SL2-)	5 V/DIV., 1 msec./DIV.	Engine idling	Refer to illustration



MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL2 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normally functioning shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the open or short circuited shift solenoid valve.
While driving and shifting gears, if the ECM detects an open or short in the shift solenoid valve SL2 circuit, the ECM determines there is a malfunction (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve SL2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

1.INSPECT NO. 2 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL2)

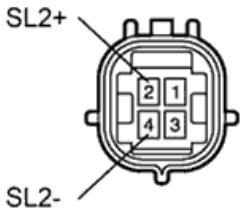
a. Disconnect the C40 No. 2 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
2 (SL2+) - 4 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
2 (SL2+) - Body ground	Always	10 kΩ or higher
4 (SL2-) - Body ground	Always	10 kΩ or higher

Component without harness connected:
(No. 2 Transmission Wire)



NG → Go to step 3

OK

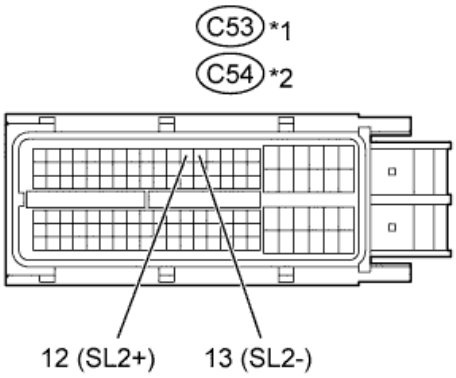
2.CHECK HARNESS AND CONNECTOR (NO. 2 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-12 (SL2+) - C53-13 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
C53-12 (SL2+) - Body ground	Always	10 kΩ or higher
C53-13 (SL2-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-12 (SL2+) - C54-13 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
C54-12 (SL2+) - Body ground	Always	10 kΩ or higher
C54-13 (SL2-) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

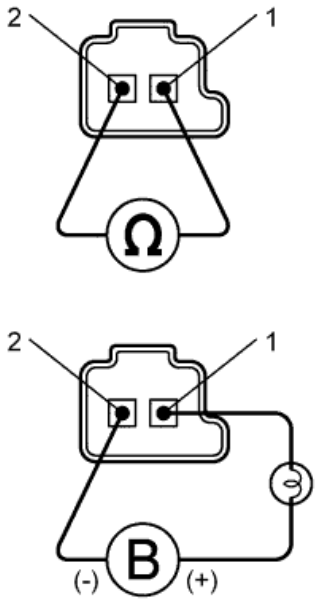
c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition

• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SL2)



NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

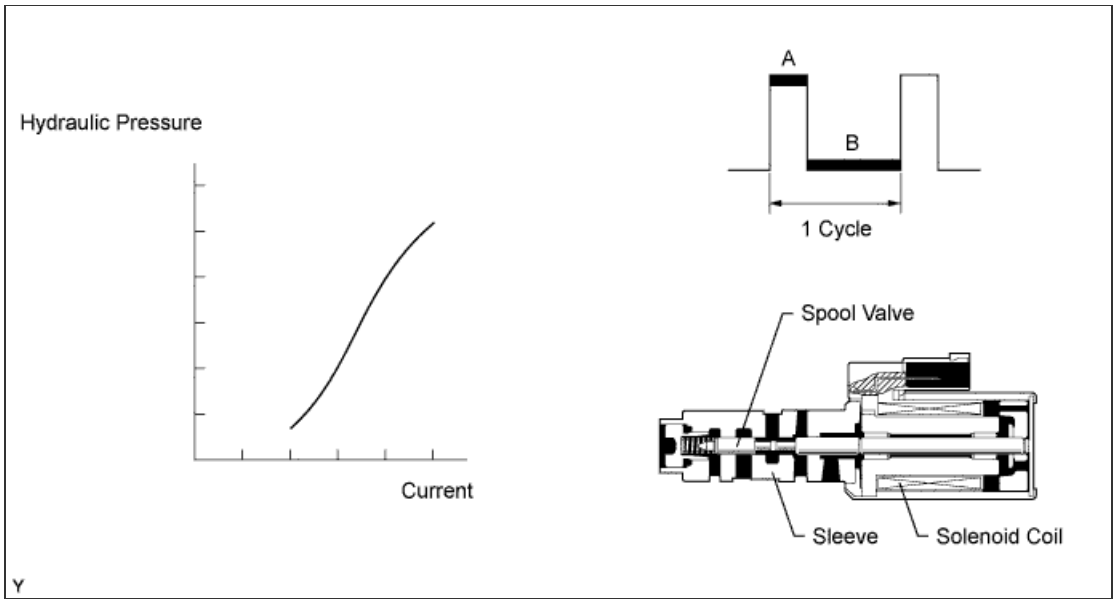
OK → REPAIR OR REPLACE NO. 2 TRANSMISSION WIRE (Click here)

DTC P2757 Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)

for Preparation Click here

DESCRIPTION

The ECM uses the signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, output speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.
Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical problems with shift solenoid valve SLU, the valve body and torque converter clutch.



DTC Code	DTC Detection Condition	Trouble Area
P2757	Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h (50 mph)), or lock-up remains ON in the lock-up OFF range (2 trip detection logic).	• Shift solenoid valve SLU remains open or closed • Shift solenoid valve SLU • Valve body is blocked • Torque converter clutch • Automatic transmission (clutch, brake, gear, etc.) • Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on the turbine (input) speed sensor NT, output speed sensor SP2, engine speed, engine load, engine temperature, vehicle speed, transmission temperature, and gear selection. The ECM determines the lock-up status of the torque converter by comparing the engine speed (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to output shaft rpm (SP2). When conditions are appropriate, the ECM requests lock-up by applying control voltage to shift solenoid valve SLU. When shift solenoid valve SLU is turned ON, it applies pressure to the lock-up relay valve and locks the torque converter clutch.
If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in shift solenoid valve SLU or the lock-up system performance.
The ECM will illuminate the MIL and store the DTC.
Example:
When one of the following conditions is met, the system determines that there is a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up ON.
  Engine speed is at least 70 rpm more than input turbine speed.
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up OFF.
  The difference between engine speed and input turbine speed is less than 35 rpm.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This

non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

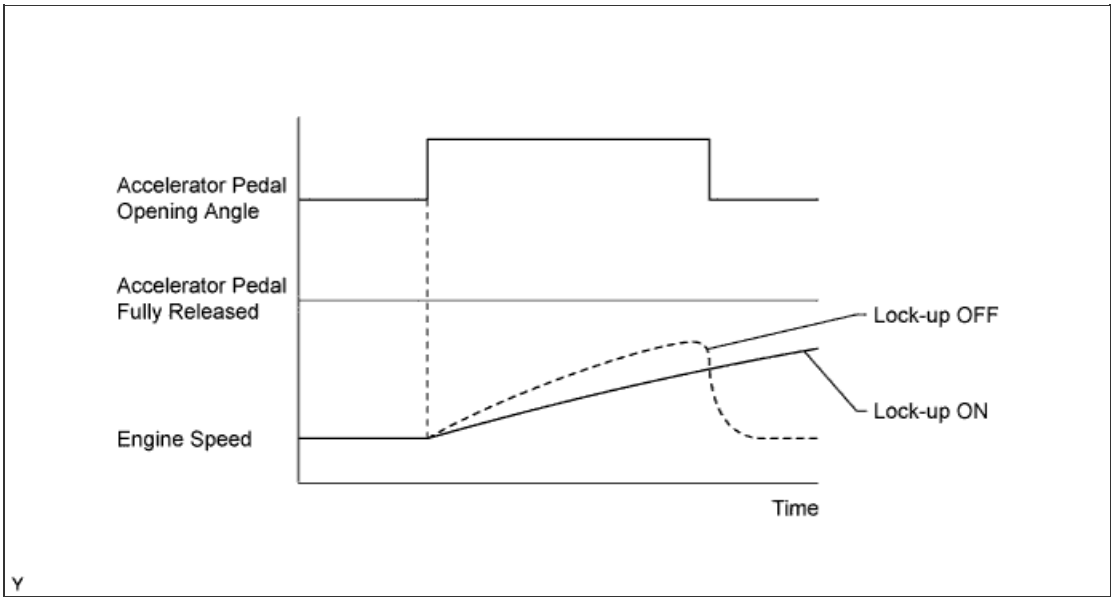
Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Lock Up	Control shift solenoid valve SLU to set automatic transmission to lock-up condition	ON or OFF	It is possible to check the shift solenoid valve SLU operation. [Vehicle Condition] • The throttle valve opening angle is less than 35%. • The vehicle speed is 60 km/h (37 mph) or more.

HINT:

- **This test can be conducted when the vehicle speed is 60 km/h (37 mph) or more.**
- **Perform this test while driving in 5th or 6th gear.**

h. Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.



HINT:

- **When changing the accelerator pedal opening angle while driving, if the engine speed does not change abruptly, lock-up is on.**
- **Slowly release the accelerator pedal in order to decelerate, but do not fully release the pedal (fully releasing the pedal will close the throttle valve and lock-up may be turned off automatically).**

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P2757)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P2757 is output	A
P2757 and other DTCs are output	B

HINT:

If any other codes besides P2757 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.INSPECT SHIFT SOLENOID VALVE SLU

a. Remove shift solenoid valve SLU.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

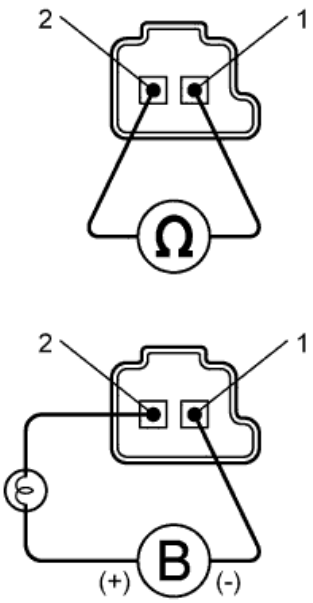
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SLU)



NG → REPLACE SHIFT SOLENOID VALVE SLU (Click here)

OK

3.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

4.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (**Click here**)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (**Click here**)

DTC P0778 Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)

for Preparation Click here

DESCRIPTION

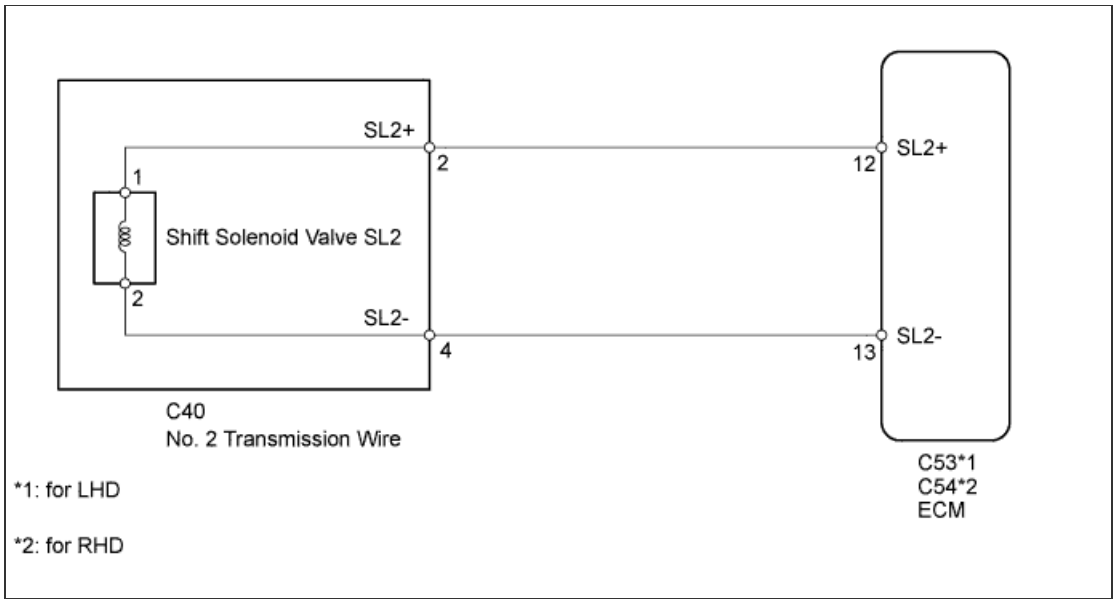
Shifting from 1st to 6th is performed in combination with the ON and OFF operation of shift solenoid valves SL1, SL2, S1, S2, S3, S4 and SR, which are controlled by the ECM. If an open or short circuit occurs in the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (Click here).

DTC Code	DTC Detection Condition	Trouble Area
P0778	The ECM checks for an open or short in the shift solenoid valve SL2 circuit while driving and shifting gears (1 trip detection logic). The output signal duty ratio equals 100% (the SL2 output signal duty ratio is less than 100% under normal conditions).	• Open or short in shift solenoid valve SL2 circuit • Shift solenoid valve SL2 • ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL2 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normally functioning shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the open or short circuited shift solenoid valve.
While driving and shifting gears, if the ECM detects an open or short in the shift solenoid valve SL2 circuit, the ECM determines there is a malfunction (Click here).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Shift solenoid valve SL2 is turned ON/OFF normally when the shift lever is in D:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL2	ON	ON	ON	ON	OFF	OFF

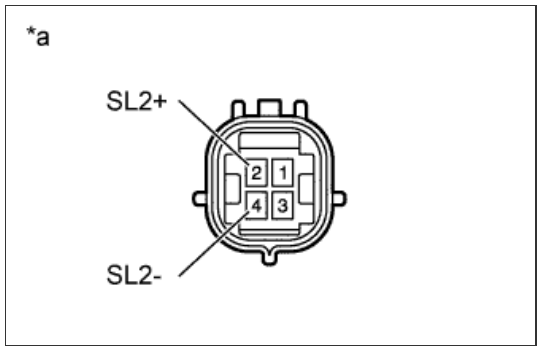
1.INSPECT NO. 2 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL2)

a. Disconnect the No. 2 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
2 (SL2+) - 4 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
2 (SL2+) - Body ground	Always	10 kΩ or higher
4 (SL2-) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 2 Transmission Wire)

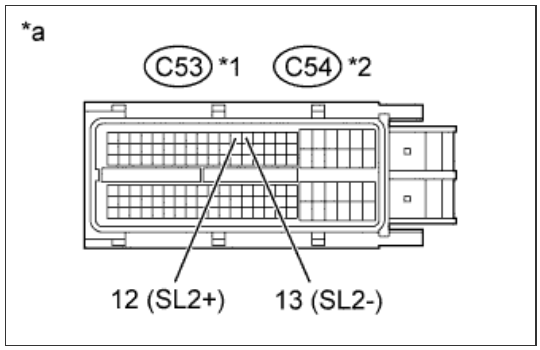
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 2 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-12 (SL2+) - C53-13 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
C53-12 (SL2+) - Body ground	Always	10 kΩ or higher
C53-13 (SL2-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-12 (SL2+) - C54-13 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
C54-12 (SL2+) - Body ground	Always	10 kΩ or higher
C54-13 (SL2-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

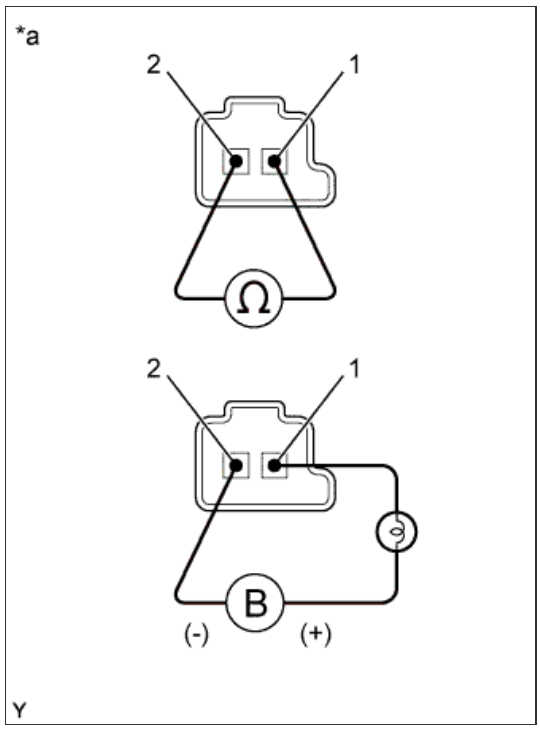
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SL2)

NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

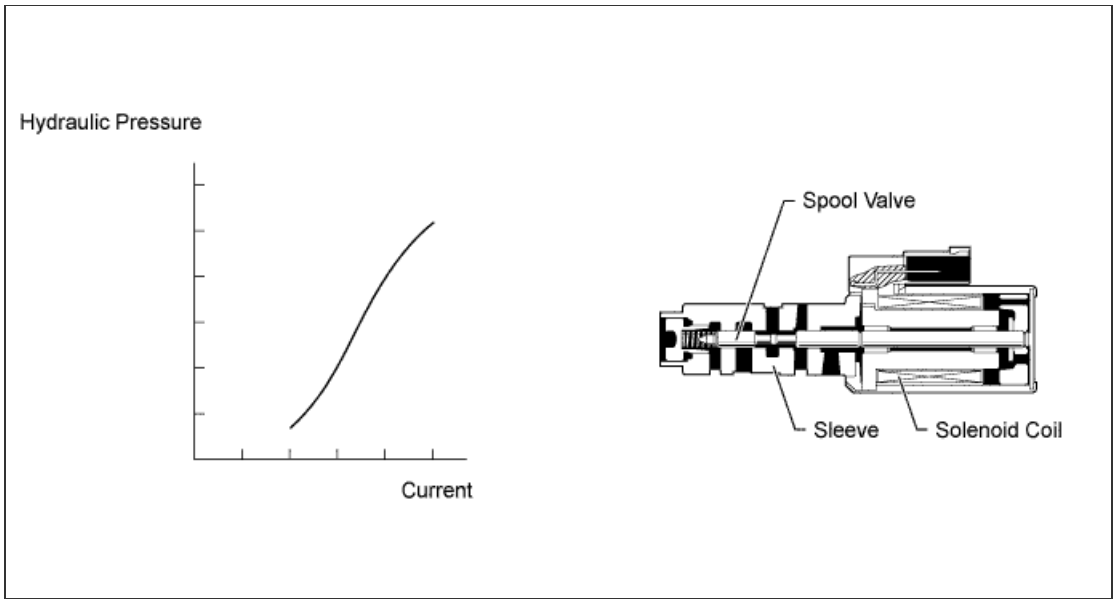
OK → REPAIR OR REPLACE NO. 2 TRANSMISSION WIRE (Click here)

DTC P2757 Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)

for Preparation Click here

DESCRIPTION

The ECM uses the signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, output speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.
Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical problems with shift solenoid valve SLU, the valve body and torque converter clutch.



DTC Code	DTC Detection Condition	Trouble Area
P2757	Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h (50 mph)), or lock-up remains ON in the lock-up OFF range (2 trip detection logic).	• Shift solenoid valve SLU remains open or closed • Shift solenoid valve SLU • Valve body is blocked • Torque converter clutch • Automatic transmission (clutch, brake, gear, etc.) • Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on the turbine (input) speed sensor NT, output speed sensor SP2, engine speed, engine load, engine temperature, vehicle speed, transmission temperature, and gear selection. The ECM determines the lock-up status of the torque converter by comparing the engine speed (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to output shaft rpm (SP2). When conditions are appropriate, the ECM requests lock-up by applying control voltage to shift solenoid valve SLU. When shift solenoid valve SLU is turned ON, it applies pressure to the lock-up relay valve and locks the torque converter clutch.
If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in shift solenoid valve SLU or the lock-up system performance.
The ECM will illuminate the MIL and store the DTC.
Example:
When one of the following conditions is met, the system determines that there is a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up ON.
  Engine speed is at least 70 rpm more than input turbine speed.
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up OFF.
  The difference between engine speed and input turbine speed is less than 35 rpm.

INSPECTION PROCEDURE

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This

non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.

b. Turn the engine switch off.

c. Connect the intelligent tester to the DLC3.

d. Turn the engine switch on (IG).

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

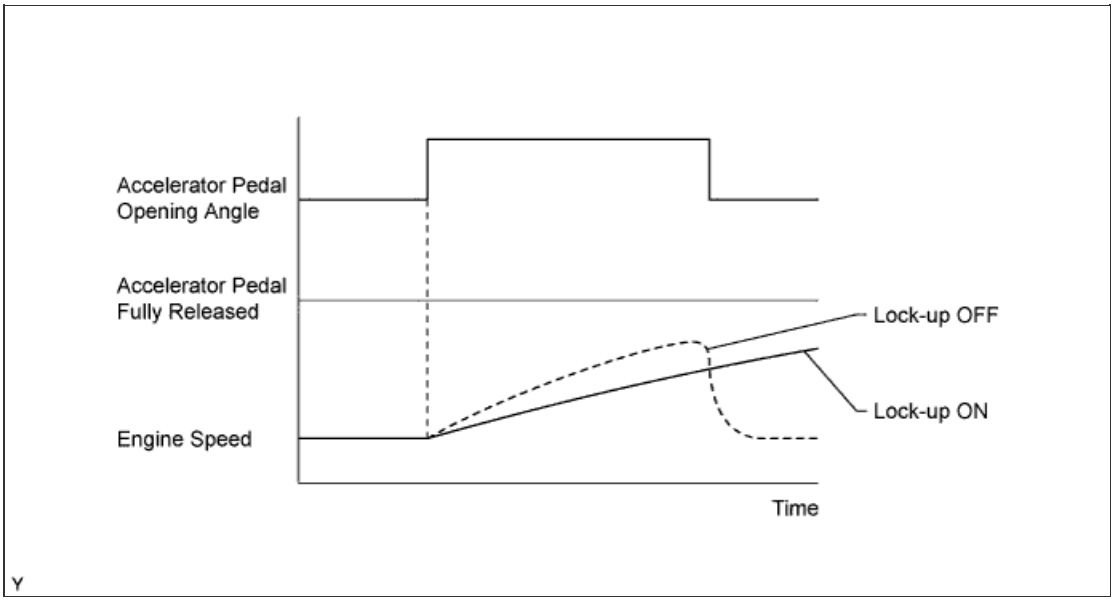
Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Lock Up	Control shift solenoid valve SLU to set automatic transmission to lock-up condition	ON or OFF	It is possible to check the shift solenoid valve SLU operation. [Vehicle Condition] • The throttle valve opening angle is less than 35%. • The vehicle speed is 60 km/h (37 mph) or more.

HINT:

- **This test can be conducted when the vehicle speed is 60 km/h (37 mph) or more.**
- **Perform this test while driving in 5th or 6th gear.**

h. Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.



HINT:

- **When changing the accelerator pedal opening angle while driving, if the engine speed does not change abruptly, lock-up is on.**
- **Slowly release the accelerator pedal in order to decelerate, but do not fully release the pedal (fully releasing the pedal will close the throttle valve and lock-up may be turned off automatically).**

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P2757)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P2757 is output	A
P2757 and other DTCs are output	B

HINT:

If any other codes besides P2757 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.INSPECT SHIFT SOLENOID VALVE SLU

a. Remove shift solenoid valve SLU.

b. Measure the resistance according to the value(s) in the table below.

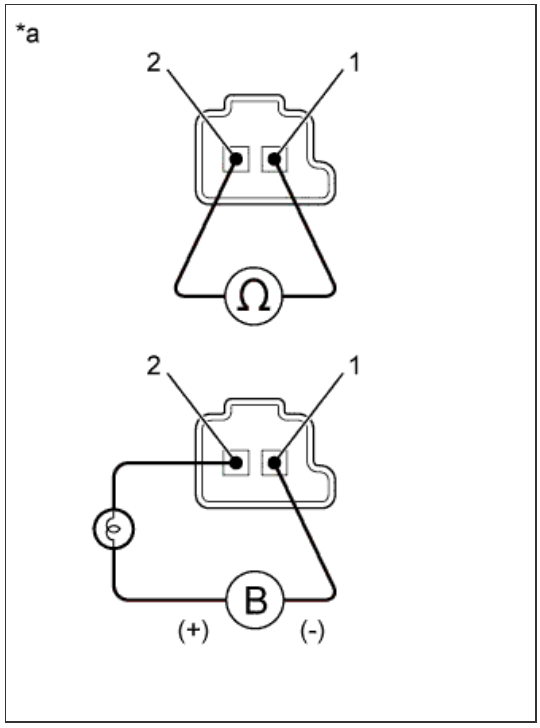
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLU)

NG → REPLACE SHIFT SOLENOID VALVE SLU (Click here)

OK

3.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

4.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

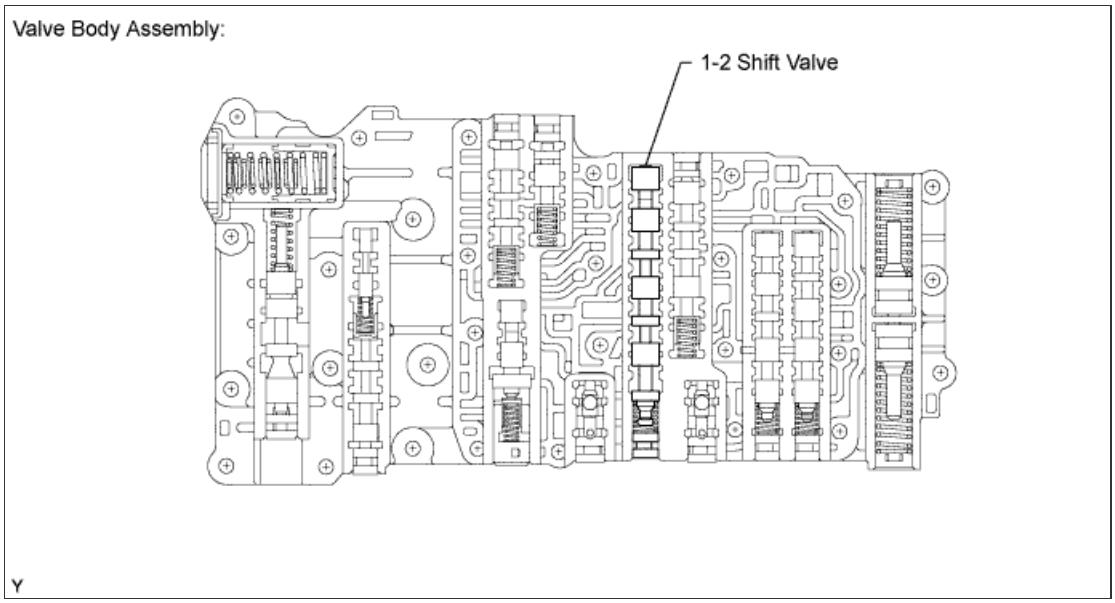
REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P0781 1-2 Shift (1-2 Shift Valve)

for Preparation Click here

DESCRIPTION

The 1-2 shift valve performs shifting to 1st gear and other gears. When shifting to 2nd and 4th gears is impossible, or when the ECM directs the transmission to switch to 5th and 6th gear and the engine overruns (clutch slips), this DTC is stored.



DTC Code	DTC Detection Condition	Trouble Area
P0781	When conditions (a) and (b), or (a) and (c) are met (2-trip detection logic*1, 1-trip detection logic*2). (a) When the ECM directs the transmission to switch to 2nd gear, the actual gear is shifted to 1st. (b) When the ECM directs the transmission to switch to 4th gear, the actual gear is shifted to 3rd. (c) When the ECM directs the transmission to switch to 5th gear, the engine overruns (clutch slips).	• Valve body is blocked up or stuck (1-2 shift valve) • Shift solenoid valve SLT remains open or closed • Automatic transmission (clutch, brake, gear, etc.)

- *1: w/ OBD
- *2: w/o OBD

HINT:

- Gear positions in the event of a shift solenoid valve mechanical problem:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	1st	3rd	3rd	N*	N*

N*: Neutral

- Gear position during fail-safe operation:
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
Actual gear position under fail-safe mode	1st*	1st*	3rd	3rd	3rd	3rd

1st*: Under engine braking, downshifting to 1st or 2nd gear is prohibited.

MONITOR DESCRIPTION

This DTC indicates that the 1-2 shift valve in the valve body is locked in the direction the spring is compressed.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF and switching oil pressure to the valves in the valve body.
The ECM calculates the "actual" transmission gear by comparing the signals from the input speed sensor (NT) and the output speed sensor (SP2). The ECM can detect many mechanical problems with the shift solenoid valves, valve body, transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and the commanded gear position are different, it will illuminate the MIL and store the DTC.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0781)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0781 is output	A
P0781 and other DTCs are output	B

HINT:

If any other codes besides P0781 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the intelligent tester to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or

		down	less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Gear positions in the event of a shift solenoid valve mechanical problem:**

Intelligent tester gear shift command	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	1st	3rd	3rd	N*	N*

N*: Neutral

OK:

Gear position changes in accordance with the intelligent tester command.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

3.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

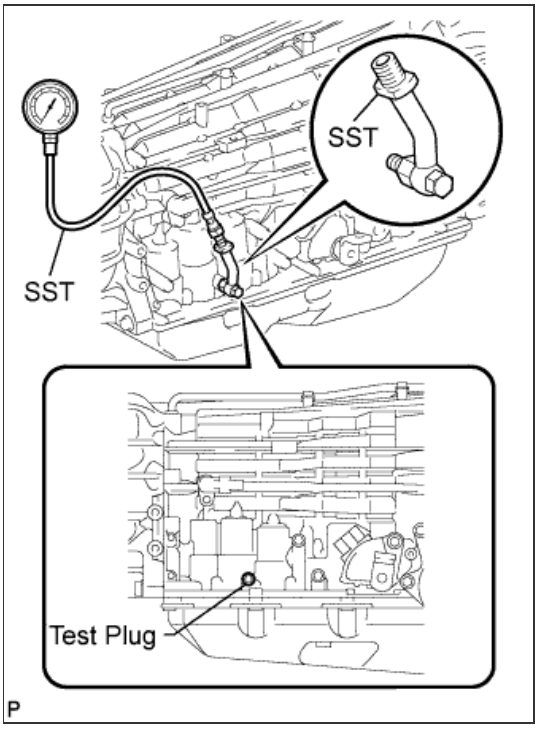
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester	Test Part	Control Range	Diagnostic Note

Display			
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (**Click here**)

OK

4.CLEAR DTC AND PERFORM RUNNING TEST

a. Clear the DTC (Click here).

b. Check for DTC again after conducting the Monitor Drive Pattern (Click here).

OK:

No DTC output.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (**Click here**)

OK

END

DTC P2759 Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)

for Preparation Click here

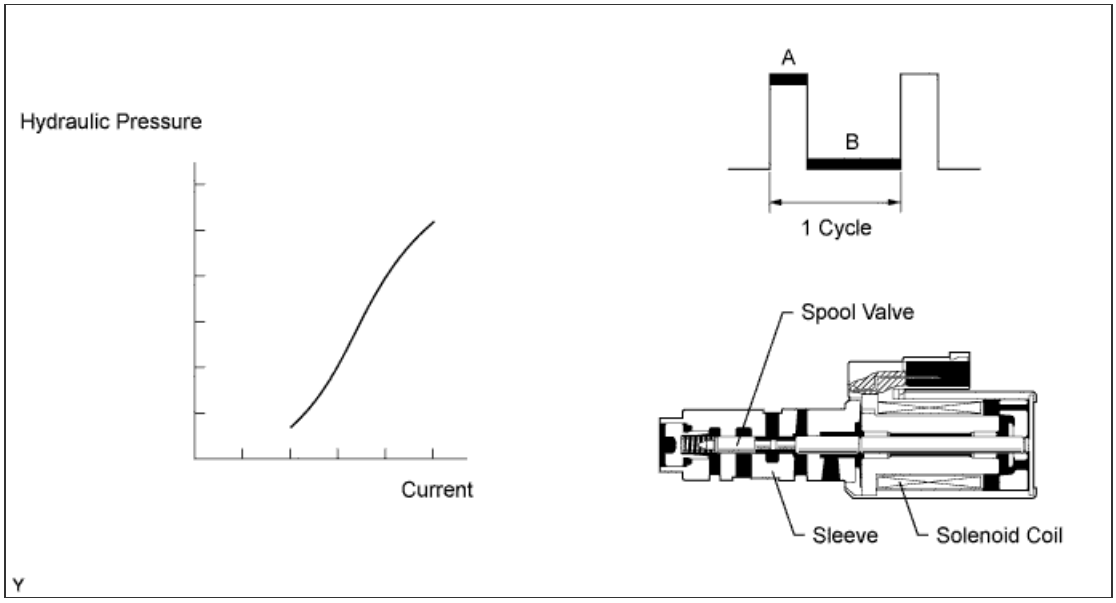
DESCRIPTION

The amount of current flow to the shift solenoid valve is controlled by the duty ratio* of the ECM output signal. During the lock-up operation, if the duty ratio increases, the lock-up hydraulic pressure increases.

HINT:

*: The duty ratio is the ratio of the current ON time (A) to the total of the current ON and OFF time (A + B).

Duty Ratio (%) = A / (A + B) x 100



DTC Code	DTC Detection Condition	Trouble Area
P2759	An open or short is detected in the shift solenoid valve SLU circuit for 1 sec. or more while driving (1 trip detection logic).	• Open or short in shift solenoid valve SLU circuit • Shift solenoid valve SLU • ECM

Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.

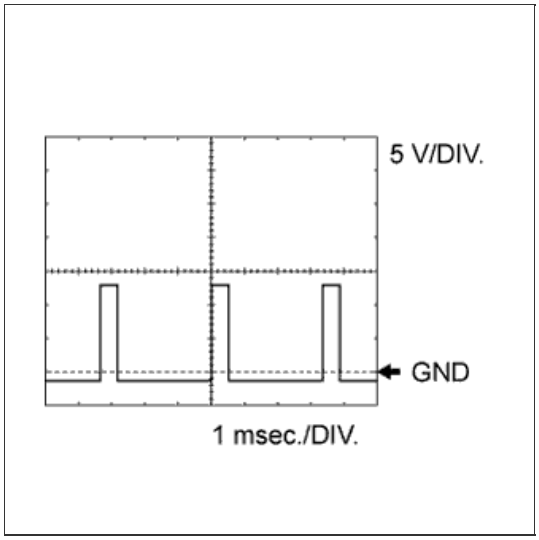
Standard:

for LHD

Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C53-10 (SLU+) - C53-11 (SLU-)	5 V/DIV., 1 msec./DIV.	5th (lock-up) or 6th (lock-up) gear	Refer to illustration

for RHD

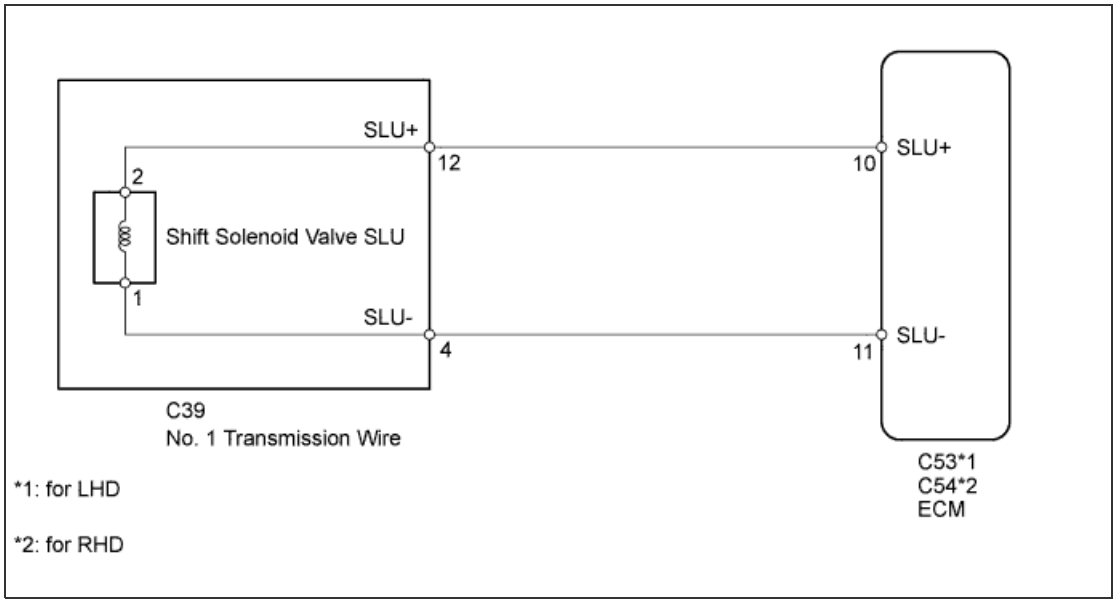
Terminal No. (Symbol)	Tool Setting	Condition	Specified Condition
C54-10 (SLU+) - C54-11 (SLU-)	5 V/DIV., 1 msec./DIV.	5th (lock-up) or 6th (lock-up) gear	Refer to illustration



MONITOR DESCRIPTION

When an open or short in the shift solenoid valve SLU circuit is detected, the ECM determines that there is a malfunction. The ECM will illuminate the MIL and store this DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLU)

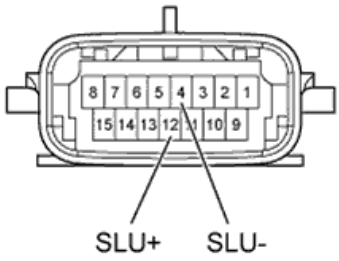
a. Disconnect the C39 No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
12 (SLU+) - 4 (SLU-)	20°C (68°F)	5.0 to 5.6 Ω
12 (SLU+) - Body ground	Always	10 kΩ or higher
4 (SLU-) - Body ground	Always	10 kΩ or higher

Component without harness connected:
(No. 1 Transmission Wire)



Y

NG → Go to step 3

OK

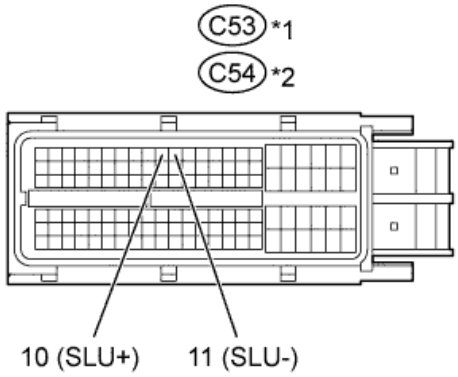
2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the C53 ECM connector (for LHD).

b. Disconnect the C54 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-10 (SLU+) - C53-11 (SLU-)	20°C (68°F)	5.0 to 5.6 Ω
C53-10 (SLU+) - Body ground	Always	10 kΩ or higher
C53-11 (SLU-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-10 (SLU+) - C54-11 (SLU-)	20°C (68°F)	5.0 to 5.6 Ω
C54-10 (SLU+) - Body ground	Always	10 kΩ or higher

C54-11 (SLU-) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK →

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SLU

a. Remove shift solenoid valve SLU.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

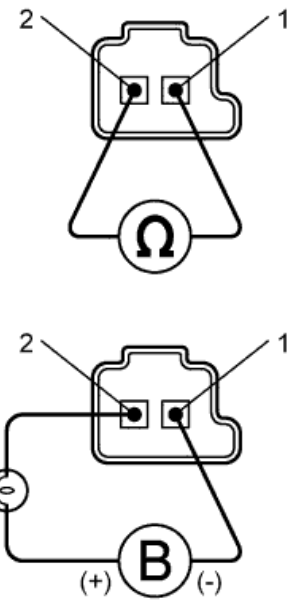
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SLU)



NG → REPLACE SHIFT SOLENOID VALVE SLU (Click here)

OK →

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0781 1-2 Shift (1-2 Shift Valve)

for Preparation Click here

DESCRIPTION

The 1-2 shift valve performs shifting to 1st gear and other gears. When shifting to 2nd and 4th gears is impossible, or when the ECM directs the transmission to switch to 5th and 6th gear and the engine overruns (clutch slips), this DTC is stored.

DTC Code	DTC Detection Condition	Trouble Area
P0781	When conditions (a) and (b), or (a) and (c) are met (2-trip detection logic*1, 1-trip detection logic*2). (a) When the ECM directs the transmission to switch to 2nd gear, the actual gear is shifted to 1st. (b) When the ECM directs the transmission to switch to 4th gear, the actual gear is shifted to 3rd. (c) When the ECM directs the transmission to switch to 5th gear, the engine overruns (clutch slips).	• Valve body is blocked up or stuck (1-2 shift valve) • Shift solenoid valve SLT remains open or closed • Automatic transmission (clutch, brake, gear, etc.)

- *1: w/ OBD
- *2: w/o OBD

HINT:

- Gear positions in the event of a shift solenoid valve mechanical problem:

ECM gear shift command	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	1st	3rd	3rd	N*	N*

N*: Neutral

- Gear position during fail-safe operation:
  If any malfunction is detected, the ECM changes into the fail-safe mode to shift into the gear positions as shown in the table below.

Gear position under normal conditions	1st	2nd	3rd	4th	5th	6th
Actual gear position under fail-safe mode	1st*	1st*	3rd	3rd	3rd	3rd

1st*: Under engine braking, downshifting to 1st or 2nd gear is prohibited.

MONITOR DESCRIPTION

This DTC indicates that the 1-2 shift valve in the valve body is locked in the direction the spring is compressed.
The ECM commands gear shifts by turning the shift solenoid valves ON/OFF and switching oil pressure to the valves in the valve body.
The ECM calculates the "actual" transmission gear by comparing the signals from the input speed sensor (NT) and the output speed sensor (SP2). The ECM can detect many mechanical problems with the shift solenoid valves, valve body, transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and the commanded gear position are different, it will illuminate the MIL and store the DTC.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTC P0781)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / DTC.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
Only P0781 is output	A
P0781 and other DTCs are output	B

HINT:

If any other codes besides P0781 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the intelligent tester to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the Active Test with the actual shift position enables you to confirm the problem (Click here).

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**
- **Gear positions in the event of a shift solenoid valve mechanical problem:**

Intelligent tester gear shift command	1st	2nd	3rd	4th	5th	6th
Actual gear position under malfunction	1st	1st	3rd	3rd	N*	N*

N*: Neutral

OK:

Gear position changes in accordance with the intelligent tester command.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

3.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

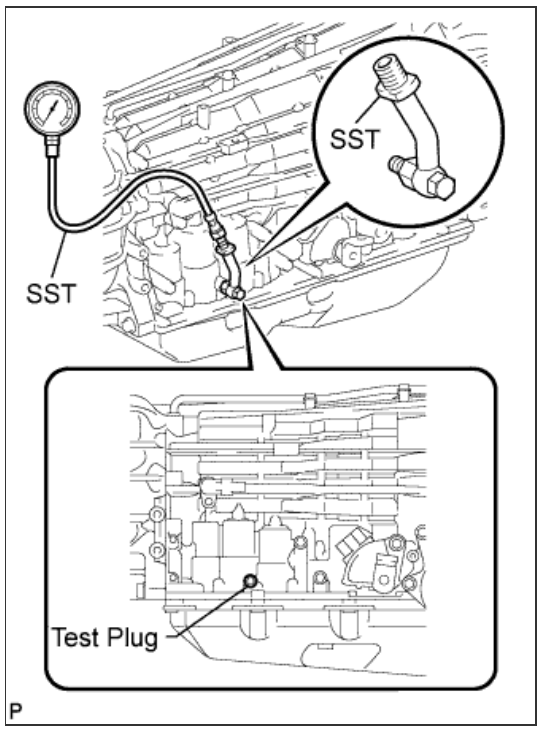
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → REPLACE SHIFT SOLENOID VALVE SLT (**Click here**)

OK

4.CLEAR DTC AND PERFORM RUNNING TEST

a. Clear the DTC (Click here).

b. Check for DTC again after conducting the Monitor Drive Pattern (Click here).

OK:
No DTC output.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)**

OK

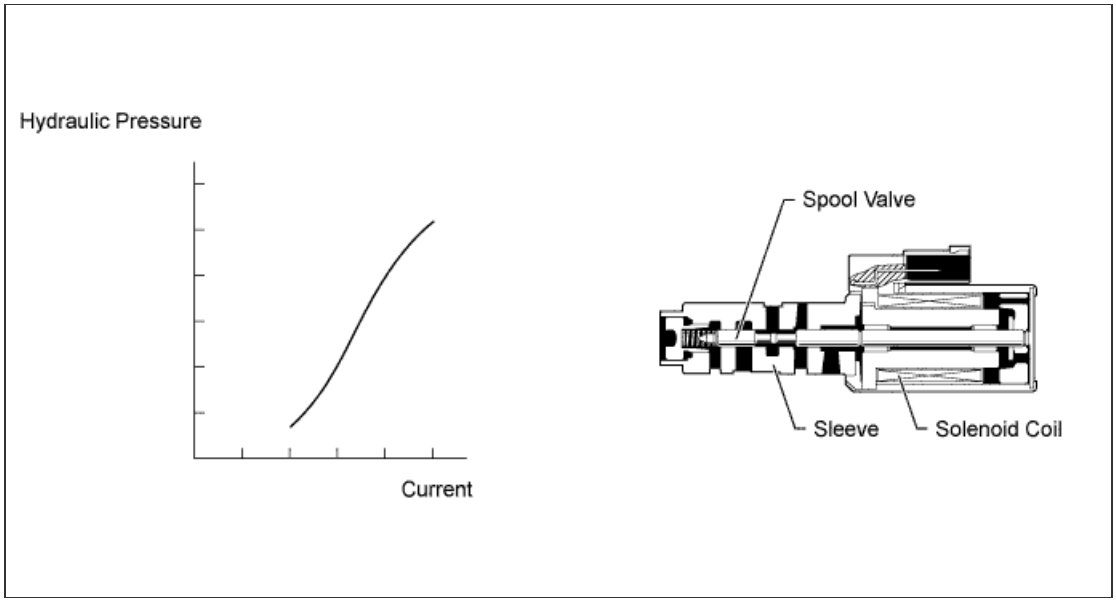
END

DTC P2759 Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)

for Preparation Click here

DESCRIPTION

The amount of current flow to the shift solenoid valve is controlled by the current of the ECM output signal. During the lock-up operation, if the current increases, the lock-up hydraulic pressure increases.

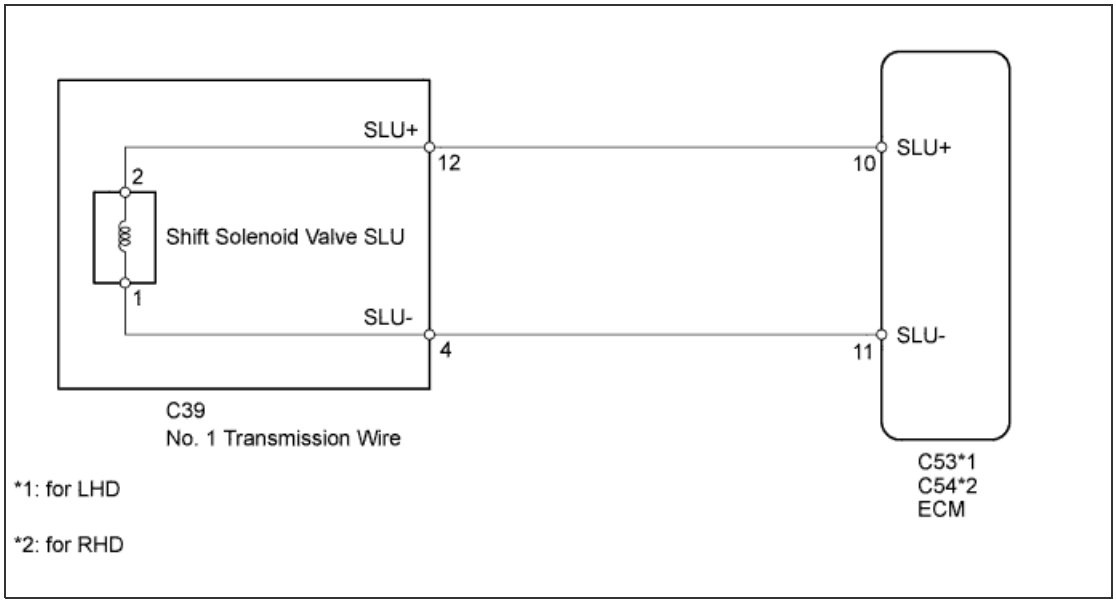


DTC Code	DTC Detection Condition	Trouble Area
P2759	An open or short is detected in the shift solenoid valve SLU circuit for 1 sec. or more while driving (1 trip detection logic).	• Open or short in shift solenoid valve SLU circuit • Shift solenoid valve SLU • ECM

MONITOR DESCRIPTION

When an open or short in the shift solenoid valve SLU circuit is detected, the ECM determines that there is a malfunction. The ECM will illuminate the MIL and store this DTC.

WIRING DIAGRAM

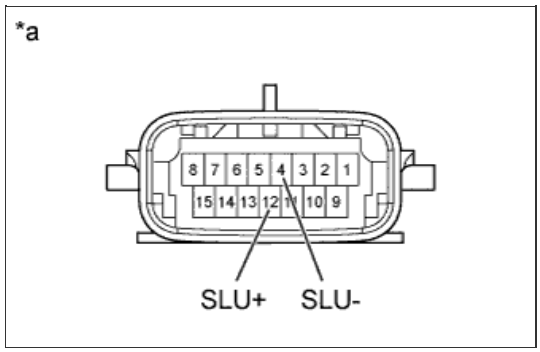


INSPECTION PROCEDURE

1.INSPECT NO. 1 TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLU)

a. Disconnect the No. 1 transmission wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
12 (SLU+) - 4 (SLU-)	20°C (68°F)	5.0 to 5.6 Ω
12 (SLU+) - Body ground	Always	10 kΩ or higher
4 (SLU-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (No. 1 Transmission Wire)

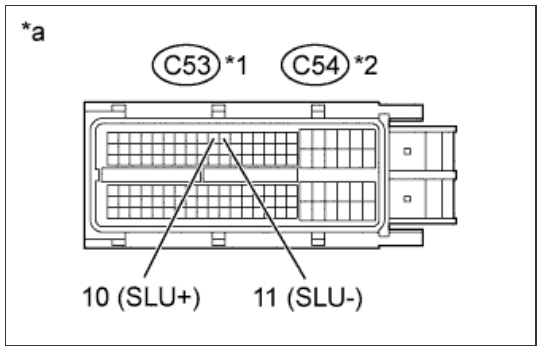
NG → Go to step 3

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 TRANSMISSION WIRE - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
C53-10 (SLU+) - C53-11 (SLU-)	20°C (68°F)	5.0 to 5.6 Ω
C53-10 (SLU+) - Body ground	Always	10 kΩ or higher
C53-11 (SLU-) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
C54-10 (SLU+) - C54-11 (SLU-)	20°C (68°F)	5.0 to 5.6 Ω
C54-10 (SLU+) - Body ground	Always	10 kΩ or higher
C54-11 (SLU-) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector

	(to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

3.INSPECT SHIFT SOLENOID VALVE SLU

a. Remove shift solenoid valve SLU.

b. Measure the resistance according to the value(s) in the table below.

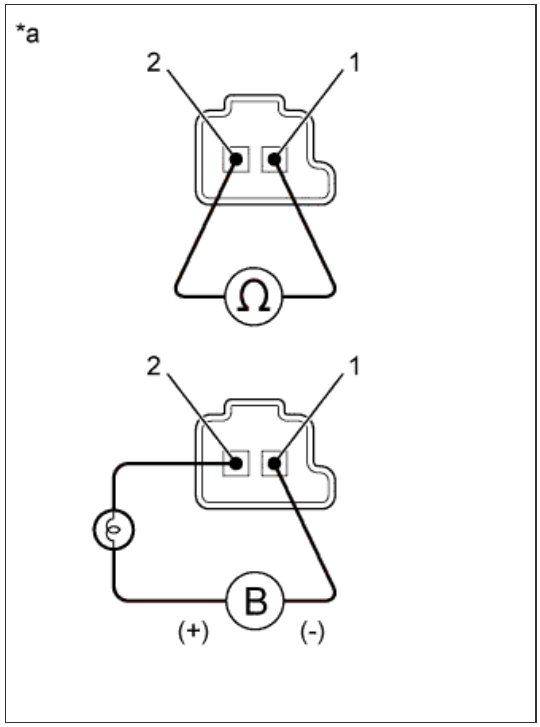
Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise



Text in Illustration

*a	Component without harness connected (Shift Solenoid Valve SLU)

NG → REPLACE SHIFT SOLENOID VALVE SLU (Click here)

OK

REPAIR OR REPLACE NO. 1 TRANSMISSION WIRE (Click here)

DTC P0818 Driveline Disconnect Switch Input Circuit

for Preparation Click here

DESCRIPTION

The ECM detects the signal indicating that the transfer is in neutral.
This DTC indicates that the signal indicating that the transfer is in neutral remains on.

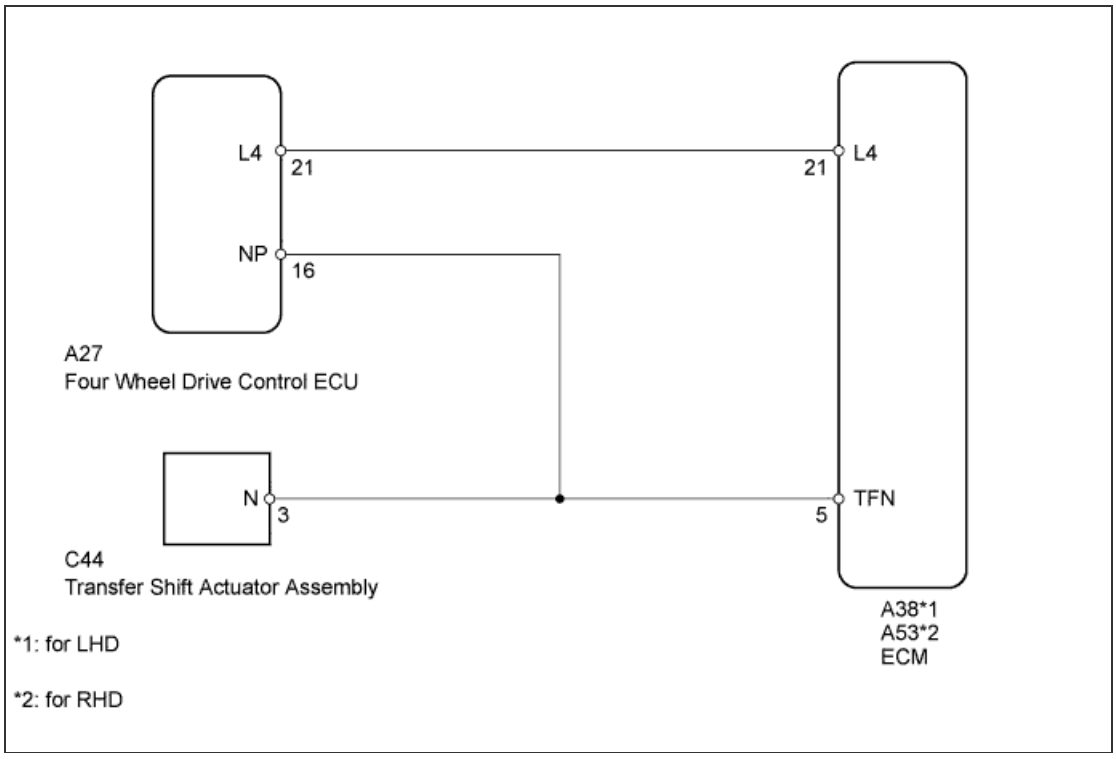
DTC Code	DTC Detection Condition	Trouble Area
P0818	The signal indicating that the transfer is in neutral remains on while the vehicle is running under the following conditions for 30 sec. (2 trip detection logic): • The vehicle speed is 25 km/h (16 mph) or more. • The transfer position switch is in H4.	• Short in transfer neutral signal • Transfer shift actuator assembly (transfer system) • ECM

MONITOR DESCRIPTION

The ECM detects whether or not the transfer is in neutral by monitoring the signal from the transfer shift actuator assembly.
If the ECM detects that the transfer is in neutral under the following conditions, the ECM will conclude that there is a malfunction of the transfer shift actuator assembly, illuminate the MIL and store the DTC:

- The transfer shift actuator assembly indicates that the transfer is in neutral.
- The transfer position switch is in the "H4" position.
- The vehicle is being driven at 25 km/h (16 mph) or more.
- The transfer neutral signal has been on for more than 30 seconds.

WIRING DIAGRAM



INSPECTION PROCEDURE

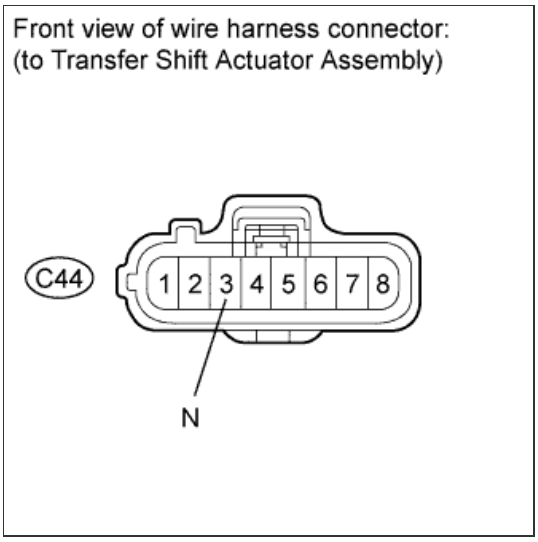
1.CHECK HARNESS AND CONNECTOR (TRANSFER SHIFT ACTUATOR ASSEMBLY - BODY GROUND)

a. Disconnect the C44 transfer shift actuator assembly connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C44-3 (N) - Body ground	Always	10 kΩ or higher



NG → Go to step 2

OK

GO TO TRANSFER SYSTEM INSPECTION (Click here)

2.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - BODY GROUND)

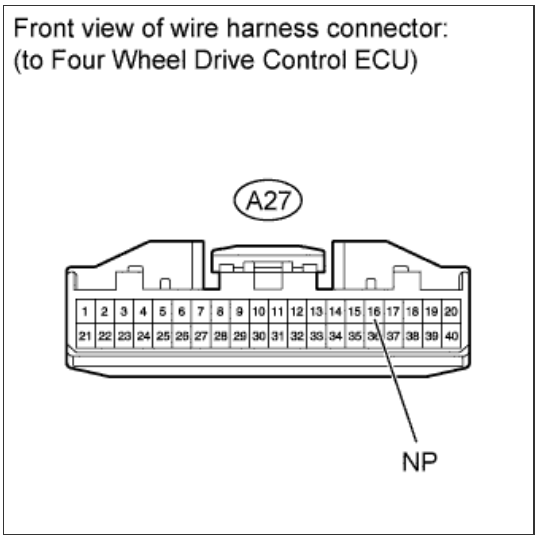
a. Disconnect the A27 four wheel drive control ECU connector.

b. Disconnect the C44 transfer shift actuator assembly connector.

c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-16 (NP) - Body ground	Always	10 kΩ or higher



NG → Go to step 3

OK

GO TO TRANSFER SYSTEM INSPECTION (Click here)

3.CHECK HARNESS AND CONNECTOR (TRANSFER SHIFT ACTUATOR ASSEMBLY, FOUR WHEEL DRIVE CONTROL ECU - ECM)

a. Disconnect the A38 ECM connector (for LHD).

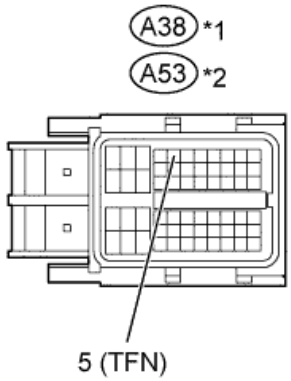
b. Disconnect the A53 ECM connector (for RHD).

c. Disconnect the C44 transfer shift actuator assembly connector.

d. Disconnect the A27 four wheel drive control ECU connector.

e. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
A38-5 (TFN) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
A53-5 (TFN) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE ECM (Click here)

DTC P2772 Four Wheel Drive (4WD) Low Switch Circuit Range / Performance

for Preparation Click here

DESCRIPTION

The ECM detects the signal from the transfer L4 position switch.
This DTC indicates that the transfer L4 position switch remains on.

DTC Code	DTC Detection Condition	Trouble Area
P2772	The transfer L4 position switch remains on while the vehicle is running under the following conditions for 1.8 sec. or more (1-trip detection logic). (a) The output shaft speed is between 1000 and 3000 rpm. (b) The transfer position switch is in H4.	• Short in transfer L4 position switch circuit • Four wheel drive control ECU • ECM

MONITOR DESCRIPTION

The ECM monitors the transfer-case L4 position switch to determine when the transfer-case L4 gears are engaged. If the transfer-case L4 gears remain engaged under the following conditions, the ECM will conclude that there is a malfunction of the L4 position switch, illuminate the MIL and store the DTC:

- The L4 switch indicates that the L4 transfer-case gears are engaged.
- The transfer-case shifter is in the "H4" position.
- The transfer-case output shaft rpm is between 1000 and 3000 rpm.
- The specified time period has elapsed.

WIRING DIAGRAM

Refer to DTC P0818 (Click here).

INSPECTION PROCEDURE

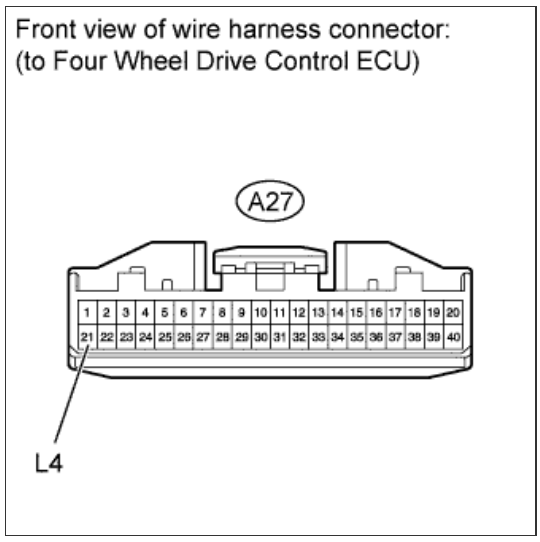
1.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - BODY GROUND)

a. Disconnect the A27 four wheel drive control ECU connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-21 (L4) - Body ground	Always	10 kΩ or higher



NG → Go to step 2

OK

GO TO TRANSFER SYSTEM INSPECTION (Click here)

2.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - ECM)

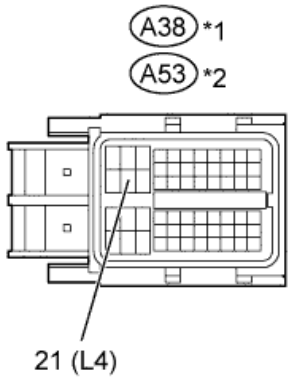
a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Disconnect the A27 four wheel drive control ECU connector.

d. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
A38-21 (L4) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
A53-21 (L4) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0894 Transmission Component Slipping

DTC P2714 Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

for Preparation Click here

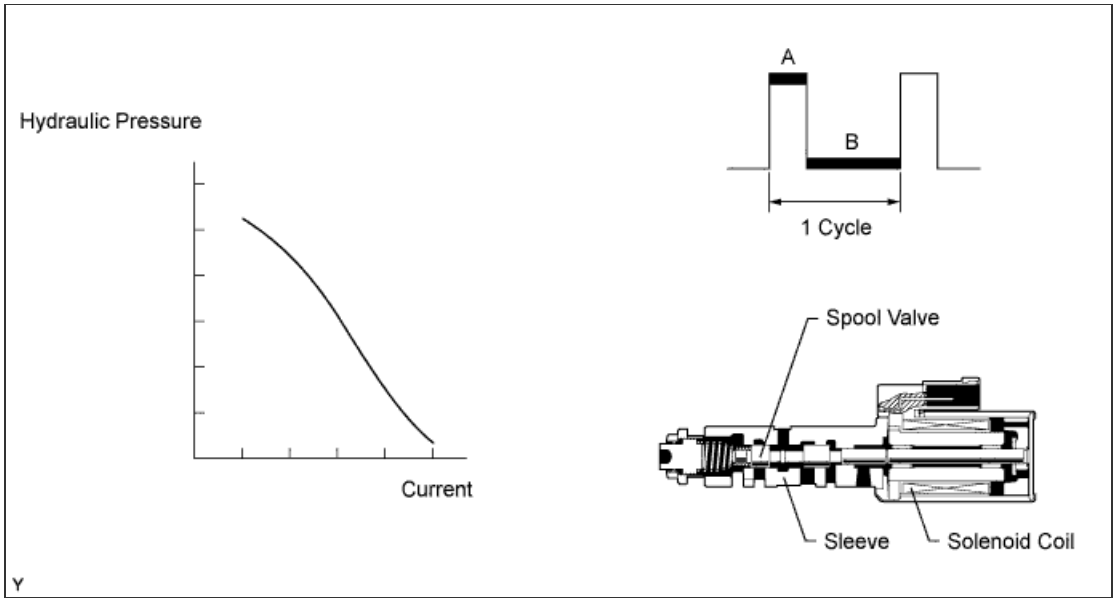
DESCRIPTION

The shift solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and vehicle speed sensor. The ECM adjusts the duty ratio* of shift solenoid valve SLT to control the hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

HINT:

*: The duty ratio is the ratio of the current ON time (A) to the total of the current ON and OFF time (A + B).

Duty Ratio (%) = A / (A + B) x 100



DTC Code	DTC Detection Condition	Trouble Area
P0894	The ECM detects a malfunction of shift solenoid valve SLT, S1, S2, S3, S4, SL2, gear 6 incorrect ratio (sequence valve) or 1-2 shift valves according to the revolution difference of the turbine and output shaft, and also by the oil pressure (2 trip detection logic).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P2714	The ECM detects a malfunction of shift solenoid valve SLT (ON side) according to the revolution difference of the turbine and output shaft, and also by the oil pressure (2 trip detection logic*1, 1-trip detection logic*2).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

- *1: w/ OBD
- *2: w/o OBD

MONITOR DESCRIPTION

The ECM calculates the amount of heat absorbed by the friction material based on the difference in revolution (clutch slippage) between the turbine and output shaft. The ECM illuminates the MIL and stores these DTCs when the amount of heat absorption exceeds the specified value.
There are 2 causes of revolution difference.

- When shift solenoid valve SLT remains ON, oil pressure decreases, which causes the clutch engagement force to decrease.
- When the shift solenoid valve remains ON or OFF, the gear position commanded by the ECM and the actual gear position are not the same.

NOTICE:

If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0894 AND P2714)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
P0894 and/or P2714 is output	A
P0894, P2714 and other DTCs are output	B

HINT:

If any other codes besides P0894 and P2714 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

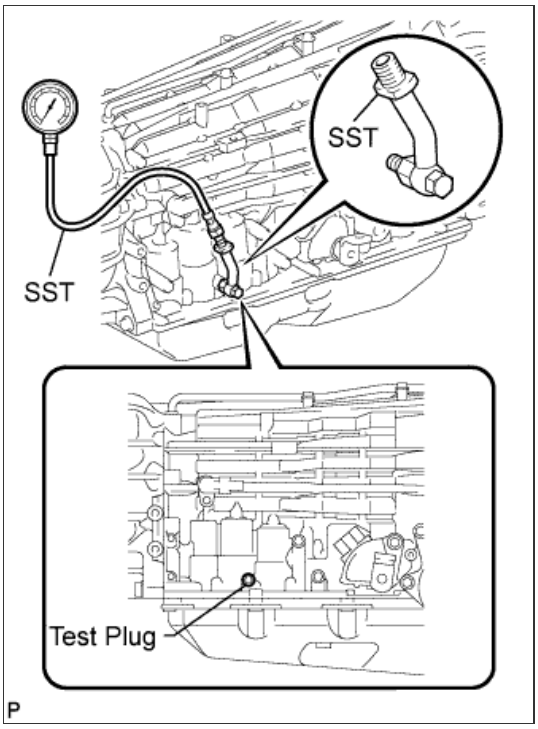
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → **Go to step 17**

OK

3.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the intelligent tester to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**

f. Compare the ECM gear shift command and the actual gear position.

OK:

Gear position changes in accordance with the intelligent tester command.

Result

System Condition			ECM Gear Shift Command						Proceed to
			1st	2nd	3rd	4th	5th	6th	
Malfunction	Shift solenoid valve S1	Stuck ON*1	2nd	2nd	3rd	4th	5th	6th	A
		Stuck OFF	1st	1st	3rd	4th	5th	N*2	
	Shift solenoid valve S2	Stuck ON	1st	2nd	2nd	4th	6th	6th	B
		Stuck OFF	3rd	3rd	3rd	4th	5th	5th	
	Shift solenoid valve S3	Stuck ON	1st	2nd	3rd	3rd	N*2	N*2	C
		Stuck OFF	3rd	4th	4th	4th	5th	6th	
	Shift solenoid valve S4	Stuck ON*3	1st	2nd	3rd	4th	5th	6th	D
		Stuck OFF	1st	2nd	3rd	4th	4th	4th	
Normal			1st	2nd	3rd	4th	5th	6th	E

HINT:

- ***1: When shift solenoid valve S1 is stuck ON, the vehicle cannot drive in reverse.**
- ***2: Neutral**
- ***3: When shift solenoid valve S4 is stuck ON, gear shifting is normal.**

B	Go to step 7
C	Go to step 10
D	Go to step 13
E	Go to step 17

A

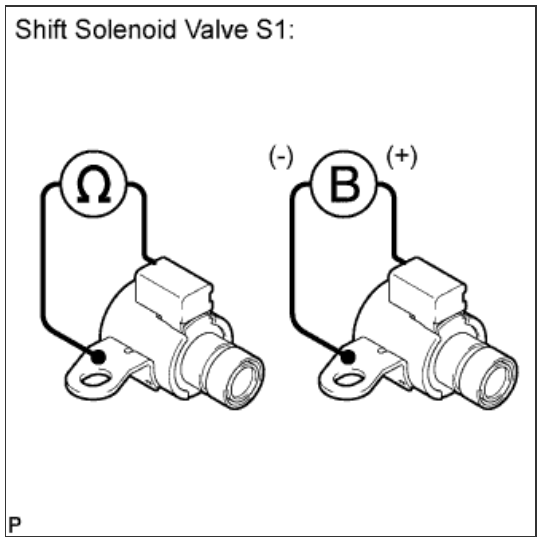
4.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

6.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

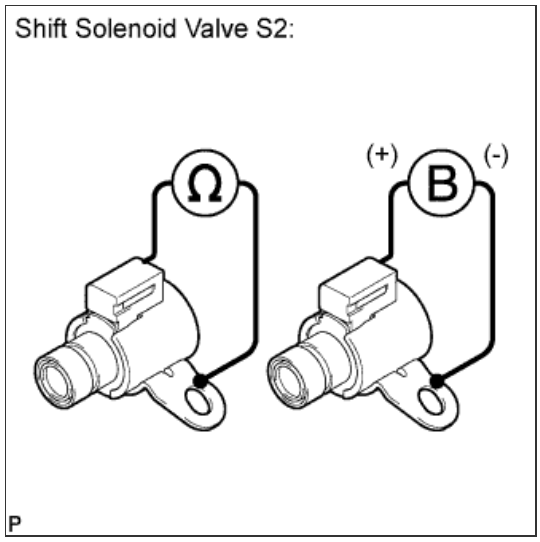
7.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

8.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

9.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

10.INSPECT SHIFT SOLENOID VALVE S3

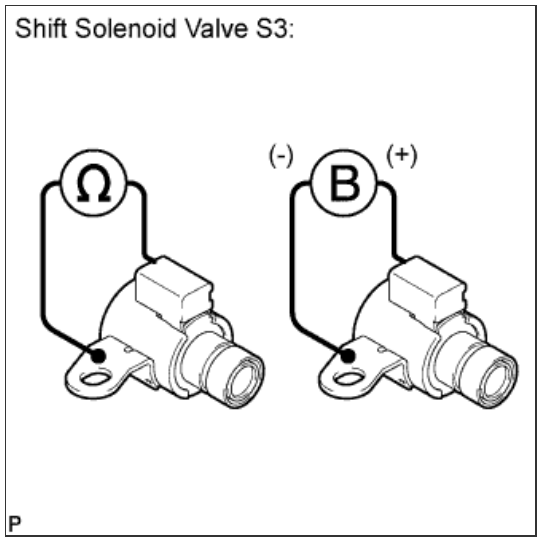
a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition

Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

11.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

12.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

13.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

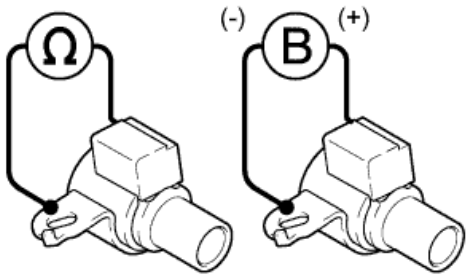
Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Shift Solenoid Valve S4:



P

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

14.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

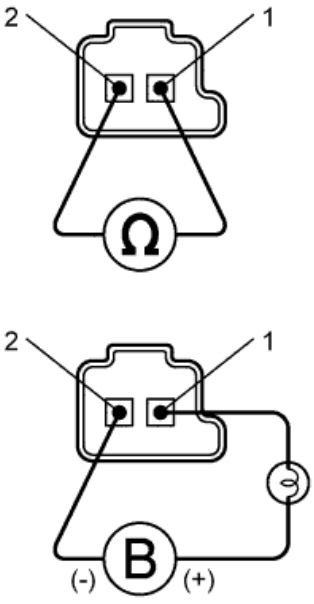
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SL2)



NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

15.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

16.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

17.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

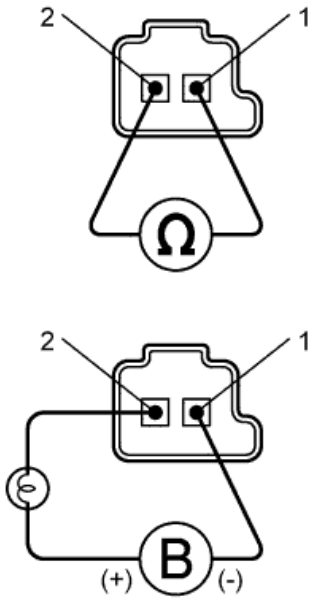
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SLT)



NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

18.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

19.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

DTC P2772 Four Wheel Drive (4WD) Low Switch Circuit Range / Performance

for Preparation Click here

DESCRIPTION

The ECM detects the signal from the transfer L4 position switch.
This DTC indicates that the transfer L4 position switch remains on.

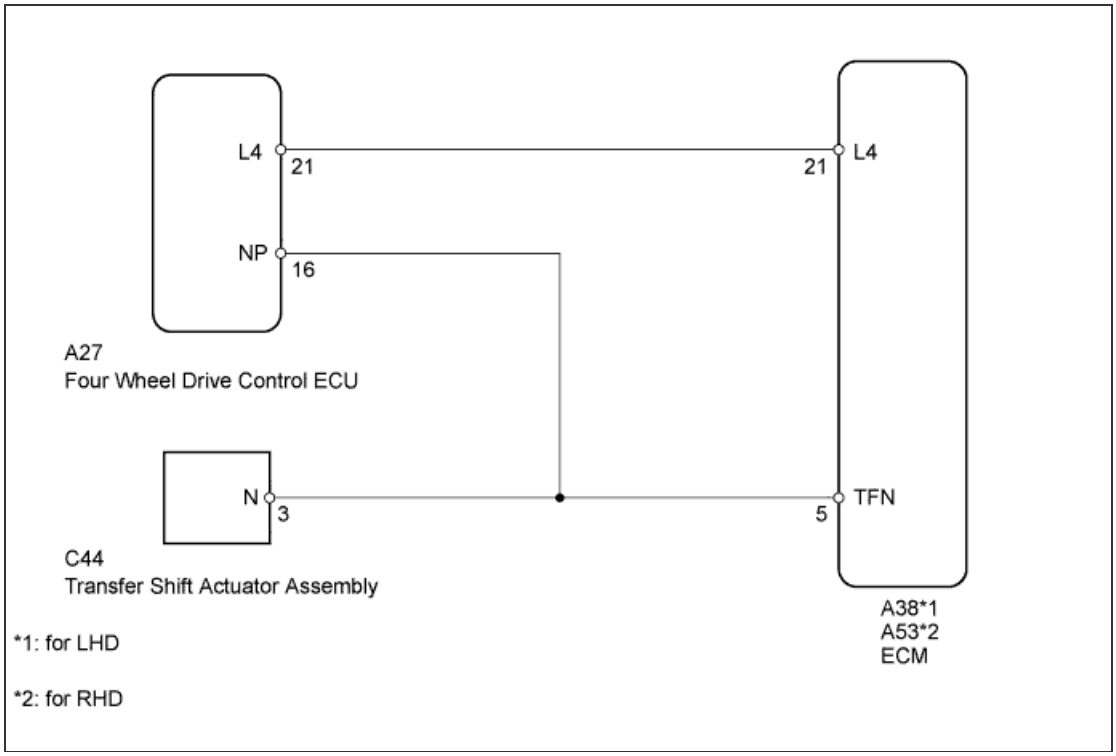
DTC Code	DTC Detection Condition	Trouble Area
P2772	The transfer L4 position switch remains on while the vehicle is running under the following conditions for 1.8 sec. or more (1-trip detection logic). (a) The output shaft speed is between 1000 and 3000 rpm. (b) The transfer position switch is in H4.	• Short in transfer L4 position switch circuit • Four wheel drive control ECU • ECM

MONITOR DESCRIPTION

The ECM monitors the transfer-case L4 position switch to determine when the transfer-case L4 gears are engaged. If the L4 switch indicates that the transfer-case L4 gears remain engaged under the following conditions, the ECM will conclude that there is a malfunction of the L4 position switch, illuminate the MIL and store the DTC:

- The transfer-case shifter is in the "H4" position.
- The transfer-case output shaft rpm is between 1000 and 3000 rpm.
- The specified time period has elapsed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - BODY GROUND)

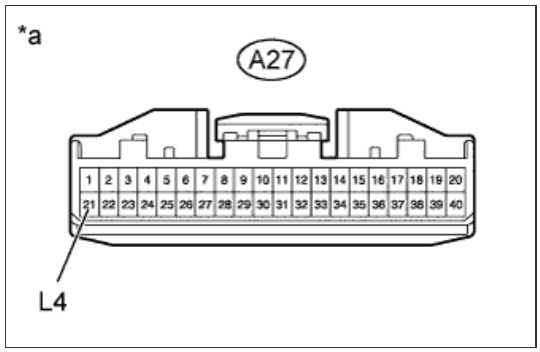
a. Disconnect the four wheel drive control ECU connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition

A27-21 (L4) - Body ground	Always	10 kΩ or higher



Text in Illustration

*a	Front view of wire harness connector (to Four Wheel Drive Control)

NG → Go to step 2

OK

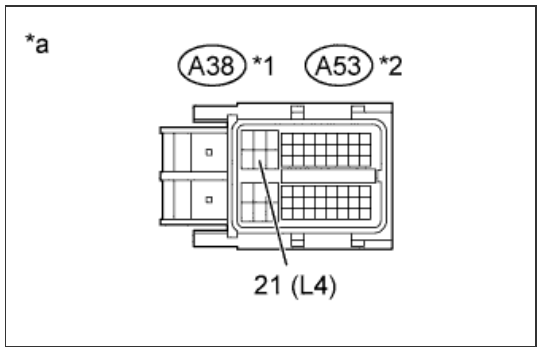
GO TO TRANSFER SYSTEM INSPECTION (Click here)

2.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - ECM)

a. Disconnect the ECM connector.

b. Disconnect the A27 four wheel drive control ECU connector.

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
A38-21 (L4) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
A53-21 (L4) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

DTC P0894 Transmission Component Slipping

DTC P2714 Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

for Preparation Click here

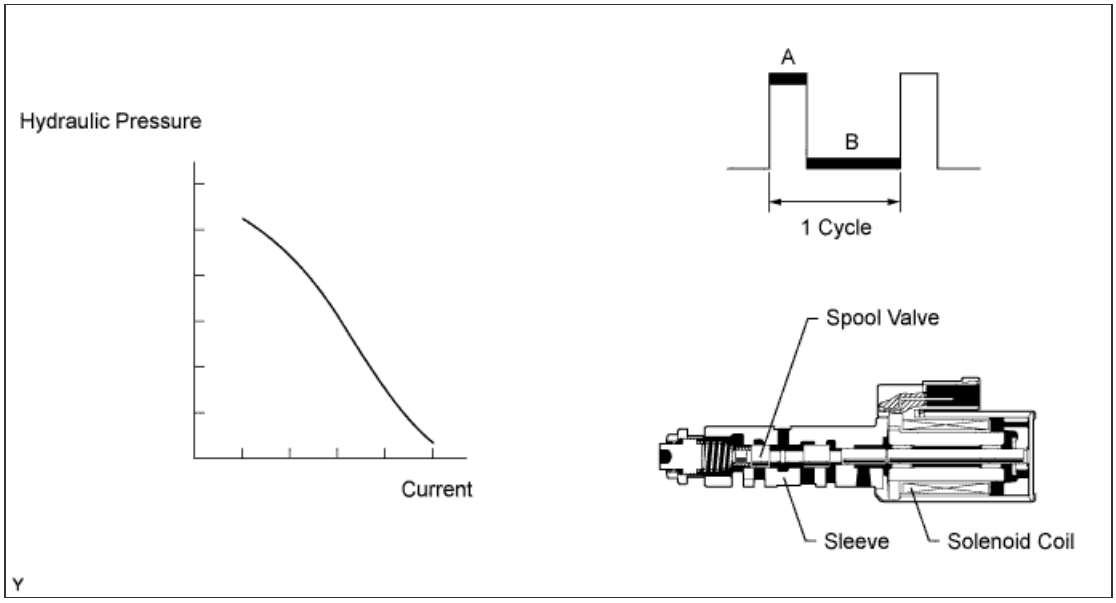
DESCRIPTION

The shift solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and vehicle speed sensor. The ECM adjusts the duty ratio* of shift solenoid valve SLT to control the hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

HINT:

*: The duty ratio is the ratio of the current ON time (A) to the total of the current ON and OFF time (A + B).

Duty Ratio (%) = A / (A + B) x 100



DTC Code	DTC Detection Condition	Trouble Area
P0894	The ECM detects a malfunction of shift solenoid valve SLT, S1, S2, S3, S4, SL2, gear 6 incorrect ratio (sequence valve) or 1-2 shift valves according to the revolution difference of the turbine and output shaft, and also by the oil pressure (2 trip detection logic).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)
P2714	The ECM detects a malfunction of shift solenoid valve SLT (ON side) according to the revolution difference of the turbine and output shaft, and also by the oil pressure (2 trip detection logic*1, 1-trip detection logic*2).	• Shift solenoid valve SLT remains open or closed • Shift solenoid valve S1, S2, S3, S4 or SL2 remains open or closed • Gear 6 incorrect ratio (sequence valve) or 1-2 shift valve is stuck • Valve body is blocked • Automatic transmission (clutch, brake, gear, etc.)

- *1: w/ OBD
- *2: w/o OBD

MONITOR DESCRIPTION

The ECM calculates the amount of heat absorbed by the friction material based on the difference in revolution (clutch slippage) between the turbine and output shaft. The ECM illuminates the MIL and stores these DTCs when the amount of heat absorption exceeds the specified value.
There are 2 causes of revolution difference.

- When shift solenoid valve SLT remains ON, oil pressure decreases, which causes the clutch engagement force to decrease.
- When the shift solenoid valve remains ON or OFF, the gear position commanded by the ECM and the actual gear position are not the same.

NOTICE:

If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

INSPECTION PROCEDURE

1.CHECK DTC OUTPUT (IN ADDITION TO DTCS P0894 AND P2714)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs using the intelligent tester.

Result

Result	Proceed to
P0894 and/or P2714 is output	A
P0894, P2714 and other DTCs are output	B

HINT:

If any other codes besides P0894 and P2714 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART (Click here)

A

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Remove the test plug on the transmission case center right side and connect SST.

SST

09992-00095 (09992-00231, 09992-00271)

b. Connect the intelligent tester to the DLC3.

c. Start the engine and warm it up.

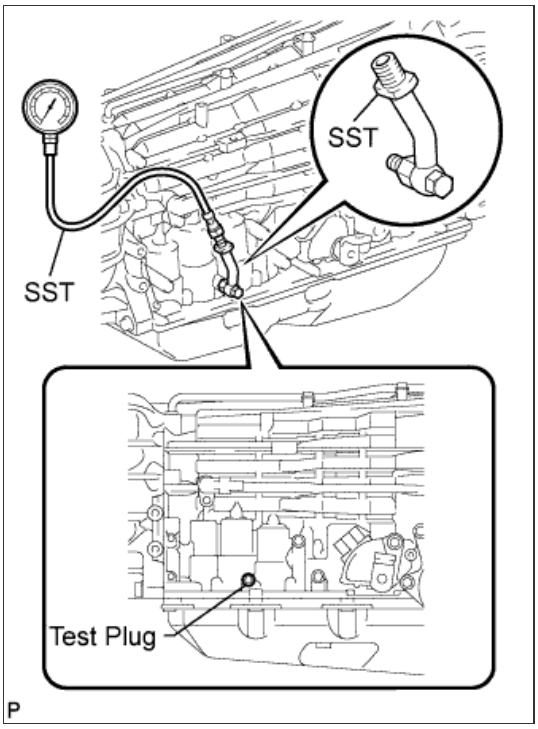
d. Measure the line pressure with SST.

e. Turn the intelligent tester on.

f. Enter the following menus: Powertrain / Engine and ECT / Active Test.

g. According to the display on the intelligent tester, perform the Active Test.

h. Measure the line pressure.



Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Activate the Solenoid (SLT)*	Operate shift solenoid valve SLT and raise line pressure	ON or OFF **HINT:** • **OFF: Line pressure up (when Active Test "Activate the Solenoid (SLT)" is performed, ECM commands shift solenoid valve SLT to turn OFF)** • **ON: No action (normal operation)**	[Vehicle Condition] • The vehicle is stopped. • The engine is idling.

HINT:

*: Activate the Solenoid (SLT) in the Active Test is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the Hydraulic Test (Click here) as well. Note that the pressure values in the Active Test and hydraulic test are different.

OK:

The line pressure changes as specified when performing the Active Test.

NG → **Go to step 17**

OK

3.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (RUNNING TEST)

CAUTION:

This test should always be performed with at least 2 people.

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **Perform the test with the A/C turned off.**

HINT:

Using the intelligent tester to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Connect the intelligent tester to the DLC3.

b. Clear the DTC (Click here).

c. Warm up the engine.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test.

e. According to the display on the intelligent tester, perform the Active Test.

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Engine and ECT

Tester Display	Test Part	Control Range	Diagnostic Note
Control the Shift Position	Operate shift solenoid valve and set each shift position	• Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves. [Vehicle Condition] The vehicle speed is 50 km/h (31 mph) or less.

HINT:

- **This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.**
- **The 4th to 5th and 5th to 6th up-shifts must be performed with the accelerator pedal released.**
- **The 6th to 5th and 5th to 4th down-shifts must be performed with the accelerator pedal released.**
- **Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.**
- **The shift position commanded by the ECM is shown in the Data List display on the intelligent tester.**

f. Compare the ECM gear shift command and the actual gear position.

OK:

Gear position changes in accordance with the intelligent tester command.

Result

System Condition			ECM Gear Shift Command						Proceed to
			1st	2nd	3rd	4th	5th	6th	
Malfunction	Shift solenoid valve S1	Stuck ON*1	2nd	2nd	3rd	4th	5th	6th	A
		Stuck OFF	1st	1st	3rd	4th	5th	N*2	
	Shift solenoid valve S2	Stuck ON	1st	2nd	2nd	4th	6th	6th	B
		Stuck OFF	3rd	3rd	3rd	4th	5th	5th	
	Shift solenoid valve S3	Stuck ON	1st	2nd	3rd	3rd	N*2	N*2	C
		Stuck OFF	3rd	4th	4th	4th	5th	6th	
	Shift solenoid valve S4	Stuck ON*3	1st	2nd	3rd	4th	5th	6th	D
		Stuck OFF	1st	2nd	3rd	4th	4th	4th	
Normal			1st	2nd	3rd	4th	5th	6th	E

HINT:

- ***1: When shift solenoid valve S1 is stuck ON, the vehicle cannot drive in reverse.**
- ***2: Neutral**
- ***3: When shift solenoid valve S4 is stuck ON, gear shifting is normal.**

B	Go to step 7
C	Go to step 10
D	Go to step 13
E	Go to step 17

A

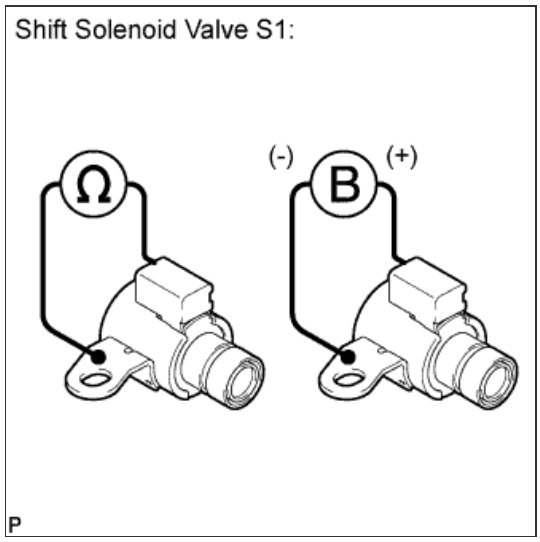
4.INSPECT SHIFT SOLENOID VALVE S1

a. Remove shift solenoid valve S1.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S1 connector • Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

NG → REPLACE SHIFT SOLENOID VALVE S1 (Click here)

OK

5.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

6.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

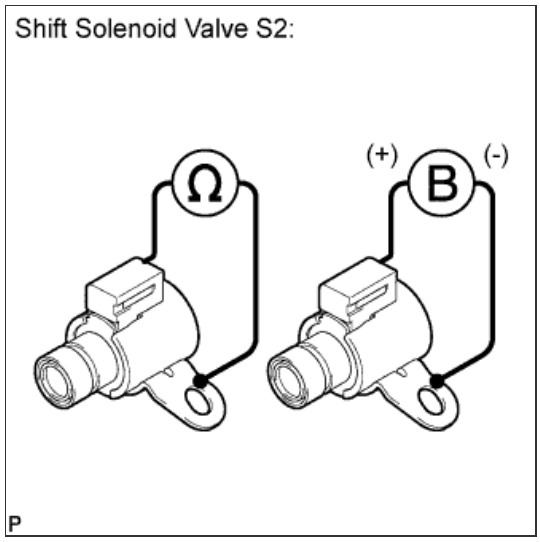
7.INSPECT SHIFT SOLENOID VALVE S2

a. Remove shift solenoid valve S2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S2 connector • Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

NG → REPLACE SHIFT SOLENOID VALVE S2 (Click here)

OK

8.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

9.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

10.INSPECT SHIFT SOLENOID VALVE S3

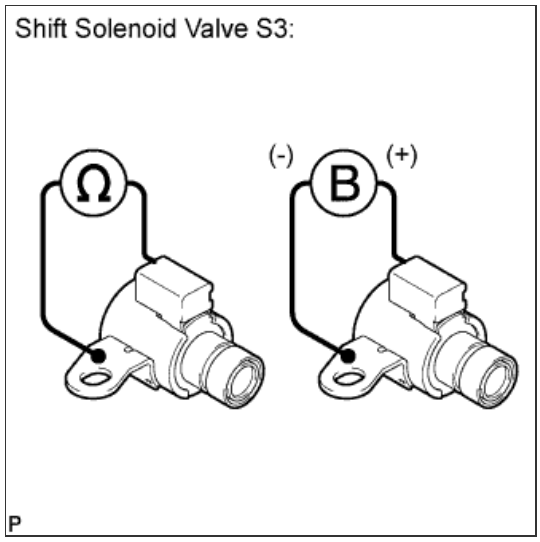
a. Remove shift solenoid valve S3.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition

Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω



c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S3 connector • Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

NG → REPLACE SHIFT SOLENOID VALVE S3 (Click here)

OK

11.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

12.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

13.INSPECT SHIFT SOLENOID VALVE S4

a. Remove shift solenoid valve S4.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

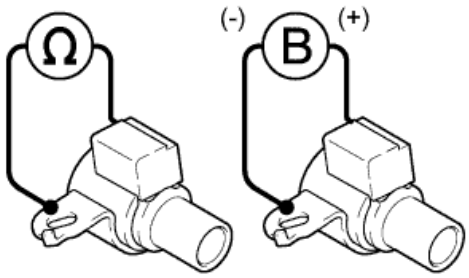
Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift solenoid valve S4 body	20°C (68°F)	11 to 15 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) → Shift solenoid valve S4 connector • Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

Shift Solenoid Valve S4:



P

NG → REPLACE SHIFT SOLENOID VALVE S4 (Click here)

OK

14.INSPECT SHIFT SOLENOID VALVE SL2

a. Remove shift solenoid valve SL2.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

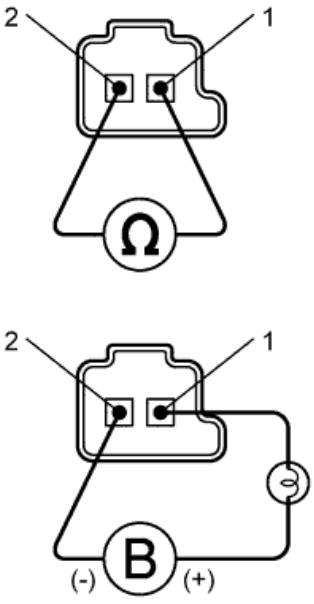
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 1 • Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SL2)



NG → REPLACE SHIFT SOLENOID VALVE SL2 (Click here)

OK

15.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

16.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

17.INSPECT SHIFT SOLENOID VALVE SLT

a. Remove shift solenoid valve SLT.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

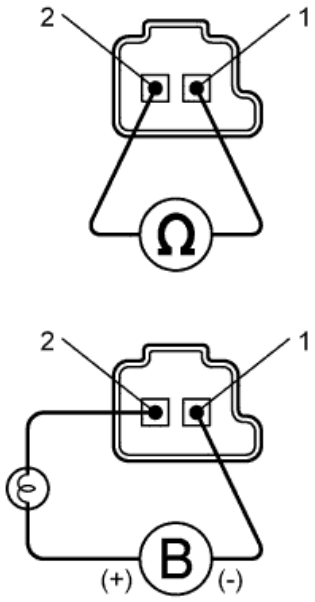
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

c. Apply battery voltage (12 V) to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
• Battery positive (+) with a 21 W bulb → Terminal 2 • Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

Component without harness connected:
(Shift Solenoid Valve SLT)



NG → REPLACE SHIFT SOLENOID VALVE SLT (Click here)

OK

18.INSPECT TRANSMISSION VALVE BODY ASSEMBLY

a. Check the transmission valve body assembly (Click here).

OK:

There are no foreign objects on any valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY (Click here)

OK

19.INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Check the torque converter clutch assembly (Click here).

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY (Click here)

OK

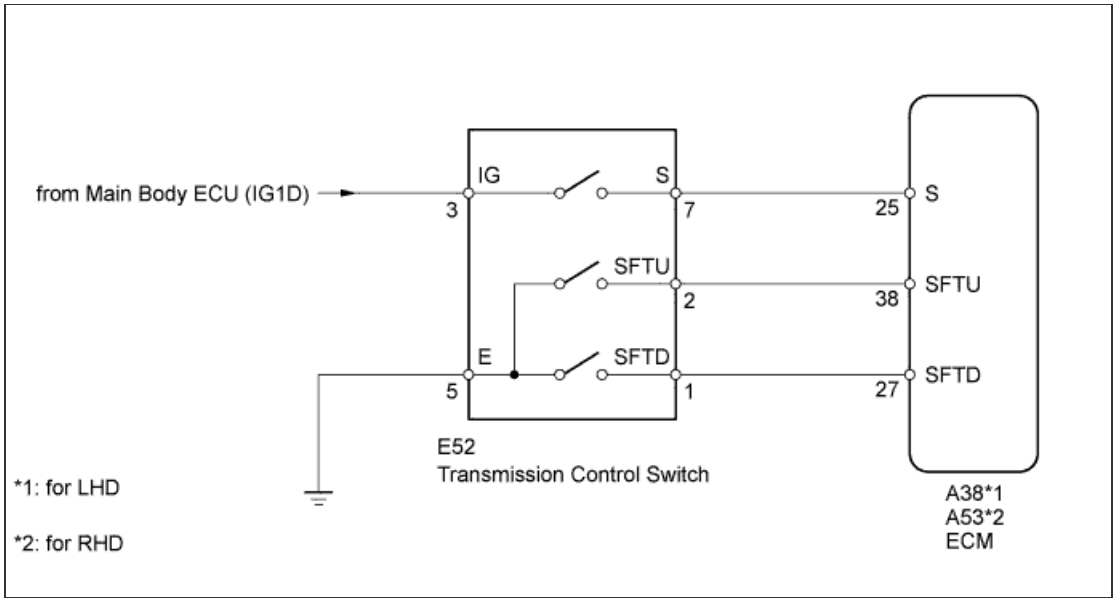
REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY (Click here)

for Preparation Click here

DESCRIPTION

When moving the shift lever to S using the transmission control switch, it is possible to switch the shift range between "1" (1st range) and "6" (6th range). Shifting to "+" once raises the shift range by one, and shifting to "-" lowers the shift range by one.

WIRING DIAGRAM



INSPECTION PROCEDURE

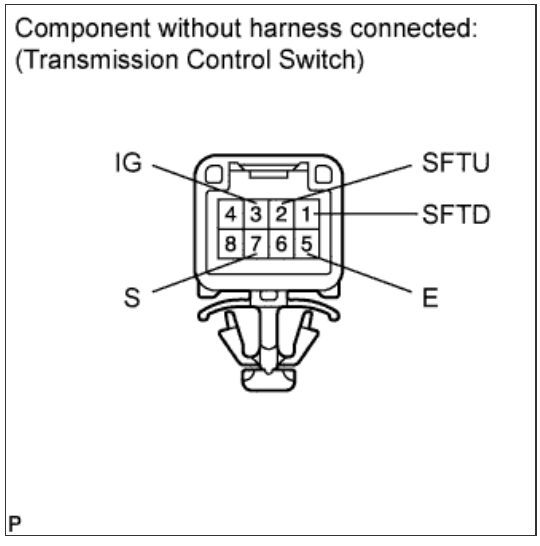
1.INSPECT TRANSMISSION CONTROL SWITCH

a. Disconnect the E52 transmission control switch connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 7 (S)	Shift lever in S, "+" or "-"	Below 1 Ω
2 (SFTU) - 5 (E)	Shift lever held in "+" (Up-shift)	Below 1 Ω
1 (SFTD) - 5 (E)	Shift lever held in "-" (Down-shift)	Below 1 Ω
3 (IG) - 7 (S)	Shift lever not in S, "+" or "-"	10 kΩ or higher
2 (SFTU) - 5 (E)	Shift lever in S	10 kΩ or higher
1 (SFTD) - 5 (E)	Shift lever in S	10 kΩ or higher



NG → REPLACE TRANSMISSION CONTROL SWITCH (TRANSMISSION FLOOR SHIFT ASSEMBLY) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - BATTERY, BODY GROUND)

a. Disconnect the E52 transmission control switch connector.

b. Measure the voltage according to the value(s) in the table below.

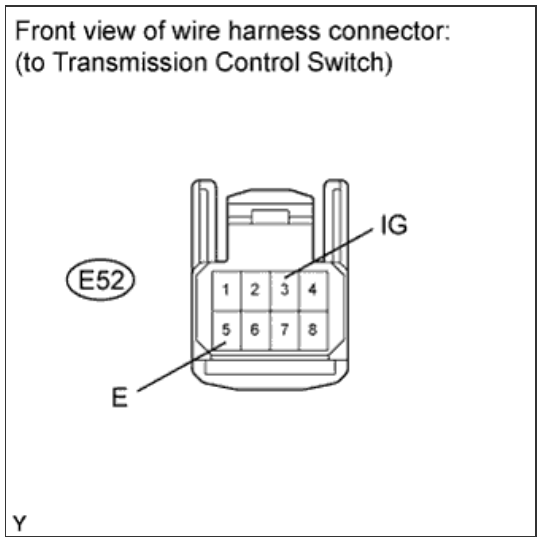
Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E52-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V
E52-3 (IG) - Body ground	Engine switch off	Below 1 V

c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
E52-5 (E) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

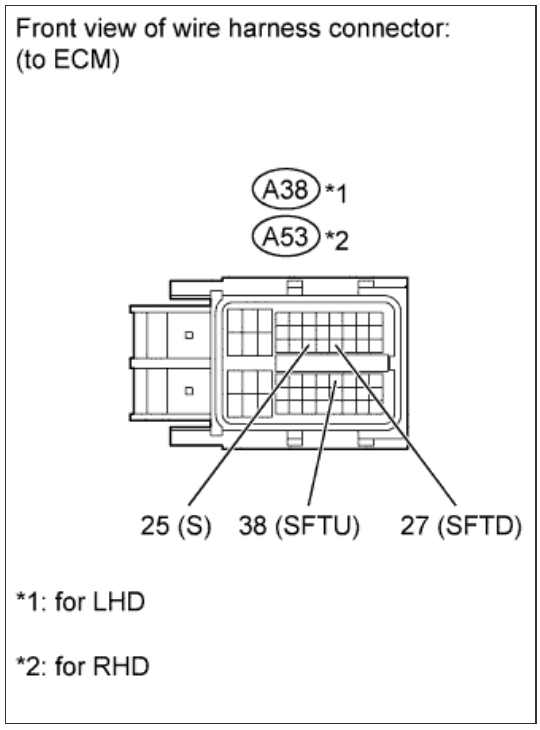
OK

3.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - ECM)

a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Measure the voltage according to the value(s) in the table below.



Standard Voltage:

for LHD

Tester Connection	Condition	Specified Condition
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not	Below 1 V

	in S, "+" or "-"	

for RHD

Tester Connection	Condition	Specified Condition
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

d. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
A38-38 (SFTU) - Body ground	• Engine switch off • Shift lever held in "+" (Up-shift)	Below 1 Ω
A38-27 (SFTD) - Body ground	• Engine switch off • Shift lever held in "-" (Down-shift)	Below 1 Ω
A38-38 (SFTU) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher
A38-27 (SFTD) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
A53-38 (SFTU) - Body ground	• Engine switch off • Shift lever held in "+" (Up-shift)	Below 1 Ω
A53-27 (SFTD) - Body ground	• Engine switch off • Shift lever held in "-" (Down-shift)	Below 1 Ω
A53-38 (SFTU) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher
A53-27 (SFTD) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

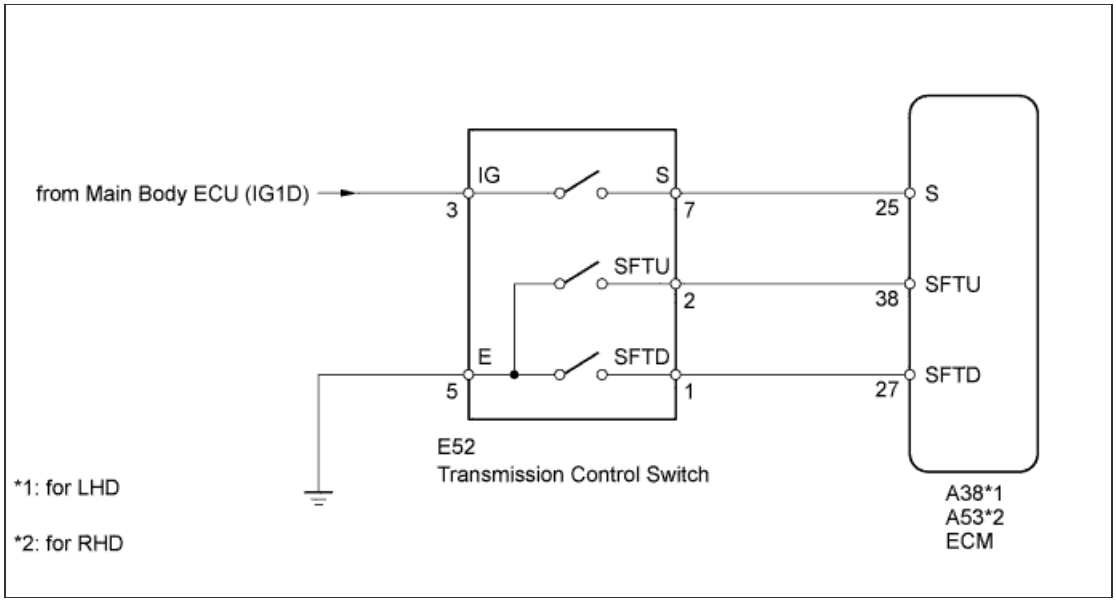
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

When moving the shift lever to S using the transmission control switch, it is possible to switch the shift range between "1" (1st range) and "6" (6th range). Shifting to "+" once raises the shift range by one, and shifting to "-" lowers the shift range by one.

WIRING DIAGRAM



INSPECTION PROCEDURE

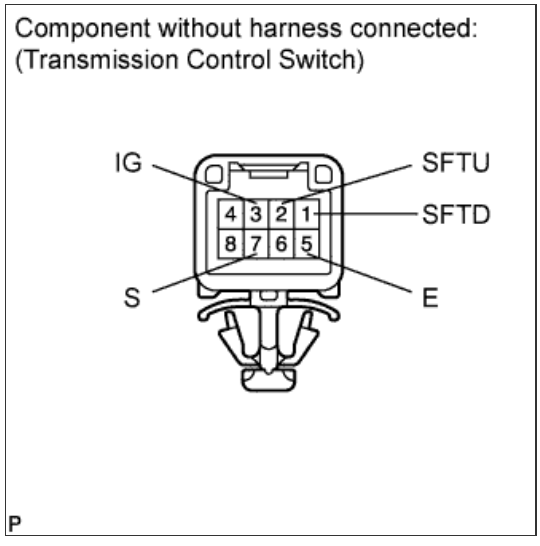
1.INSPECT TRANSMISSION CONTROL SWITCH

a. Disconnect the E52 transmission control switch connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 7 (S)	Shift lever in S, "+" or "-"	Below 1 Ω
2 (SFTU) - 5 (E)	Shift lever held in "+" (Up-shift)	Below 1 Ω
1 (SFTD) - 5 (E)	Shift lever held in "-" (Down-shift)	Below 1 Ω
3 (IG) - 7 (S)	Shift lever not in S, "+" or "-"	10 kΩ or higher
2 (SFTU) - 5 (E)	Shift lever in S	10 kΩ or higher
1 (SFTD) - 5 (E)	Shift lever in S	10 kΩ or higher



NG → REPLACE TRANSMISSION CONTROL SWITCH (TRANSMISSION FLOOR SHIFT ASSEMBLY) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - BATTERY, BODY GROUND)

a. Disconnect the E52 transmission control switch connector.

b. Measure the voltage according to the value(s) in the table below.

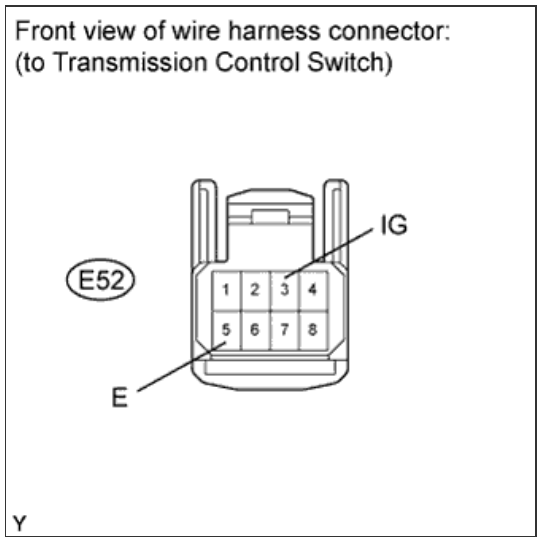
Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E52-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V
E52-3 (IG) - Body ground	Engine switch off	Below 1 V

c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
E52-5 (E) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

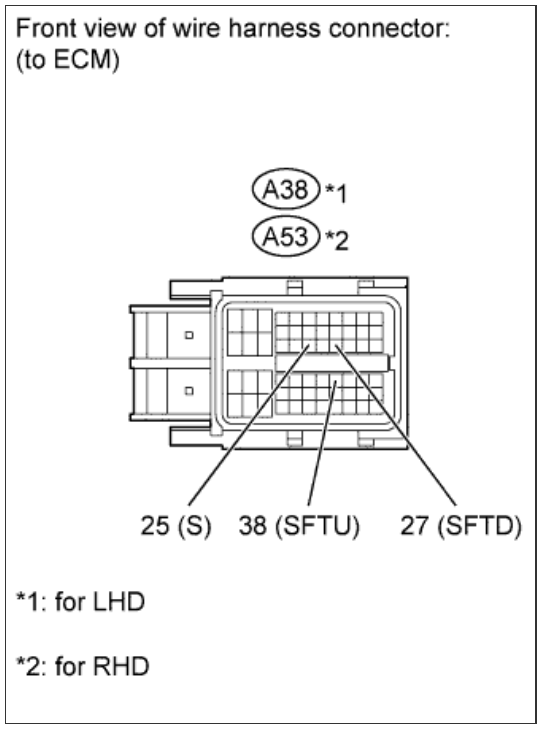
OK

3.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - ECM)

a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Measure the voltage according to the value(s) in the table below.



Standard Voltage:

for LHD

Tester Connection	Condition	Specified Condition
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not	Below 1 V

	in S, "+" or "-"	

for RHD

Tester Connection	Condition	Specified Condition
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

d. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
A38-38 (SFTU) - Body ground	• Engine switch off • Shift lever held in "+" (Up-shift)	Below 1 Ω
A38-27 (SFTD) - Body ground	• Engine switch off • Shift lever held in "-" (Down-shift)	Below 1 Ω
A38-38 (SFTU) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher
A38-27 (SFTD) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
A53-38 (SFTU) - Body ground	• Engine switch off • Shift lever held in "+" (Up-shift)	Below 1 Ω
A53-27 (SFTD) - Body ground	• Engine switch off • Shift lever held in "-" (Down-shift)	Below 1 Ω
A53-38 (SFTU) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher
A53-27 (SFTD) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

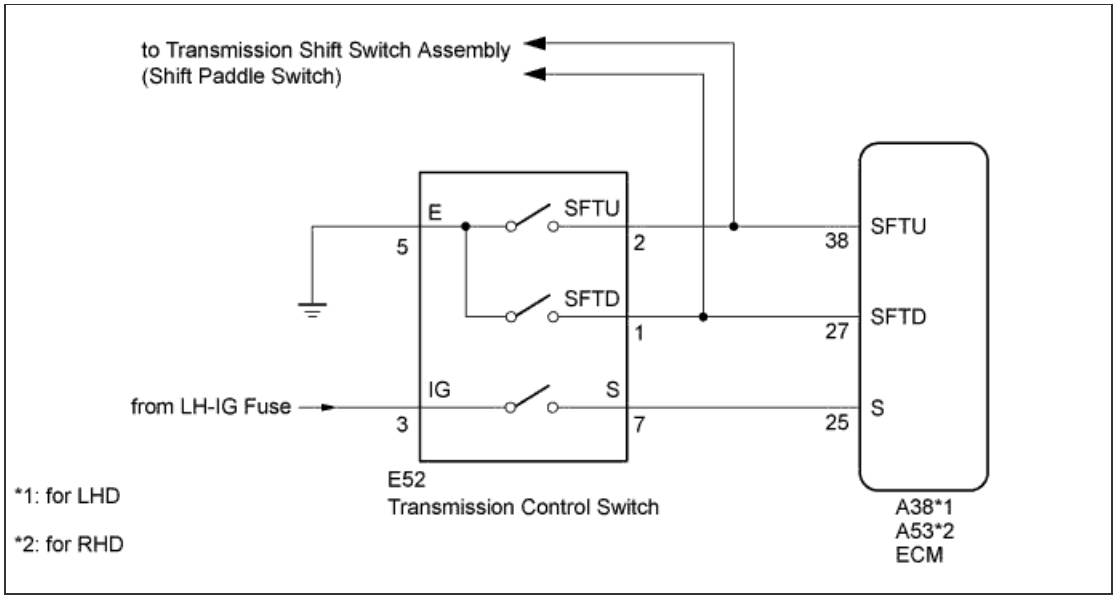
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

When moving the shift lever to S using the transmission control switch, it is possible to switch the shift range between "1" (1st range) and "6" (6th range). Shifting to "+" once raises the shift range by one, and shifting to "-" lowers the shift range by one.

WIRING DIAGRAM

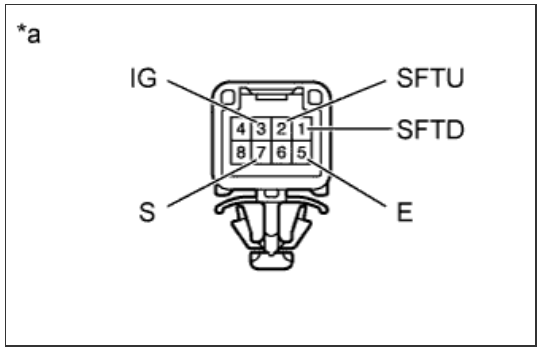


INSPECTION PROCEDURE

1.INSPECT TRANSMISSION CONTROL SWITCH

a. Disconnect the transmission control switch connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 7 (S)	Shift lever in S, "+" or "-"	Below 1 Ω
2 (SFTU) - 5 (E)	Shift lever held in "+" (Up-shift)	Below 1 Ω
1 (SFTD) - 5 (E)	Shift lever held in "-" (Down-shift)	Below 1 Ω
3 (IG) - 7 (S)	Shift lever not in S, "+" or "-"	10 kΩ or higher
2 (SFTU) - 5 (E)	Shift lever in S	10 kΩ or higher
1 (SFTD) - 5 (E)	Shift lever in S	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (Transmission Control Switch)

NG → REPLACE TRANSMISSION CONTROL SWITCH (TRANSMISSION FLOOR SHIFT ASSEMBLY) (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - BATTERY, BODY GROUND)

a. Disconnect the transmission control switch connector.

b. Measure the voltage according to the value(s) in the table below.

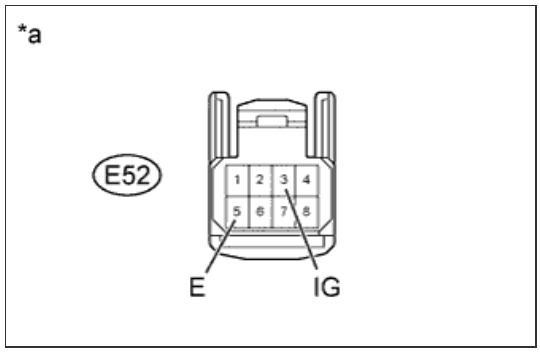
Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E52-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V
E52-3 (IG) - Body ground	Engine switch off	Below 1 V

c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
E52-5 (E) - Body ground	Always	Below 1 Ω



Text in Illustration

*a	Front view of wire harness connector (to Transmission Control Switch)

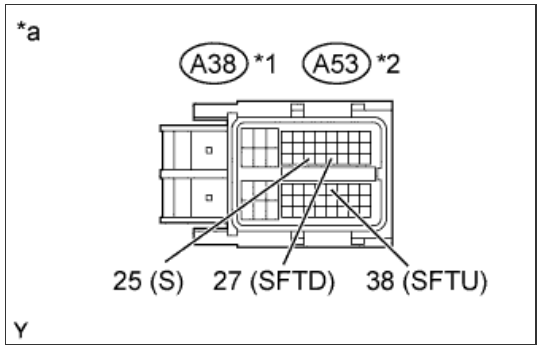
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - ECM)

a. Disconnect the ECM connector.

b. Measure the voltage according to the value(s) in the table below.



Standard Voltage:

for LHD

Tester Connection	Condition	Specified Condition
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A38-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

for RHD

Tester Connection	Condition	Specified Condition

A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever in S, "+" or "-"	11 to 14 V
A53-25 (S) - Body ground	• Engine switch on (IG) • Shift lever not in S, "+" or "-"	Below 1 V

c. Turn the engine switch off.

d. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
A38-38 (SFTU) - Body ground	• Engine switch off • Shift lever held in "+" (Up-shift)	Below 1 Ω
A38-27 (SFTD) - Body ground	• Engine switch off • Shift lever held in "-" (Down-shift)	Below 1 Ω
A38-38 (SFTU) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher
A38-27 (SFTD) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
A53-38 (SFTU) - Body ground	• Engine switch off • Shift lever held in "+" (Up-shift)	Below 1 Ω
A53-27 (SFTD) - Body ground	• Engine switch off • Shift lever held in "-" (Down-shift)	Below 1 Ω
A53-38 (SFTU) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher
A53-27 (SFTD) - Body ground	• Engine switch off • Shift lever in S	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

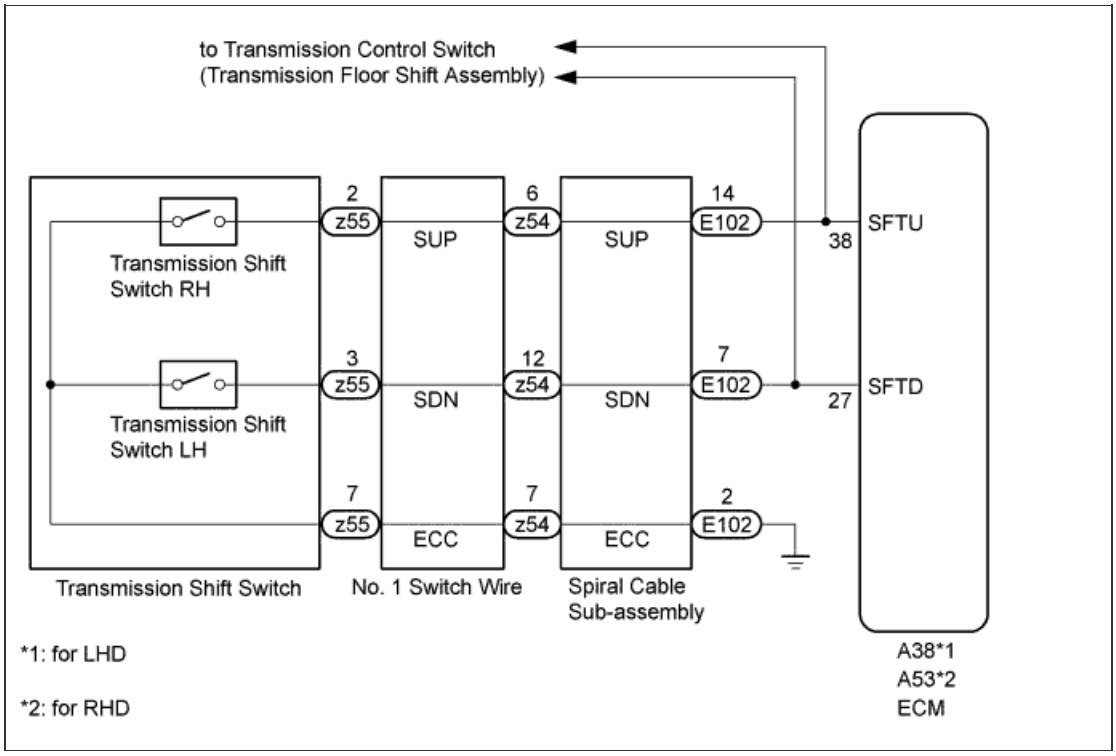
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

When the shift lever is in S, the shift range can be changed using the shift paddle switches. It is also possible to select the shift range when the vehicle is being driven with the shift lever in D by operating the shift paddle switches.

WIRING DIAGRAM



INSPECTION PROCEDURE

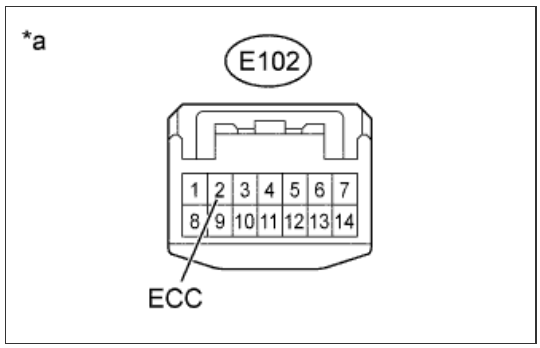
1.CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - BODY GROUND)

a. Disconnect the spiral cable connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
E102-2 (ECC) - Body ground	Always	Below 1 Ω



Text in Illustration

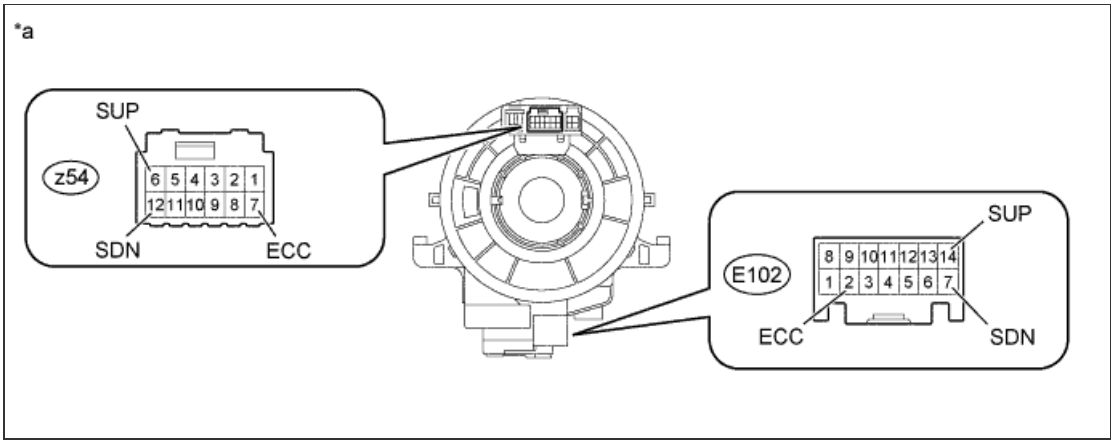
*a	Front view of wire harness connector (to Spiral Cable with Sensor Sub-assembly)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2.INSPECT SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

a. Remove the spiral cable with sensor sub-assembly (Click here).



b. Set the spiral cable to the center position.

c. Measure the resistance between the terminals of the spiral cable.

i. After setting the spiral cable to the center position, rotate the spiral cable 2.5 times clockwise and measure the resistance. Then rotate the spiral cable 2.5 times counterclockwise and measure the resistance.

ii. After setting the spiral cable to the center position, rotate the spiral cable 2.5 times clockwise. Then while rotating the spiral cable 5 times counterclockwise, measure the resistance.

Standard Resistance:

Tester Connection	Condition	Specified Condition
z54-6 (SUP) - E102-14 (SUP)	Always	Below 1 Ω
z54-12 (SDN) - E102-7 (SDN)	Always	Below 1 Ω
z54-7 (ECC) - E102-2 (ECC)	Always	Below 1 Ω

NOTICE:

As the spiral cable may break, do not rotate the spiral cable more than the specified amount.

Text in Illustration

*a	Component without harness connected (Spiral Cable with Sensor Sub-assembly)

NG → REPLACE SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY (Click here)

OK

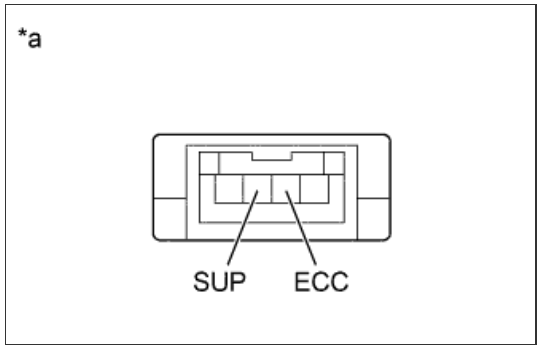
3.INSPECT TRANSMISSION SHIFT SWITCH ASSEMBLY RH (+)

a. Remove the transmission shift switch assembly RH (+) (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
SUP - ECC	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
SUP - ECC	"+" shift paddle not operated (up-shift)	1 MΩ or higher



Text in Illustration

*a	Component without harness connected (Transmission Shift Switch Assembly RH (+))

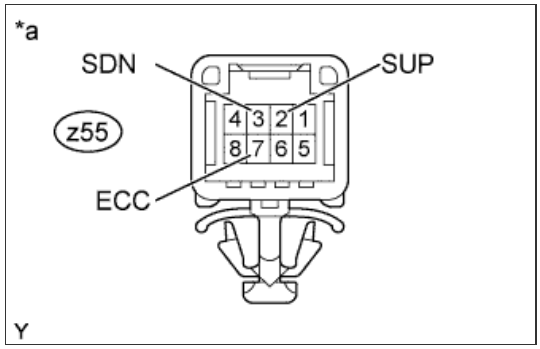
NG → REPLACE TRANSMISSION SHIFT SWITCH ASSEMBLY RH (+) (Click here)

OK

4.INSPECT TRANSMISSION SHIFT SWITCH ASSEMBLY LH (-)

a. Disconnect the transmission shift switch assembly LH (-) connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
z55-2 (SUP) - z55-7 (ECC)	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
z55-3 (SDN) - z55-7 (ECC)	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
z55-2 (SUP) - z55-7 (ECC)	"+" shift paddle not operated (up-shift)	1 MΩ or higher
z55-3 (SDN) - z55-7 (ECC)	"-" shift paddle not operated (down-shift)	1 MΩ or higher

Text in Illustration

*a	Front view of wire harness connector (Transmission Shift Switch Assembly LH (-))

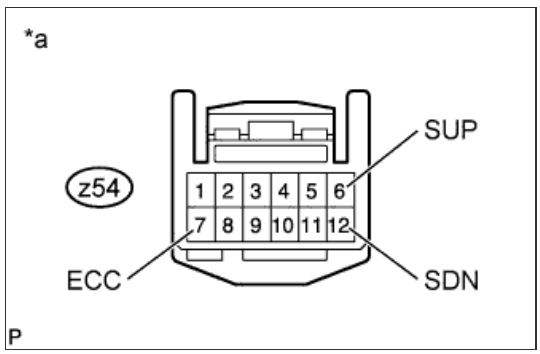
NG → REPLACE TRANSMISSION SHIFT SWITCH ASSEMBLY LH (-)

OK

5.INSPECT NO. 1 SWITCH WIRE

a. Disconnect the No. 1 switch wire connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
z54-6 (SUP) - z54-7 (ECC)	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
z54-12 (SDN) - z54-7 (ECC)	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
z54-6 (SUP) - z54-7 (ECC)	"+" shift paddle not operated (up-shift)	1 MΩ or higher
z54-12 (SDN) - z54-7 (ECC)	"-" shift paddle not operated (down-shift)	1 MΩ or higher

Text in Illustration

*a	Component without harness connected (No. 1 Switch Wire)

NG → REPLACE NO. 1 SWITCH WIRE (Click here)

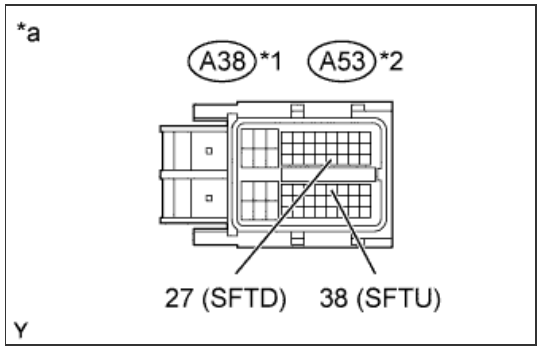
OK

6.CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - ECM)

a. Disconnect the ECM connector.

b. Disconnect the transmission control switch (transmission floor shift assembly) connector.

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Switch Condition	Specified Condition
A38-38 (SFTU) - Body ground	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
A38-27 (SFTD) - Body ground	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
A38-38 (SFTU) - Body ground	"+" shift paddle not operated (up-shift)	1 MΩ or higher
A38-27 (SFTD) - Body ground	"-" shift paddle not operated (down-shift)	1 MΩ or higher

for RHD

Tester Connection	Switch Condition	Specified Condition
A53-38 (SFTU) - Body ground	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
A53-27 (SFTD) - Body ground	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
A53-38 (SFTU) - Body ground	"+" shift paddle not operated (up-shift)	1 MΩ or higher
A53-27 (SFTD) - Body ground	"-" shift paddle not operated (down-shift)	1 MΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

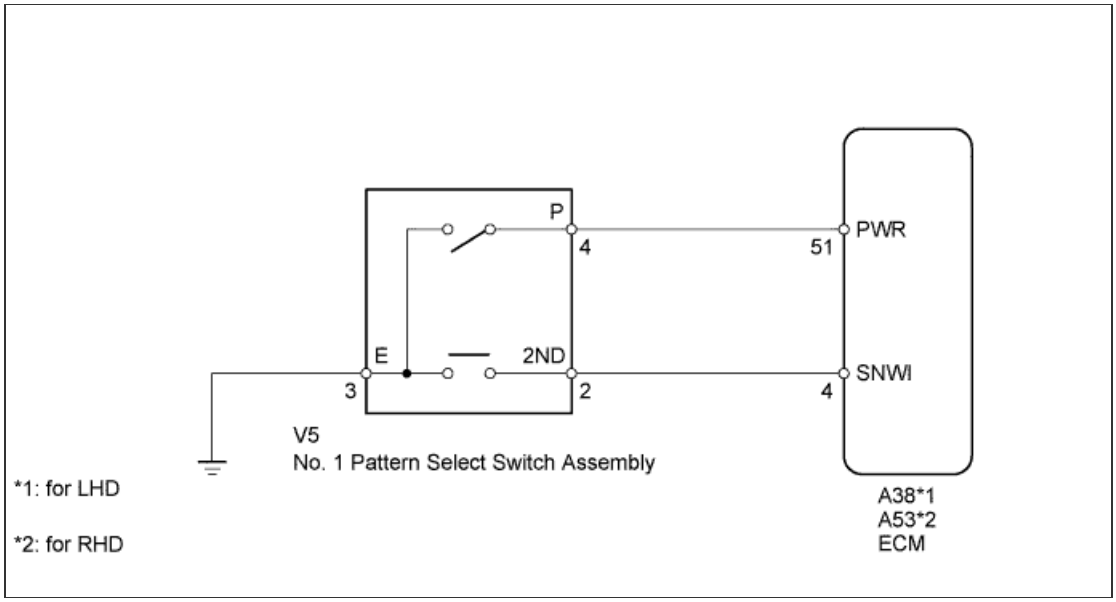
REPLACE ECM (Click here)

for Preparation Click here

DESCRIPTION

The ECM memory contains the programs for the normal and power shift patterns and lock-up pattern.
By following the programs corresponding to the signals from the No. 1 pattern select switch assembly, the park/neutral position switch and other various sensors, the ECM switches the shift solenoid valves on and off, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

When the pattern select switch (PWR) is pushed, switch contact is made and power mode is selected. To cancel power mode, push the pattern select switch (PWR) once again.

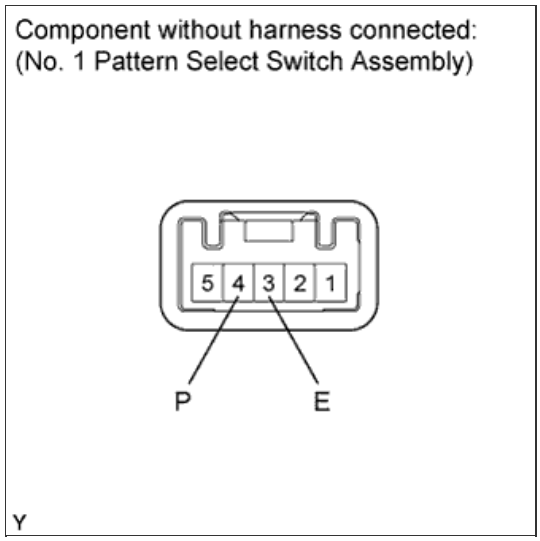
1.INSPECT NO. 1 PATTERN SELECT SWITCH ASSEMBLY (PWR)

a. Remove the No. 1 pattern select switch assembly (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
4 (P) - 3 (E)	Pattern select switch (PWR) on	Below 1 Ω
4 (P) - 3 (E)	Pattern select switch (PWR) off	10 kΩ or higher



NG → REPLACE NO. 1 PATTERN SELECT SWITCH ASSEMBLY (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - BODY GROUND)

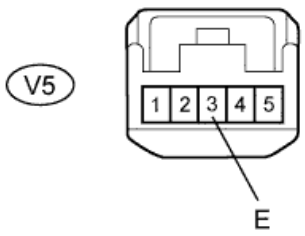
a. Disconnect the V5 No. 1 pattern select switch assembly connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
V5-3 (E) - Body ground	Always	Below 1 Ω

Front view of wire harness connector:
(to No. 1 Pattern Select Switch Assembly)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

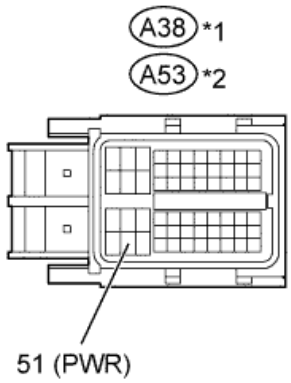
3.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - ECM)

a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Switch Condition	Specified Condition
A38-51 (PWR) - Body ground	Pattern select switch (PWR) on	Below 1 Ω
A38-51 (PWR) - Body ground	Pattern select switch (PWR) off	10 kΩ or higher

for RHD

Tester Connection	Switch Condition	Specified Condition
A53-51 (PWR) - Body ground	Pattern select switch (PWR) on	Below 1 Ω
A53-51 (PWR) - Body ground	Pattern select switch (PWR) off	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

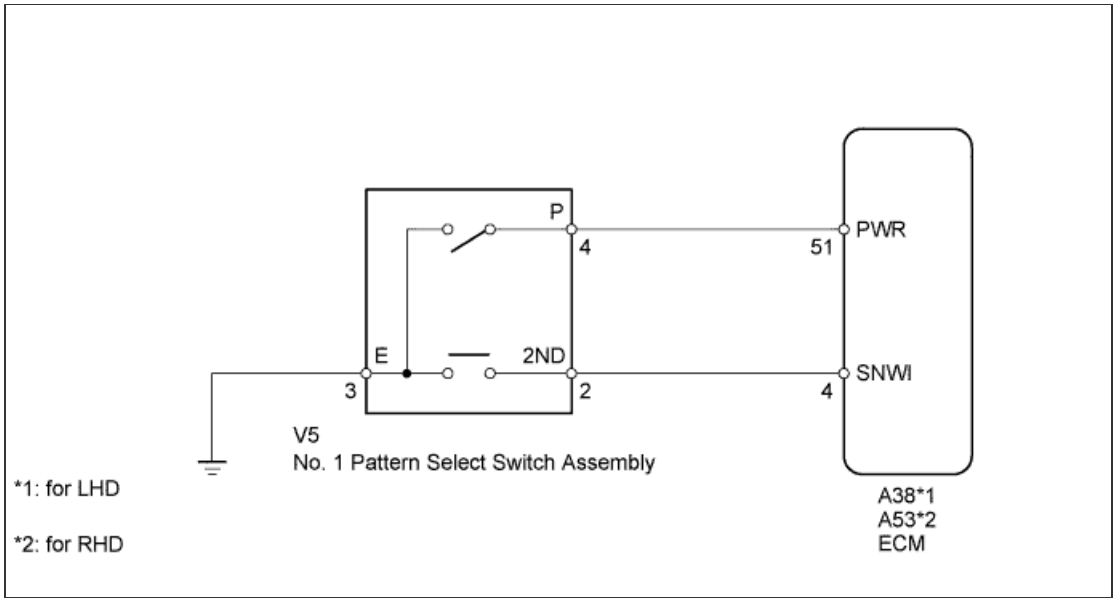
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

The ECM memory contains the programs for the normal and power shift patterns and lock-up pattern.
By following the programs corresponding to the signals from the No. 1 pattern select switch assembly, the park/neutral position switch and other various sensors, the ECM switches the shift solenoid valves on and off, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

When the pattern select switch (PWR) is pushed, switch contact is made and power mode is selected. To cancel power mode, push the pattern select switch (PWR) once again.

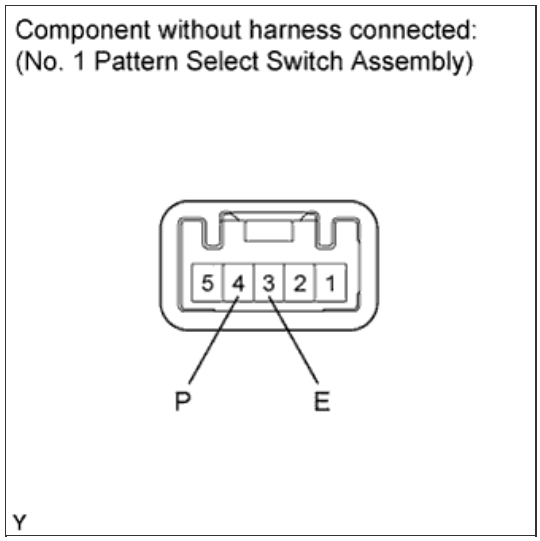
1.INSPECT NO. 1 PATTERN SELECT SWITCH ASSEMBLY (PWR)

a. Remove the No. 1 pattern select switch assembly (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
4 (P) - 3 (E)	Pattern select switch (PWR) on	Below 1 Ω
4 (P) - 3 (E)	Pattern select switch (PWR) off	10 kΩ or higher



NG → REPLACE NO. 1 PATTERN SELECT SWITCH ASSEMBLY (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - BODY GROUND)

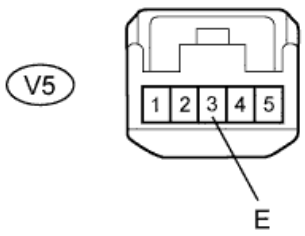
a. Disconnect the V5 No. 1 pattern select switch assembly connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
V5-3 (E) - Body ground	Always	Below 1 Ω

Front view of wire harness connector:
(to No. 1 Pattern Select Switch Assembly)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

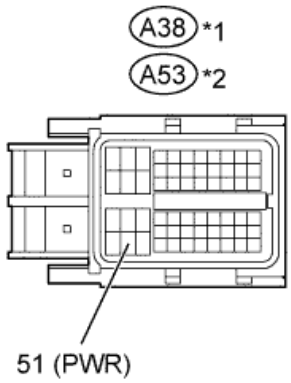
3.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - ECM)

a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Switch Condition	Specified Condition
A38-51 (PWR) - Body ground	Pattern select switch (PWR) on	Below 1 Ω
A38-51 (PWR) - Body ground	Pattern select switch (PWR) off	10 kΩ or higher

for RHD

Tester Connection	Switch Condition	Specified Condition
A53-51 (PWR) - Body ground	Pattern select switch (PWR) on	Below 1 Ω
A53-51 (PWR) - Body ground	Pattern select switch (PWR) off	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

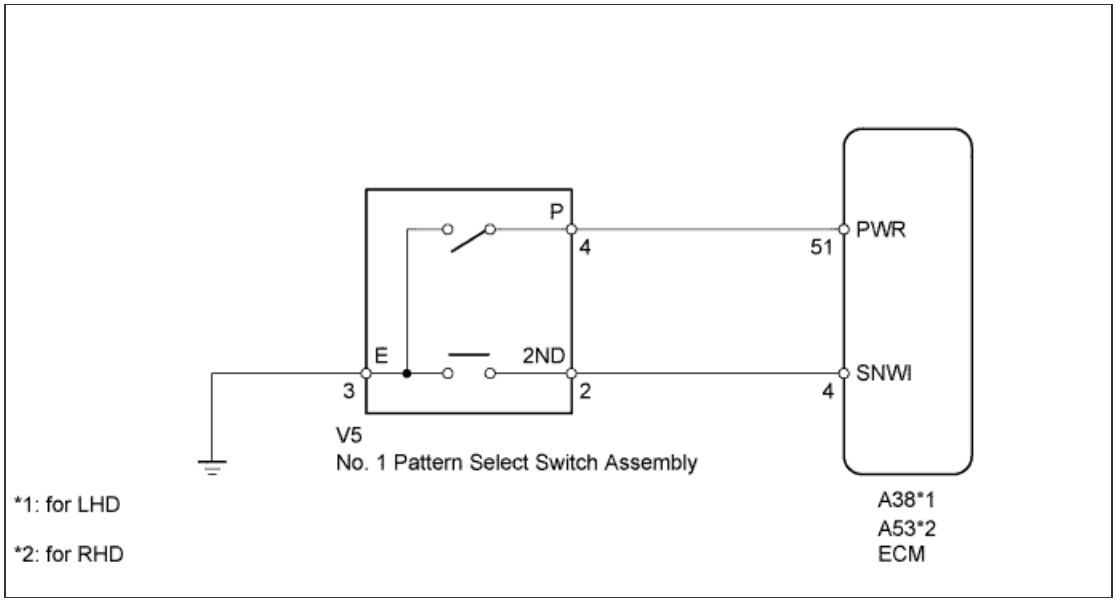
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

The ECM memory contains the programs for the normal and power shift patterns and lock-up pattern.
By following the programs corresponding to the signals from the No. 1 pattern select switch assembly, the park/neutral position switch and other various sensors, the ECM switches the shift solenoid valves on and off, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

When the pattern select switch (PWR) is pushed, switch contact is made and power mode is selected. To cancel power mode, push the pattern select switch (PWR) once again.

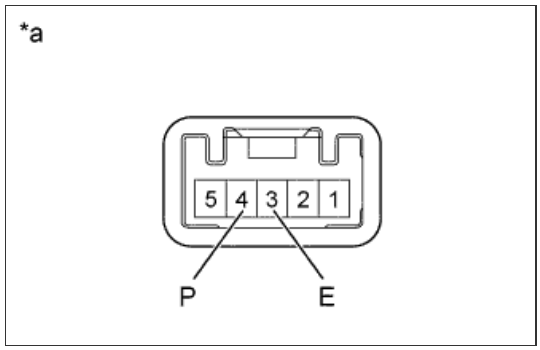
1.INSPECT NO. 1 PATTERN SELECT SWITCH ASSEMBLY (PWR)

a. Remove the No. 1 pattern select switch assembly (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
4 (P) - 3 (E)	Pattern select switch (PWR) on	Below 1 Ω
4 (P) - 3 (E)	Pattern select switch (PWR) off	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 1 Pattern Select Switch Assembly)

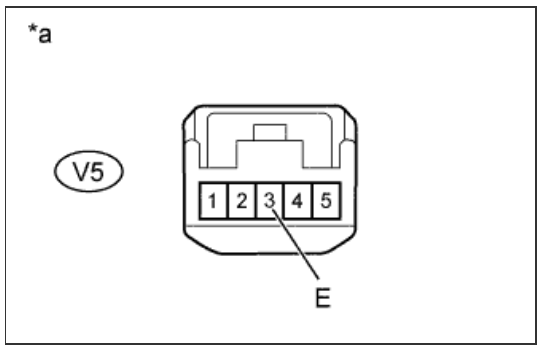
NG → REPLACE NO. 1 PATTERN SELECT SWITCH ASSEMBLY (Click here)

OK

2.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - BODY GROUND)

a. Disconnect the No. 1 pattern select switch assembly connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
V5-3 (E) - Body ground	Always	Below 1 Ω

Text in Illustration

*a	Front view of wire harness connector (to No. 1 Pattern Select Switch Assembly)

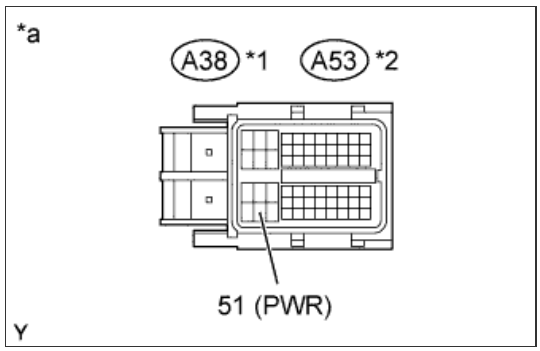
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Switch Condition	Specified Condition
A38-51 (PWR) - Body ground	Pattern select switch (PWR) on	Below 1 Ω
A38-51 (PWR) - Body ground	Pattern select switch (PWR) off	10 kΩ or higher

for RHD

Tester Connection	Switch Condition	Specified Condition
A53-51 (PWR) - Body ground	Pattern select switch (PWR) on	Below 1 Ω
A53-51 (PWR) - Body ground	Pattern select switch (PWR) off	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

When 2nd mode is selected with the No. 1 pattern select switch assembly, the ECM controls the shift solenoid valves and the transmission starts from 2nd gear.
The 2nd mode is the system that operates the throttle motor to control engine output to reduce skidding of the driving wheels, and guarantee takeoff acceleration, driving straightness and turning stability.
When the shift lever is in D, the transmission automatically shifts up through 3rd to 6th as usual.

WIRING DIAGRAM

Refer to Pattern Select Switch Power Mode Circuit (Click here).

INSPECTION PROCEDURE

When the pattern select switch (2ND) is pushed, switch contact is made and 2nd mode is selected. To cancel 2nd mode, push the pattern select switch (2ND) once again.

HINT:

2nd mode is automatically canceled when the engine switch is turned off.

1.DRIVING TEST

HINT:

The driving test should be performed on a paved road (nonskid road).

a. Start the engine.

b. Turn the 2ND switch off (normal drive mode).

c. Confirm vehicle response by driving from a parked position to fully depressing the accelerator pedal.

d. Turn the 2ND switch on and perform the same check as above.
When driving the vehicle with the 2ND switch on and off, check that there is a difference in acceleration.

OK:
There is a difference in acceleration.

NG → Go to step 2

OK →

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

2.INSPECT NO. 1 PATTERN SELECT SWITCH ASSEMBLY (2ND)

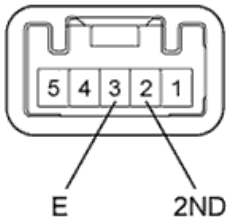
a. Remove the No. 1 pattern select switch assembly (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
2 (2ND) - 3 (E)	Pattern select switch (2ND) and held pressed	Below 1 Ω
2 (2ND) - 3 (E)	Pattern select switch (2ND) released	10 kΩ or higher

Component without harness connected:
(No. 1 Pattern Select Switch Assembly)



Y

NG → REPLACE NO. 1 PATTERN SELECT SWITCH ASSEMBLY (Click here)

OK

3.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - BODY GROUND)

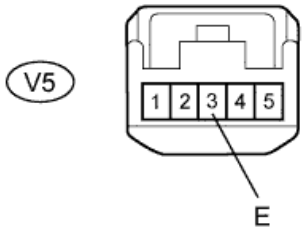
a. Disconnect the V5 No. 1 pattern select switch assembly connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
V5-3 (E) - Body ground	Always	Below 1 Ω

Front view of wire harness connector:
(to No. 1 Pattern Select Switch Assembly)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

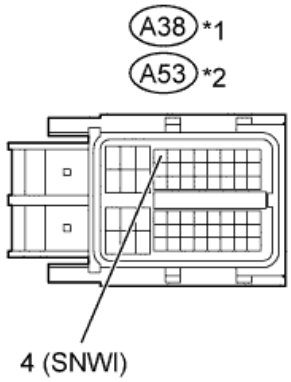
4.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - ECM)

a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Switch Condition	Specified Condition
A38-4 (SNWI) - Body ground	Pattern select switch (2ND) pressed and held	Below 1 Ω
A38-4 (SNWI) - Body ground	Pattern select switch (2ND) released	10 kΩ or higher

for RHD

Tester Connection	Switch Condition	Specified Condition
A53-4 (SNWI) - Body ground	Pattern select switch (2ND) pressed and held	Below 1 Ω
A53-4 (SNWI) - Body ground	Pattern select switch (2ND) released	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

When 2nd mode is selected with the No. 1 pattern select switch assembly, the ECM controls the shift solenoid valves and the transmission starts from 2nd gear.
The 2nd mode is the system that operates the throttle motor to control engine output to reduce skidding of the driving wheels, and guarantee takeoff acceleration, driving straightness and turning stability.
When the shift lever is in D, the transmission automatically shifts up through 3rd to 6th as usual.

WIRING DIAGRAM

Refer to Pattern Select Switch Power Mode Circuit (Click here).

INSPECTION PROCEDURE

When the pattern select switch (2ND) is pushed, switch contact is made and 2nd mode is selected. To cancel 2nd mode, push the pattern select switch (2ND) once again.

HINT:

2nd mode is automatically canceled when the engine switch is turned off.

1.DRIVING TEST

HINT:

The driving test should be performed on a paved road (nonskid road).

a. Start the engine.

b. Turn the 2ND switch off (normal drive mode).

c. Confirm vehicle response by driving from a parked position to fully depressing the accelerator pedal.

d. Turn the 2ND switch on and perform the same check as above.
When driving the vehicle with the 2ND switch on and off, check that there is a difference in acceleration.

OK:
There is a difference in acceleration.

NG → Go to step 2

OK →

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

2.INSPECT NO. 1 PATTERN SELECT SWITCH ASSEMBLY (2ND)

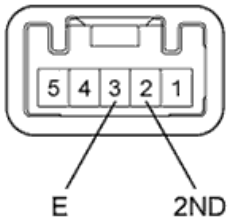
a. Remove the No. 1 pattern select switch assembly (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
2 (2ND) - 3 (E)	Pattern select switch (2ND) and held pressed	Below 1 Ω
2 (2ND) - 3 (E)	Pattern select switch (2ND) released	10 kΩ or higher

Component without harness connected:
(No. 1 Pattern Select Switch Assembly)



Y

NG → REPLACE NO. 1 PATTERN SELECT SWITCH ASSEMBLY (Click here)

OK

3.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - BODY GROUND)

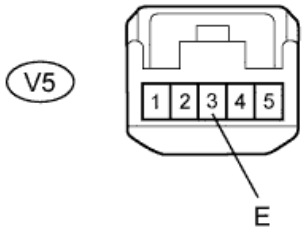
a. Disconnect the V5 No. 1 pattern select switch assembly connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
V5-3 (E) - Body ground	Always	Below 1 Ω

Front view of wire harness connector:
(to No. 1 Pattern Select Switch Assembly)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

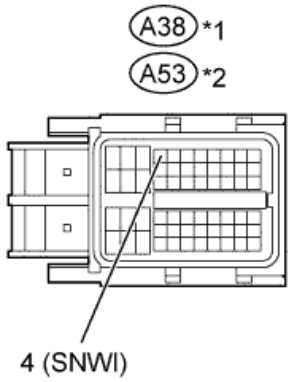
4.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - ECM)

a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Switch Condition	Specified Condition
A38-4 (SNWI) - Body ground	Pattern select switch (2ND) pressed and held	Below 1 Ω
A38-4 (SNWI) - Body ground	Pattern select switch (2ND) released	10 kΩ or higher

for RHD

Tester Connection	Switch Condition	Specified Condition
A53-4 (SNWI) - Body ground	Pattern select switch (2ND) pressed and held	Below 1 Ω
A53-4 (SNWI) - Body ground	Pattern select switch (2ND) released	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

When 2nd mode is selected with the No. 1 pattern select switch assembly, the ECM controls the shift solenoid valves and the transmission starts from 2nd gear.
The 2nd mode is the system that operates the throttle motor to control engine output to reduce skidding of the driving wheels, and guarantee takeoff acceleration, driving straightness and turning stability.
When the shift lever is in D, the transmission automatically shifts up through 3rd to 6th as usual.

WIRING DIAGRAM

Refer to Pattern Select Switch Power Mode Circuit (Click here).

INSPECTION PROCEDURE

When the pattern select switch (2ND) is pushed, switch contact is made and 2nd mode is selected. To cancel 2nd mode, push the pattern select switch (2ND) once again.

HINT:

2nd mode is automatically canceled when the engine switch is turned off.

1.DRIVING TEST

HINT:

The driving test should be performed on a paved road (nonskid road).

a. Start the engine.

b. Turn the 2ND switch off (normal drive mode).

c. Confirm vehicle response by driving from a parked position to fully depressing the accelerator pedal.

d. Turn the 2ND switch on and perform the same check as above.
When driving the vehicle with the 2ND switch on and off, check that there is a difference in acceleration.

OK:
There is a difference in acceleration.

NG → Go to step 2

OK →

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

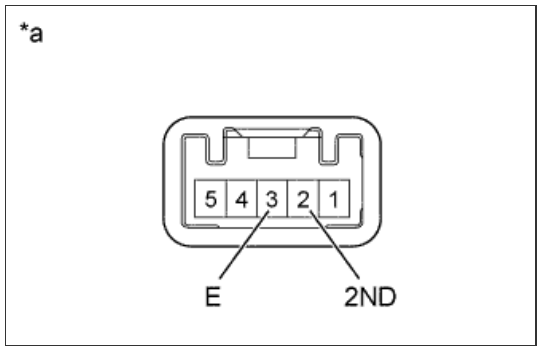
2.INSPECT NO. 1 PATTERN SELECT SWITCH ASSEMBLY (2ND)

a. Remove the No. 1 pattern select switch assembly (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
2 (2ND) - 3 (E)	Pattern select switch (2ND) and held pressed	Below 1 Ω
2 (2ND) - 3 (E)	Pattern select switch (2ND) released	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (No. 1 Pattern Select Switch Assembly)

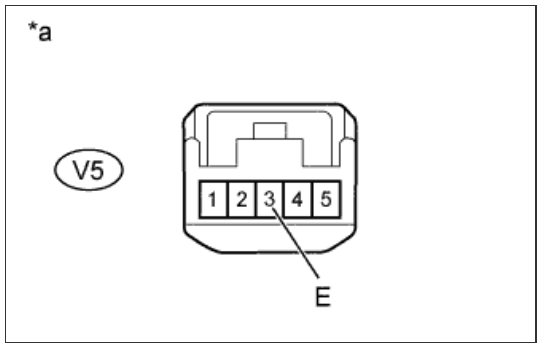
NG → REPLACE NO. 1 PATTERN SELECT SWITCH ASSEMBLY (Click here)

OK

3.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - BODY GROUND)

a. Disconnect the No. 1 pattern select switch assembly connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
V5-3 (E) - Body ground	Always	Below 1 Ω

Text in Illustration

*a	Front view of wire harness connector (to No. 1 Pattern Select Switch Assembly)

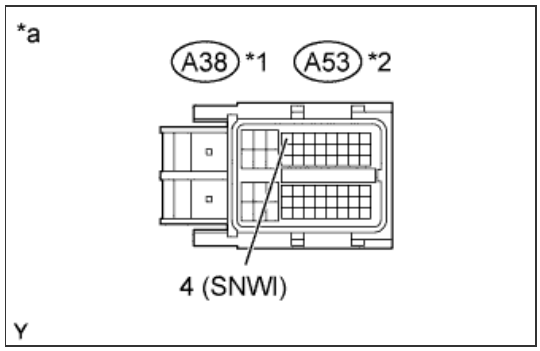
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4.CHECK HARNESS AND CONNECTOR (NO. 1 PATTERN SELECT SWITCH ASSEMBLY - ECM)

a. Disconnect the ECM connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Switch Condition	Specified Condition
A38-4 (SNWI) - Body ground	Pattern select switch (2ND) pressed and held	Below 1 Ω
A38-4 (SNWI) - Body ground	Pattern select switch (2ND) released	10 kΩ or higher

for RHD

Tester Connection	Switch Condition	Specified Condition
A53-4 (SNWI) - Body ground	Pattern select switch (2ND) pressed and held	Below 1 Ω
A53-4 (SNWI) - Body ground	Pattern select switch (2ND) released	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here

DESCRIPTION

The four wheel drive control ECU judges whether the transfer is in the L4 position based on the information from the limit switch inside the transfer shift actuator assembly which is detected by the ECM. The four wheel drive control ECU then inputs a signal to the combination meter assembly via CAN communication and turns on the 4LO indicator.

WIRING DIAGRAM

Refer to DTC P0818 (Click here).

INSPECTION PROCEDURE

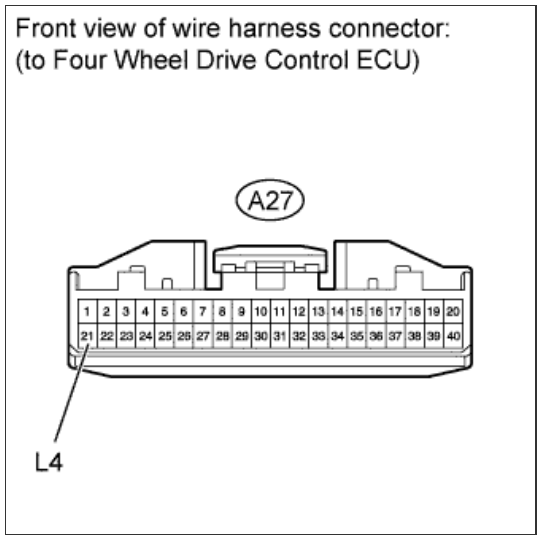
1.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - BODY GROUND)

a. Disconnect the A27 four wheel drive control ECU connector.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-21 (L4) - Body ground	Always	10 kΩ or higher



NG → Go to step 2

OK

GO TO TRANSFER SYSTEM INSPECTION (Click here)

2.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - ECM)

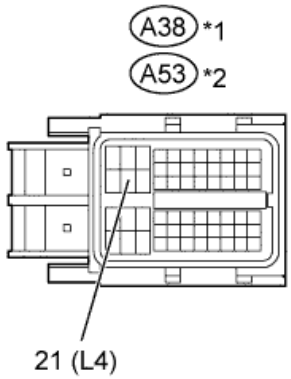
a. Disconnect the A38 ECM connector (for LHD).

b. Disconnect the A53 ECM connector (for RHD).

c. Disconnect the A27 four wheel drive control ECU connector.

d. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to ECM)



*1: for LHD

*2: for RHD

Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
A38-21 (L4) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
A53-21 (L4) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

for Preparation Click here

DESCRIPTION

The four wheel drive control ECU judges whether the transfer is in the L4 position based on the information from the limit switch inside the transfer shift actuator assembly which is detected by the ECM. The four wheel drive control ECU then inputs a signal to the combination meter assembly via CAN communication and turns on the 4LO indicator.

WIRING DIAGRAM

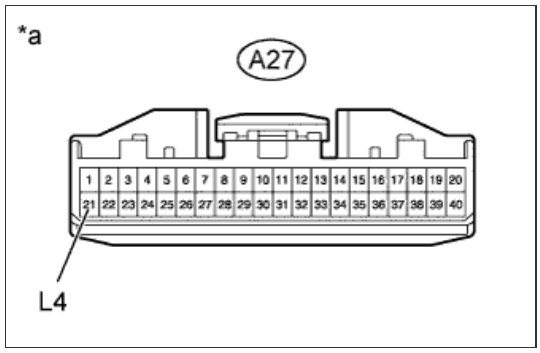
Refer to DTC P2772 (Click here).

INSPECTION PROCEDURE

1.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - BODY GROUND)

a. Disconnect the four wheel drive control ECU connector.

b. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-21 (L4) - Body ground	Always	10 kΩ or higher

Text in Illustration

*a	Front view of wire harness connector (to Four Wheel Drive Control)

NG → Go to step 2

OK

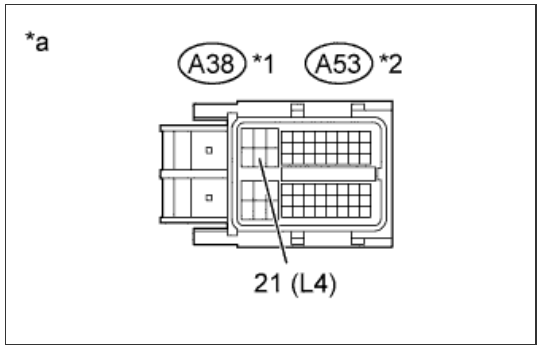
GO TO TRANSFER SYSTEM INSPECTION (Click here)

2.CHECK HARNESS AND CONNECTOR (FOUR WHEEL DRIVE CONTROL ECU - ECM)

a. Disconnect the ECM connector.

b. Disconnect the A27 four wheel drive control ECU connector.

c. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

for LHD

Tester Connection	Condition	Specified Condition
A38-21 (L4) - Body ground	Always	10 kΩ or higher

for RHD

Tester Connection	Condition	Specified Condition
A53-21 (L4) - Body ground	Always	10 kΩ or higher

Text in Illustration

*1	for LHD
*2	for RHD
*a	Front view of wire harness connector (to ECM)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (Click here)

for Preparation Click here

1. REPLACE AUTOMATIC TRANSMISSION FLUID

a. Lift the vehicle. [*1]

NOTICE:

Set the vehicle on a lift so that the vehicle is kept level when it is lifted up (make sure that the tilt angle from the front to rear of the vehicle is within +/- 1°).

b. Remove the No. 2 engine under cover and oil pan protector assembly.

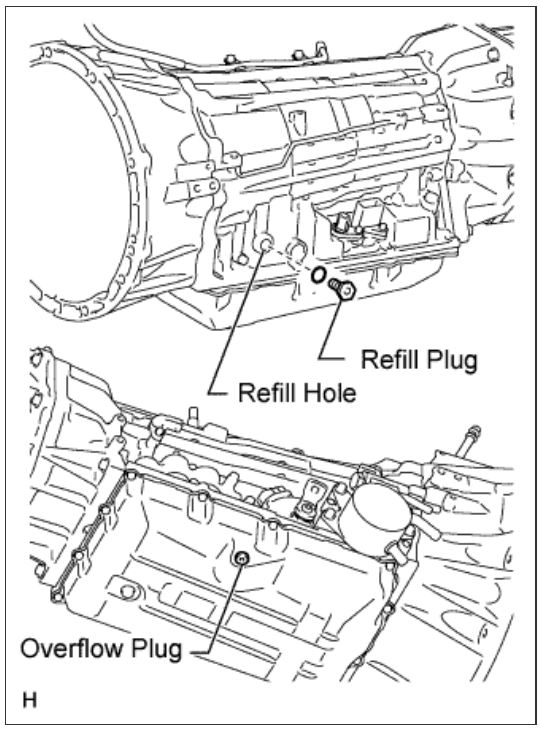
c. Remove the drain plug and gasket, and drain the ATF. [*2]

d. Temporarily install the gasket and drain plug. [*3]

HINT:

Reuse the old gasket. The plug will be removed again to adjust the fluid level.

e. Remove the refill plug and overflow plug. [*4]



f. Add fluid to the refill hole until it flows out of the overflow plug hole. [*5]

NOTICE:

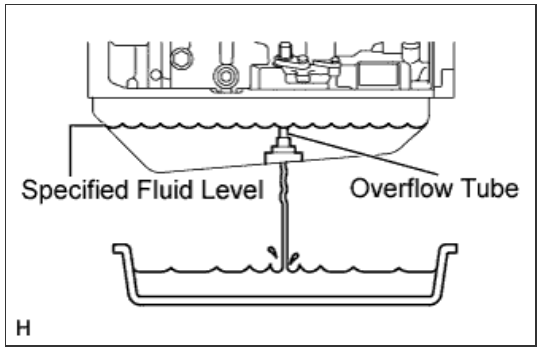
Use Toyota Genuine ATF WS.

g. Wait until the fluid flow slows and only drops come out. [*6]

h. Temporarily install the gasket and overflow plug. [*7]

HINT:

Reuse the old gasket. The plug will be removed again to adjust the fluid level.



i. Add fluid to the refill hole using the amount of fluid specified for removal and installation of the oil pan. [*8]

HINT:

Specified amount of fluid is 2.1 liters (2.2 US qts, 1.9 Imp. qts).

j. Temporarily install the gasket and refill plug to avoid fluid spillage. [*9]

HINT:

Reuse the old gasket. The plug will be removed again to adjust the fluid level.

k. Lower the vehicle. [*10]

l. Start the engine. [*11]

NOTICE:

Make sure that the A/C switch is off.

m. Slowly move the shift lever from P to S and then back to P. [*12]

n. Allow the engine to idle for 30 seconds to warm it up. [*13]

o. Turn the engine switch off. [*14]

p. Repeat steps [*1] to [*14].

q. Repeat steps [*1] to [*2].

r. Install a new gasket and the drain plug.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }

s. Repeat steps [*4] to [*10].

t. Adjust the fluid level (Click here).

u. Install the No. 2 engine under cover and oil pan protector assembly.

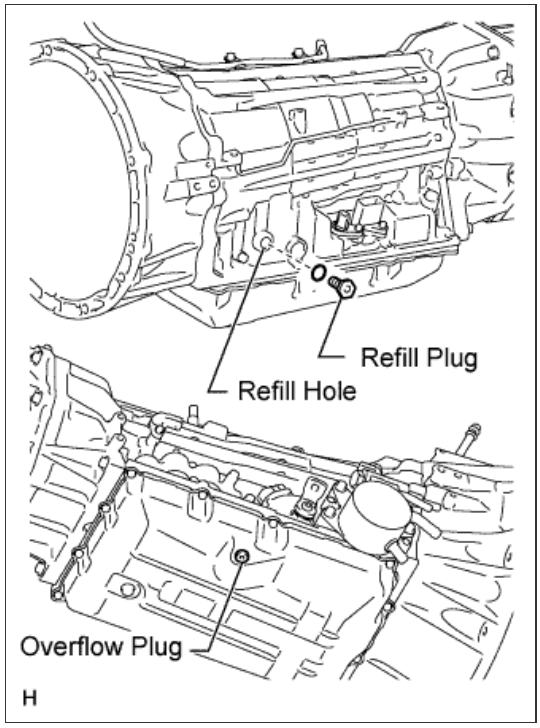
v. Lower the vehicle.

w. Operation complete.

for Preparation Click here

1. BEFORE FILLING TRANSMISSION

- This transmission requires Toyota Genuine ATF WS transmission fluid.
- After servicing the transmission, you must refill the transmission with the correct amount of fluid.
- Keep the vehicle level while adjusting the fluid level.
- Proceed to the "Transmission Pan Fill" procedures if you replaced the entire transmission, transmission pan, drain plug, valve body and/or torque converter.
- Proceed to the "Transmission Fill" procedures after removing the refill plug if you replaced the transmission hose and/or output shaft oil seal.

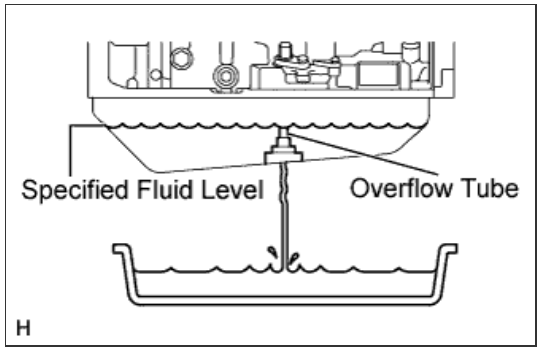


2. TRANSMISSION PAN FILL

a. Remove the refill plug and overflow plug.

b. Fill the transmission through the refill hole until fluid begins to trickle out of the overflow tube.

c. Reinstall the overflow plug.



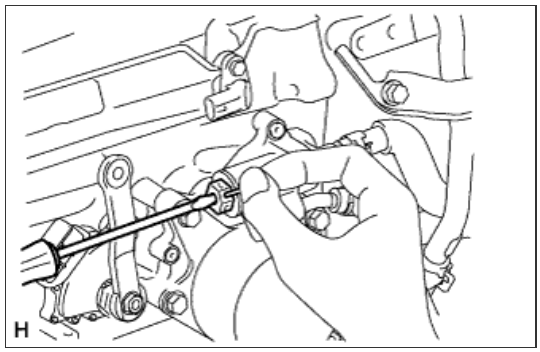
3. TRANSMISSION FILL

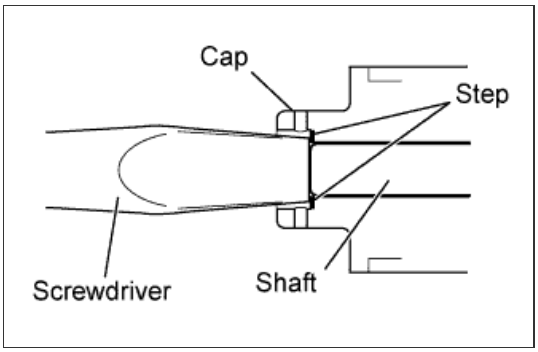
a. Push the shaft of the thermostat and fix it in place.

i. By using compressed air, etc., blow dust off of the thermostat cap to clean it.

ii. Using a screwdriver, push the shaft of the thermostat.

HINT:





- **Pushed amount: 5.5 to 7.0 mm (0.217 to 0.276 in.)**
- **Push the shaft until the screwdriver contacts the inside step of the cap.**

iii. With the shaft of the thermostat pressed, push a pin (diameter: 1.0 to 1.8 mm (0.0394 to 0.0709 in.)) into a hole on the side of the thermostat cap. Insert the pin until it passes through the hole on the other side of the thermostat cap to fix the shaft in place.

b. Fill the transmission with the amount of fluid listed in the table below.

Standard Capacity:

Repair	Fill Amount
Transmission pan and drain plug removal	2.1 liters (2.2 US qts., 1.9 Imp. qts.)
Transmission valve body removal	4.7 liters (5.0 US qts., 4.1 Imp. qts.)
Torque converter removal	6.1 liters (6.4 US qts., 5.4 Imp. qts.)

c. Reinstall the refill plug to prevent the fluid from splashing.

HINT:

If you cannot add the listed amount of fluid, do the following:

i. Install the refill plug.

ii. Allow the engine to idle with the air conditioning OFF.

iii. Move the shift lever through the entire gear range to circulate fluid.

iv. Wait for 30 seconds with the engine idling.

v. Stop the engine.

vi. Remove the refill plug and add fluid.

vii. Reinstall the refill plug.

4. ADJUST FLUID TEMPERATURE

NOTICE:

The fluid temperature can be confirmed by checking the indicator light in the meter or by using the GTS. When using the GTS, it is necessary to change to temperature detection mode in order to idle the vehicle appropriately.

a. When using the GTS:

i. Turn the engine switch off.

ii. Connect the GTS to the DLC3.

iii. Turn the engine switch on (IG).

iv. Enter the following menus: Powertrain / Engine and ECT / Active Test / Connect the TC and TE1.

v. Enter the following menus: Powertrain / Engine and ECT / Data List / A/T Oil Temperature 1.

vi. Check the ATF temperature.

NOTICE:

- **The ATF temperature must be between 43 to 48°C (109 to 118°F).**
- **If the ATF temperature is not between 43 to 48°C (109 to 118°F), turn the ignition switch off and wait until the fluid temperature drops between 43 to 48°C (109 to 118°F).**

vii. According to the display on the GTS, perform the Active Test "Connect the TC and TE1".

HINT:

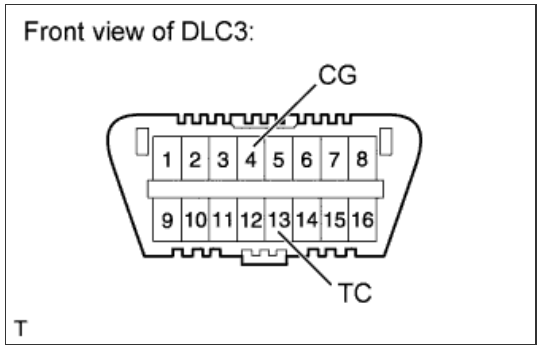
Indicator lights of the combination meter blink to output DTCs when TC and TE1 are connected.

viii. Start the engine.

NOTICE:

Check that electrical systems such as the air conditioning system, audio system and lighting system are off.

b. When not using the GTS:



i. Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

SST
09843-18040

ii. Start the engine.

NOTICE:

Check that electrical systems such as the air conditioning system, audio system and lighting system are off.

HINT:

Indicator lights of the meter blink to output DTCs when terminals TC and CG are connected.

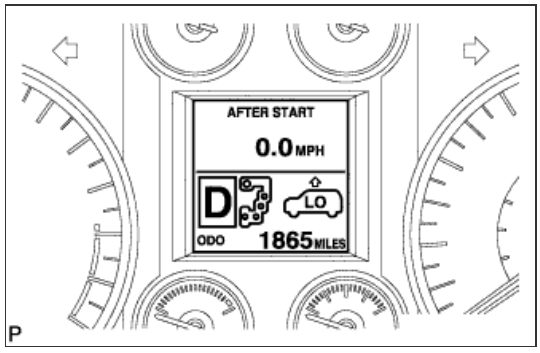
c. Slowly move the shift lever from P to S, then change the gears from 1st to 6th. Then return the shift lever to P.

HINT:

Slowly move the shift lever to circulate the fluid through each part of the transmission.

d. Move the shift lever to D, and quickly move back and forth between N and D (once within 1.5 seconds) for at least 6 seconds. This will activate the fluid temperature detection mode.

Standard condition:
Indicator light (D) remains illuminated for 2 seconds and then turns off.



e. When using the GTS:

i. Return the shift lever to P and press OFF on the Active Test display.

f. When not using the GTS:

i. Return the shift lever to P and disconnect terminals 13 (TC) and 4 (CG).

g. Allow the engine to idle until the fluid temperature reaches 43 to 48°C (109 to 118°F).

h. The indicator (D) will come on again when the fluid temperature reaches 43°C (109°F) and will blink when it exceeds 48°C (118°F).

Indicator Indication of ATF Temperature:

Below Proper Temperature	Proper Temperature	Higher than Proper Temperature
Data List [A/T Oil Temperature 1] 43°C (109°F) or less	Data List [A/T Oil Temperature 1] 43 to 48°C (109 to 118°F)	Data List [A/T Oil Temperature 1] 48°C (118°F) or higher
Indicator light (D) Turn off	Indicator light (D) Turn on	Indicator light (D) Blinking

NOTICE:

Perform the fluid level inspection while the indicator light is on.

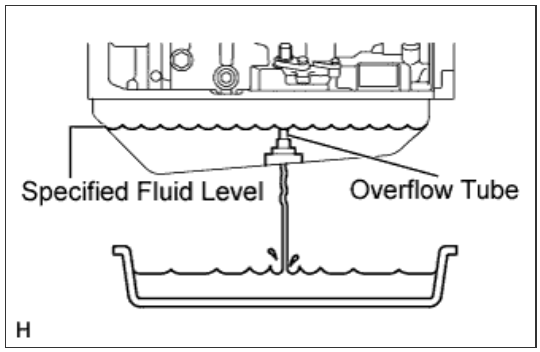
5. FLUID LEVEL CHECK

NOTICE:

The fluid temperature must be between 43 to 48°C (109 to 118°F) to accurately check the fluid level.

a. Remove the overflow plug with the engine idling.

b. Check that fluid comes out of the overflow tube.
If fluid does not come out, proceed to the "Transmission Refill" procedures.
If fluid comes out, wait until the overflow slows to a trickle and proceed to the "Complete" procedures.



6. TRANSMISSION REFILL

a. Remove the overflow plug.

b. Remove the refill plug and gasket.

c. Add ATF into the refill hole until ATF flows from the overflow tube.

d. Wait until the overflow slows to a trickle and proceed to the "Complete" procedures.

7. COMPLETE

a. Install a new gasket and the overflow plug.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }

b. Stop the engine.

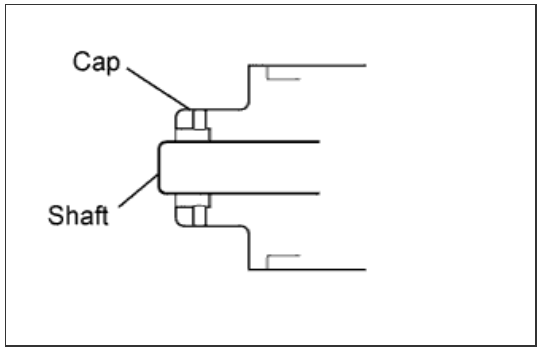
c. Install a new gasket and the refill plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

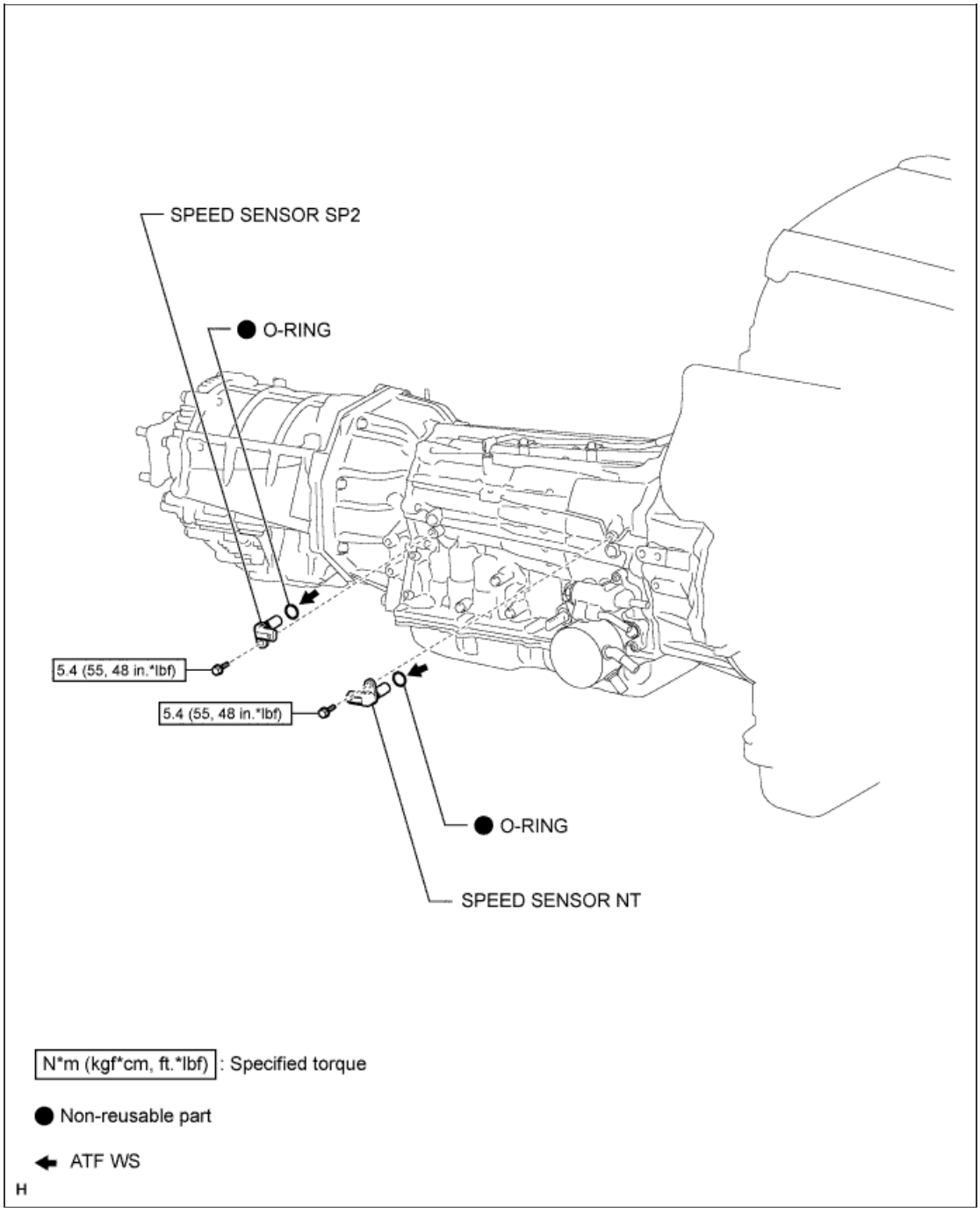
d. Remove the pin.

NOTICE:

- **Make sure the shaft of the thermostat is protruding from the hole of the cap.**
- **Check that there is no ATF leaking from the cap hole.**


Cap
Shaft

for Preparation Click here



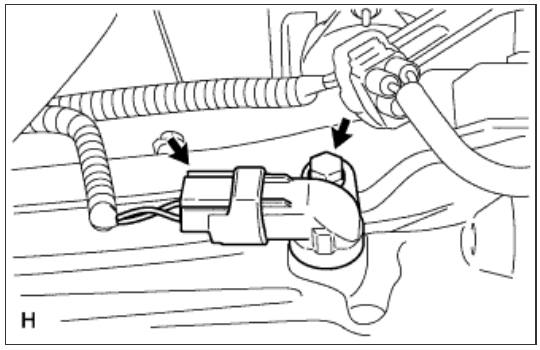
for Preparation Click here

1. REMOVE SPEED SENSOR NT

a. Disconnect the sensor connector.

b. Remove the bolt and sensor.

c. Remove the O-ring from the sensor.

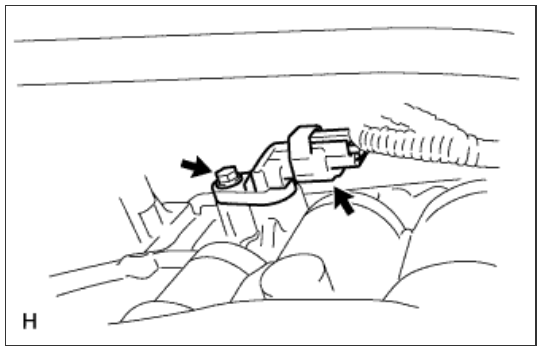


2. REMOVE SPEED SENSOR SP2

a. Disconnect the sensor connector.

b. Remove the bolt and sensor.

c. Remove the O-ring from the sensor.



for Preparation Click here

1. INSPECT SPEED SENSOR NT

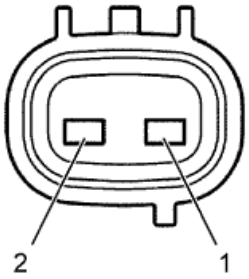
a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

If the result is not as specified, replace the sensor.

Component without harness connected:
(Speed Sensor NT)



2. INSPECT SPEED SENSOR SP2

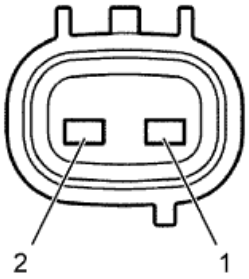
a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

If the result is not as specified, replace the sensor.

Component without harness connected:
(Speed Sensor SP2)



for Preparation Click here

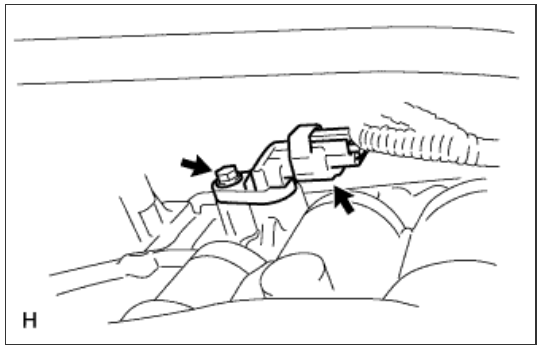
1. INSTALL SPEED SENSOR SP2

a. Coat a new O-ring with ATF and install it to the sensor.

b. Install the sensor with the bolt.

Torque:
5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

c. Connect the sensor connector.



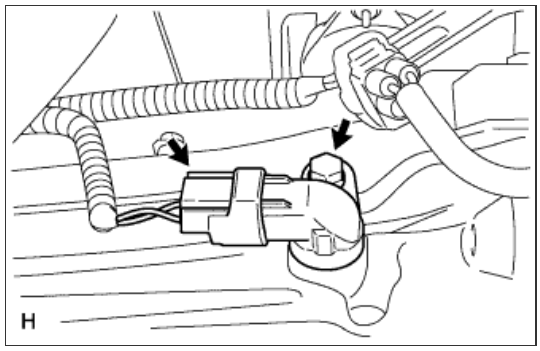
2. INSTALL SPEED SENSOR NT

a. Coat a new O-ring with ATF and install it to the sensor.

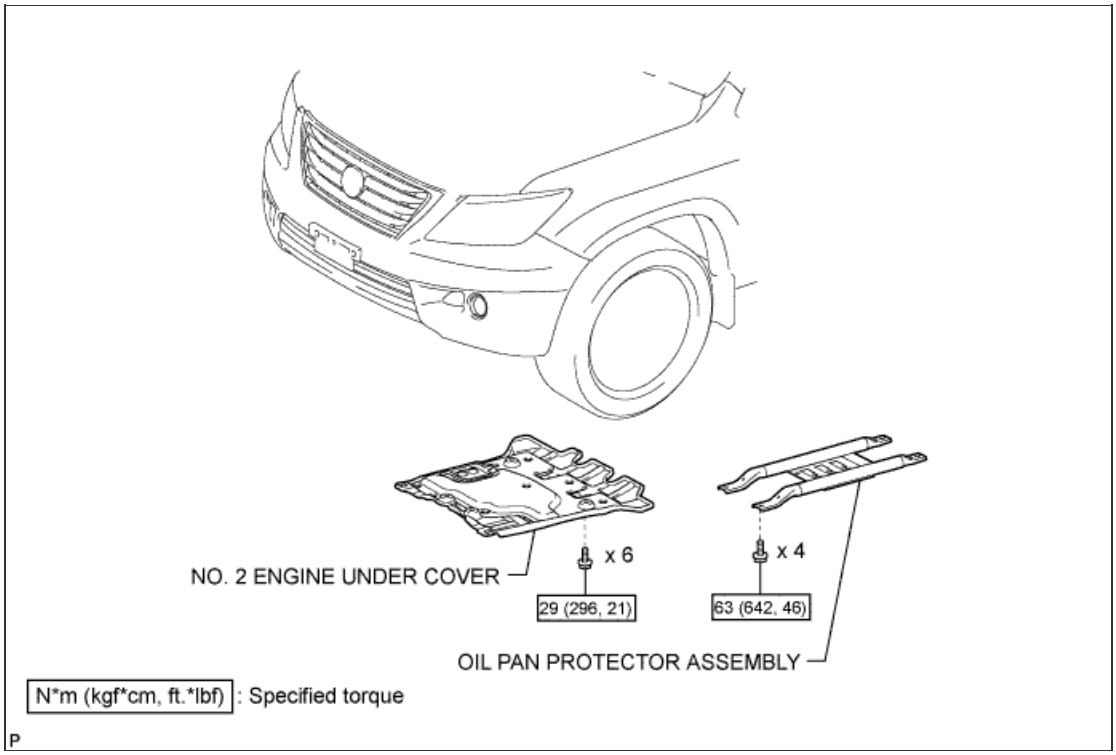
b. Install the sensor with the bolt.

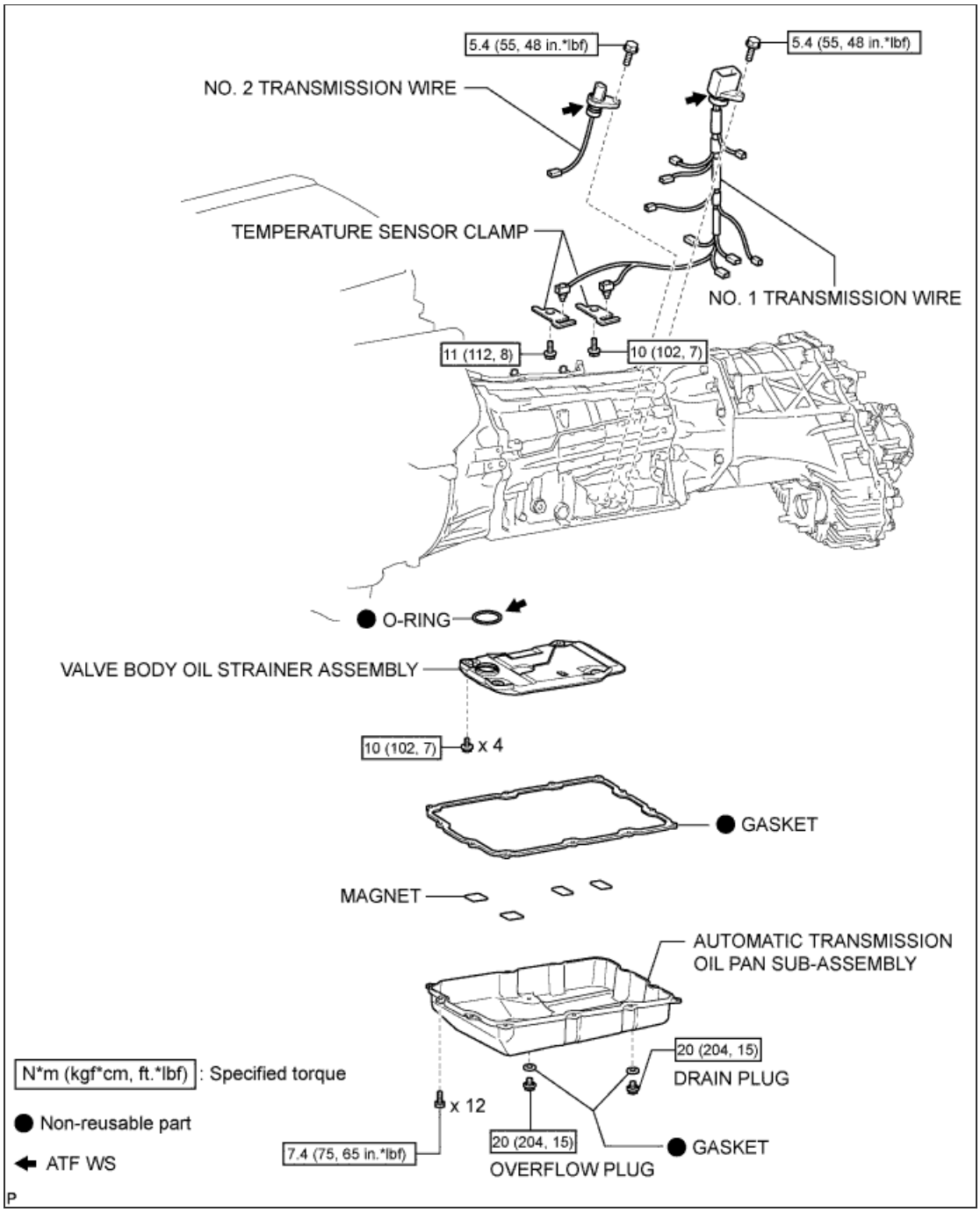
Torque:
5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

c. Connect the sensor connector.



for Preparation Click here

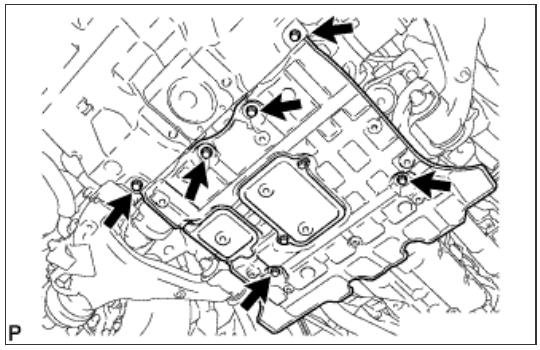



5.4 (55, 48 in.*lbf)
5.4 (55, 48 in.*lbf)
NO. 2 TRANSMISSION WIRE
TEMPERATURE SENSOR CLAMP
NO. 1 TRANSMISSION WIRE
11 (112, 8)
10 (102, 7)
O-RING
VALVE BODY OIL STRAINER ASSEMBLY
10 (102, 7)
x 4
GASKET
MAGNET
AUTOMATIC TRANSMISSION
OIL PAN SUB-ASSEMBLY
20 (204, 15)
DRAIN PLUG
x 12
7.4 (75, 65 in.*lbf)
20 (204, 15)
GASKET
OVERFLOW PLUG
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
ATF WS
P

for Preparation Click here

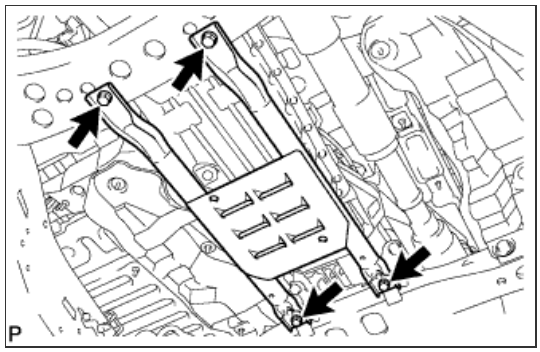
1. REMOVE NO. 2 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.



2. REMOVE OIL PAN PROTECTOR ASSEMBLY

a. Remove the 4 bolts and oil pan protector.



3. DRAIN AUTOMATIC TRANSMISSION FLUID

a. Remove the drain plug and gasket, and drain the ATF.

b. Install a new gasket and the drain plug.

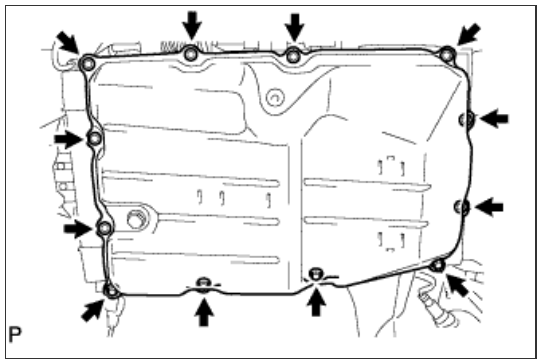
Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }

4. REMOVE AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY

a. Remove the 12 bolts, oil pan and gasket from the transmission.

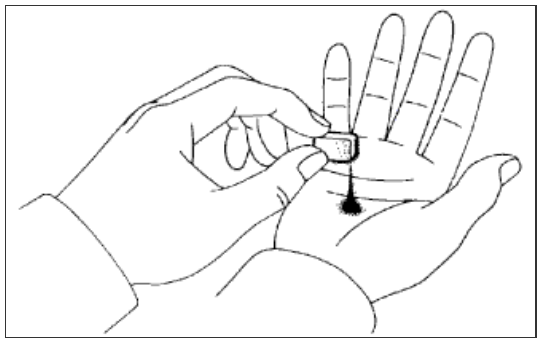
NOTICE:

Some fluid will remain in the oil pan. Remove all the bolts, and carefully remove the oil pan assembly.



b. Examine the particles in the pan.

i. Remove the 4 magnets and use them to collect steel particles. Carefully inspect the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.
Steel (magnetic): bearing, gear and clutch plate wear
Brass (non-magnetic): bush wear



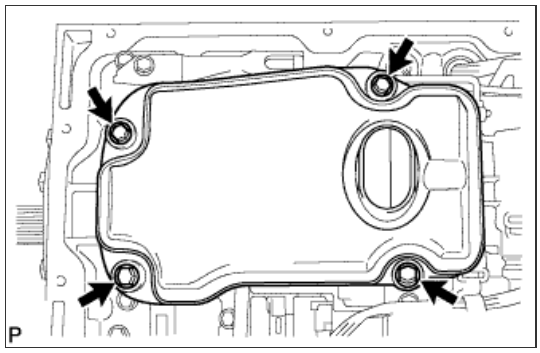
5. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

a. Remove the 4 bolts and oil strainer.

NOTICE:

Be careful as some fluid may leak out of the oil strainer.

b. Remove the O-ring from the oil strainer.

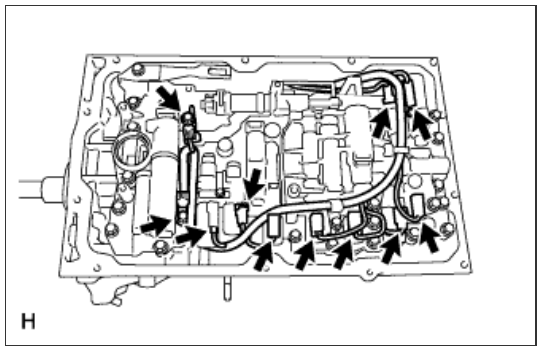


6. DISCONNECT TRANSMISSION WIRE

a. Remove the 2 bolts and 2 temperature sensor clamps.

b. Disconnect the 2 ATF temperature sensors.

c. Disconnect the 9 connectors from the solenoid valves.

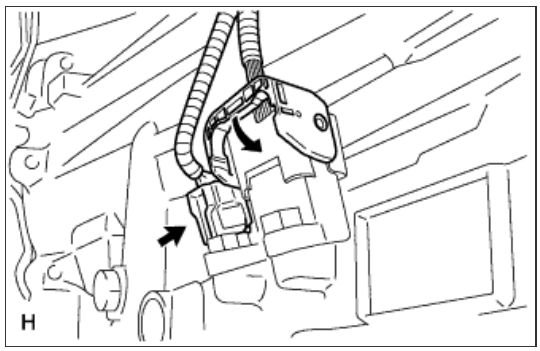


7. REMOVE TRANSMISSION WIRE

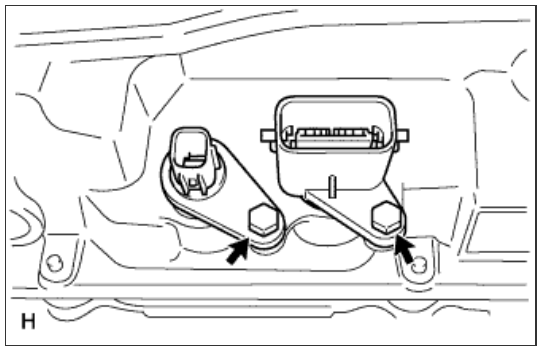
a. Disconnect the 2 wire connectors.

HINT:

Detach the claw, press down the lever, and then disconnect the transmission wire connector.



b. Remove the 2 bolts and pull out the 2 transmission wires.


H

for Preparation Click here

1. INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)

a. Measure the resistance according to the value(s) in the table below.

HINT:

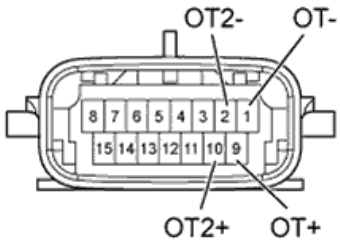
If the resistance is out of the specified range at any of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Standard Resistance:

Tester Connection	ATF Temperature	Specified Condition
1 (OT-) - 9 (OT+)	10°C (50°F)	5 to 8 kΩ
1 (OT-) - 9 (OT+)	25°C (77°F)	2.5 to 4.5 kΩ
1 (OT-) - 9 (OT+)	110°C (230°F)	0.22 to 0.28 kΩ
2 (OT2-) - 10 (OT2+)	10°C (50°F)	5 to 8 kΩ
2 (OT2-) - 10 (OT2+)	25°C (77°F)	2.5 to 4.5 kΩ
2 (OT2-) - 10 (OT2+)	110°C (230°F)	0.22 to 0.28 kΩ

If the result is not as specified, replace the transmission wire.

Component without harness connected:
(No. 1 Transmission Wire)



Y

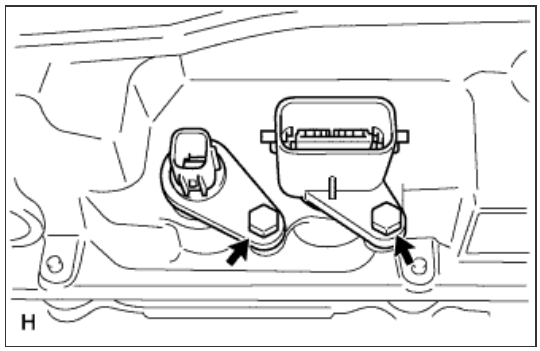
for Preparation Click here

1. INSTALL TRANSMISSION WIRE

a. Coat the O-ring of the transmission wire connector with ATF.

b. Install the 2 transmission wires with the 2 bolts.

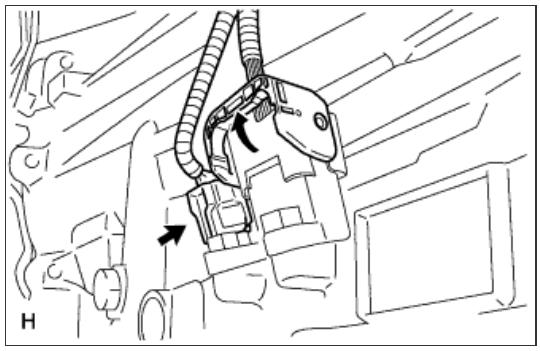
Torque:
5.4 N*m{ 55 kgf*cm , 48 in.*lbf }



c. Connect the 2 transmission wire connectors.

HINT:

Push up the lever until the claw of the transmission wire connector makes a connection sound.



2. CONNECT TRANSMISSION WIRE

a. Connect the 9 connectors to the solenoid valves.

b. Connect the 2 ATF temperature sensors with the 2 clamps and 2 bolts.

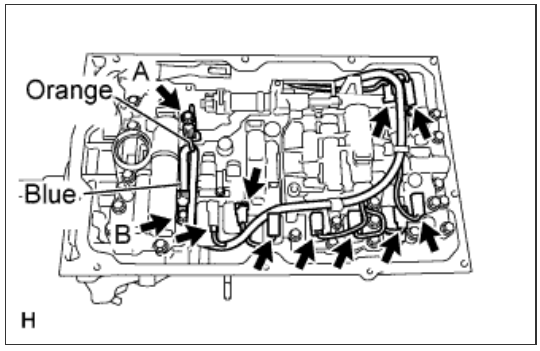
Torque:
for bolt A:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }
for bolt B:
11 N*m{ 112 kgf*cm , 8 ft.*lbf }

HINT:

Each bolt length is indicated below.

12 mm (0.472 in.) for bolt A

36 mm (1.41 in.) for bolt B

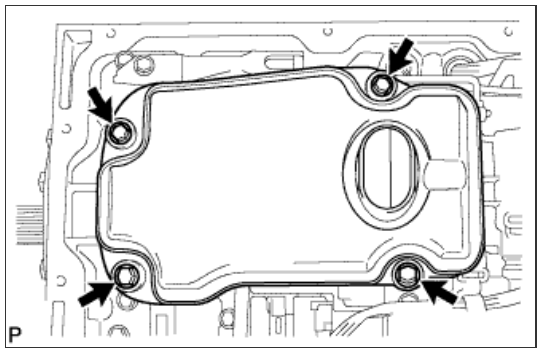


3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

a. Coat a new O-ring with ATF and install it to the oil strainer.

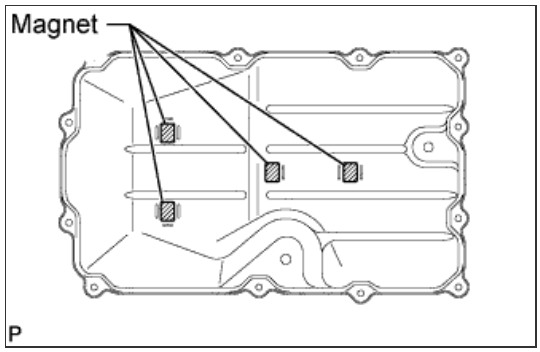
b. Install the oil strainer with the 4 bolts.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



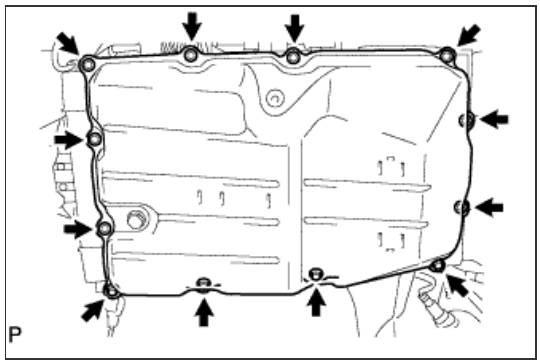
4. INSTALL AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY

a. Install the 4 transmission oil cleaner magnets to the oil pan.



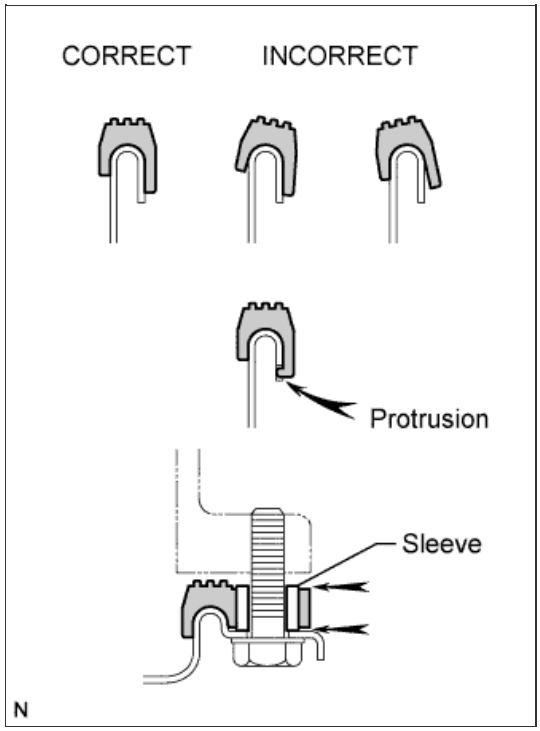
b. Install a new gasket and the oil pan with the 12 bolts.

Torque:
7.4 N*m{ 75 kgf*cm , 65 in.*lbf }



NOTICE:

- **Make sure that there is no oil or foreign matter on the gasket seal surface and oil pan contact surface.**
- **Install the gasket so that there is no slack in the gasket, and make sure the entire circumference of the seal surface is level.**
- **Make sure that the 9 gasket drop prevention protrusions are set on the oil pan.**
- **When tightening the bolts of the oil pan, make sure that the gasket is not pinched between the gasket tightening area sleeve and the transmission seal surface.**



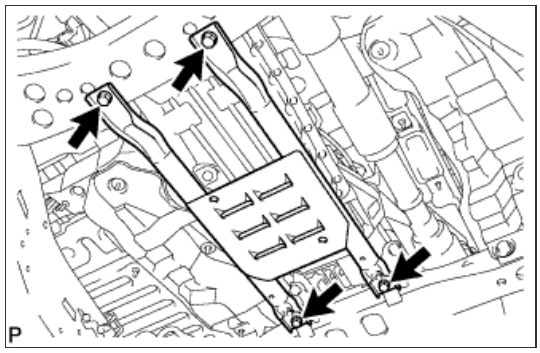
5. ADD AUTOMATIC TRANSMISSION FLUID

a. Add automatic transmission fluid (Click here).

6. INSTALL OIL PAN PROTECTOR ASSEMBLY

a. Install the oil pan protector with the 4 bolts.

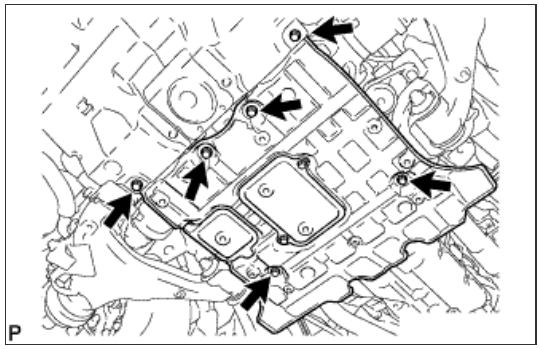
Torque:
63 N*m{ 642 kgf*cm , 46 ft.*lbf }



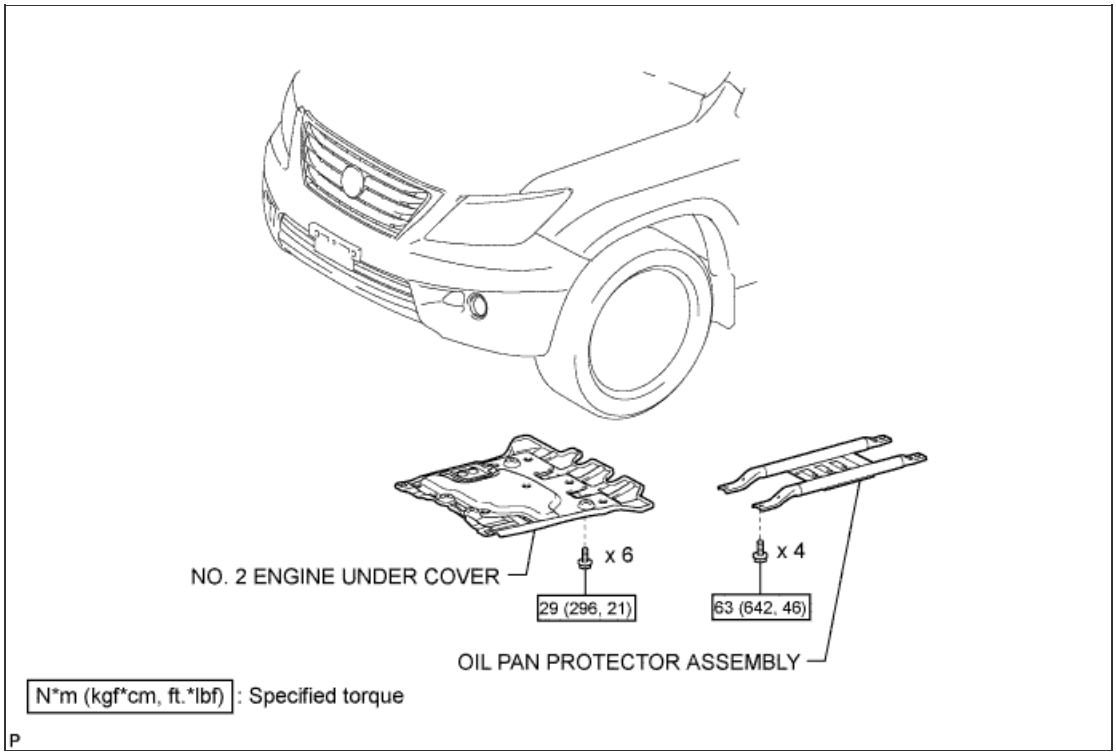
7. INSTALL NO. 2 ENGINE UNDER COVER

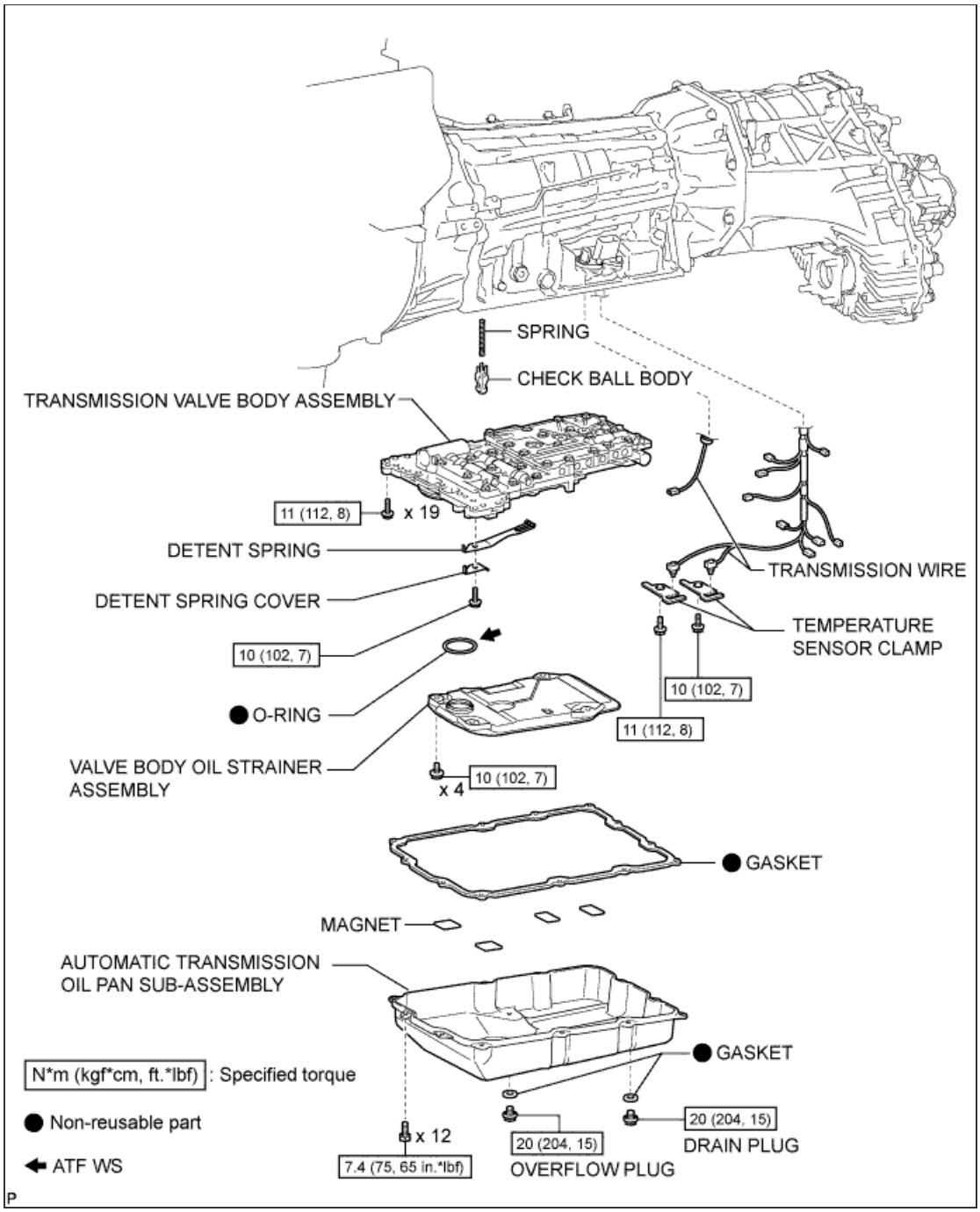
a. Install the under cover with the 6 bolts.

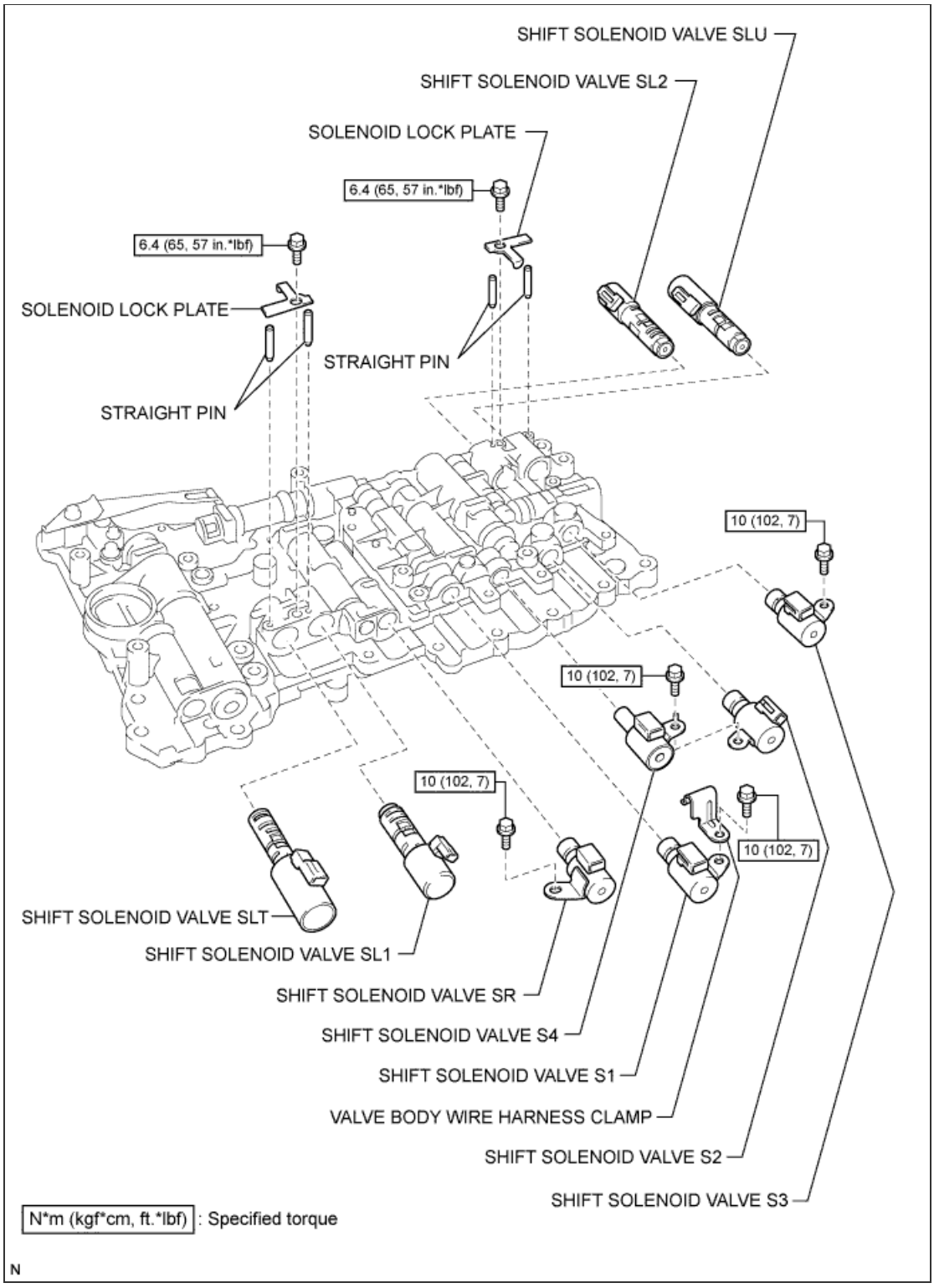
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



for Preparation Click here



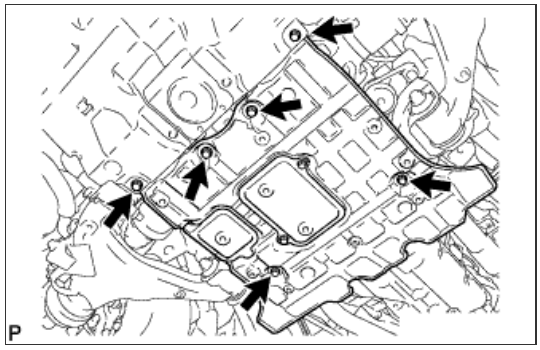

SPRING
CHECK BALL BODY
TRANSMISSION VALVE BODY ASSEMBLY
11 (112, 8)
x 19
DETENT SPRING
DETENT SPRING COVER
10 (102, 7)
O-RING
VALVE BODY OIL STRAINER ASSEMBLY
TRANSMISSION WIRE
TEMPERATURE SENSOR CLAMP
10 (102, 7)
11 (112, 8)
10 (102, 7)
x 4
GASKET
MAGNET
AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY
GASKET
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
ATF WS
x 12
7.4 (75, 65 in.*lbf)
20 (204, 15)
OVERFLOW PLUG
20 (204, 15)
DRAIN PLUG
P


SHIFT SOLENOID VALVE SLU
SHIFT SOLENOID VALVE SL2
SOLENOID LOCK PLATE
6.4 (65, 57 in.*lbf)
6.4 (65, 57 in.*lbf)
SOLENOID LOCK PLATE
STRAIGHT PIN
STRAIGHT PIN
10 (102, 7)
10 (102, 7)
10 (102, 7)
10 (102, 7)
SHIFT SOLENOID VALVE SLT
SHIFT SOLENOID VALVE SL1
SHIFT SOLENOID VALVE SR
SHIFT SOLENOID VALVE S4
SHIFT SOLENOID VALVE S1
VALVE BODY WIRE HARNESS CLAMP
SHIFT SOLENOID VALVE S2
SHIFT SOLENOID VALVE S3
N*m (kgf*cm, ft.*lbf) : Specified torque
N

for Preparation Click here

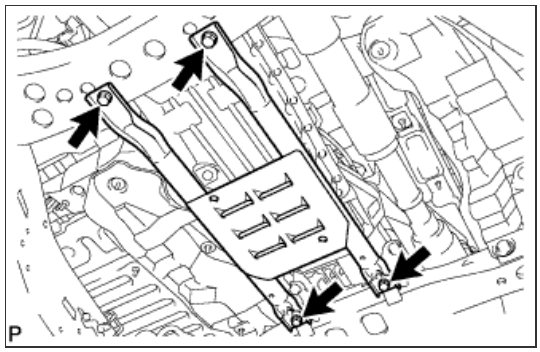
1. REMOVE NO. 2 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.



2. REMOVE OIL PAN PROTECTOR ASSEMBLY

a. Remove the 4 bolts and oil pan protector.



3. DRAIN AUTOMATIC TRANSMISSION FLUID

a. Remove the drain plug and gasket, and drain the ATF.

b. Install a new gasket and the drain plug.

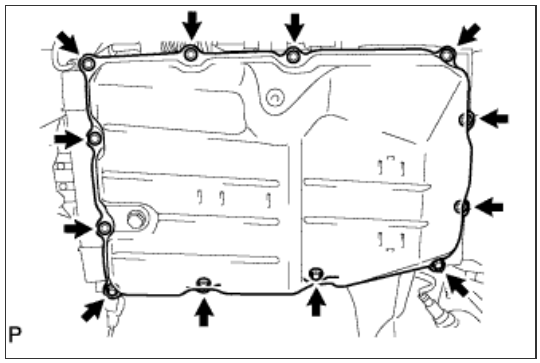
Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }

4. REMOVE AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY

a. Remove the 12 bolts, oil pan and gasket from the transmission.

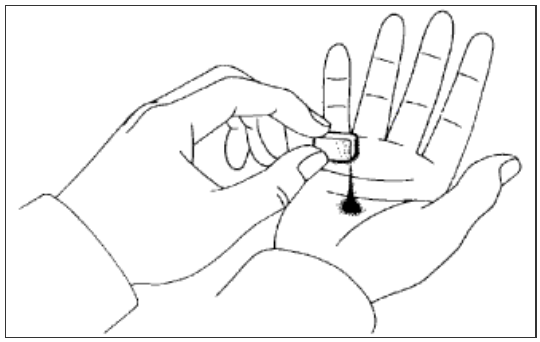
NOTICE:

Some fluid will remain in the oil pan. Remove all the bolts, and carefully remove the oil pan assembly.



b. Examine the particles in the pan.

i. Remove the 4 magnets and use them to collect steel particles. Carefully inspect the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.
Steel (magnetic): bearing, gear and clutch plate wear
Brass (non-magnetic): bush wear



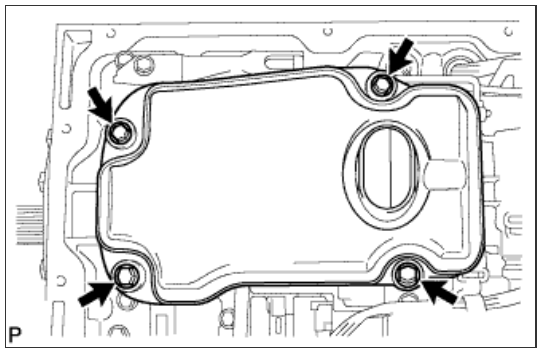
5. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

a. Remove the 4 bolts and oil strainer.

NOTICE:

Be careful as some fluid may leak out of the oil strainer.

b. Remove the O-ring from the oil strainer.

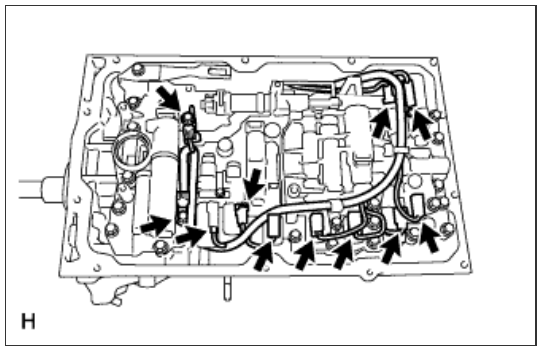


6. DISCONNECT TRANSMISSION WIRE

a. Remove the 2 bolts and 2 temperature sensor clamps.

b. Disconnect the 2 ATF temperature sensors.

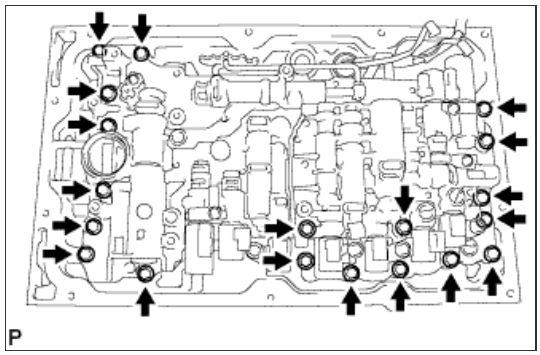
c. Disconnect the 9 connectors from the solenoid valves.



7. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

a. Remove the bolt, detent spring cover and detent spring.

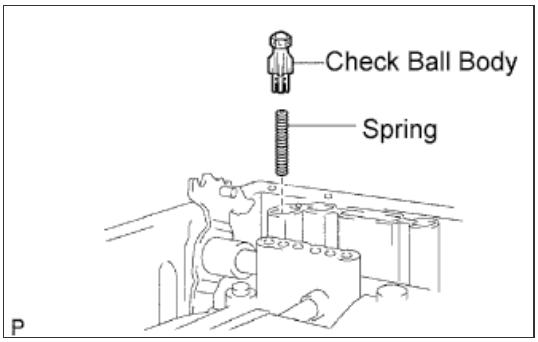
b. Remove the 19 bolts and valve body.



c. Remove the check ball body and spring.

NOTICE:

Do not drop the check ball body and spring.

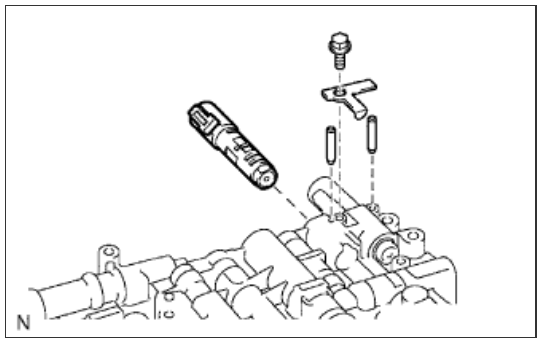


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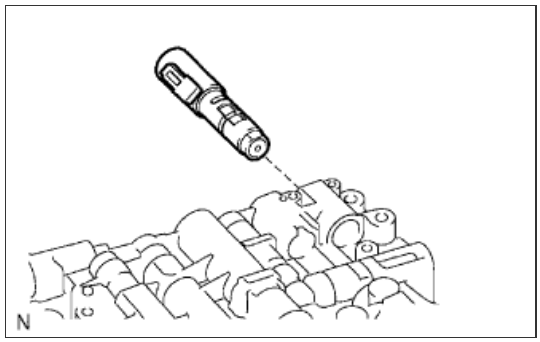
1. REMOVE SHIFT SOLENOID VALVE SL2

a. Remove the bolt, lock plate and 2 straight pins.

b. Remove the shift solenoid valve.



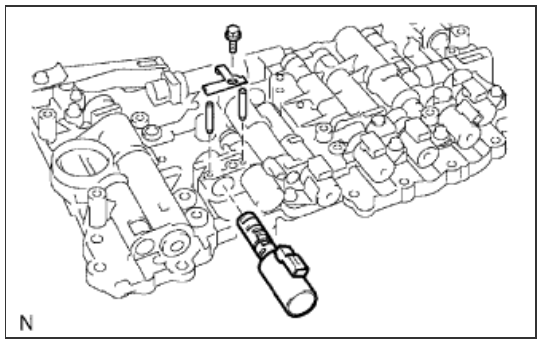
2. REMOVE SHIFT SOLENOID VALVE SLU



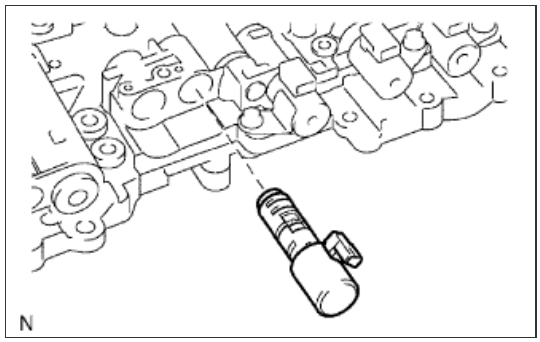
3. REMOVE SHIFT SOLENOID VALVE SLT

a. Remove the bolt, lock plate and 2 straight pins.

b. Remove the shift solenoid valve.

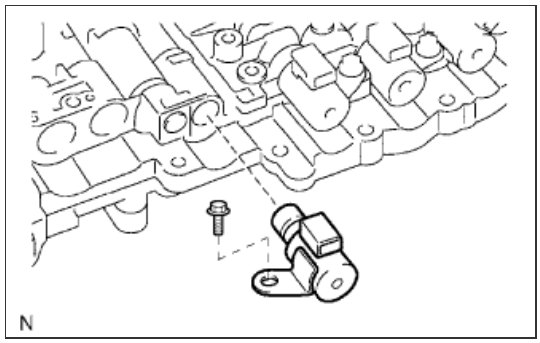


4. REMOVE SHIFT SOLENOID VALVE SL1



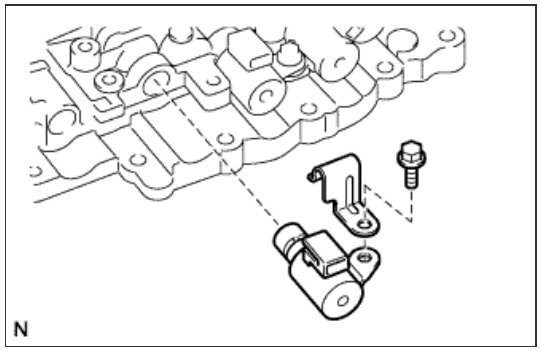
5. REMOVE SHIFT SOLENOID VALVE SR

a. Remove the bolt and shift solenoid valve.



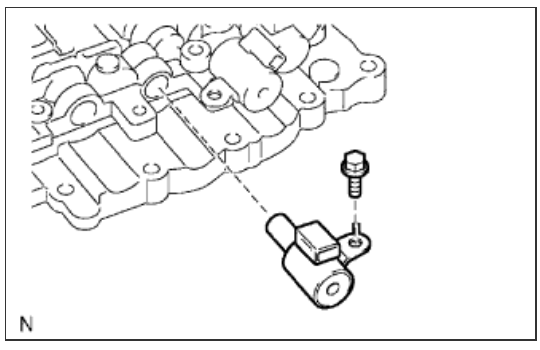
6. REMOVE SHIFT SOLENOID VALVE S1

a. Remove the bolt, valve body wire harness clamp and shift solenoid valve.

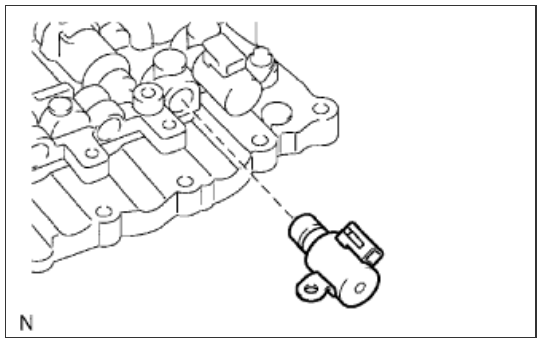


7. REMOVE SHIFT SOLENOID VALVE S4

a. Remove the bolt and shift solenoid valve.

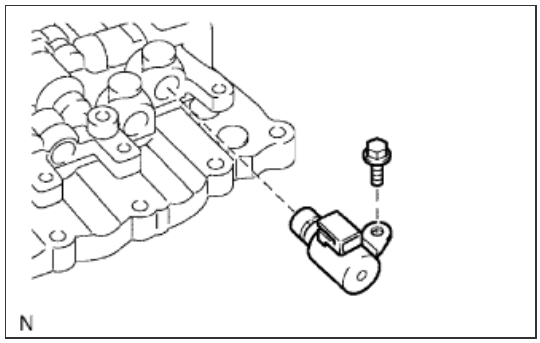


8. REMOVE SHIFT SOLENOID VALVE S2



9. REMOVE SHIFT SOLENOID VALVE S3

a. Remove the bolt and shift solenoid valve.



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1. INSPECT SHIFT SOLENOID VALVE SL1

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

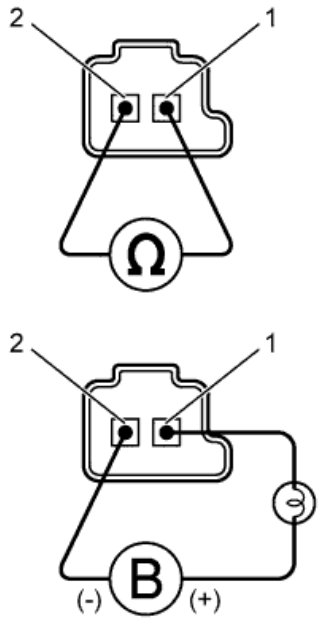
b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) with a 21 W bulb → Terminal 1 Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.

Component without harness connected:
(Shift Solenoid Valve SL1)



2. INSPECT SHIFT SOLENOID VALVE S1

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S1 connector terminal - Shift solenoid valve S1 body	20°C (68°F)	11 to 15 Ω

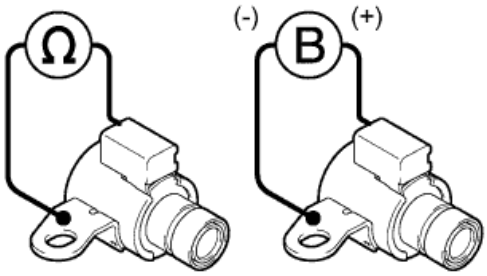
b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Shift solenoid valve S1 connector Battery negative (-) → Shift solenoid valve S1 body	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.

Shift Solenoid Valve S1:



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3. INSPECT SHIFT SOLENOID VALVE S2

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

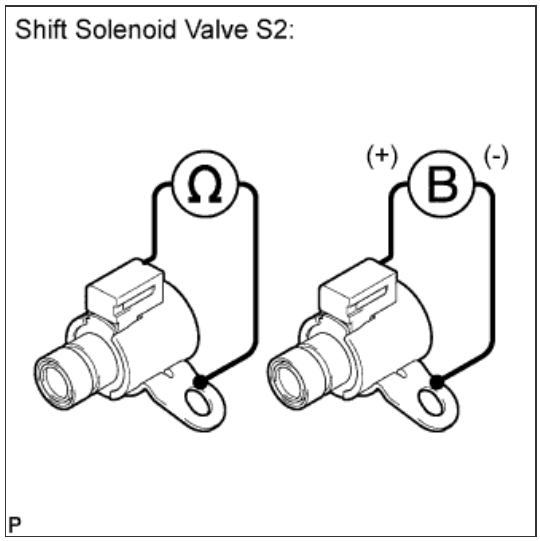
Tester Connection	Condition	Specified Condition
Shift solenoid valve S2 connector terminal - Shift solenoid valve S2 body	20°C (68°F)	11 to 15 Ω

b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Shift solenoid valve S2 connector Battery negative (-) → Shift solenoid valve S2 body	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.



4. INSPECT SHIFT SOLENOID VALVE S3

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

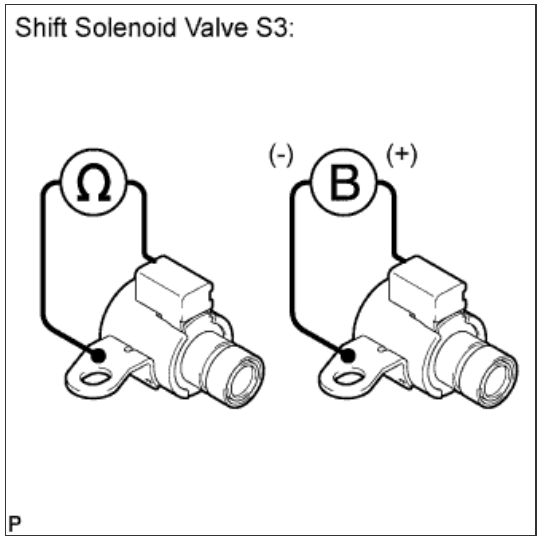
Tester Connection	Condition	Specified Condition
Shift solenoid valve S3 connector terminal - Shift solenoid valve S3 body	20°C (68°F)	11 to 15 Ω

b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Shift solenoid valve S3 connector Battery negative (-) → Shift solenoid valve S3 body	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.



5. INSPECT SHIFT SOLENOID VALVE S4

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
Shift solenoid valve S4 connector terminal - Shift	20°C (68°F)	11 to 15 Ω

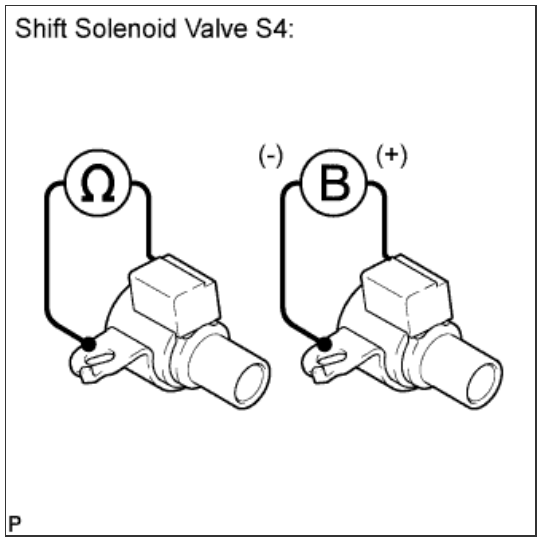
solenoid valve S4 body		

b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Shift solenoid valve S4 connector Battery negative (-) → Shift solenoid valve S4 body	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.



6. INSPECT SHIFT SOLENOID VALVE SL2

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

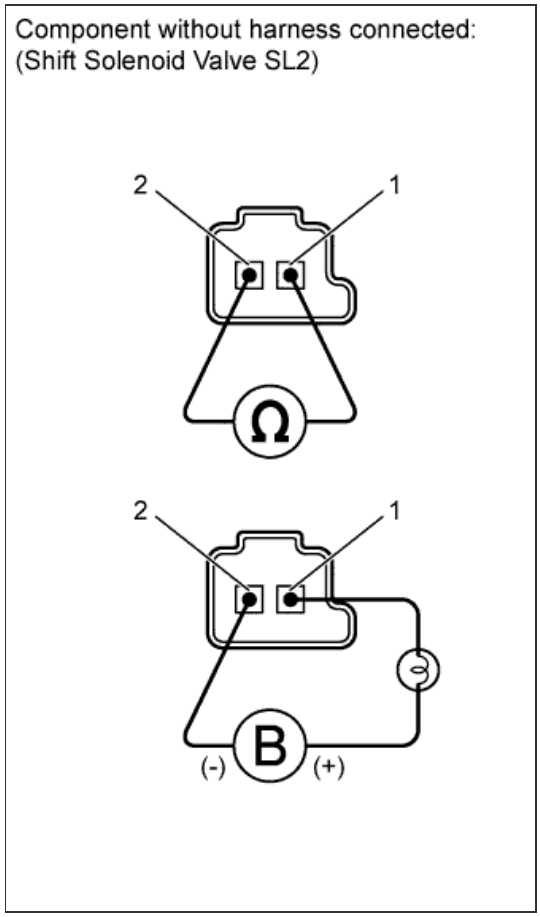
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) with a 21 W bulb → Terminal 1 Battery negative (-) → Terminal 2	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.



7. INSPECT SHIFT SOLENOID VALVE SR

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

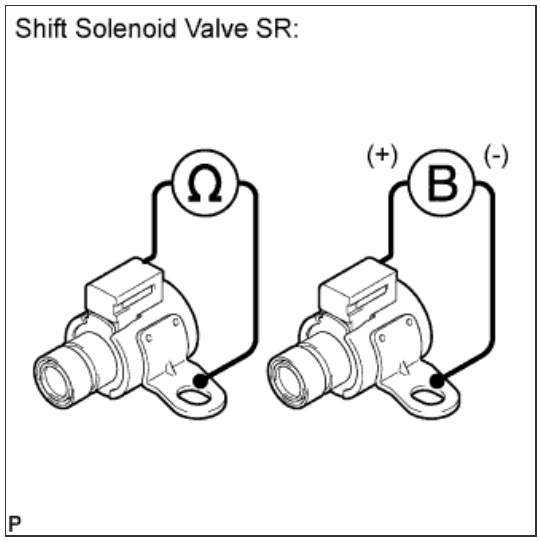
Tester Connection	Condition	Specified Condition
Shift solenoid valve SR connector terminal - Shift solenoid valve SR body	20°C (68°F)	11 to 15 Ω

b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Shift solenoid valve SR connector Battery negative (-) → Shift solenoid valve SR body	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.



8. INSPECT SHIFT SOLENOID VALVE SLT

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

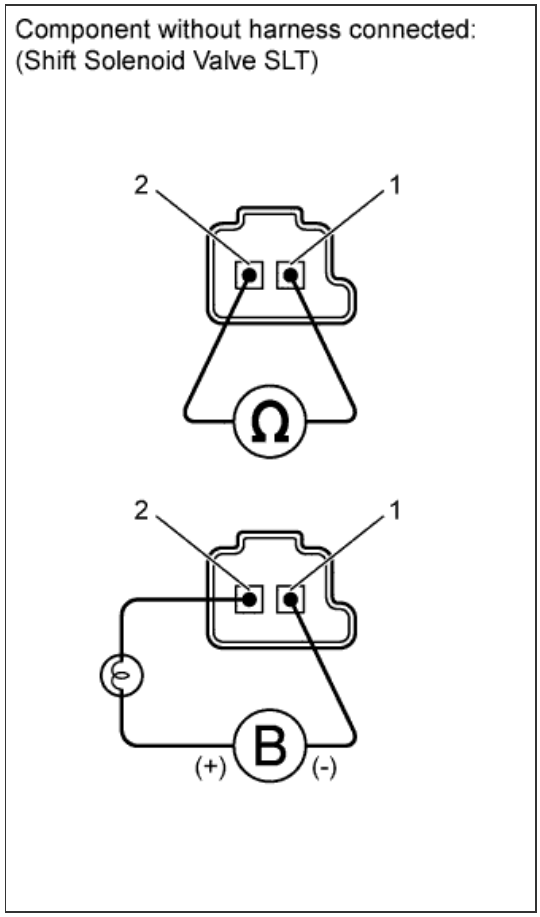
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) with a 21 W bulb → Terminal 2 Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.



9. INSPECT SHIFT SOLENOID VALVE SLU

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

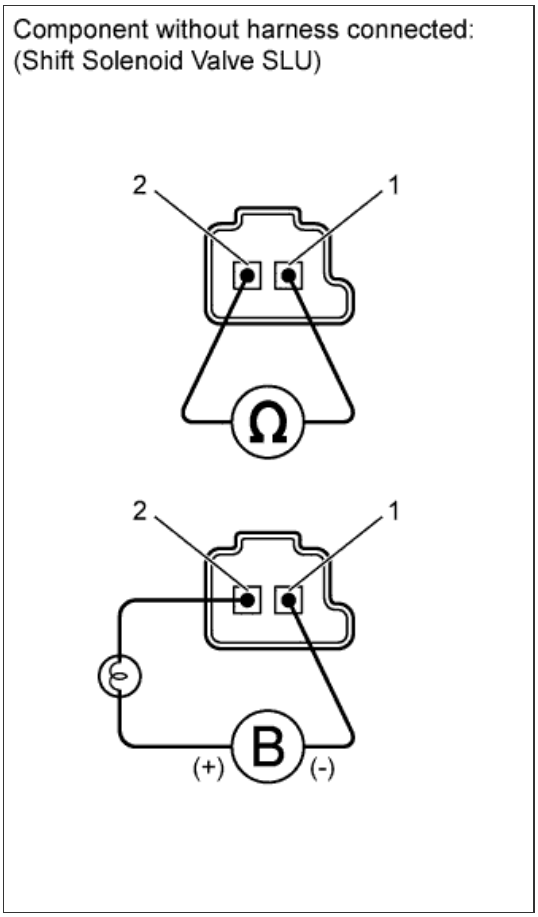
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	5.0 to 5.6 Ω

b. Apply 12 V battery voltage to the shift solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) with a 21 W bulb → Terminal 2 Battery negative (-) → Terminal 1	Valve moves and makes an operating noise

If the result is not as specified, replace the solenoid valve.

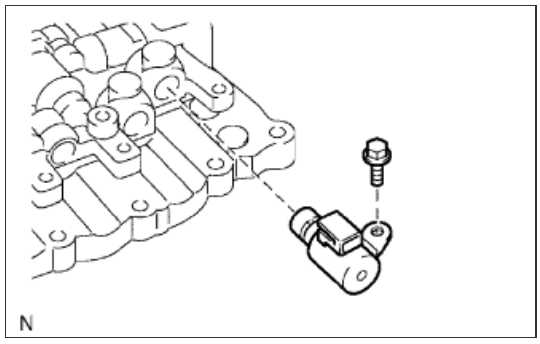


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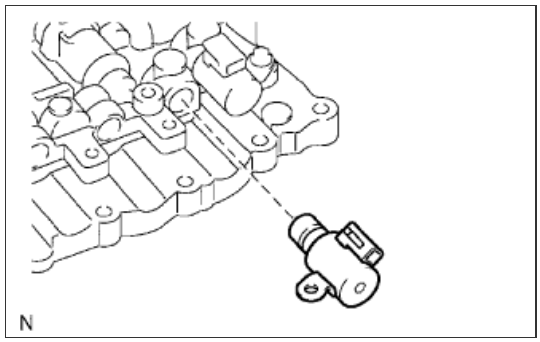
1. INSTALL SHIFT SOLENOID VALVE S3

a. Install the shift solenoid valve with the bolt.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



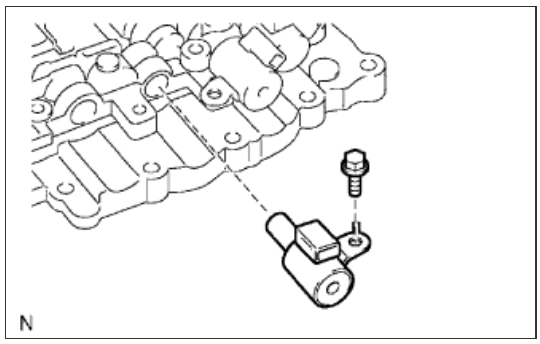
2. INSTALL SHIFT SOLENOID VALVE S2



3. INSTALL SHIFT SOLENOID VALVE S4

a. Install the shift solenoid valve with the bolt.

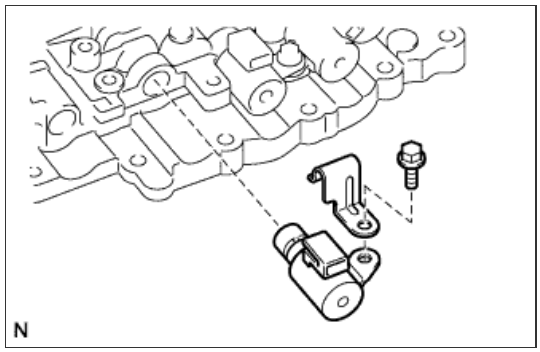
Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



4. INSTALL SHIFT SOLENOID VALVE S1

a. Install the shift solenoid valve and valve body wire harness clamp with the bolt.

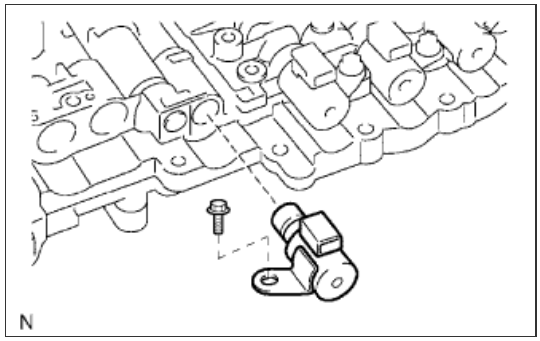
Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



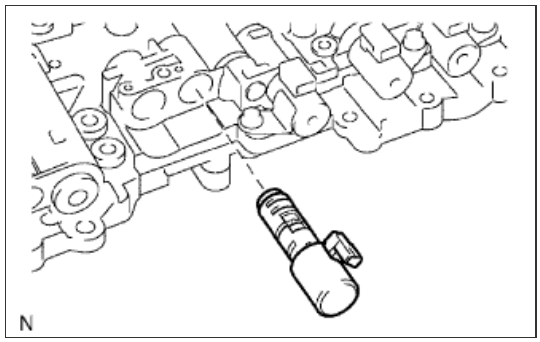
5. INSTALL SHIFT SOLENOID VALVE SR

a. Install the shift solenoid valve with the bolt.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



6. INSTALL SHIFT SOLENOID VALVE SL1

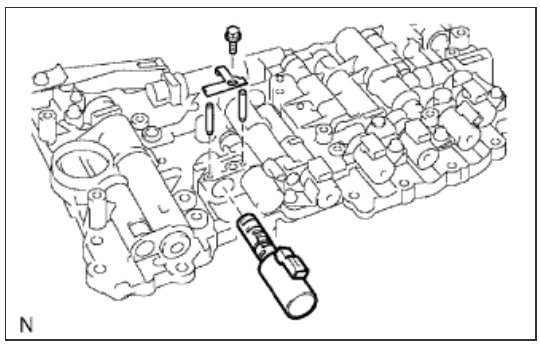


7. INSTALL SHIFT SOLENOID VALVE SLT

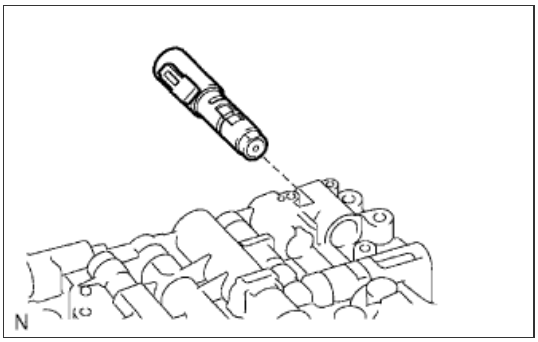
a. Install the shift solenoid valve.

b. Install the 2 straight pins and lock plate with the bolt.

Torque:
6.4 N*m{ 65 kgf*cm , 57 in.*lbf }



8. INSTALL SHIFT SOLENOID VALVE SLU

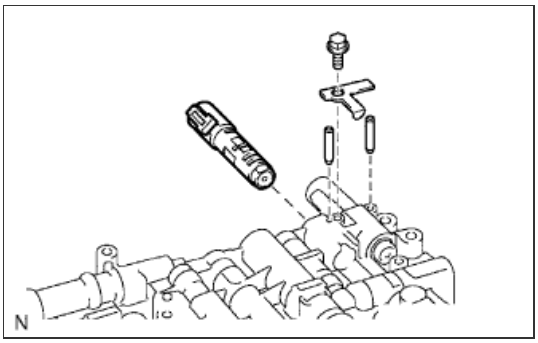


9. INSTALL SHIFT SOLENOID VALVE SL2

a. Install the shift solenoid valve.

b. Install the 2 straight pins and lock plate with the bolt.

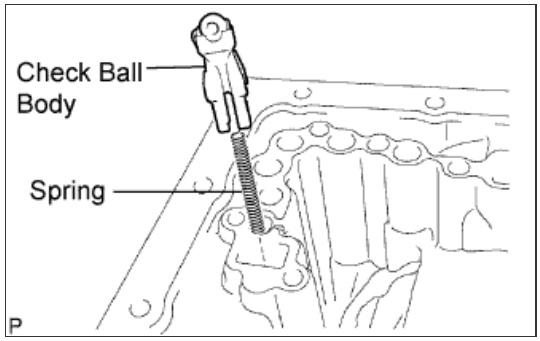
Torque:
6.4 N*m{ 65 kgf*cm , 57 in.*lbf }



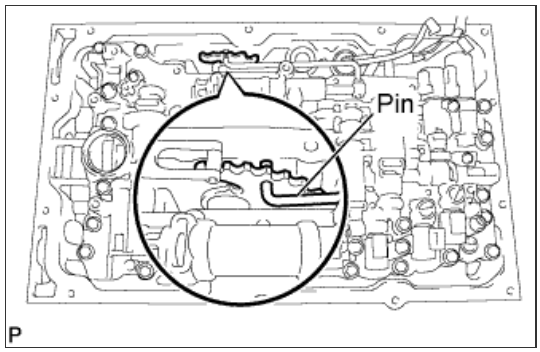
for Preparation Click here

1. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

a. Install the spring and check ball body.



b. Insert the pin of the manual valve into the hole of the manual valve lever.



c. Install the 19 bolts.

Torque:
11 N*m{ 112 kgf*cm , 8 ft.*lbf }

HINT:

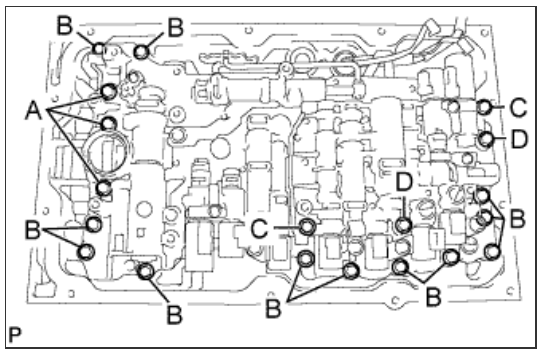
Each bolt length is indicated below.

36 mm (1.42 in.) for bolt A

25 mm (0.984 in.) for bolt B

45 mm (1.77 in.) for bolt C

50 mm (1.97 in.) for bolt D



d. Install the detent spring and detent spring cover with the bolt.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }

2. CONNECT TRANSMISSION WIRE

a. Connect the 9 connectors to the solenoid valves.

b. Connect the 2 ATF temperature sensors with the 2 clamps and 2 bolts.

Torque:
for bolt A:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }
for bolt B:

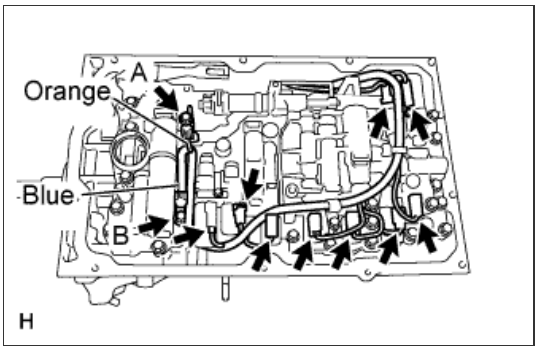
11 N*m{ 112 kgf*cm , 8 ft.*lbf }

HINT:

Each bolt length is indicated below.

12 mm (0.472 in.) for bolt A

36 mm (1.41 in.) for bolt B

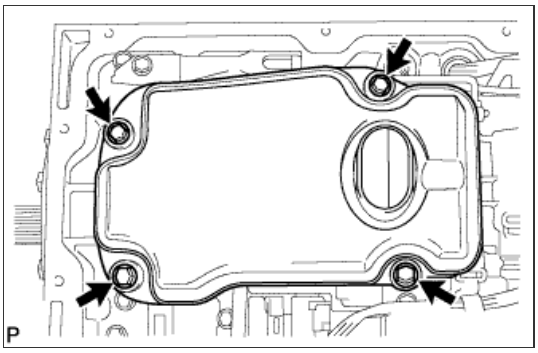


3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

a. Coat a new O-ring with ATF and install it to the oil strainer.

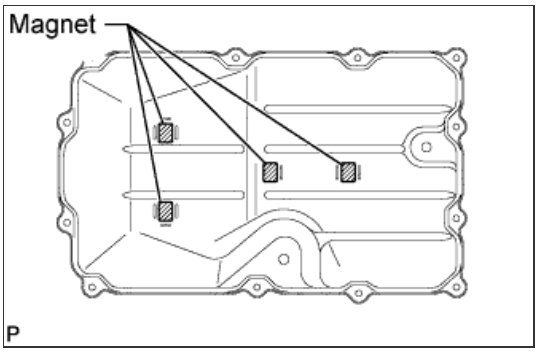
b. Install the oil strainer with the 4 bolts.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



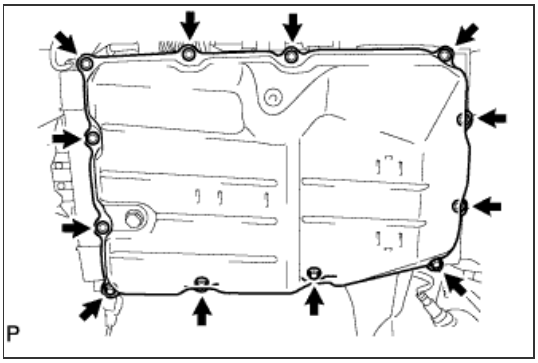
4. INSTALL AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY

a. Install the 4 transmission oil cleaner magnets to the oil pan.



b. Install a new gasket and the oil pan with the 12 bolts.

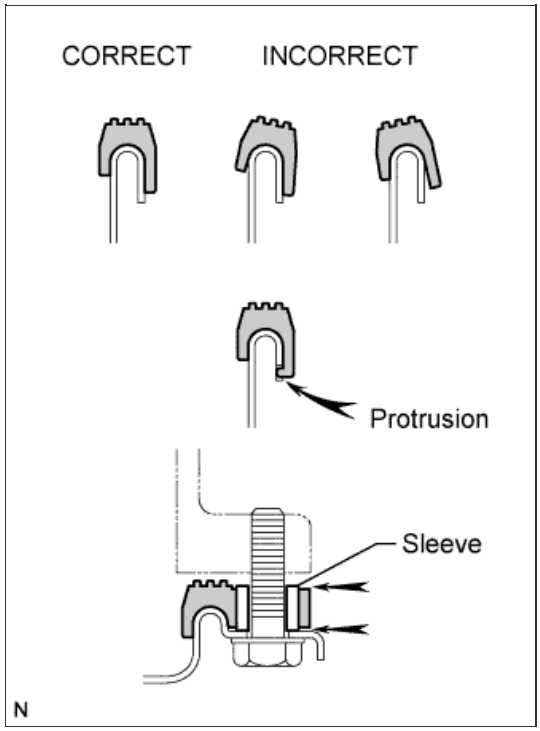
Torque:
7.4 N*m{ 75 kgf*cm , 65 in.*lbf }



NOTICE:

- **Make sure that there is no oil or foreign matter on the gasket seal surface and oil pan contact surface.**
- **Install the gasket so that there is no slack in the gasket, and make sure the entire circumference of the seal surface is level.**
- **Make sure that the 9 gasket drop prevention protrusions are set on the oil pan.**

- **When tightening the bolts of the oil pan, make sure that the gasket is not pinched between the gasket tightening area sleeve and the transmission seal surface.**



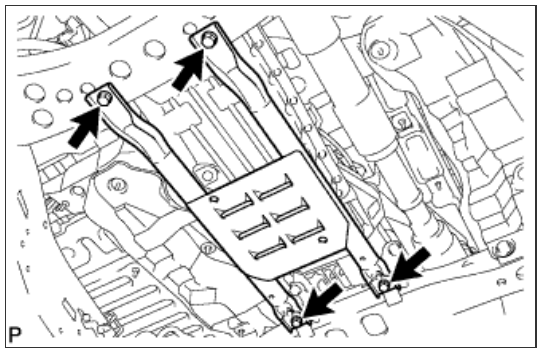
5. ADD AUTOMATIC TRANSMISSION FLUID

a. Add automatic transmission fluid (Click here).

6. INSTALL OIL PAN PROTECTOR ASSEMBLY

a. Install the oil pan protector with the 4 bolts.

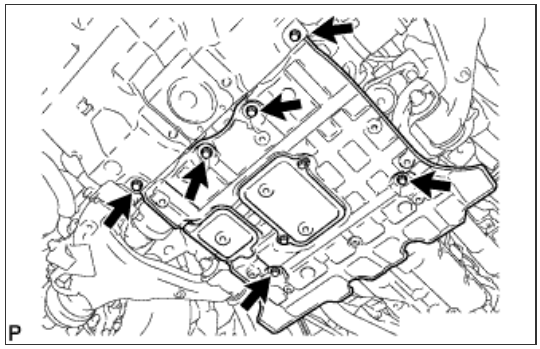
Torque:
63 N*m{ 642 kgf*cm , 46 ft.*lbf }



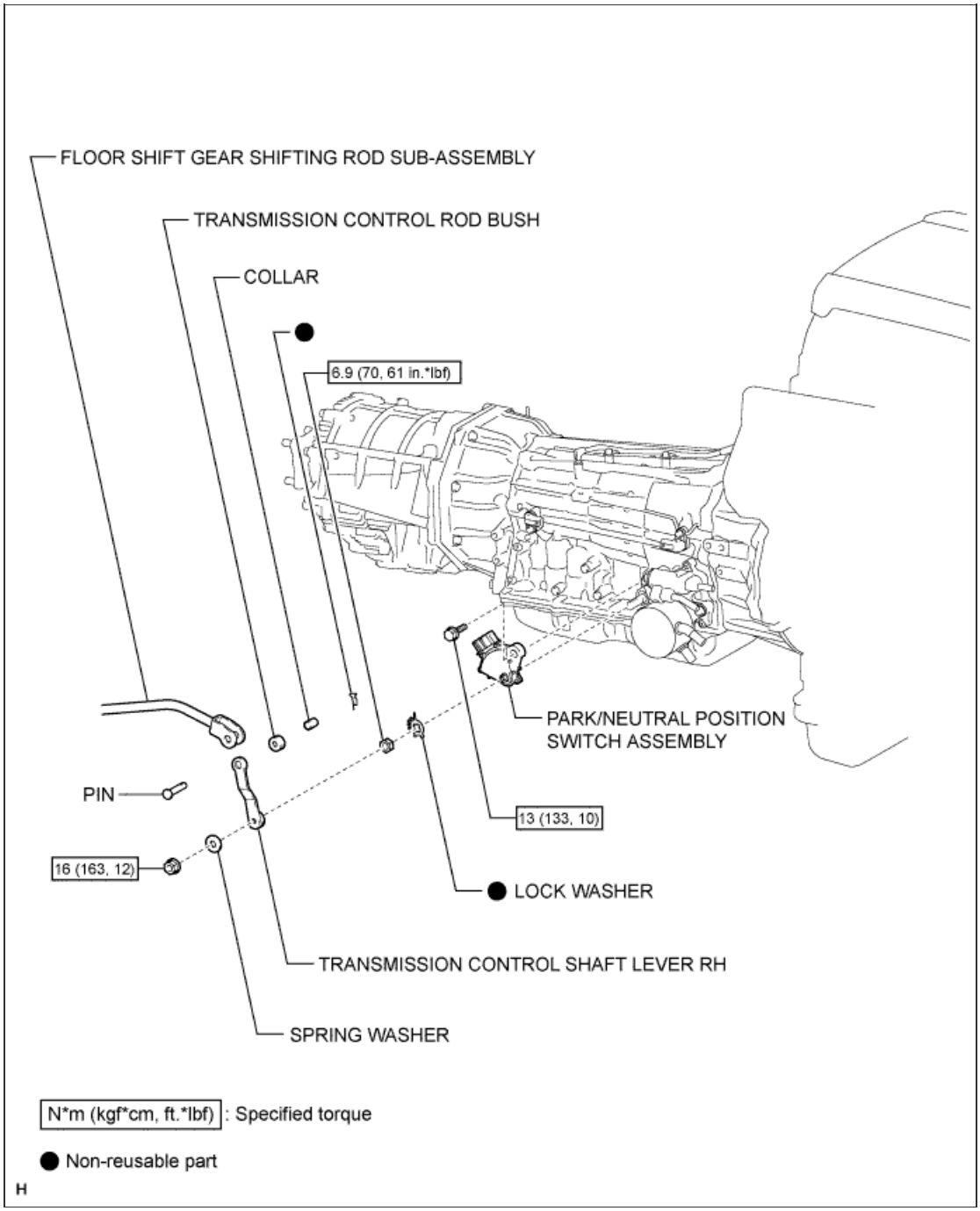
7. INSTALL NO. 2 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



for Preparation Click here



for Preparation Click here

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

a. Apply the parking brake and turn the engine switch on (IG).

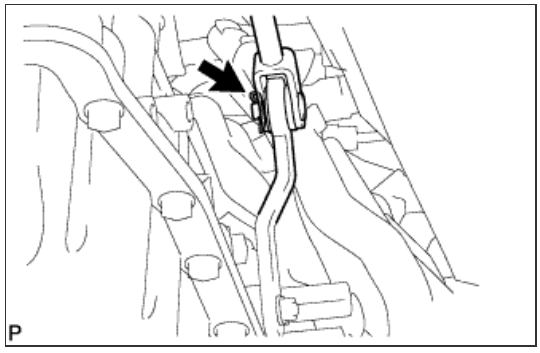
b. Depress the brake pedal and check that the engine starts when the shift lever is in N or P, but does not start in other positions.

c. Check that the back-up light illuminates and the reverse warning buzzer sounds only when the shift lever is in R.

for Preparation Click here

1. DISCONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Remove the clip and pin, and disconnect the shifting rod from the transmission control shaft lever RH.

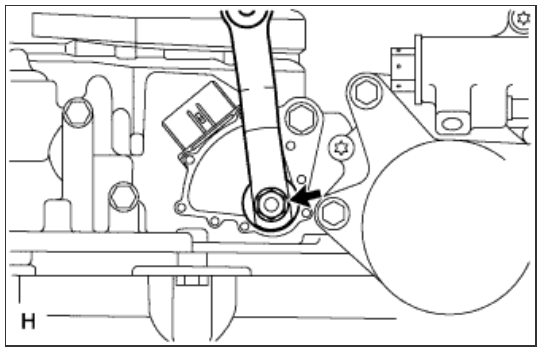


2. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

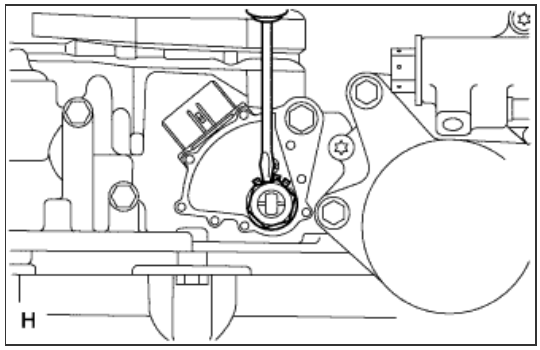
a. Disconnect the switch connector.

b. Remove the nut, spring washer and transmission control shaft lever RH.

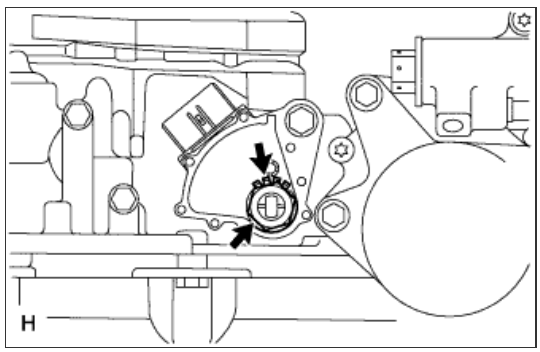
c. Remove the collar and transmission control rod bush from the transmission control shaft lever RH.



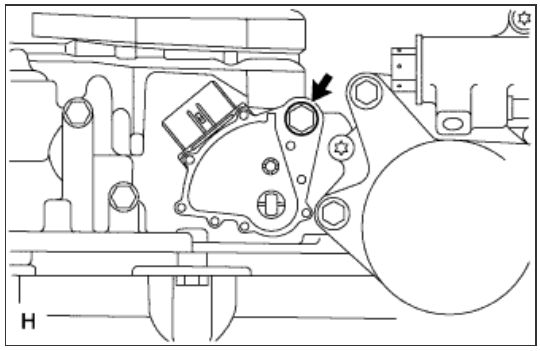
d. Using a screwdriver, bend the tabs of the lock washer.



e. Remove the lock nut and lock washer.



f. Remove the bolt and switch.



HINT:

Make sure that the manual valve lever shaft has not been rotated prior to installing the park/neutral position switch as the detent spring may become detached from the manual valve lever shaft.

for Preparation Click here

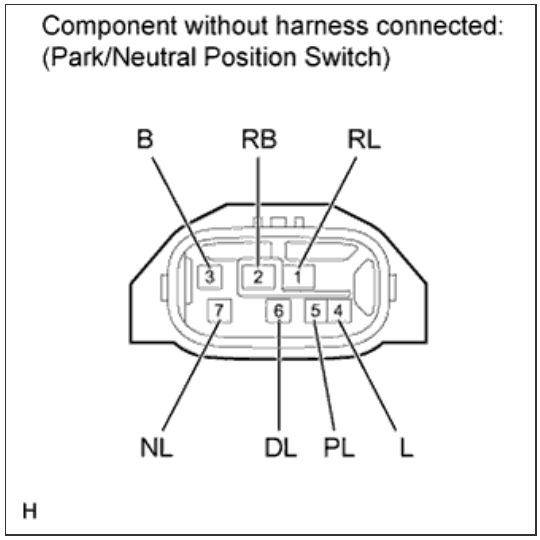
1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
2 (RB) - 5 (PL)	Shift lever in P	Below 1 Ω
2 (RB) - 5 (PL)	Shift lever not in P	10 kΩ or higher
2 (RB) - 1 (RL)	Shift lever in R	Below 1 Ω
2 (RB) - 1 (RL)	Shift lever not in R	10 kΩ or higher
2 (RB) - 7 (NL)	Shift lever in N	Below 1 Ω
2 (RB) - 7 (NL)	Shift lever not in N	10 kΩ or higher
2 (RB) - 6 (DL)	Shift lever in D or S	Below 1 Ω
2 (RB) - 6 (DL)	Shift lever not in D or S	10 kΩ or higher
3 (B) - 4 (L)	Shift lever in P or N	Below 1 Ω
3 (B) - 4 (L)	Shift lever not in P or N	10 kΩ or higher

If the result is not as specified, replace the switch assembly.



for Preparation Click here

1. ADJUST PARK/NEUTRAL POSITION SWITCH ASSEMBLY

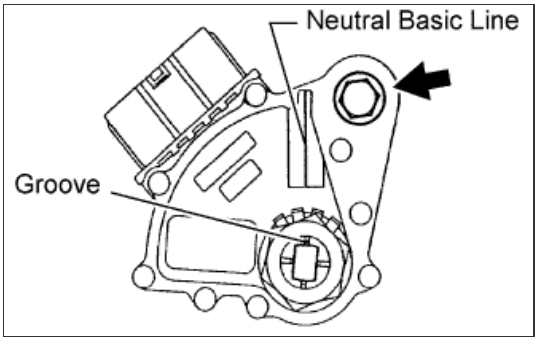
a. Loosen the bolt of the park/neutral position switch and move the shift lever to N.

b. Align the groove with the neutral basic line.

c. Hold the switch in the position described above and tighten the bolt.

Torque:
13 N*m{ 130 kgf*cm , 10 ft.*lbf }

d. After the adjustment, perform the on-vehicle inspection (Click here).



for Preparation Click here

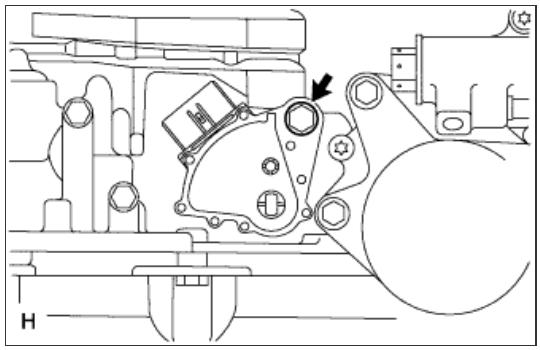
1. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

HINT:

Make sure that the manual valve lever shaft has not been rotated prior to installing the park/neutral position switch as the detent spring may become detached from the manual valve lever shaft.

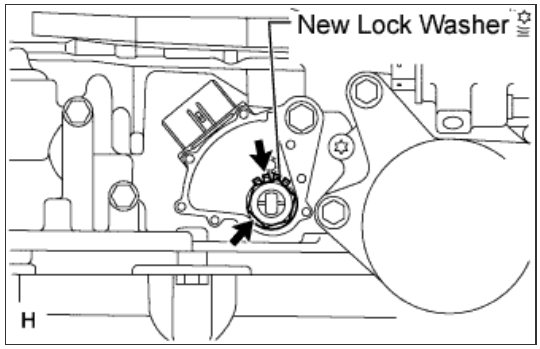
a. Install the switch to the manual valve shaft.

b. Temporarily install the bolt.

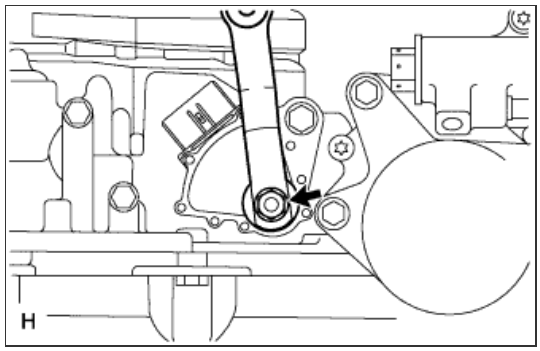


c. Install a new lock washer and the nut.

Torque:
6.9 N*m{ 70 kgf*cm , 61 in.*lbf }

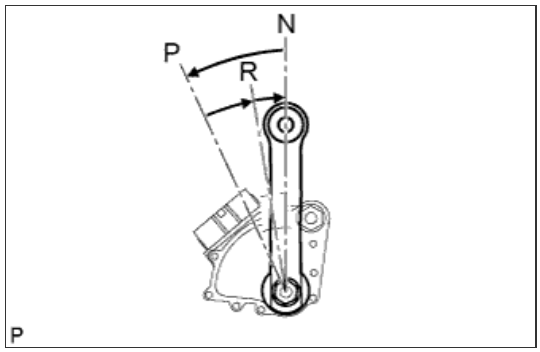


d. Temporarily install the control shaft lever RH.



e. Turn the control shaft lever RH counterclockwise until it stops, and then turn it clockwise 2 notches to set it to the N position.

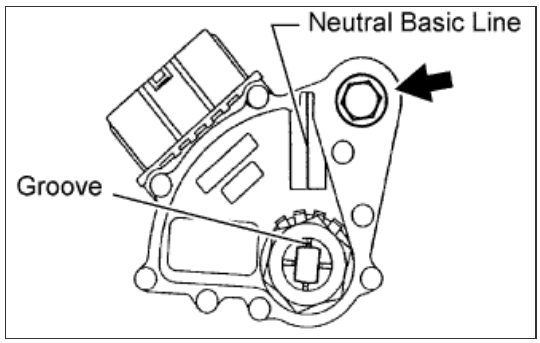
f. Remove the control shaft lever RH.



g. Align the groove with the neutral basic line.

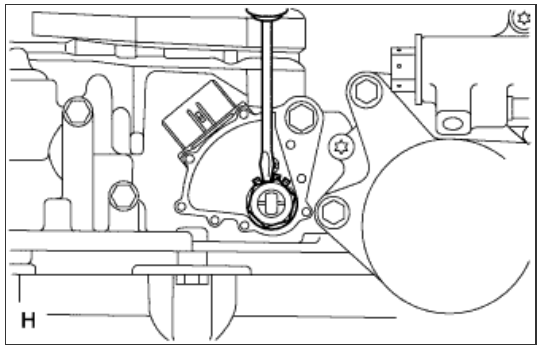
h. Hold the switch in the position described above and tighten the bolt.

Torque:
13 N*m{ 133 kgf*cm , 10 ft.*lbf }



i. Using a screwdriver, bend the tabs of the lock washer.

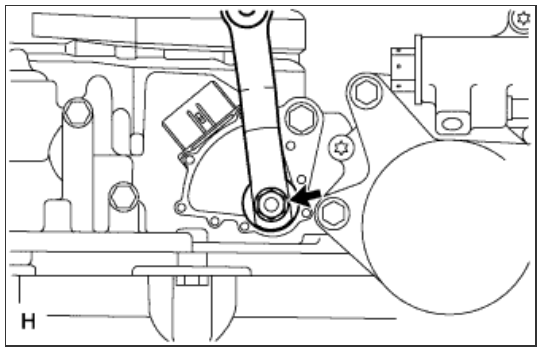
j. Install the transmission control rod bush and collar to the transmission control shaft lever RH.



k. Install the transmission control shaft lever RH with the spring washer and nut.

Torque:
16 N*m{ 163 kgf*cm , 12 ft.*lbf }

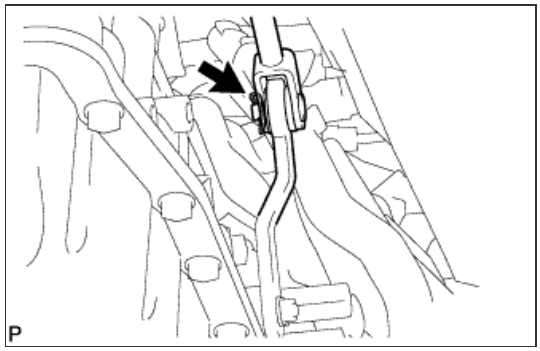
l. Connect the switch connector.



2. CONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Connect the shifting rod to the transmission control shaft lever RH with the pin.

b. Install a new clip.



3. INSPECT SHIFT LEVER POSITION

a. When moving the shift lever from P to R with the engine switch on (IG) and the brake pedal depressed, make sure that it moves smoothly and correctly into position.

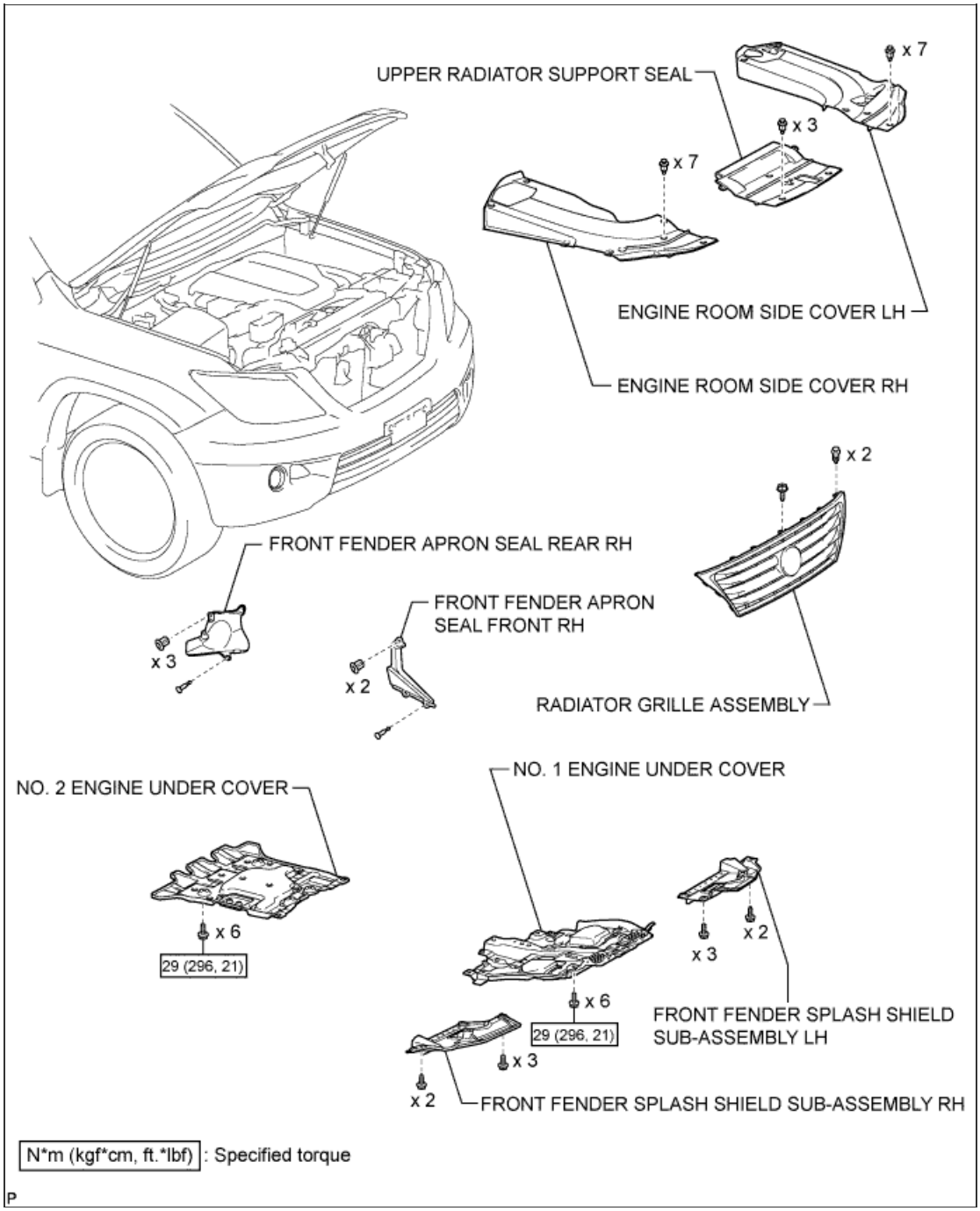
b. Check that the shift lever does not stop when moving the shift lever from R to P, and check that the shift lever does not stick when moving the shift lever from D to S.

c. Start the engine and make sure that the vehicle moves forward after moving the shift lever from N to D and moves rearward after moving the shift lever to R.
If the operation cannot be performed as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

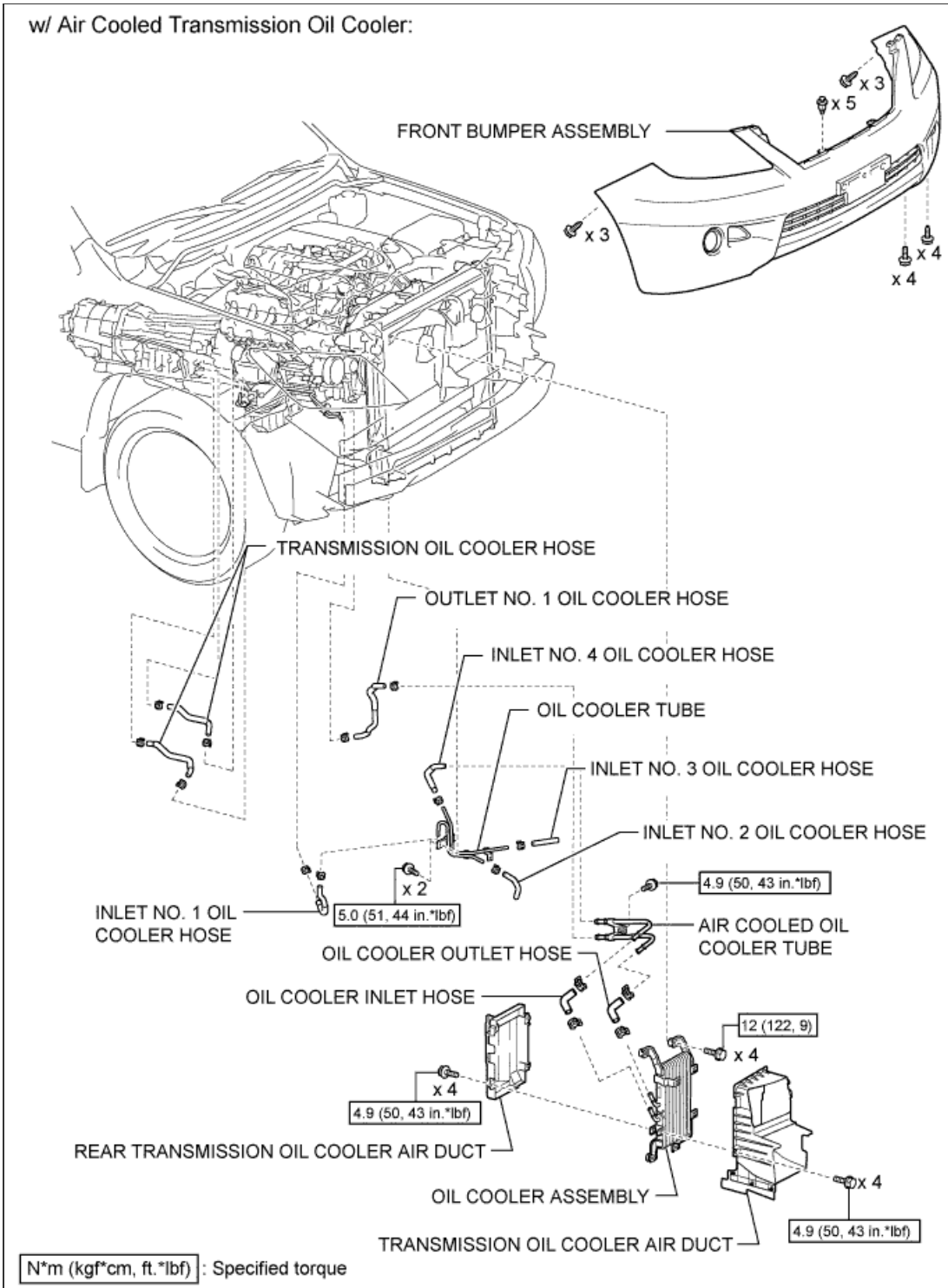
4. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

a. Inspect the switch (Click here).

for Preparation Click here

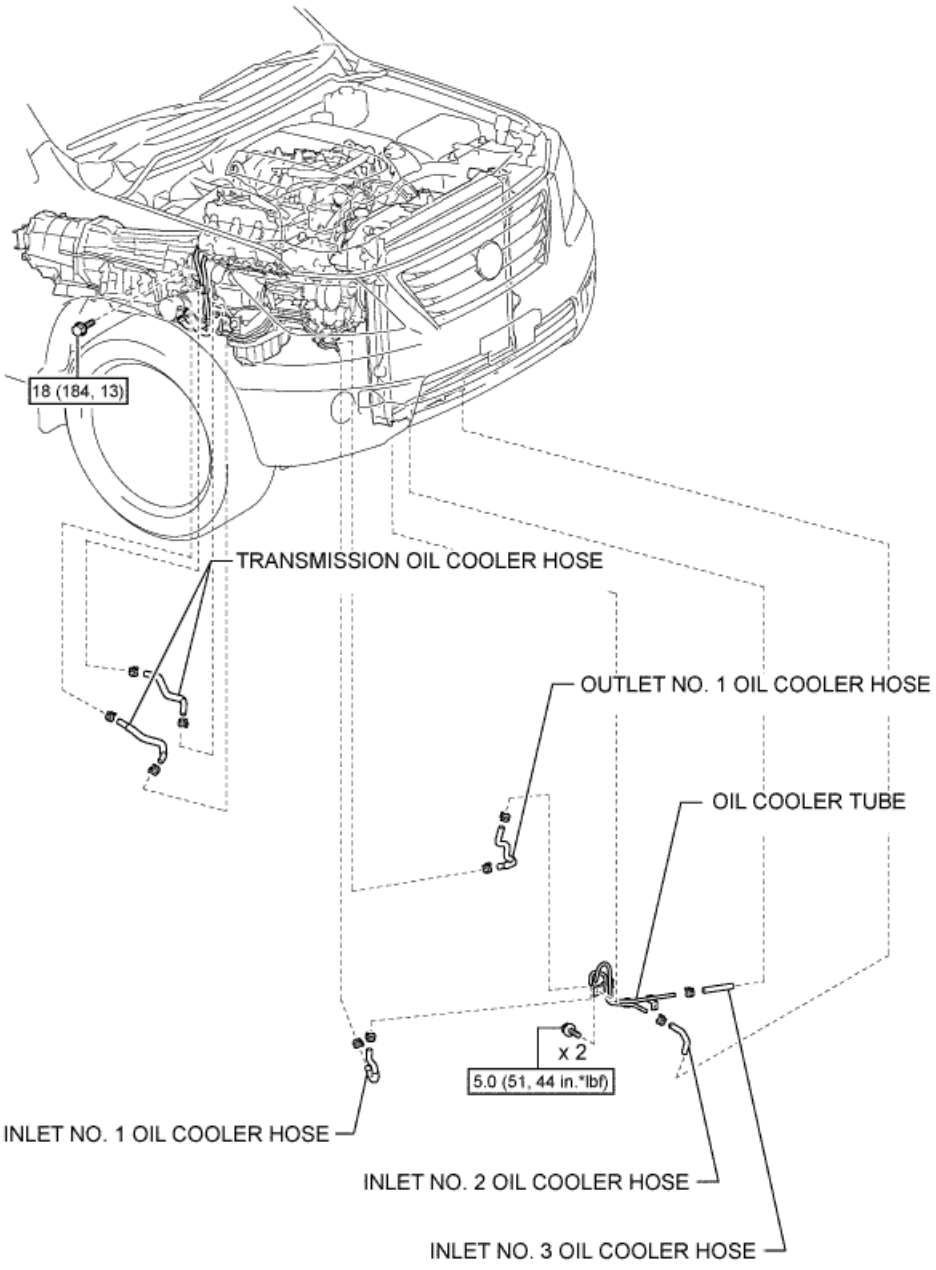


w/ Air Cooled Transmission Oil Cooler:



P

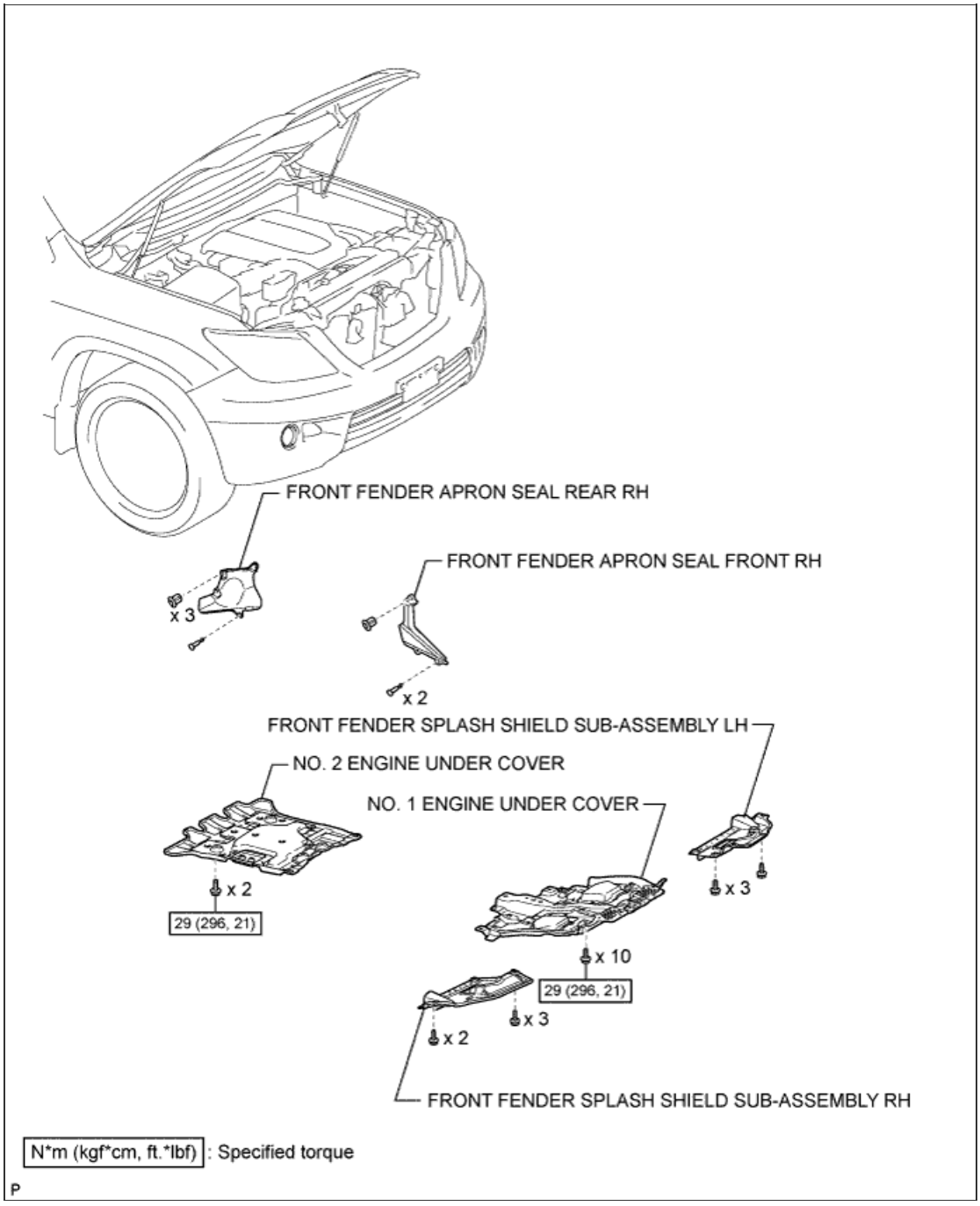
w/o Air Cooled Transmission Oil Cooler:



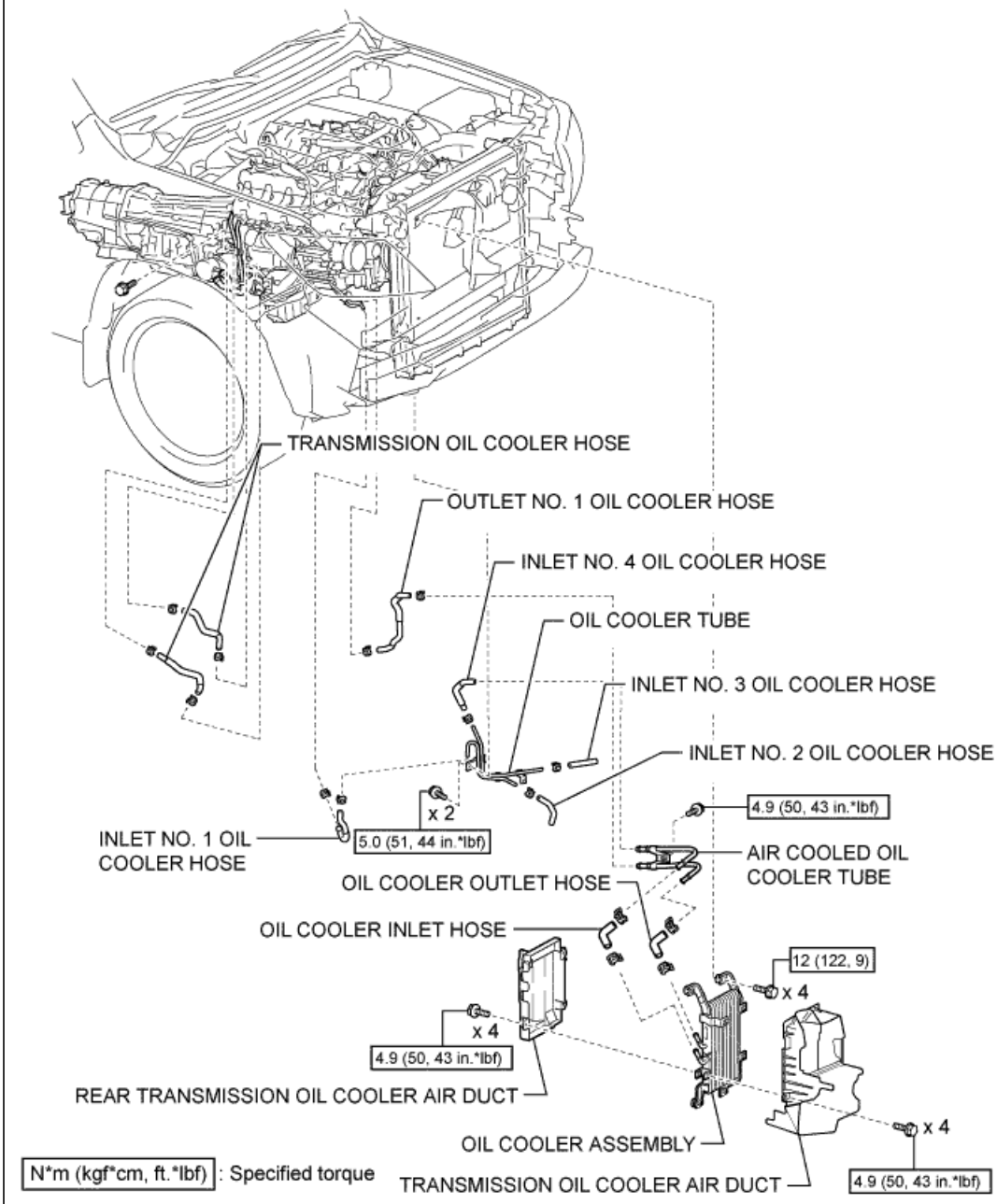
N*m (kgf*cm, ft.*lbf) : Specified torque

P

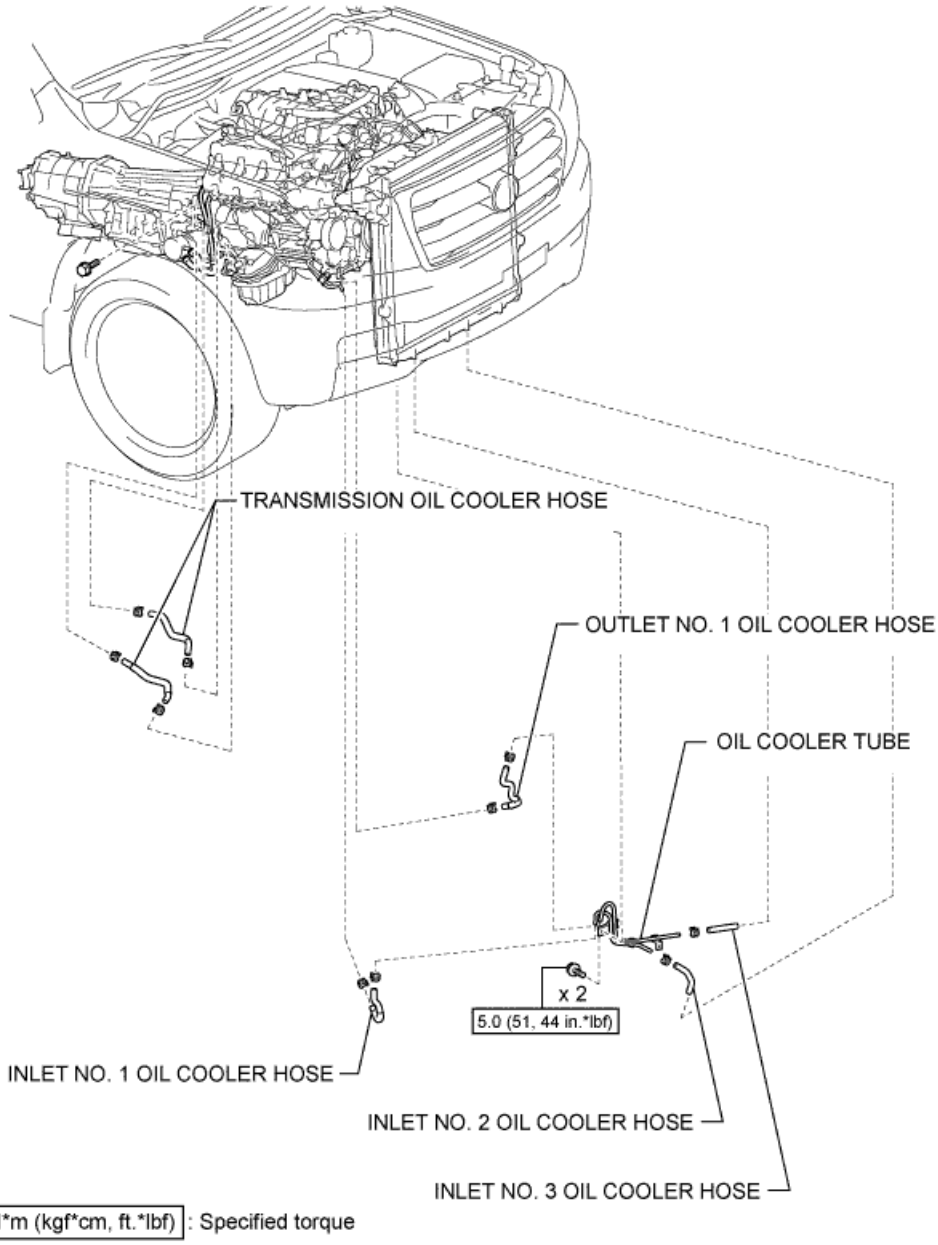
for Preparation Click here



w/ Air Cooled Transmission Oil Cooler:



w/o Air Cooled Transmission Oil Cooler:



N*m (kgf*cm, ft.*lbf) : Specified torque

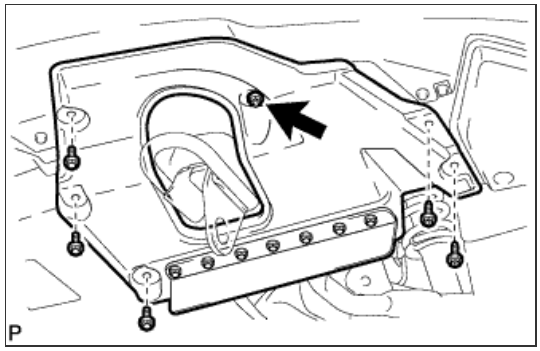
P

for Preparation Click here

1. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Remove the 3 bolts and 2 screws.

b. Turn the clip indicated by the arrow in the illustration to remove the fender splash shield.



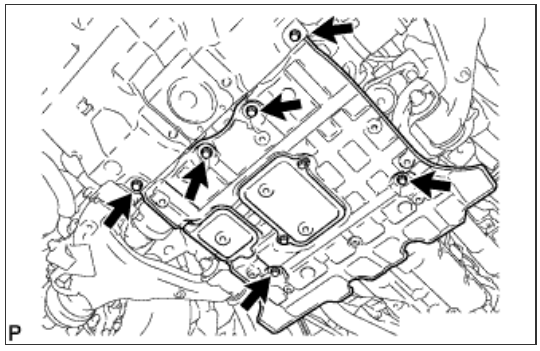
2. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

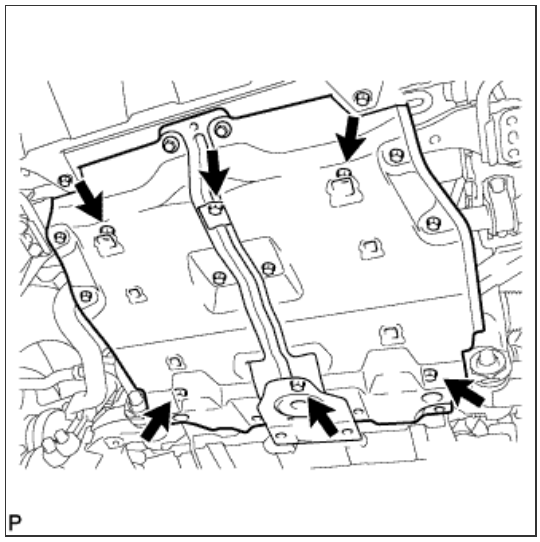
3. REMOVE NO. 2 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.



4. REMOVE NO. 1 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.

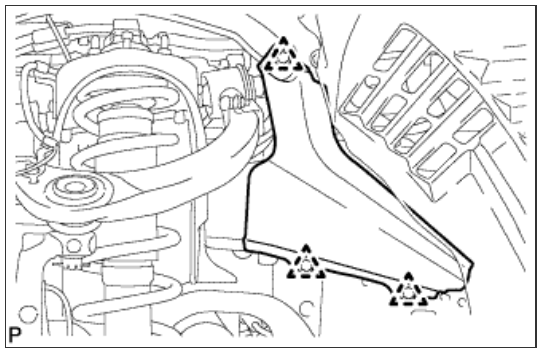


5. REMOVE FRONT BUMPER ASSEMBLY (w/ Air Cooled Transmission Oil Cooler)

a. Remove the front bumper (Click here).

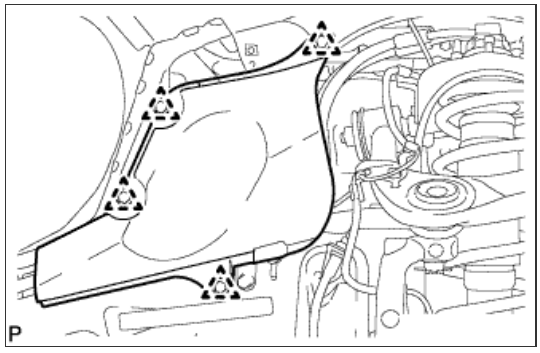
6. REMOVE FRONT FENDER APRON SEAL FRONT RH

a. Using a clip remover, remove the 3 clips and fender apron seal.



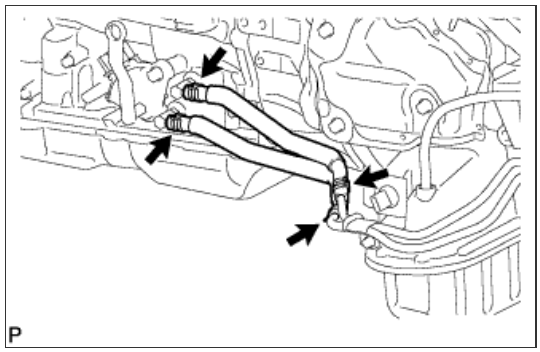
7. REMOVE FRONT FENDER APRON SEAL REAR RH

a. Using a clip remover, remove the 4 clips and fender apron seal.



8. DISCONNECT TRANSMISSION OIL COOLER HOSE (w/ Air Cooled Transmission Oil Cooler)

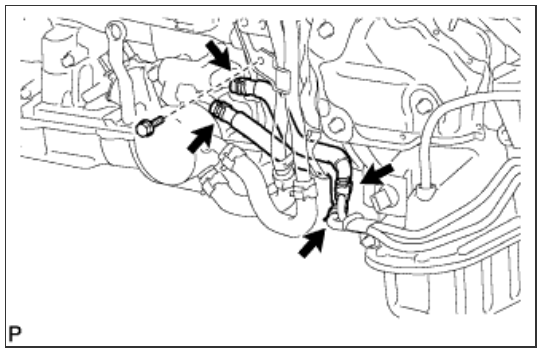
a. Disconnect the 2 transmission oil cooler hoses.



9. DISCONNECT TRANSMISSION OIL COOLER HOSE (w/o Air Cooled Transmission Oil Cooler)

a. Remove the bolt and move the water by-pass pipe so that the 2 transmission oil cooler hoses can be disconnected.

b. Disconnect the 2 transmission oil cooler hoses.



10. DISCONNECT INLET NO. 1 OIL COOLER HOSE AND OUTLET NO. 1 OIL COOLER HOSE

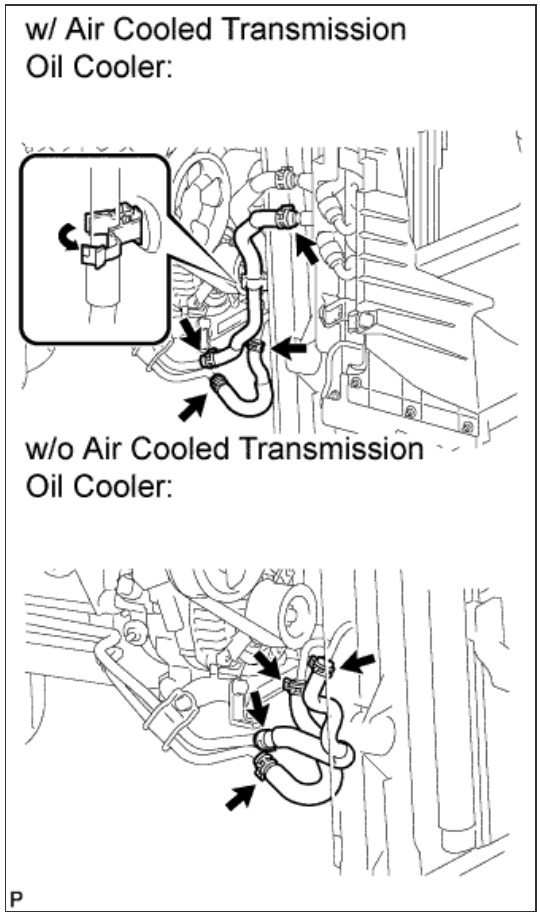
a. w/ Air Cooled Transmission Oil Cooler:

i. Detach the claw to open the flexible hose clamp.

ii. Disconnect the inlet and outlet oil cooler hoses.

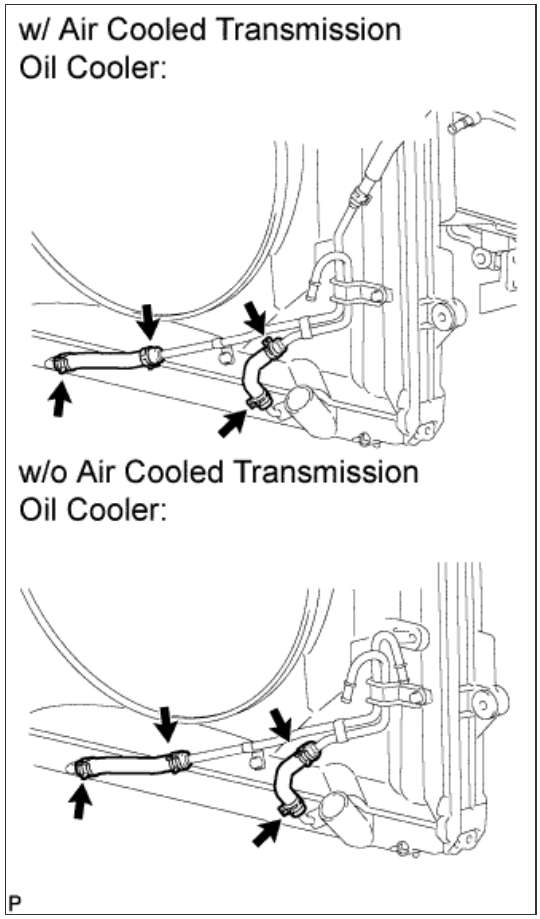
b. w/o Air Cooled Transmission Oil Cooler:

i. Disconnect the inlet and outlet oil cooler hoses.

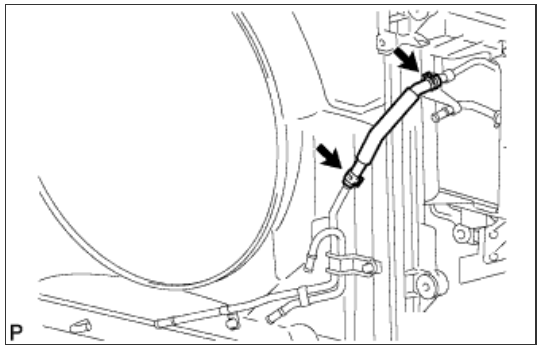


11. DISCONNECT INLET NO. 2 OIL COOLER HOSE AND INLET NO. 3 OIL COOLER HOSE

a. Disconnect the 2 inlet oil cooler hoses.

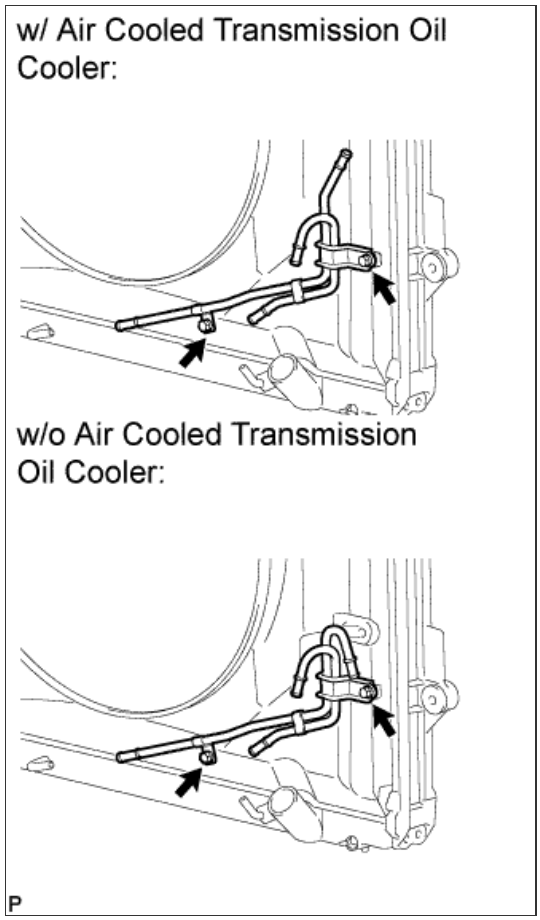


12. DISCONNECT INLET NO. 4 OIL COOLER HOSE (w/ Air Cooled Transmission Oil Cooler)



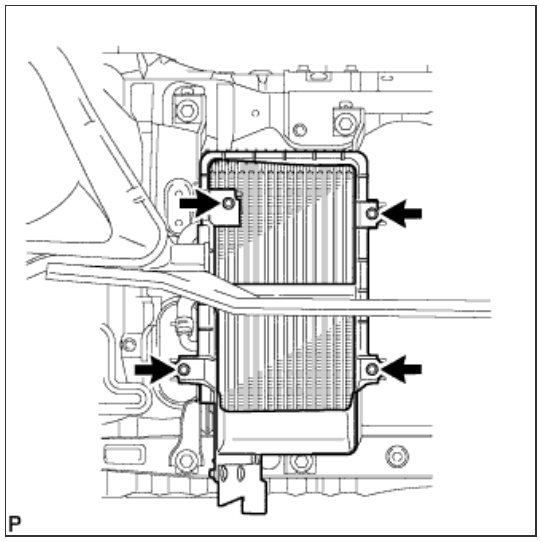
13. REMOVE OIL COOLER TUBE

a. Remove the 2 bolts and oil cooler tube.



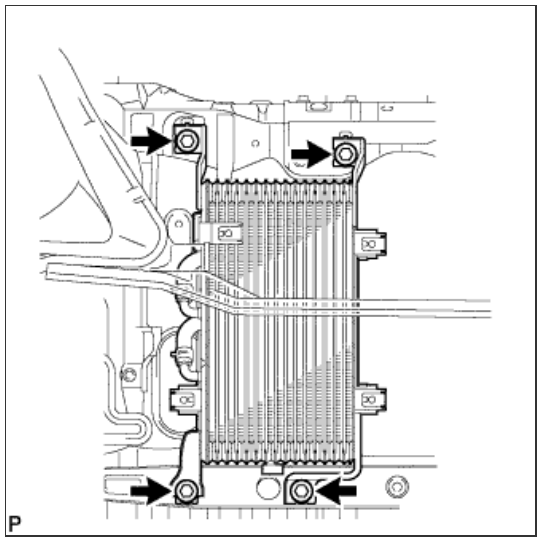
14. REMOVE TRANSMISSION OIL COOLER AIR DUCT (w/ Air Cooled Transmission Oil Cooler)

a. Remove the 4 bolts and transmission oil cooler air duct.

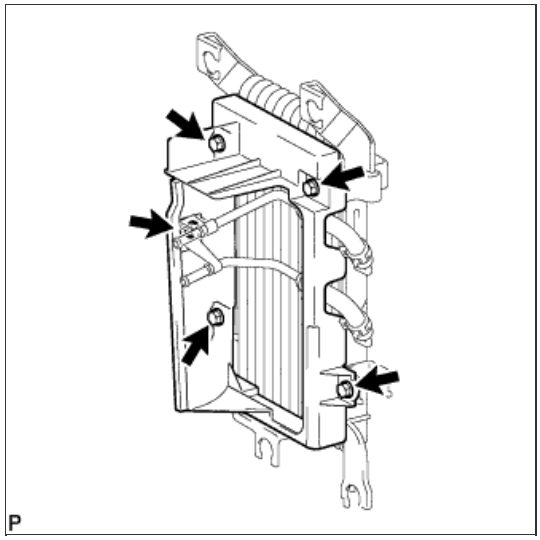


15. REMOVE OIL COOLER ASSEMBLY (w/ Air Cooled Transmission Oil Cooler)

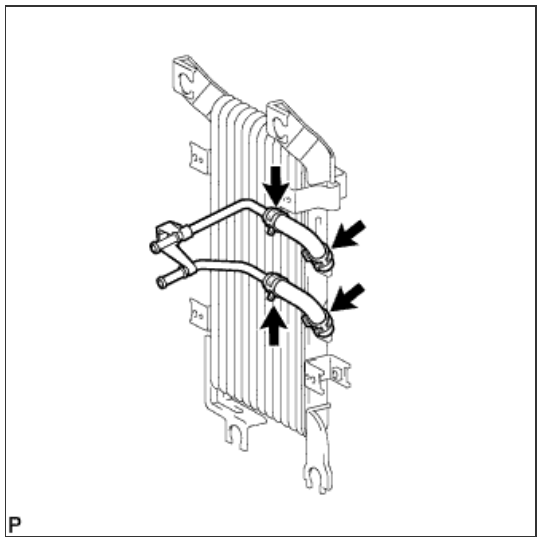
a. Remove the 4 bolts and oil cooler.



b. Remove the 5 bolts and transmission oil cooler air duct.



c. Disconnect the oil cooler inlet hose and outlet hose and remove the tube.

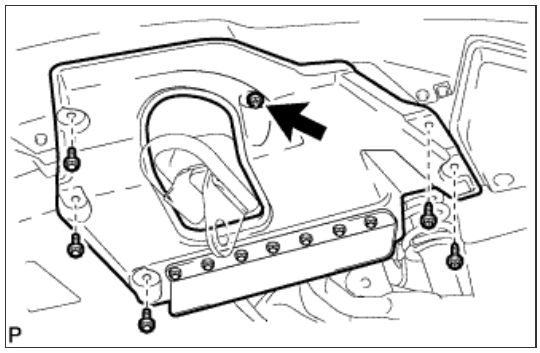


for Preparation Click here

1. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Remove the 3 bolts and 2 screws.

b. Turn the clip indicated by the arrow in the illustration to remove the front fender splash shield sub-assembly LH.



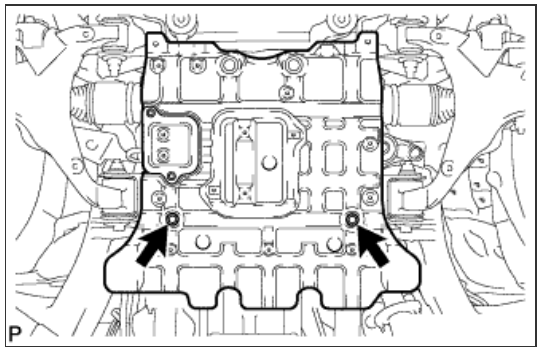
2. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedure described for the LH side.

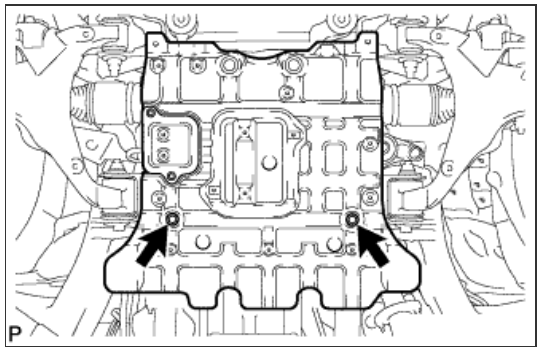
3. REMOVE NO. 1 ENGINE UNDER COVER

a. Remove the 2 bolts and No. 2 engine under cover.



4. REMOVE NO. 2 ENGINE UNDER COVER

a. Remove the 2 bolts and No. 2 engine under cover.

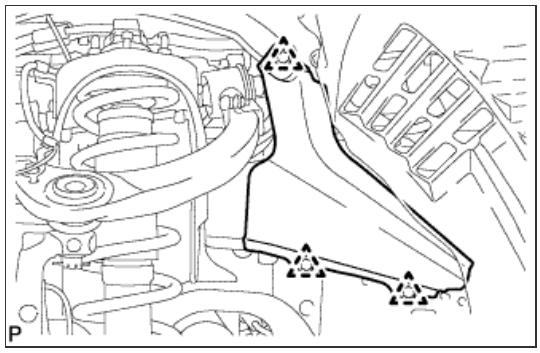


5. REMOVE FRONT BUMPER ASSEMBLY (w/ Air Cooled Transmission Oil Cooler)

a. Remove the front bumper (Click here).

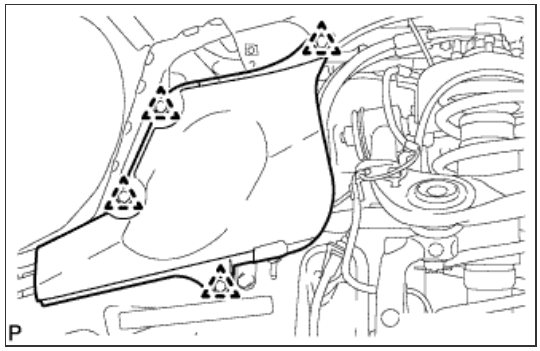
6. REMOVE FRONT FENDER APRON SEAL FRONT RH

a. Using a clip remover, remove the 3 clips and fender apron seal.



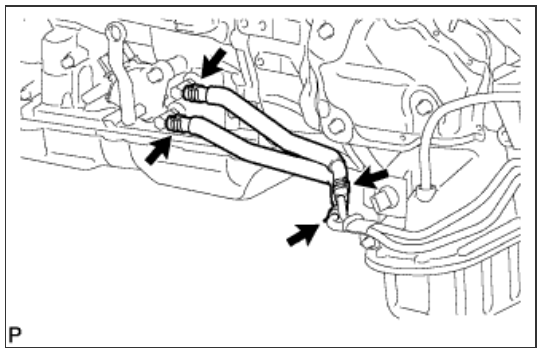
7. REMOVE FRONT FENDER APRON SEAL REAR RH

a. Using a clip remover, remove the 4 clips and fender apron seal.



8. DISCONNECT TRANSMISSION OIL COOLER HOSE (w/ Air Cooled Transmission Oil Cooler)

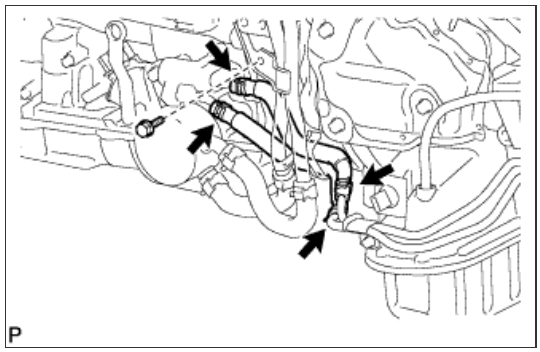
a. Disconnect the 2 transmission oil cooler hoses.



9. DISCONNECT TRANSMISSION OIL COOLER HOSE (w/o Air Cooled Transmission Oil Cooler)

a. Remove the bolt and move the water by-pass pipe so that the 2 transmission oil cooler hoses can be disconnected.

b. Disconnect the 2 transmission oil cooler hoses.



10. DISCONNECT INLET NO. 1 OIL COOLER HOSE AND OUTLET NO. 1 OIL COOLER HOSE

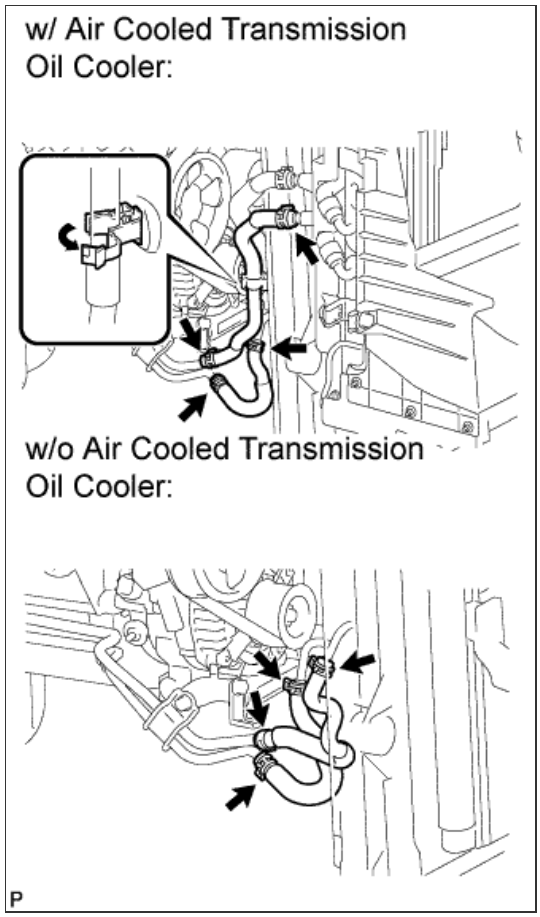
a. w/ Air Cooled Transmission Oil Cooler:

i. Detach the claw to open the flexible hose clamp.

ii. Disconnect the inlet and outlet oil cooler hoses.

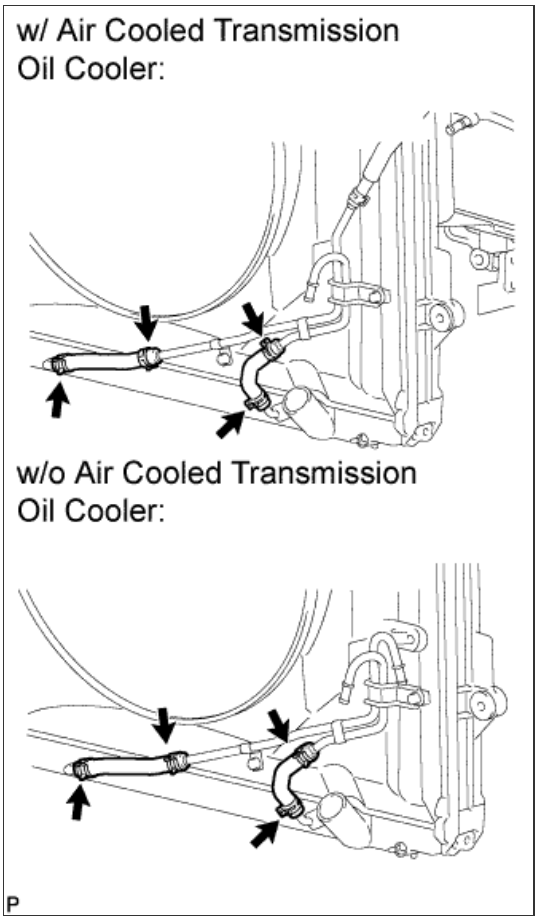
b. w/o Air Cooled Transmission Oil Cooler:

i. Disconnect the inlet and outlet oil cooler hoses.

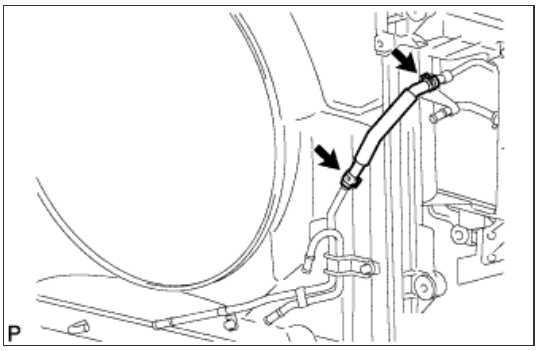


11. DISCONNECT INLET NO. 2 OIL COOLER HOSE AND INLET NO. 3 OIL COOLER HOSE

a. Disconnect the 2 inlet oil cooler hoses.

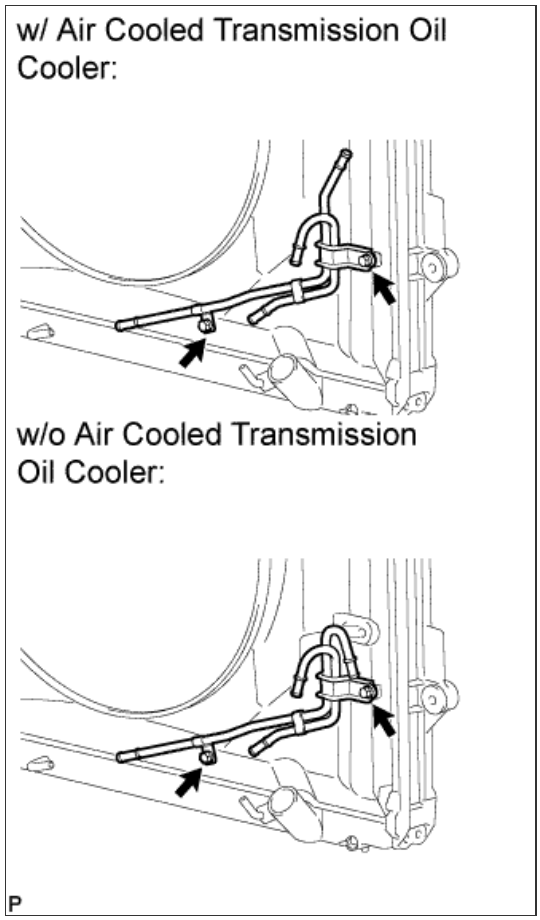


12. DISCONNECT INLET NO. 4 OIL COOLER HOSE (w/ Air Cooled Transmission Oil Cooler)



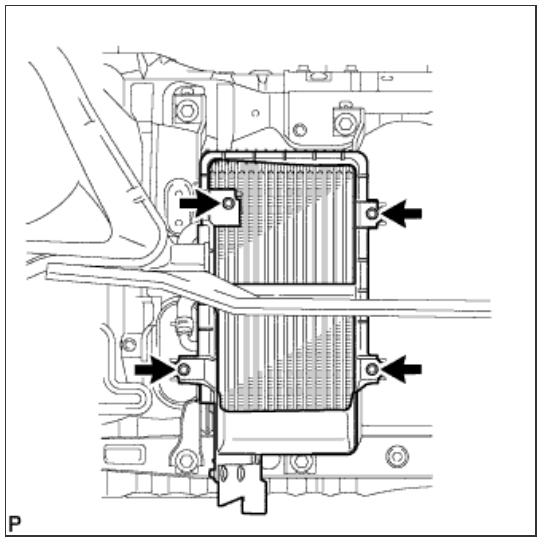
13. REMOVE OIL COOLER TUBE

a. Remove the 2 bolts and oil cooler tube.



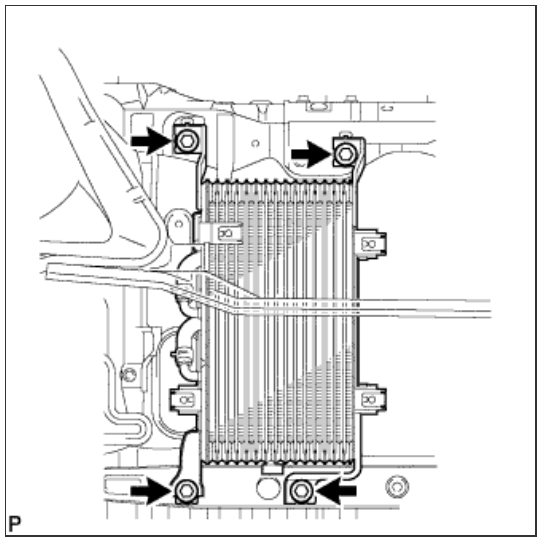
14. REMOVE TRANSMISSION OIL COOLER AIR DUCT (w/ Air Cooled Transmission Oil Cooler)

a. Remove the 4 bolts and transmission oil cooler air duct.

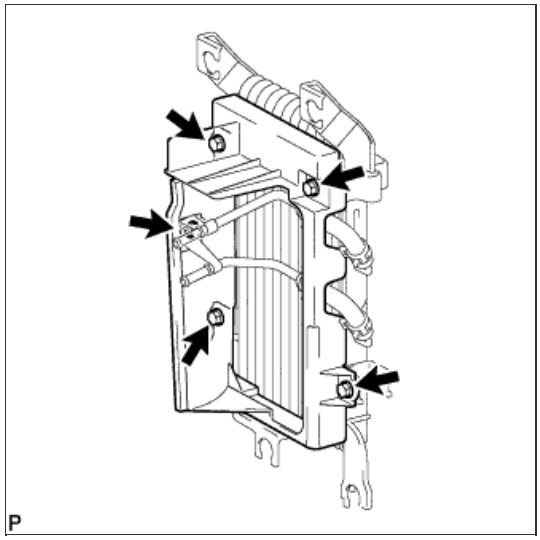


15. REMOVE OIL COOLER ASSEMBLY (w/ Air Cooled Transmission Oil Cooler)

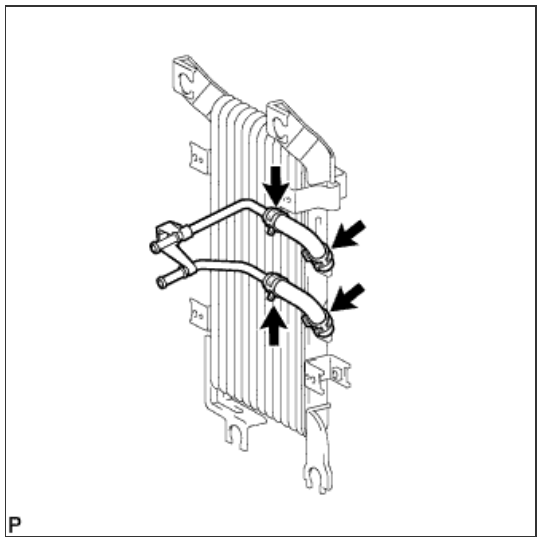
a. Remove the 4 bolts and oil cooler.



b. Remove the 5 bolts and transmission oil cooler air duct.



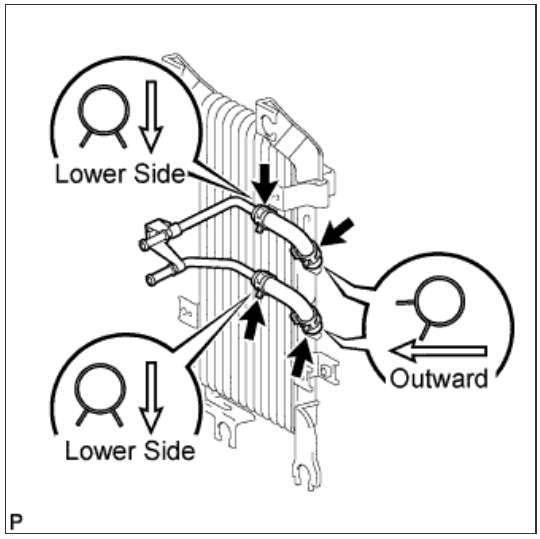
c. Disconnect the oil cooler inlet hose and outlet hose and remove the tube.



for Preparation Click here

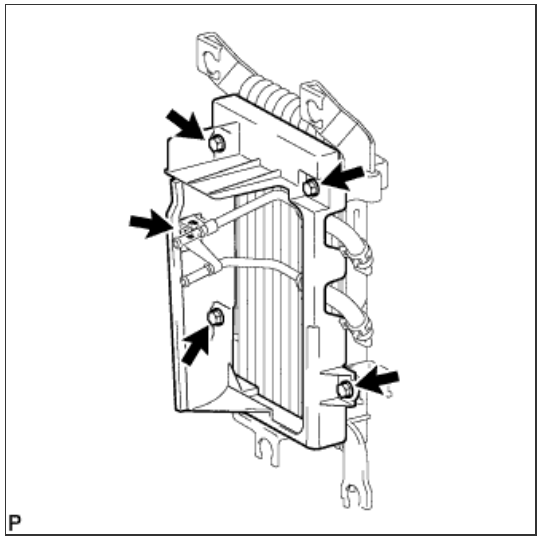
1. INSTALL OIL COOLER ASSEMBLY (w/ Air Cooled Transmission Oil Cooler)

a. Connect the oil cooler inlet hose and outlet hose.



b. Install the rear transmission oil cooler air duct with the 4 bolts, and then install the air cooled oil cooler tube to the transmission oil cooler air duct with the bolt.

Torque:
4.9 N*m{ 50 kgf*cm , 43 in.*lbf }



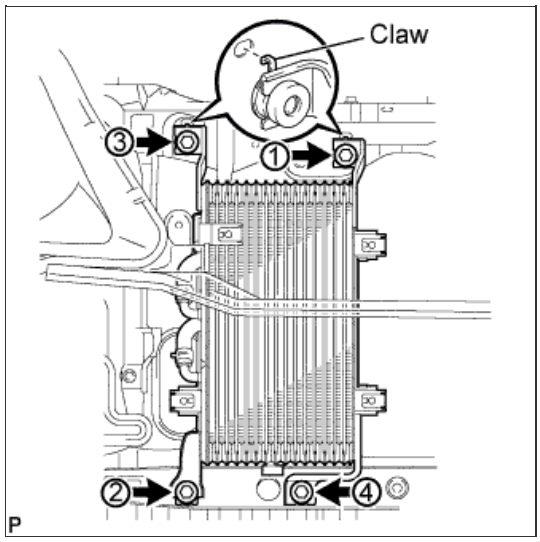
c. Temporarily put the oil cooler on the radiator support.

NOTICE:

Securely attach the 2 claws of the oil cooler into the holes of the radiator support.

d. Install the 4 bolts in the sequence shown in the illustration.

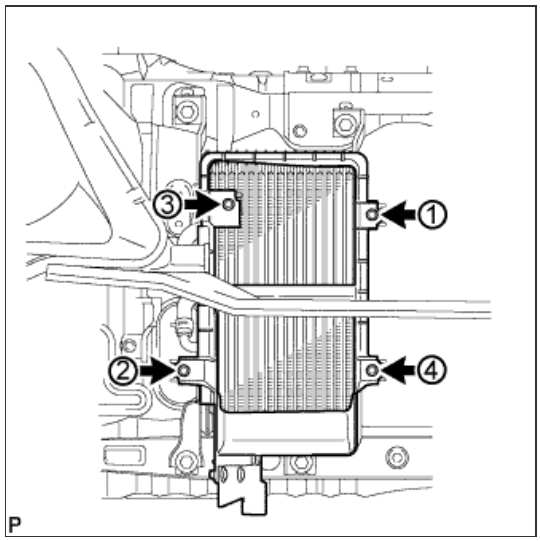
Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



2. INSTALL TRANSMISSION OIL COOLER AIR DUCT (w/ Air Cooled Transmission Oil Cooler)

a. Install the oil cooler air duct with the 4 bolts in the sequence shown in the illustration.

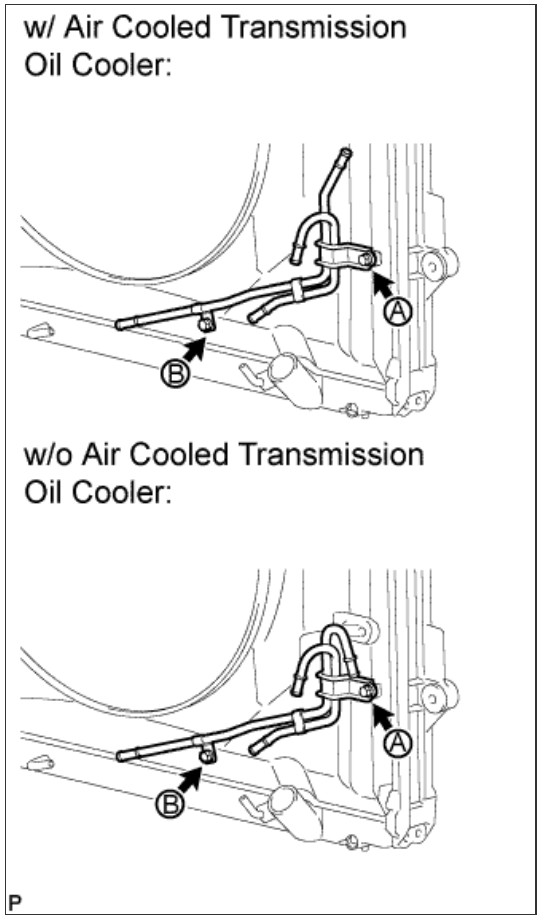
Torque:
4.9 N*m{ 50 kgf*cm , 43 in.*lbf }



3. INSTALL OIL COOLER TUBE

a. Temporarily install the oil cooler tube to the fan shroud with bolt A. Install bolt B and tighten it to the specified torque. Then tighten bolt A to the specified torque.

Torque:
5.0 N*m{ 51 kgf*cm , 44 in.*lbf }



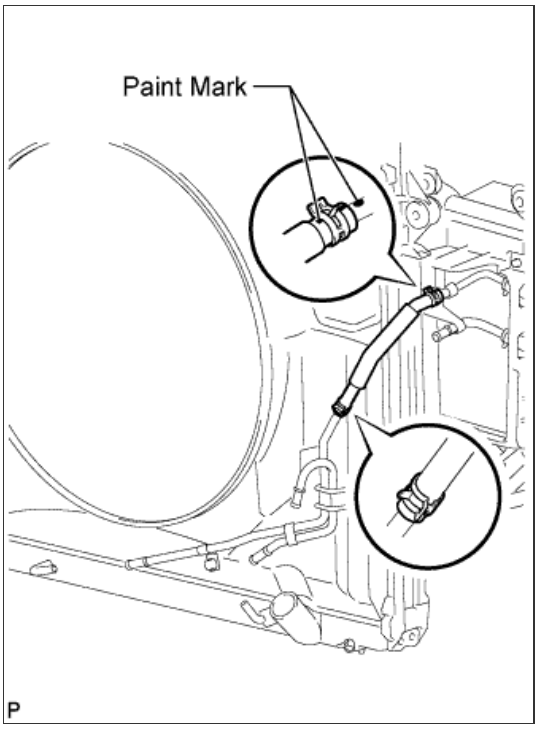
4. CONNECT INLET NO. 4 OIL COOLER HOSE (w/ Air Cooled Transmission Oil Cooler)

a. Connect the inlet oil cooler hose as shown in the illustration.

NOTICE:

Make sure the pinching portion of each clip is facing the direction shown in the

illustration and the paint marks are aligned as shown in the illustration.

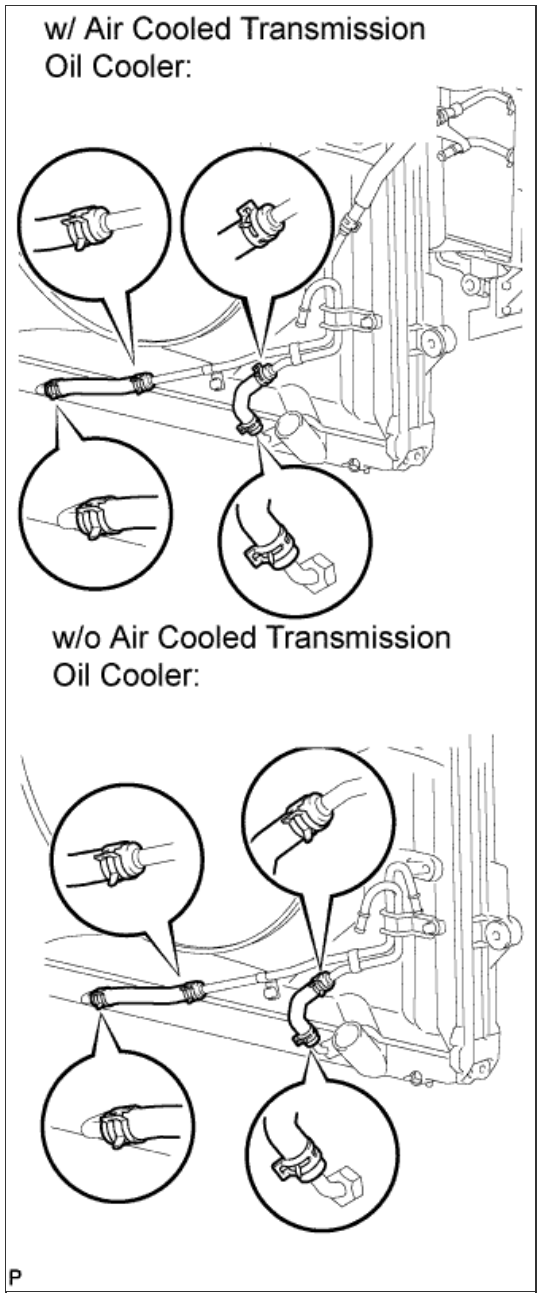


5. CONNECT INLET NO. 2 OIL COOLER HOSE AND INLET NO. 3 OIL COOLER HOSE

a. Connect the 2 inlet oil cooler hoses as shown in the illustration.

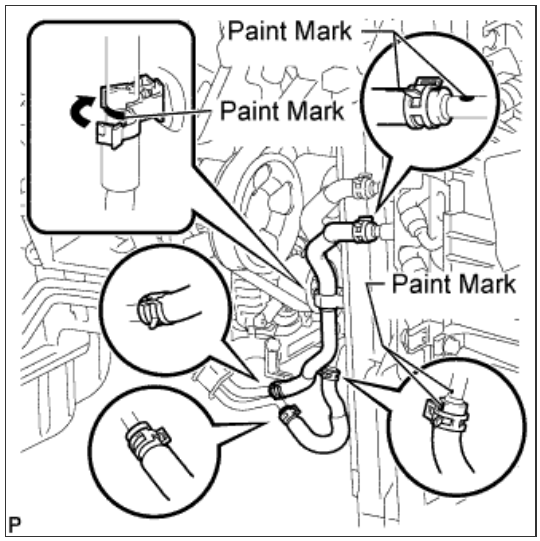
NOTICE:

Make sure the pinching portion of each clip is facing the direction shown in the illustration.



6. CONNECT INLET NO. 1 OIL COOLER HOSE AND OUTLET NO. 1 OIL COOLER HOSE

a. w/ Air Cooled Transmission Oil Cooler:



i. Connect the 2 oil cooler hoses as shown in the illustration.

NOTICE:

Make sure the pinching portion of each clip is facing the direction shown in the illustration and the paint marks are aligned as shown in the illustration.

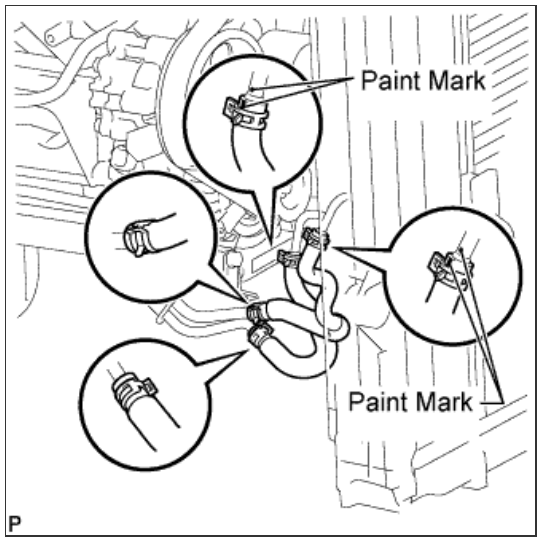
ii. Pass the hose through the flexible hose clamp and close the clamp shown in the illustration.

b. w/o Air Cooled Transmission Oil Cooler:

i. Connect the 2 oil cooler hoses as shown in the illustration.

NOTICE:

Make sure the pinching portion of each clip is facing the direction shown in the illustration and the paint marks are aligned as shown in the illustration.



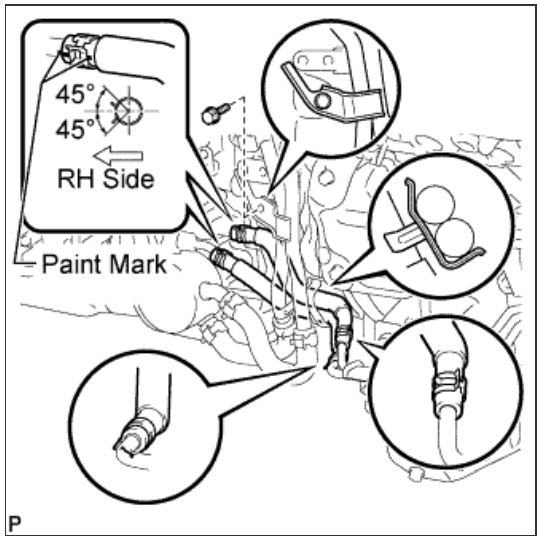
7. CONNECT TRANSMISSION OIL COOLER HOSE (w/o Air Cooled Transmission Oil Cooler)

a. Connect the 2 transmission oil cooler hoses as shown in the illustration, and then install the water by-pass pipe with the bolt.

Torque:
18 N*m{ 184 kgf*cm , 13 ft.*lbf }

NOTICE:

Make sure the pinching portion of each clip is facing the direction shown in the illustration.

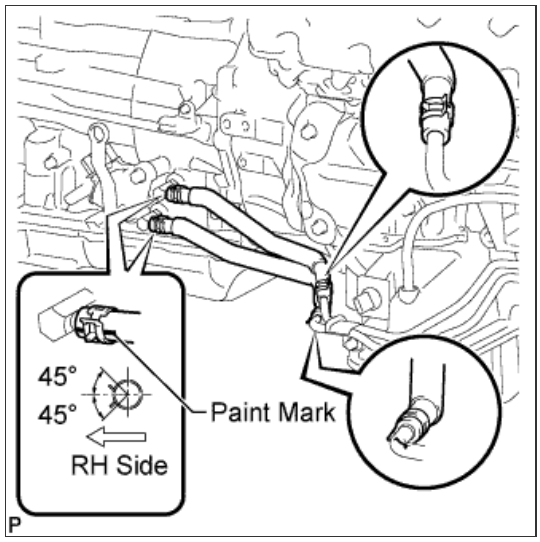


8. CONNECT TRANSMISSION OIL COOLER HOSE (w/ Air Cooled Transmission Oil Cooler)

a. Connect the 2 transmission oil cooler hoses as shown in the illustration.

NOTICE:

Make sure the pinching portion of each clip is facing the direction shown in the illustration.

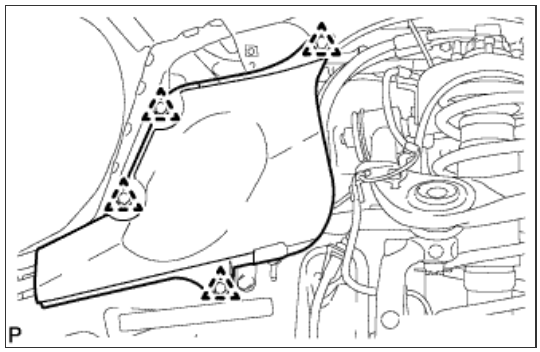


9. ADD AUTOMATIC TRANSMISSION FLUID

a. Add automatic transmission fluid (Click here).

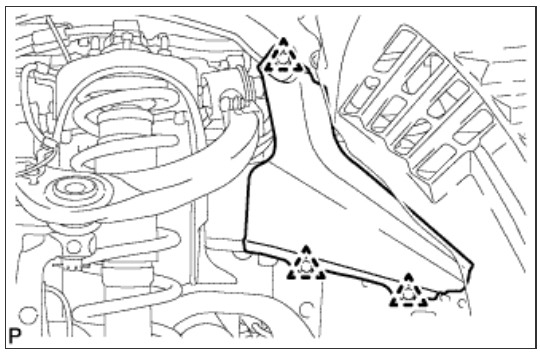
10. INSTALL FRONT FENDER APRON SEAL REAR RH

a. Install the fender apron seal with the 4 clips.



11. INSTALL FRONT FENDER APRON SEAL FRONT RH

a. Install the fender apron seal with the 3 clips.



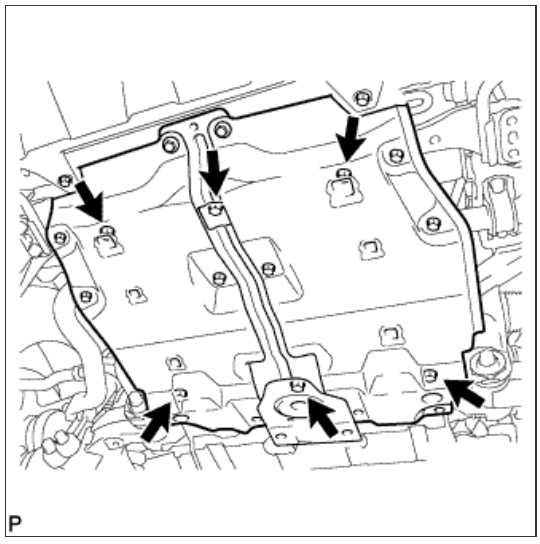
12. INSTALL FRONT BUMPER ASSEMBLY (w/ Air Cooled Transmission Oil Cooler)

a. Install the front bumper (Click here).

13. INSTALL NO. 1 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

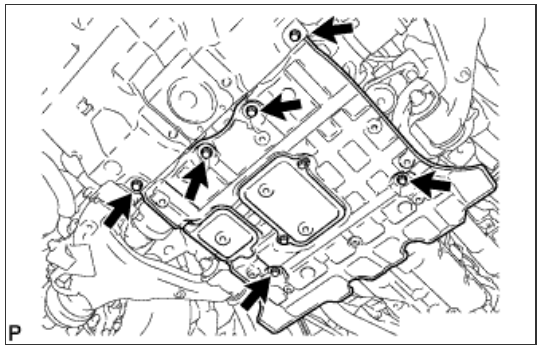
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



14. INSTALL NO. 2 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

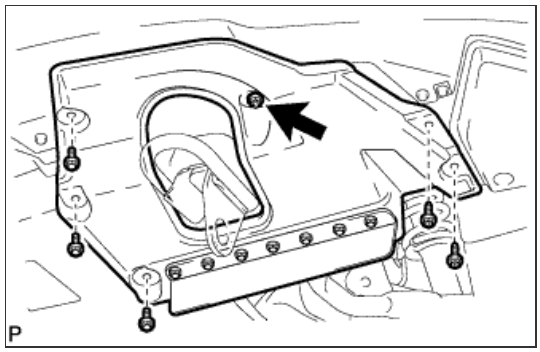
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



15. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Push in the clip indicated by the arrow in the illustration to install the fender splash shield.

b. Install the 3 bolts and 2 screws.

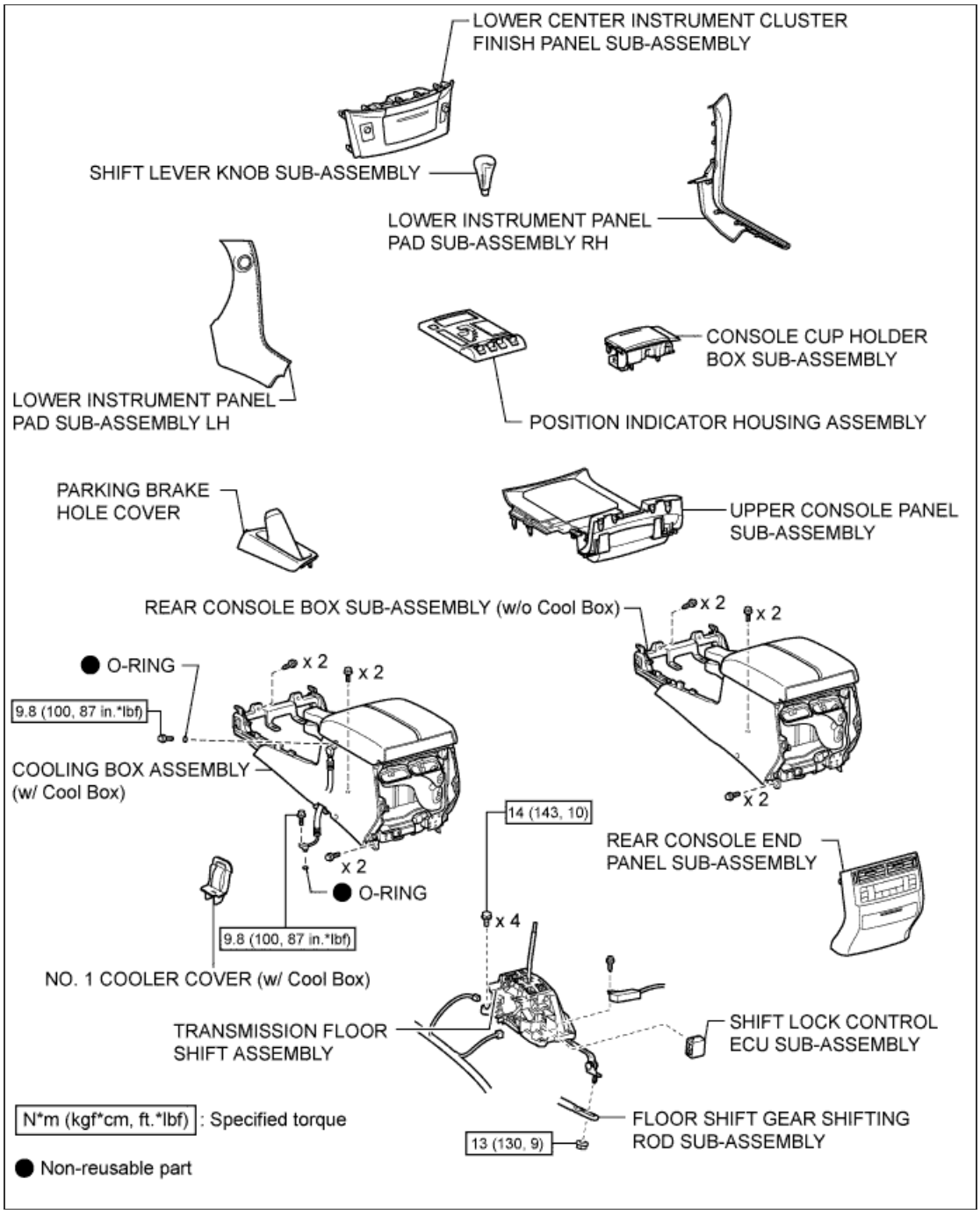


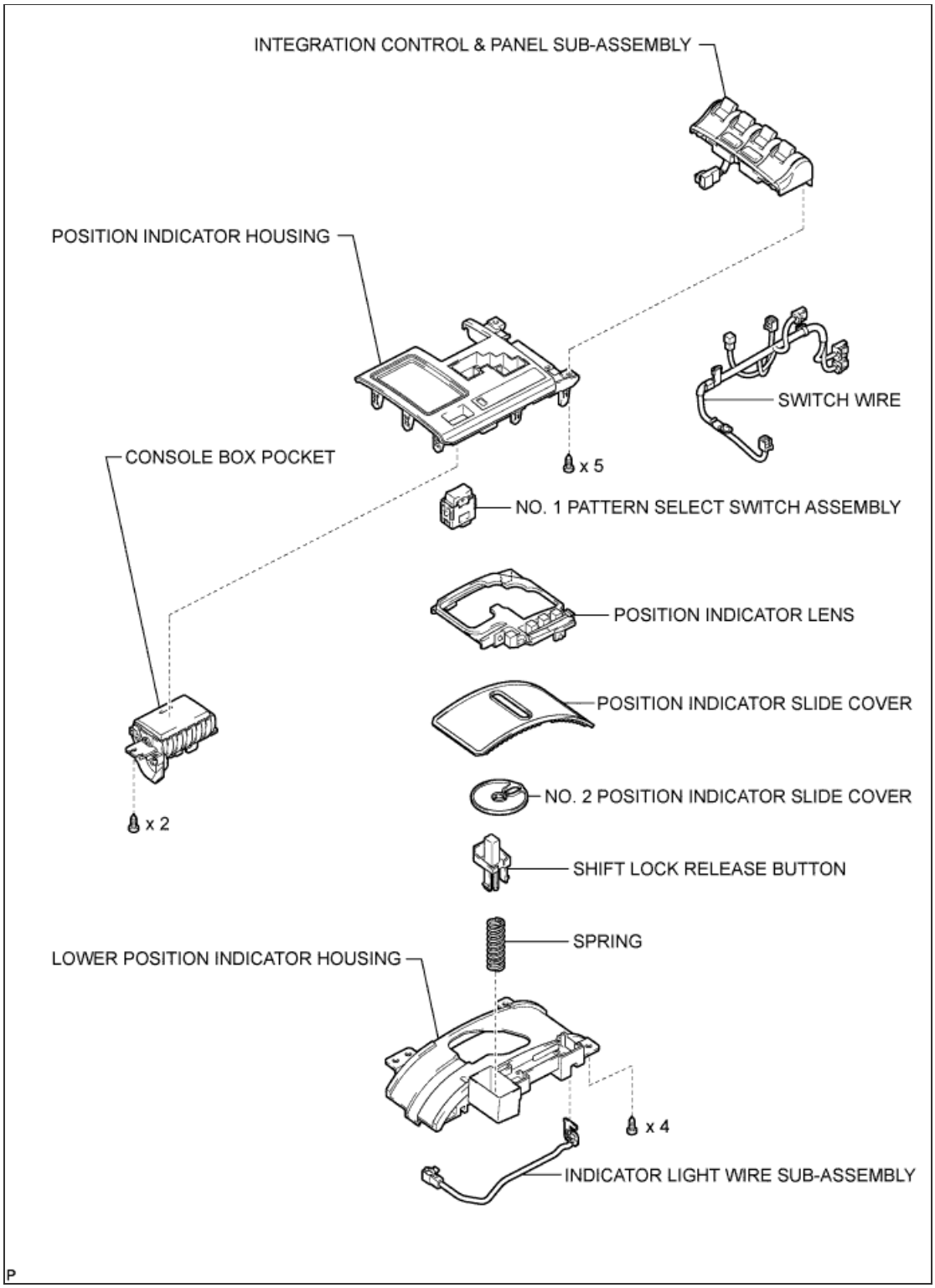
16. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

for Preparation [Click here]




INTEGRATION CONTROL & PANEL SUB-ASSEMBLY
POSITION INDICATOR HOUSING
SWITCH WIRE
x 5
CONSOLE BOX POCKET
NO. 1 PATTERN SELECT SWITCH ASSEMBLY
POSITION INDICATOR LENS
POSITION INDICATOR SLIDE COVER
NO. 2 POSITION INDICATOR SLIDE COVER
x 2
SHIFT LOCK RELEASE BUTTON
SPRING
LOWER POSITION INDICATOR HOUSING
x 4
INDICATOR LIGHT WIRE SUB-ASSEMBLY
P

for Preparation Click here

1. INSPECT SHIFT LEVER POSITION

a. When moving the shift lever from P to R with the engine switch on (IG) and the brake pedal depressed, make sure that it moves smoothly and correctly into position.

b. Check that the shift lever does not stop when moving the shift lever from R to P, and check that the shift lever does not stick when moving the shift lever from D to S.

c. Start the engine and make sure that the vehicle moves forward after moving the shift lever from N to D and moves rearward after moving the shift lever to R.
If the operation cannot be performed as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

2. CHECK SHIFT LOCK OPERATION

a. Move the shift lever to P.

b. Turn the engine switch off.

c. Check that the shift lever cannot be moved from P.

d. Turn the engine switch on (IG), depress the brake pedal and check that the shift lever can be moved to other positions.
If the operation cannot be done as specified, inspect the shift lever assembly and shift lock control unit.

3. CHECK SHIFT LOCK RELEASE BUTTON OPERATION

a. When operating the shift lever with the shift lock release button pressed, check that the lever can be moved to any position.
If the operation cannot be performed as specified, check the shift lever assembly.

4. CHECK SHIFT LOCK CONTROL ECU

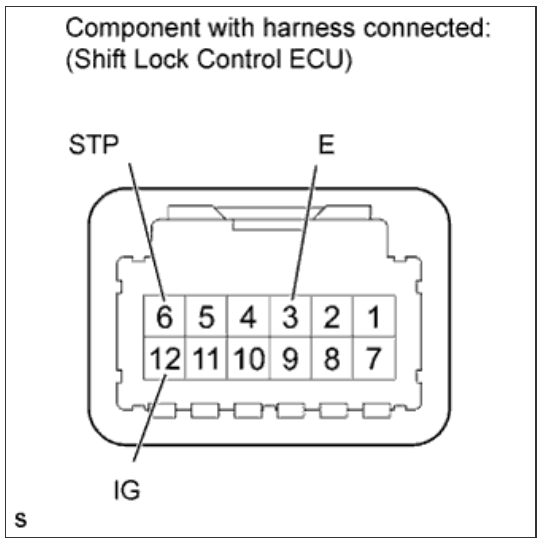
a. Measure the voltage according to the value(s) in the table below.

HINT:

Do not disconnect the shift lock control ECU connector.

Standard Voltage:

Tester Connection	Condition	Specified Condition
12 (IG) - 3 (E)	Engine switch on (IG)	11 to 14 V
12 (IG) - 3 (E)	Engine switch off	Below 1 V
6 (STP) - 3 (E)	Depress brake pedal	11 to 14 V
6 (STP) - 3 (E)	Release brake pedal	Below 1 V



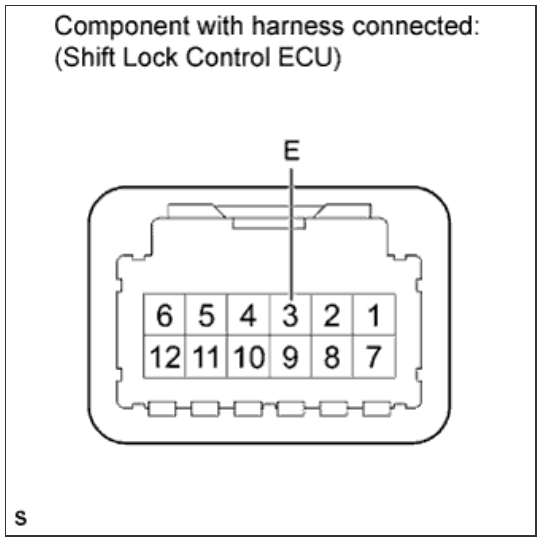
b. Measure the resistance according to the value(s) in the table below.

HINT:

Do not disconnect the shift lock control ECU connector.

Standard Resistance:

Tester Connection	Condition	Specified Value
3 (E) - Body ground	Always	Below 1 Ω



c. Disconnect the shift lock solenoid connector from the shift lock control ECU.

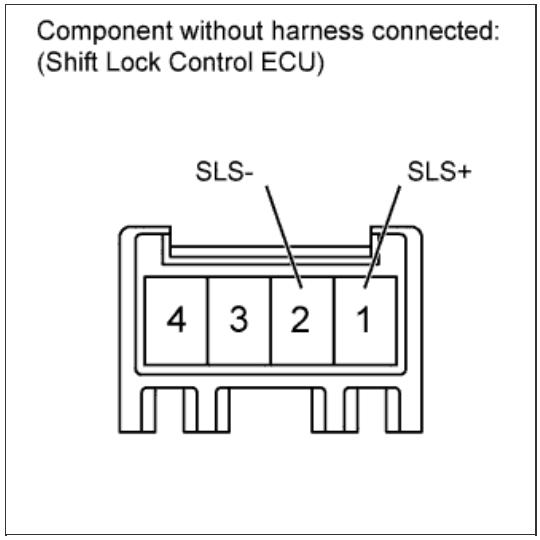
d. Measure the voltage according to the value(s) in the table below.

HINT:

Do not disconnect the shift lock control ECU connector.

Standard Voltage:

Tester Connection	Condition	Specified Condition
1 (SLS+) - 2 (SLS-)	Engine switch off	Below 1 V
1 (SLS+) - 2 (SLS-)	Engine switch on (IG)	Below 1 V
	Engine switch on (IG) and brake pedal depressed	11 to 14 V



If the result is not as specified, replace the shift lever assembly.

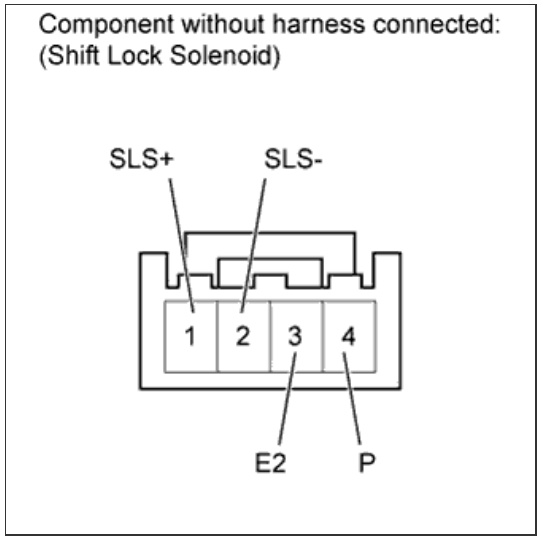
5. CHECK SHIFT LOCK SOLENOID

a. Disconnect the shift lock solenoid connector from the shift lock control ECU.

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 (SLS+) - 2 (SLS-)	Always	101 to 123 Ω
3 (E2) - 4 (P)	Shift lever in P	10 kΩ or higher
3 (E2) - 4 (P)	Shift lever not in P	Below 1 Ω



c. Apply 12 V battery voltage to the shift lock solenoid valve and check that the valve moves and makes an operating noise.

OK:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 (SLS+) Battery negative (-) → Terminal 2 (SLS-)	Solenoid moves and makes an operating noise

If the result is not as specified, replace the shift lever assembly.

for Preparation Click here

1. REMOVE COOLING BOX ASSEMBLY (w/ Cool Box)

a. Remove the cooling box assembly (Click here).

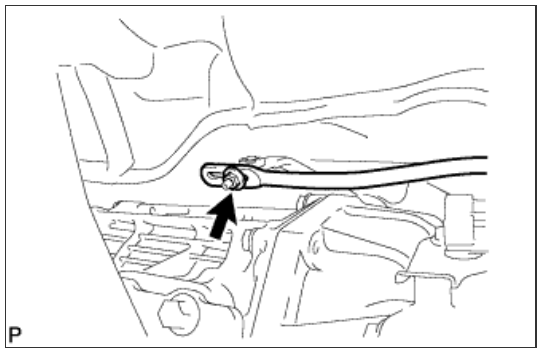
2. REMOVE REAR CONSOLE BOX SUB-ASSEMBLY (w/o Cool Box)

a. Remove the rear console box sub-assembly (Click here).

3. DISCONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Move the shift lever to N.

b. Remove the nut and disconnect the shifting rod from the connecting rod swivel.

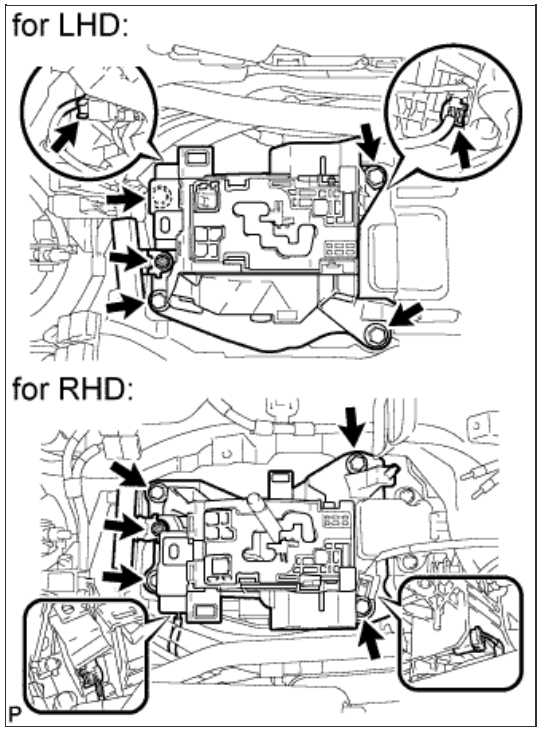


4. REMOVE TRANSMISSION FLOOR SHIFT ASSEMBLY

a. Disconnect the 2 connectors.

b. Remove the screw and disconnect the indoor electrical key oscillator.

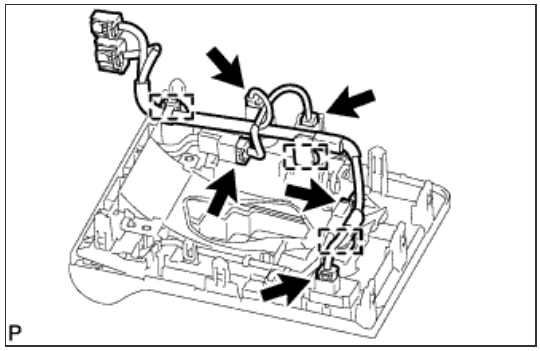
c. Remove the 4 bolts and floor shift.



for Preparation Click here

1. REMOVE SWITCH WIRE

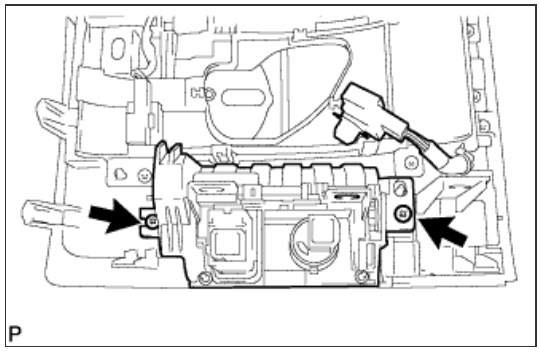
a. Disconnect the 5 connectors, detach the 3 clamps and remove the wire from the position indicator housing.



2. REMOVE CONSOLE BOX POCKET

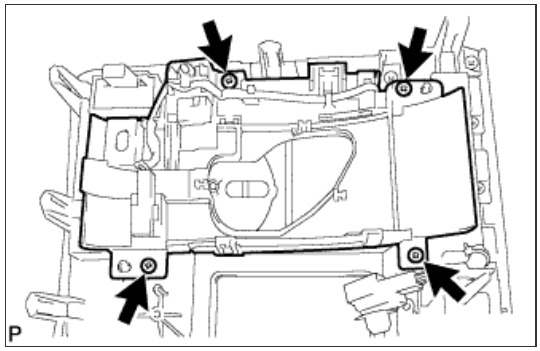
a. Detach the integration control & panel connector.

b. Remove the 2 screws and console box pocket from the position indicator housing.



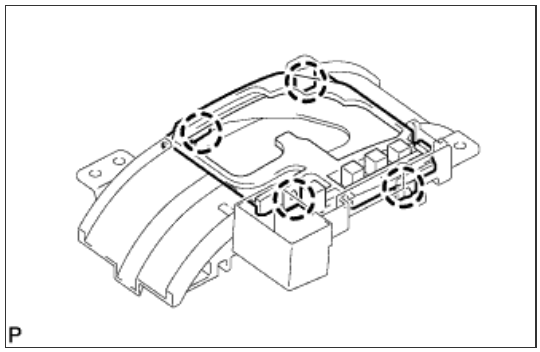
3. REMOVE LOWER POSITION INDICATOR HOUSING

a. Remove the 4 screws and lower position indicator housing from the position indicator housing.



4. REMOVE POSITION INDICATOR LENS

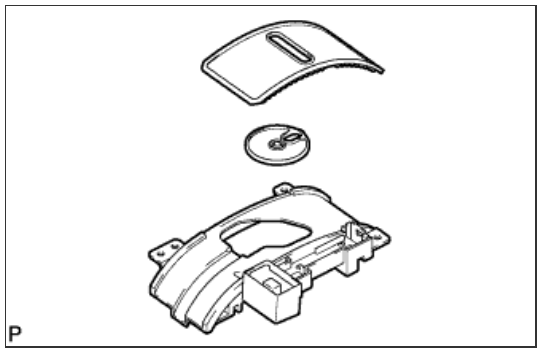
a. Detach the 4 claws and remove the position indicator lens from the lower position indicator housing.



5. REMOVE POSITION INDICATOR SLIDE COVER

a. Remove the position indicator slide cover together with the No. 2 position indicator slide cover.

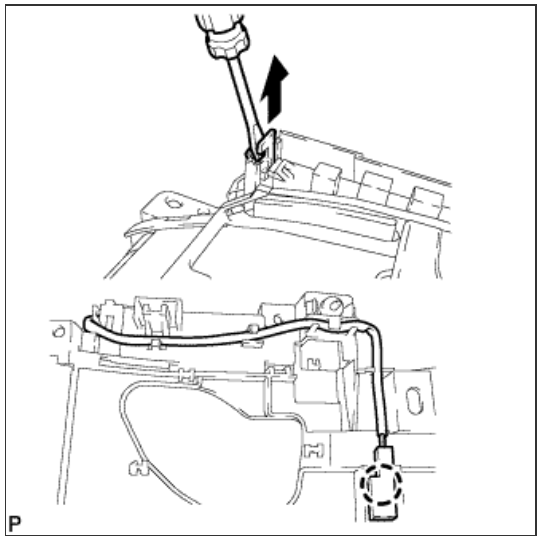
b. Remove the No. 2 position indicator slide cover from the position indicator slide cover.



6. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY

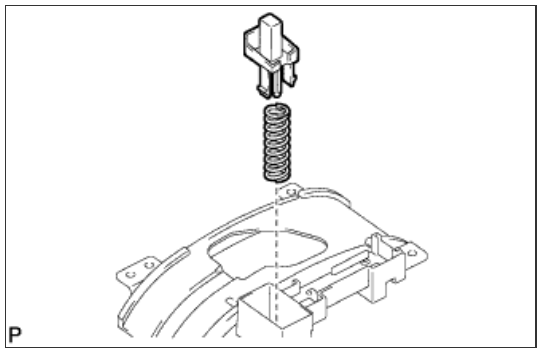
a. Detach the indicator light wire connector.

b. Using a small screwdriver, detach the claw and pull out the indicator light wire from the lower position indicator housing.



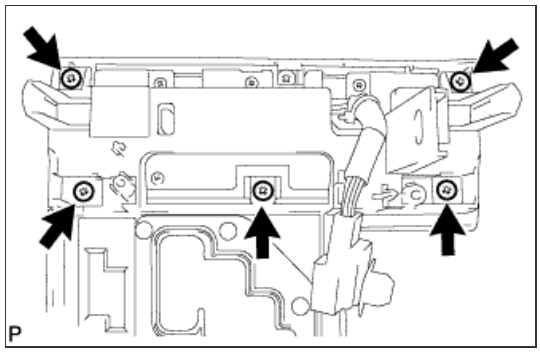
7. REMOVE SHIFT LOCK RELEASE BUTTON

a. Detach the 2 claws and remove the shift lock release button and spring from the lower position indicator housing.



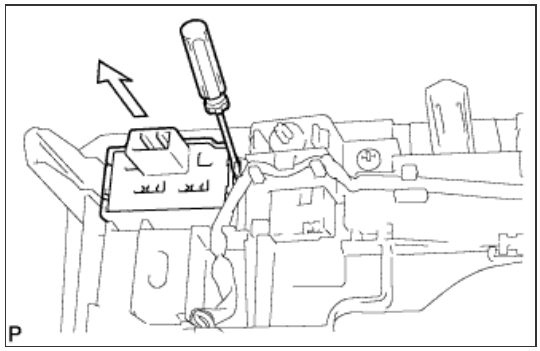
8. REMOVE INTEGRATION CONTROL & PANEL SUB-ASSEMBLY

a. Remove the 5 screws, and then remove the integration control & panel from the position indicator housing.



9. REMOVE NO. 1 PATTERN SELECT SWITCH ASSEMBLY

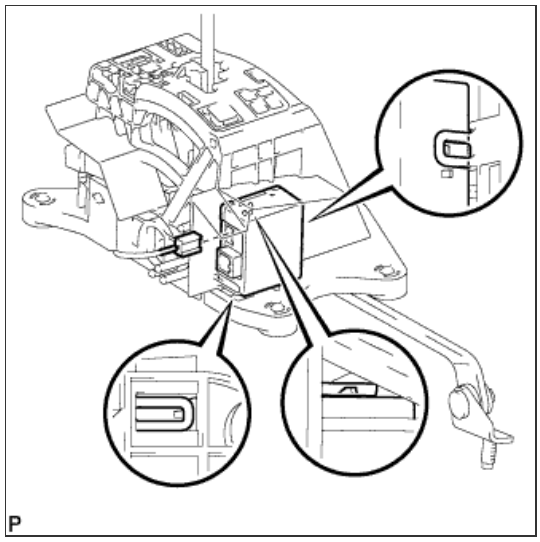
a. Using a small screwdriver, detach the 2 claws and remove the pattern select switch from the position indicator housing.



10. REMOVE SHIFT LOCK CONTROL ECU SUB-ASSEMBLY

a. Disconnect the shift lock solenoid connector.

b. Detach the 3 claws and remove the ECU from the transmission floor shift.


P

for Preparation Click here

1. INSPECT TRANSMISSION CONTROL SWITCH

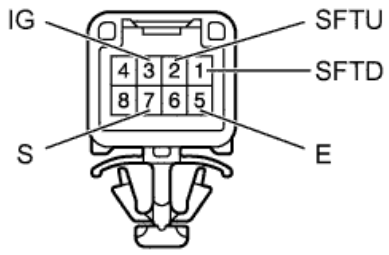
a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 7 (S)	Shift lever in S, "+" or "-"	Below 1 Ω
2 (SFTU) - 5 (E)	Shift lever held in "+" (Up-shift)	
1 (SFTD) - 5 (E)	Shift lever held in "-" (Down-shift)	
3 (IG) - 7 (S)	Shift lever not in S, "+" or "-"	10 kΩ or higher
2 (SFTU) - 5 (E)	Shift lever in S	
1 (SFTD) - 5 (E)		

If the result is not as specified, replace the transmission floor shift assembly.

Component without harness connected:
(Transmission Control Switch)



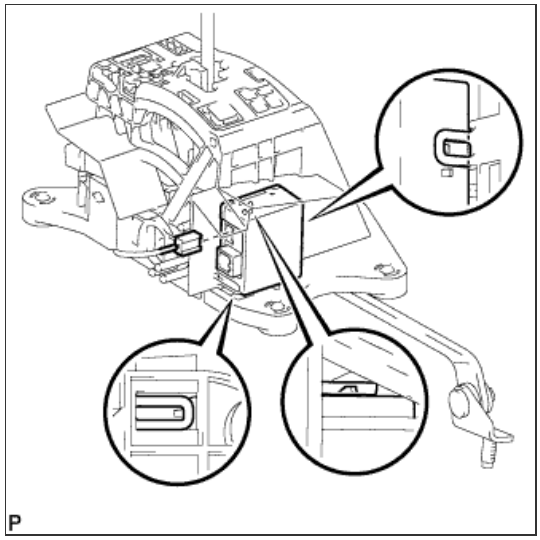
P

for Preparation Click here

1. INSTALL SHIFT LOCK CONTROL ECU SUB-ASSEMBLY

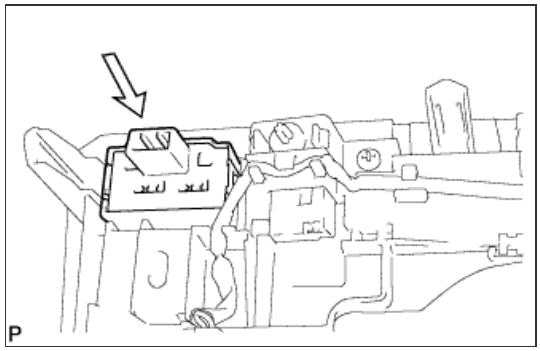
a. Attach the 3 claws to install the ECU to the transmission floor shift.

b. Connect the shift lock solenoid connector.



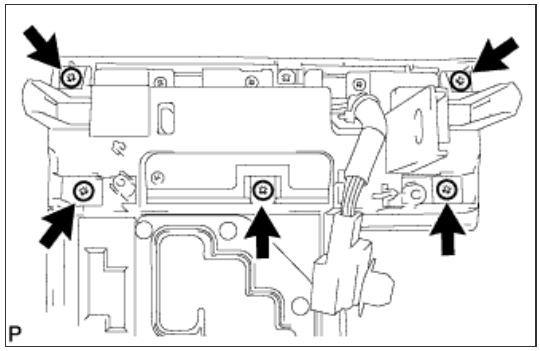
2. INSTALL NO. 1 PATTERN SELECT SWITCH ASSEMBLY

a. Install the pattern select switch to the position indicator housing and attach the 2 claws.



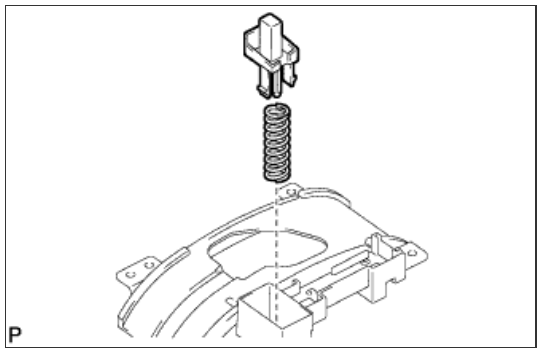
3. INSTALL INTEGRATION CONTROL & PANEL SUB-ASSEMBLY

a. Install the integration control & panel to the position indicator housing with the 5 screws.



4. INSTALL SHIFT LOCK RELEASE BUTTON

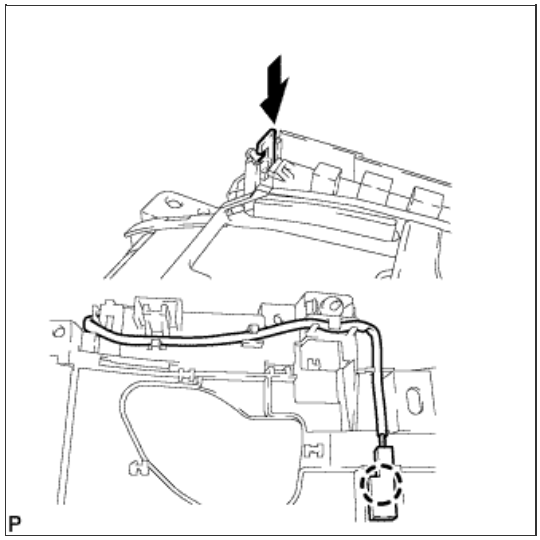
a. Install the spring and shift lock release button to the lower position indicator housing and attach the 2 claws.



5. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY

a. Insert the indicator light wire to the position indicator housing and attach the claw.

b. Attach the indicator light wire connector to the lower position indicator housing.



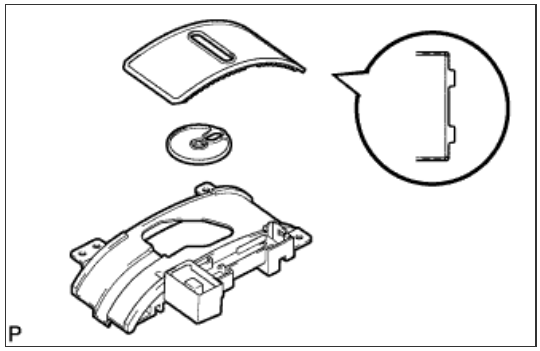
6. INSTALL POSITION INDICATOR SLIDE COVER

a. Install the No. 2 position indicator slide cover to the position indicator slide cover.

b. Install the position indicator slide cover together with the No. 2 slide cover to the lower position indicator housing.

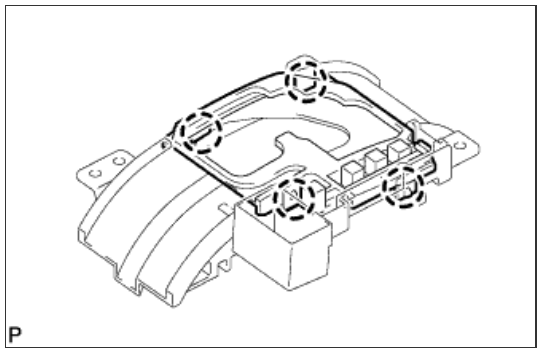
NOTICE:

Make sure the protrusions of the position indicator slide cover are facing rearwards.



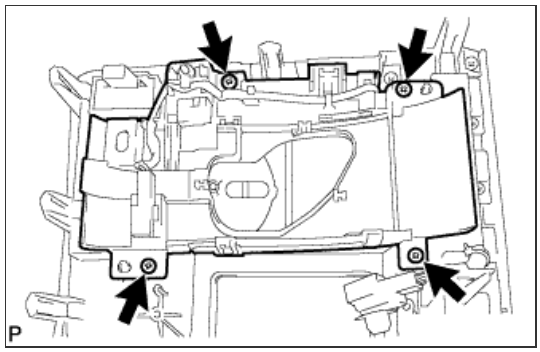
7. INSTALL POSITION INDICATOR LENS

a. Attach the 4 claws to install the position indicator lens to the lower position indicator housing.



8. INSTALL LOWER POSITION INDICATOR HOUSING

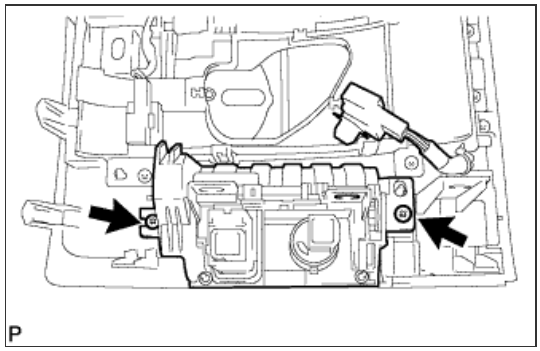
a. Install the lower position indicator housing to the position indicator housing with the 4 screws.



9. INSTALL CONSOLE BOX POCKET

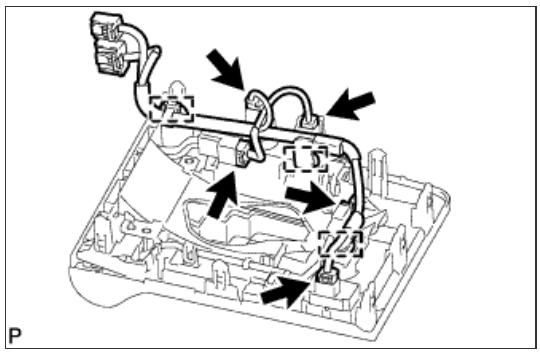
a. Install the console box pocket to the position indicator housing with the 2 screws.

b. Attach the integration control & panel connector.



10. INSTALL SWITCH WIRE

a. Connect the 5 connectors and attach the 3 clamps to install the switch wire to the position indicator housing.



for Preparation Click here

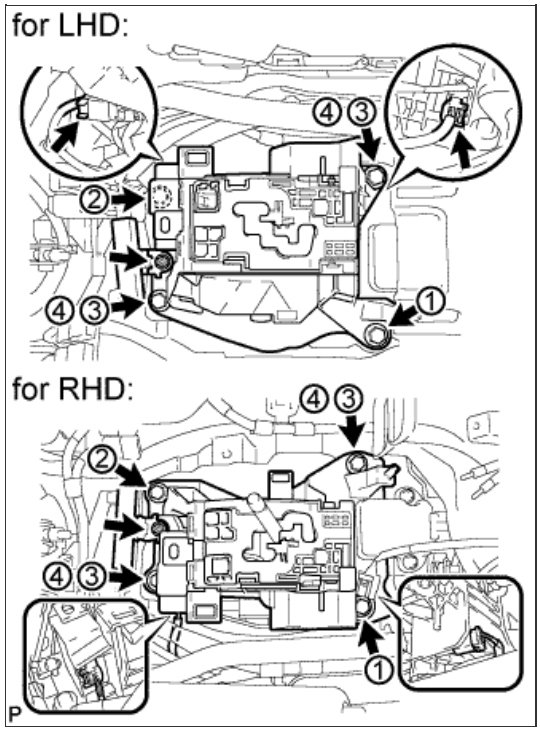
1. INSTALL TRANSMISSION FLOOR SHIFT ASSEMBLY

a. Install the floor shift with the 4 bolts. Tighten the bolts in the order shown in the illustration.

Torque:
14 N*m{ 143 kgf*cm , 10 ft.*lbf }

b. Install the indoor electrical key oscillator with the screw.

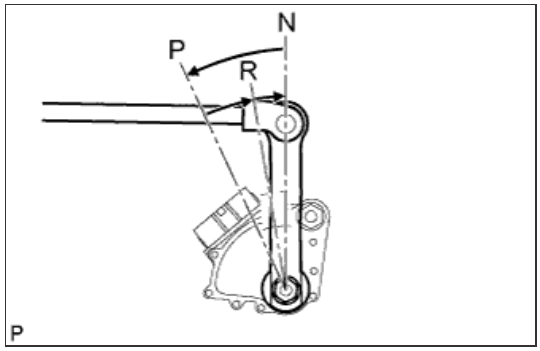
c. Connect the 2 connectors.



2. CONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Turn the control shaft lever RH of the park/neutral position switch counterclockwise until it stops, and then turn it clockwise 2 notches to set it to the N position.

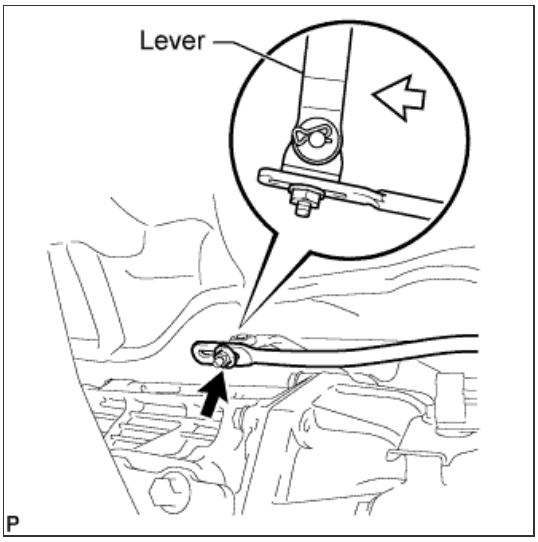
b. Move the shift lever to N.



c. Temporarily install the floor shift gear shifting rod with the nut.

d. Tighten the nut while lightly pushing the lever rearward.

Torque:
13 N*m{ 130 kgf*cm , 9 ft.*lbf }



3. INSTALL REAR CONSOLE BOX SUB-ASSEMBLY (w/o Cool Box)

a. Install the rear console box sub-assembly (Click here).

4. INSTALL COOLING BOX ASSEMBLY (w/ Cool Box)

a. Install the cooling box assembly (Click here).

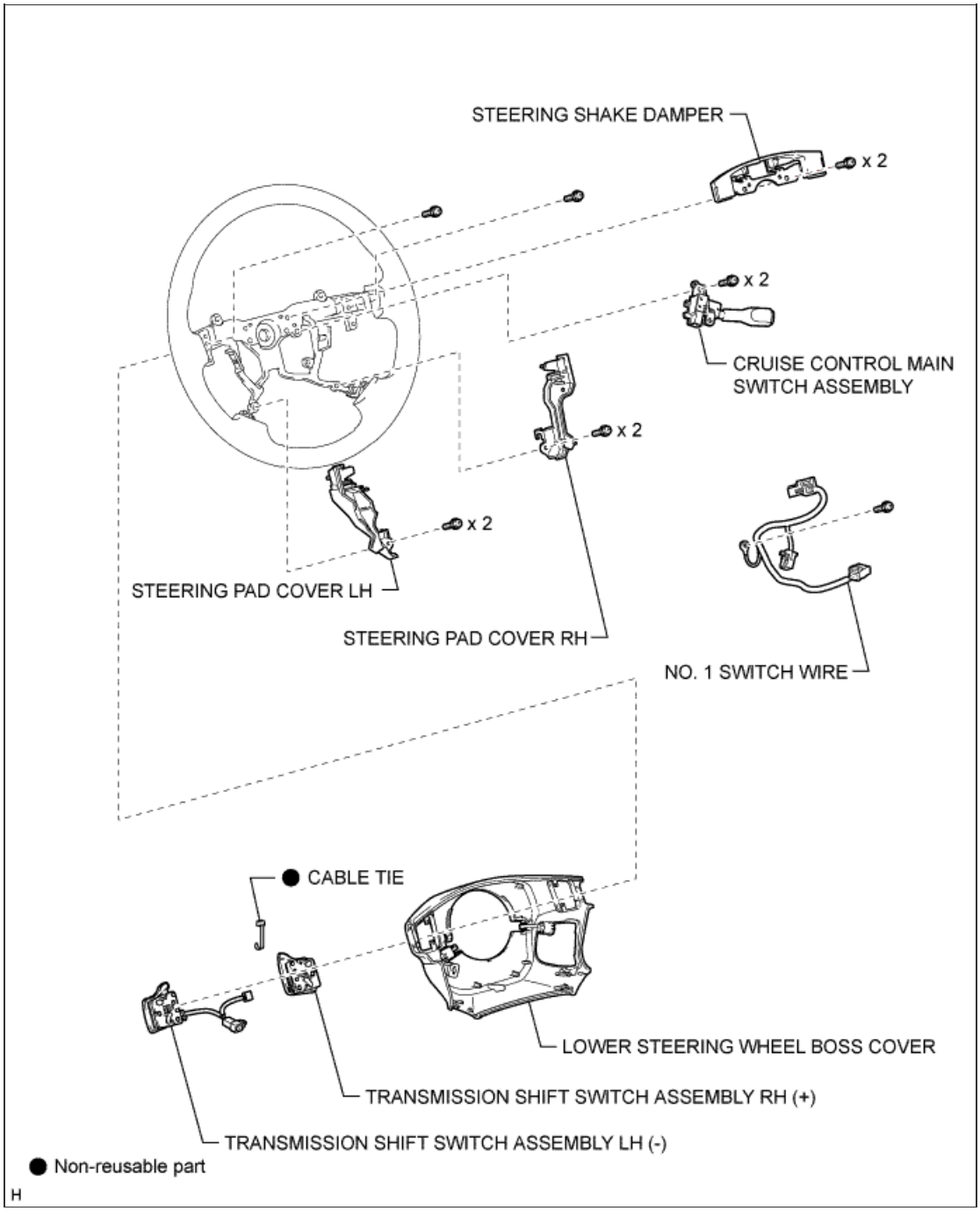
5. INSPECT SHIFT LEVER POSITION

a. When moving the shift lever from P to R with the engine switch on (IG) and the brake pedal depressed, make sure that it moves smoothly and correctly into position.

b. Check that the shift lever does not stop when moving the shift lever from R to P, and check that the shift lever does not stick when moving the shift lever from D to S.

c. Start the engine and make sure that the vehicle moves forward after moving the shift lever from N to D and moves rearward after moving the shift lever to R.
If the operation cannot be performed as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

for Preparation Click here



for Preparation Click here

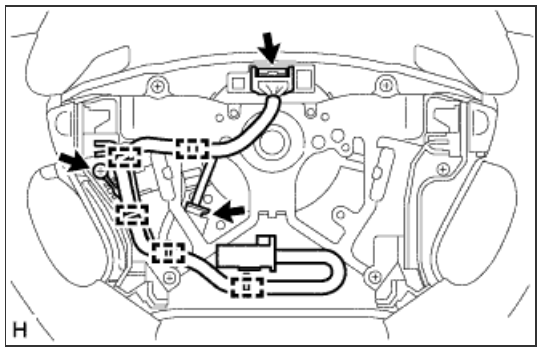
1. REMOVE STEERING PAD

(Click here)

2. REMOVE NO. 1 SWITCH WIRE

a. Disconnect the 2 connectors and detach the 5 guides from the steering wheel assembly.

b. Remove the screw and No. 1 switch wire from the steering wheel assembly.

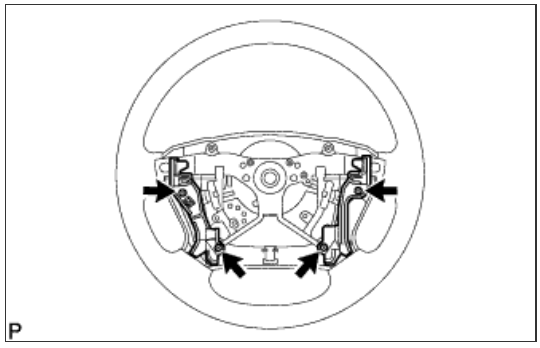


3. REMOVE STEERING WHEEL ASSEMBLY

(Click here)

4. REMOVE STEERING PAD COVER RH AND LH

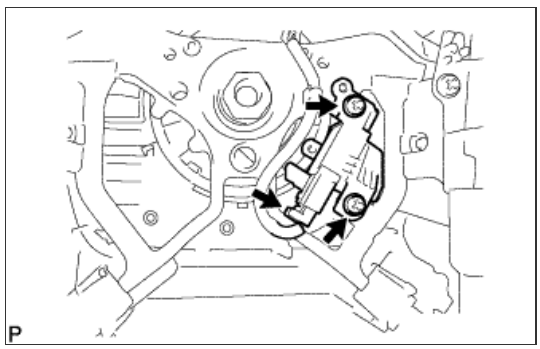
a. Remove the 4 screws and steering pad cover.



5. REMOVE CRUISE CONTROL MAIN SWITCH ASSEMBLY

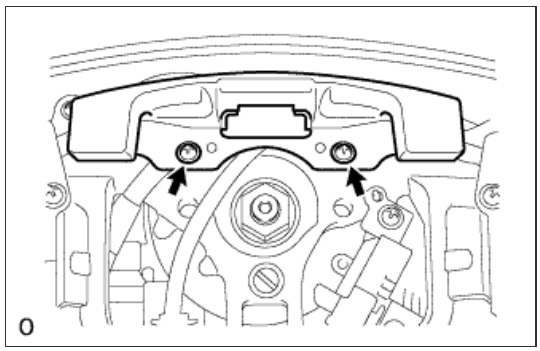
a. Disconnect the connector.

b. Remove the 2 screws and cruise control main switch.



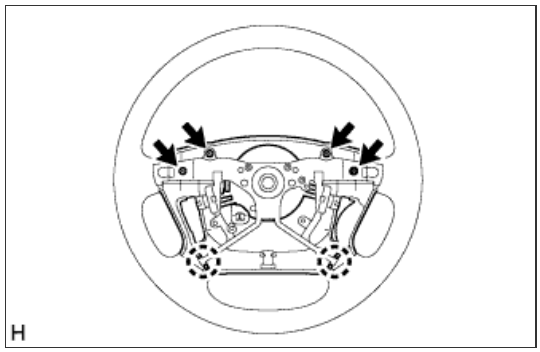
6. REMOVE STEERING SHAKE DAMPER

a. Remove the 2 screws and steering shake damper.



7. REMOVE LOWER STEERING WHEEL BOSS COVER

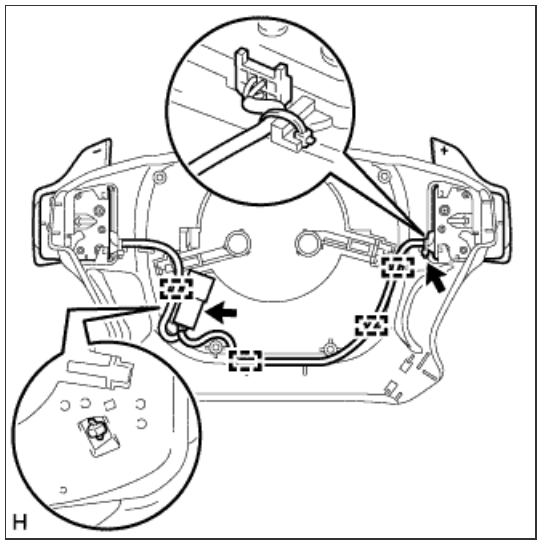
a. Remove the 4 screws, detach the 2 claws and remove the lower cover.



8. REMOVE TRANSMISSION SHIFT SWITCH ASSEMBLY

a. Detach the connector clamp and 4 guides.

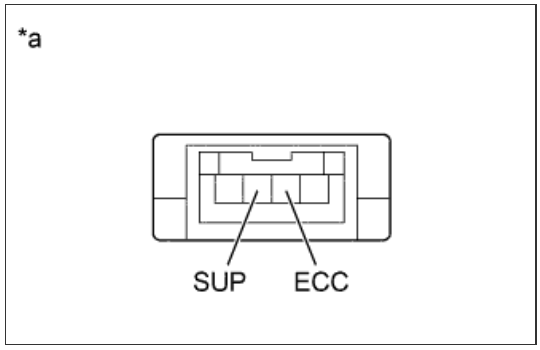
b. Cut the cable tie of the shift switch RH (+), disconnect the connector and remove the shift switch RH (+) and LH (-).



for Preparation Click here

1. INSPECT TRANSMISSION SHIFT SWITCH ASSEMBLY RH (+)

a. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
SUP - ECC	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
SUP - ECC	"+" shift paddle not operated (up-shift)	1 MΩ or higher

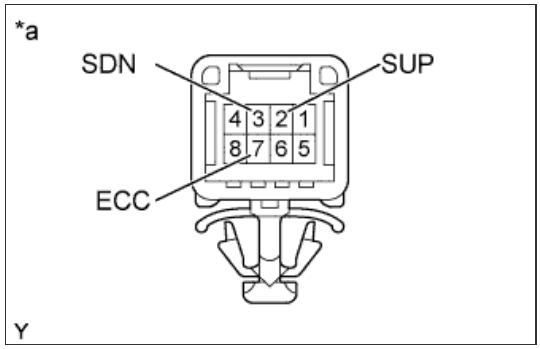
Text in Illustration

*a	Component without harness connected (Transmission Shift Switch Assembly RH (+))

If the result is not as specified, replace the transmission shift switch assembly RH (+).

2. INSPECT TRANSMISSION SHIFT SWITCH ASSEMBLY LH (-)

a. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
2 (SUP) - 7 (ECC)	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω
3 (SDN) - 7 (ECC)	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
2 (SUP) - 7 (ECC)	"+" shift paddle not operated (up-shift)	1 MΩ or higher
3 (SDN) - 7 (ECC)	"-" shift paddle not operated (down-shift)	1 MΩ or higher

Text in Illustration

*a	Front view of wire harness connector (Transmission Shift Switch Assembly LH (-))

If the result is not as specified, replace the transmission shift switch assembly LH (-).

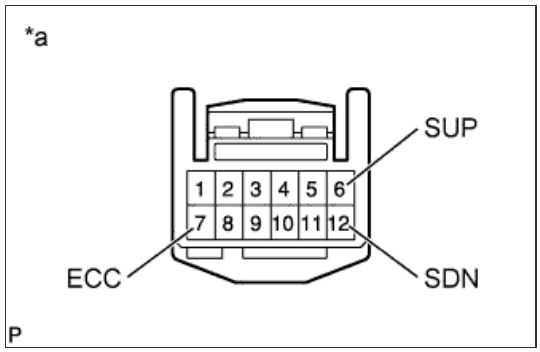
3. INSPECT NO. 1 SWITCH WIRE

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
6 (SUP) - 7 (ECC)	"+" shift paddle operated and held (up-shift)	Below 2.5 Ω

12 (SDN) - 7 (ECC)	"-" shift paddle operated and held (down-shift)	Below 2.5 Ω
6 (SUP) - 7 (ECC)	"+" shift paddle not operated (up-shift)	1 MΩ or higher
12 (SDN) - 7 (ECC)	"-" shift paddle not operated (down-shift)	1 MΩ or higher



Text in Illustration

*a	Component without harness connected (No. 1 Switch Wire)

If the resistance value is not as specified, replace the No. 1 switch wire.

for Preparation Click here

1. INSTALL TRANSMISSION SHIFT SWITCH ASSEMBLY

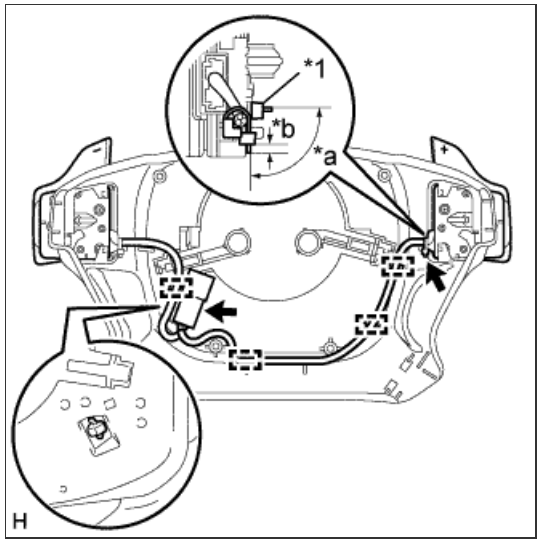
Text in Illustration

*1	Cable Tie
*a	0 to 90°
*b	1 to 3 mm (0.0394 to 0.118 in.)

a. Pass the harness of the shift switch LH (-) through the holes of the lower steering wheel boss cover and attach the connector clamp.

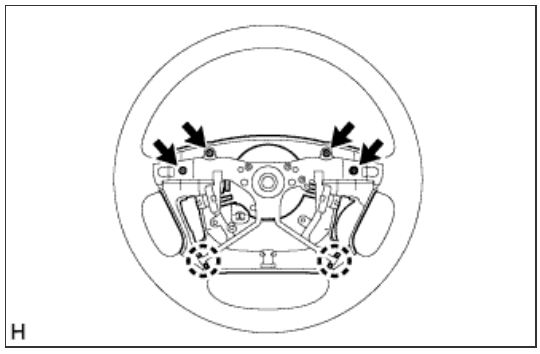
b. Connect the connector to the shift switch RH (+) and install a new cable tie to the switch at the location shown in the illustration to secure the wire in place.

c. Attach the 4 guides.



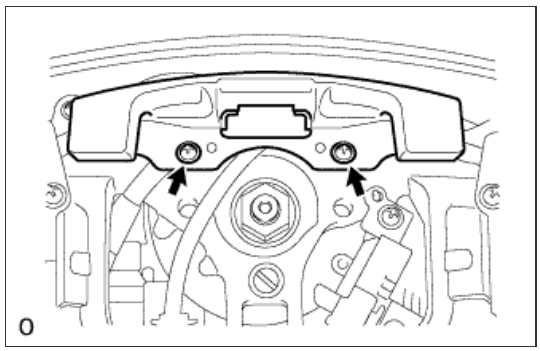
2. INSTALL LOWER STEERING WHEEL BOSS COVER

a. Attach the 2 claws to install the lower cover and install the 4 screws.



3. INSTALL STEERING SHAKE DAMPER

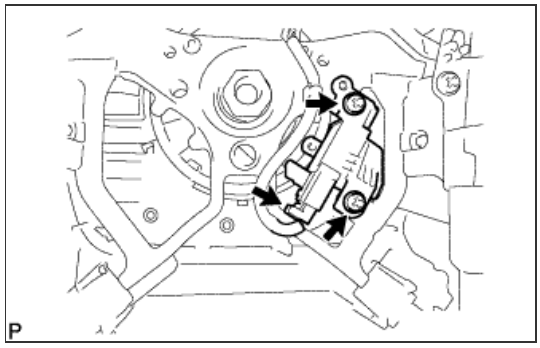
a. Install the steering shake damper with the 2 screws.



4. INSTALL CRUISE CONTROL MAIN SWITCH ASSEMBLY

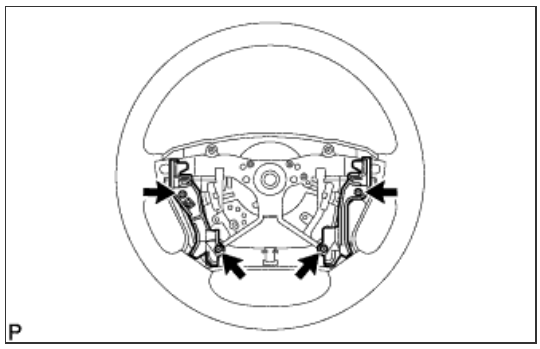
a. Install the cruise control main switch with the 2 screws.

b. Connect the connector.



5. INSTALL STEERING PAD COVER RH AND LH

a. Install the steering pad cover with the 4 screws.



6. INSTALL STEERING WHEEL ASSEMBLY

(Click here)

7. INSTALL NO. 1 SWITCH WIRE

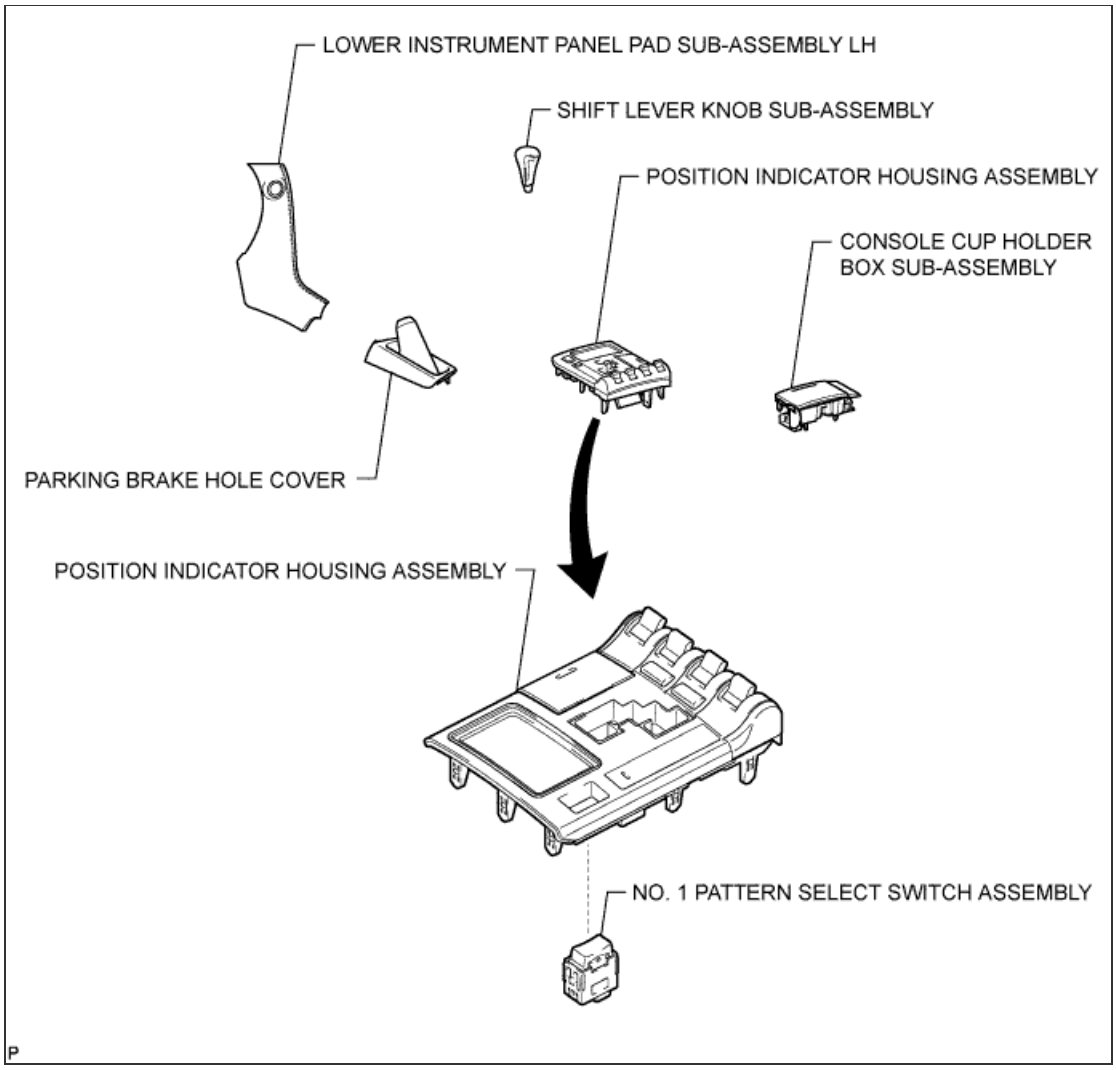
a. Install the No. 1 switch wire with the screw.

b. Connect the 2 connectors and attach the 5 guides to install the No. 1 switch wire.

8. INSTALL STEERING PAD

(Click here)

for Preparation Click here

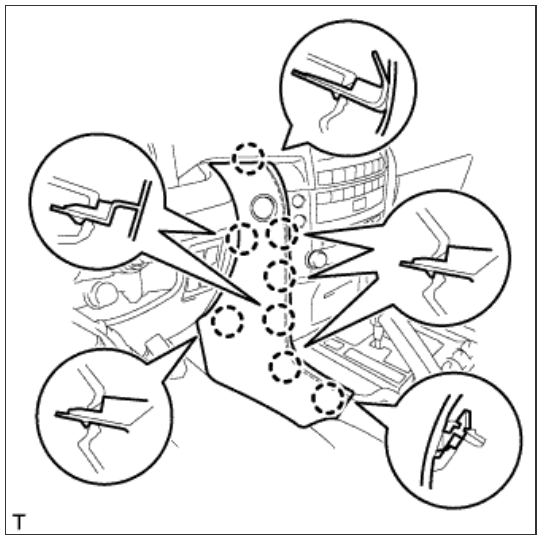


for Preparation Click here

1. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

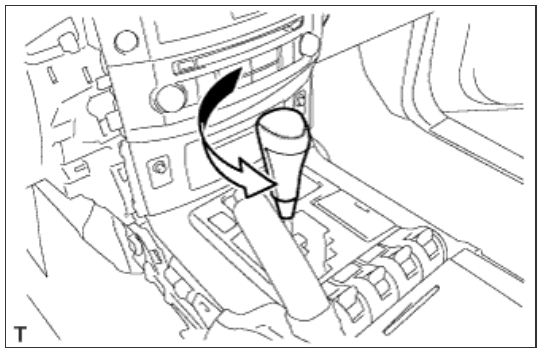
a. Detach the 8 claws.

b. Disconnect the connector and remove the panel pad.



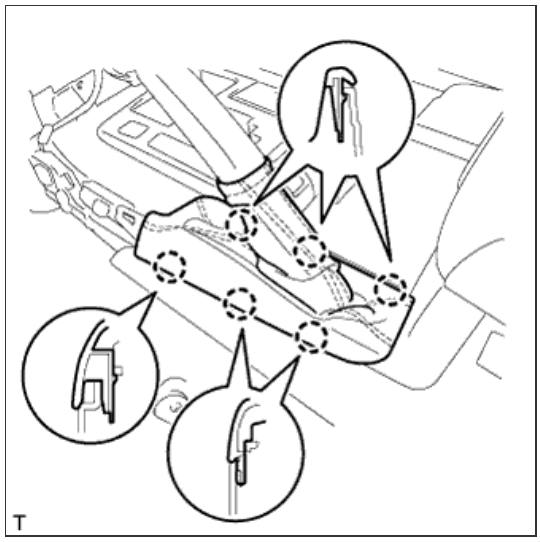
2. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY

a. Twist the shift lever knob in the direction indicated by the arrow and remove it.



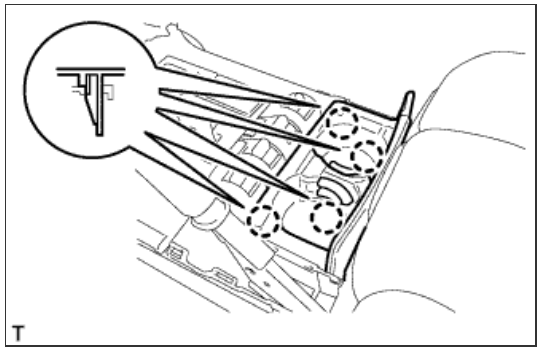
3. REMOVE PARKING BRAKE HOLE COVER

a. Detach the 6 claws and remove the cover.



4. REMOVE CONSOLE CUP HOLDER BOX SUB-ASSEMBLY

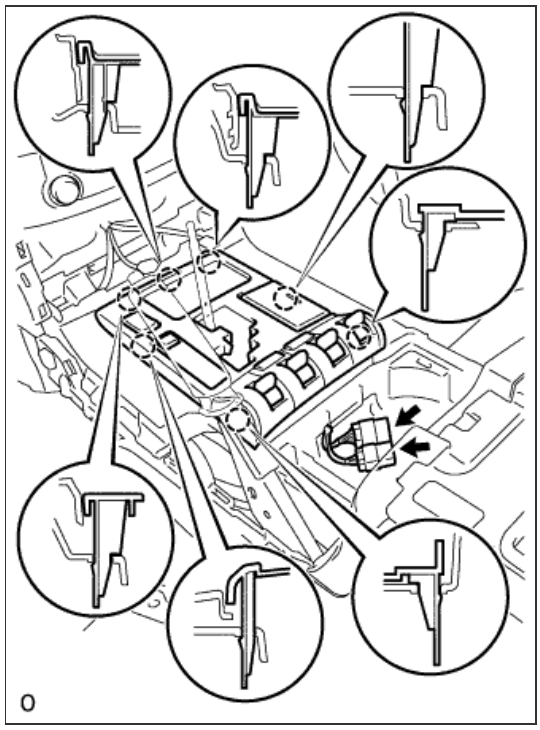
a. Detach the 4 claws and remove the box.



5. REMOVE POSITION INDICATOR HOUSING ASSEMBLY

a. Disconnect the 2 connectors.

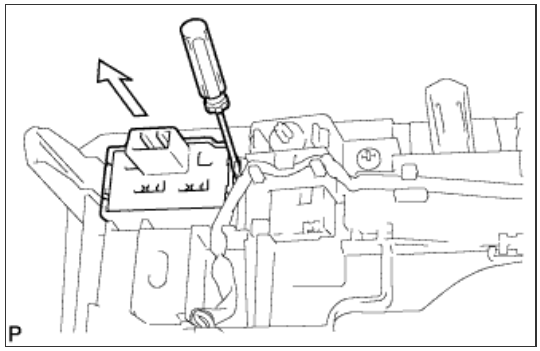
b. Detach the 7 claws and remove the position indicator housing.



6. REMOVE NO. 1 PATTERN SELECT SWITCH ASSEMBLY

a. Disconnect the connector.

b. Using a small screwdriver, detach the 2 claws and remove the pattern select switch from the position indicator housing.



for Preparation Click here

1. REMOVE NO. 1 PATTERN SELECT SWITCH ASSEMBLY

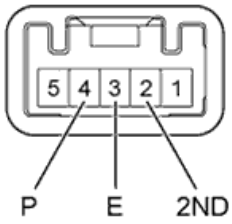
a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
4 (P) - 3 (E)	Pattern select (PWR) switch on	Below 1 Ω
4 (P) - 3 (E)	Pattern select (PWR) switch off	10 kΩ or higher
2 (2ND) - 3 (E)	Pattern select (2ND) switch continuously pressed	Below 1 Ω
2 (2ND) - 3 (E)	Pattern select (2ND) switch released	10 kΩ or higher

If the result is not as specified, replace the No. 1 pattern select switch assembly.

Component without harness connected:
(Pattern Select Switch)



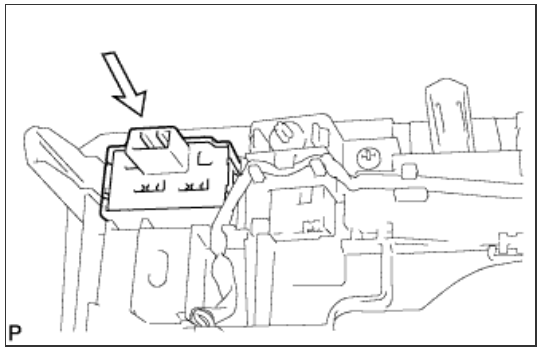
Y

for Preparation Click here

1. INSTALL NO. 1 PATTERN SELECT SWITCH ASSEMBLY

a. Install the pattern select switch to the position indicator housing and attach the 2 claws.

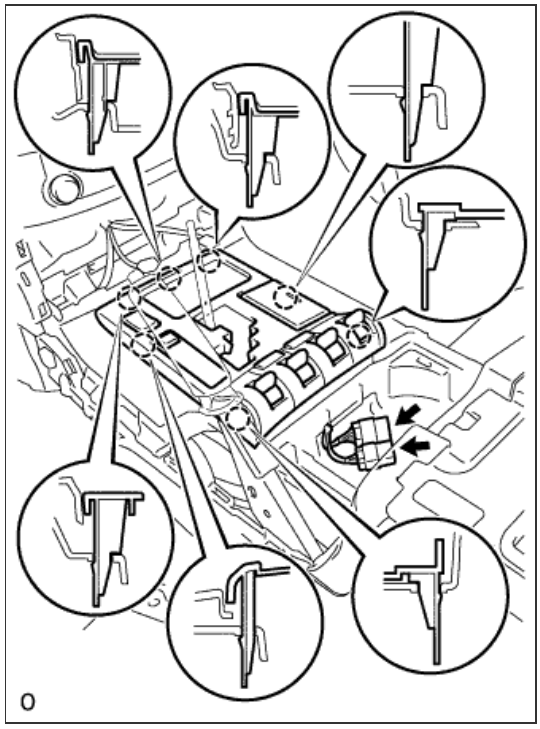
b. Connect the connector.



2. INSTALL POSITION INDICATOR HOUSING ASSEMBLY

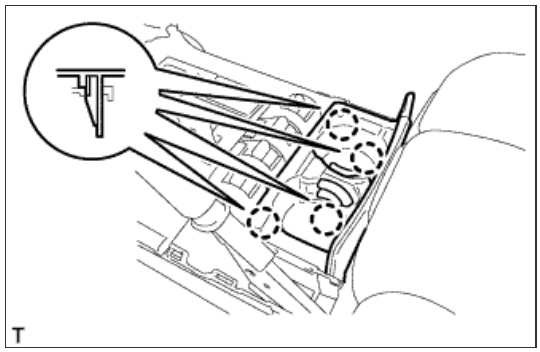
a. Attach the 7 claws to install the position indicator housing.

b. Connect the 2 connectors.



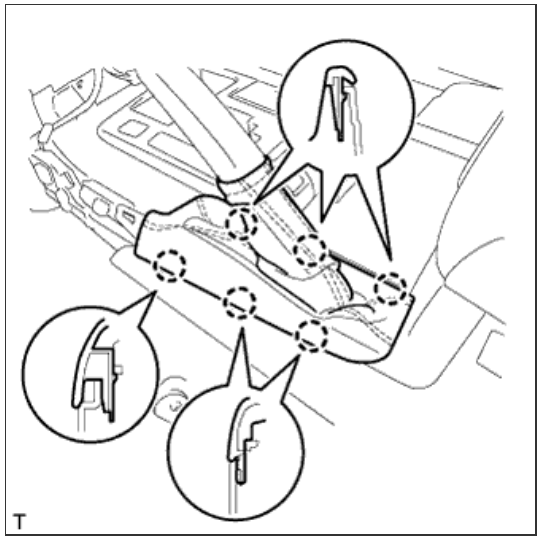
3. INSTALL CONSOLE CUP HOLDER BOX SUB-ASSEMBLY

a. Attach the 4 claws to install the box.



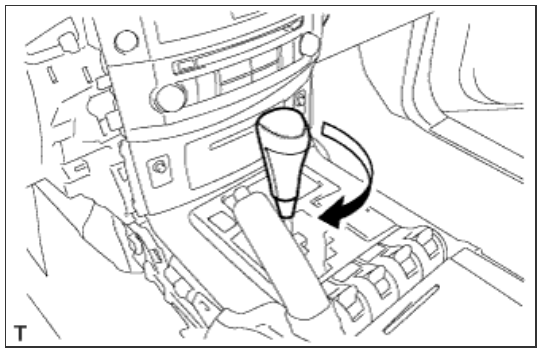
4. INSTALL PARKING BRAKE HOLE COVER

a. Attach the 6 claws to install the cover.



5. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY

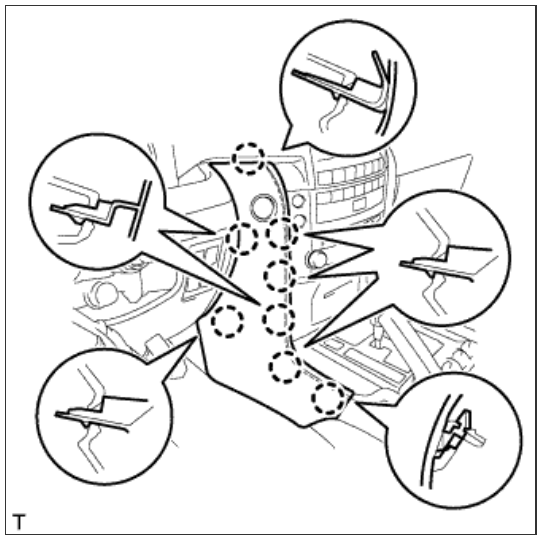
a. Install the shift lever knob and twist it in the direction indicated by the arrow.



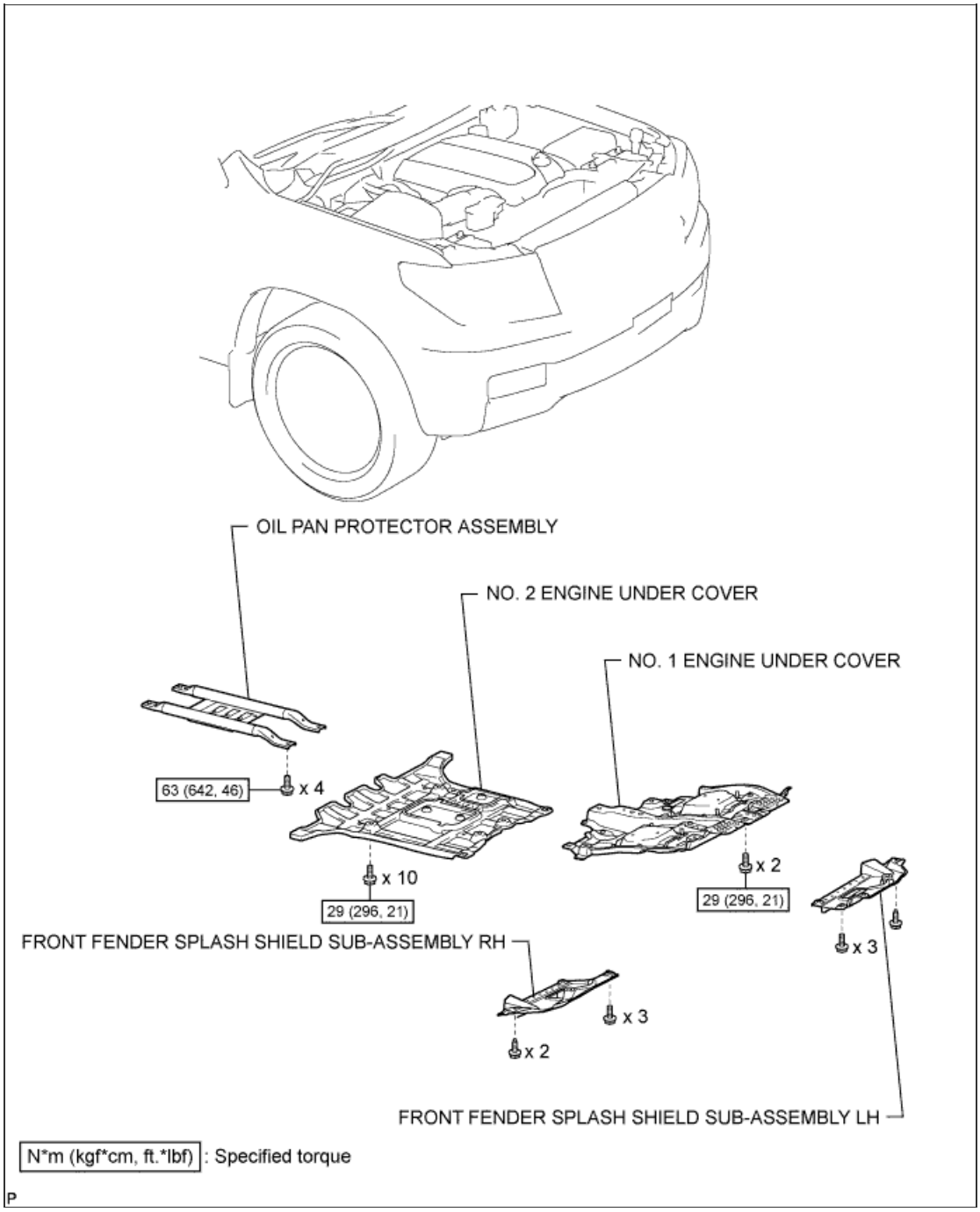
6. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

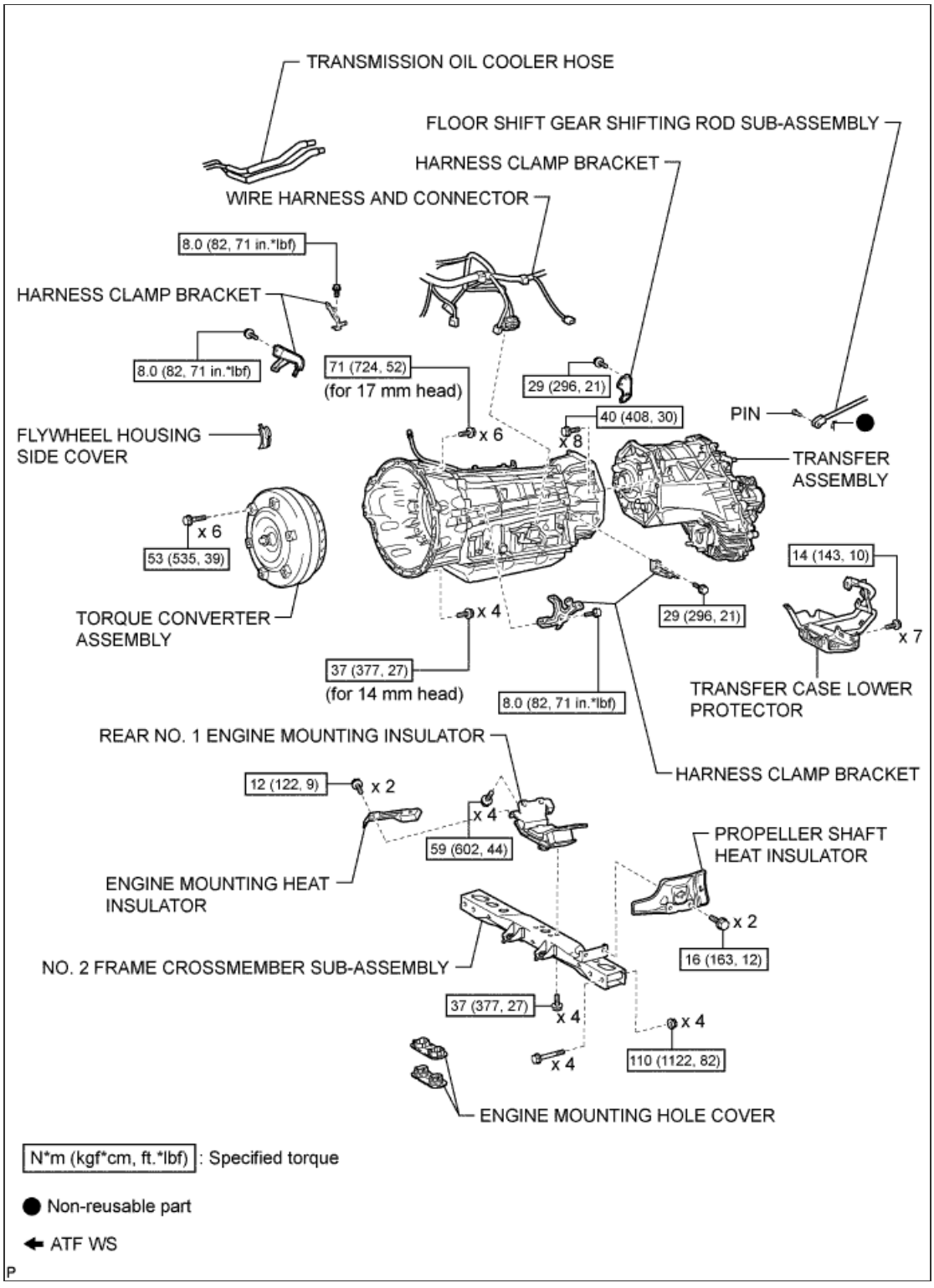
a. Connect the connector.

b. Attach the 8 claws to install the panel pad.


T

for Preparation Click here




TRANSMISSION OIL COOLER HOSE
FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY
HARNESS CLAMP BRACKET
WIRE HARNESS AND CONNECTOR
8.0 (82, 71 in.*lbf)
HARNESS CLAMP BRACKET
8.0 (82, 71 in.*lbf)
71 (724, 52)
(for 17 mm head)
29 (296, 21)
40 (408, 30)
PIN
FLYWHEEL HOUSING SIDE COVER
x 6
x 8
TRANSFER ASSEMBLY
x 6
53 (535, 39)
14 (143, 10)
x 7
TORQUE CONVERTER ASSEMBLY
x 4
29 (296, 21)
37 (377, 27)
(for 14 mm head)
8.0 (82, 71 in.*lbf)
TRANSFER CASE LOWER PROTECTOR
REAR NO. 1 ENGINE MOUNTING INSULATOR
HARNESS CLAMP BRACKET
12 (122, 9)
x 2
x 4
59 (602, 44)
PROPELLER SHAFT HEAT INSULATOR
ENGINE MOUNTING HEAT INSULATOR
x 2
16 (163, 12)
NO. 2 FRAME CROSSMEMBER SUB-ASSEMBLY
37 (377, 27)
x 4
x 4
x 4
110 (1122, 82)
ENGINE MOUNTING HOLE COVER
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
ATF WS
P

for Preparation Click here

1. PRECAUTION

NOTICE:

After turning the engine switch off, waiting time may be required before disconnecting the cable from the battery terminal. Therefore, make sure to read the disconnecting the cable from the battery terminal notice before proceeding with work (Click here).

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

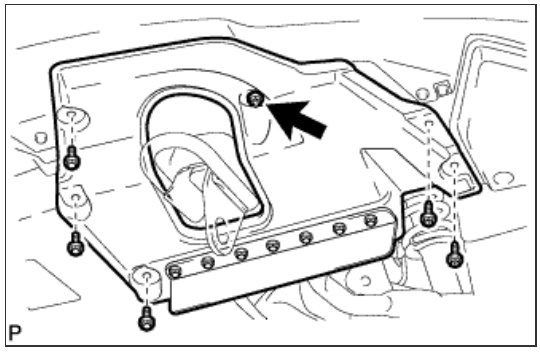
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

3. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Remove the 3 bolts and 2 screws.

b. Turn the clip indicated by the arrow in the illustration to remove the front fender splash shield sub-assembly LH.



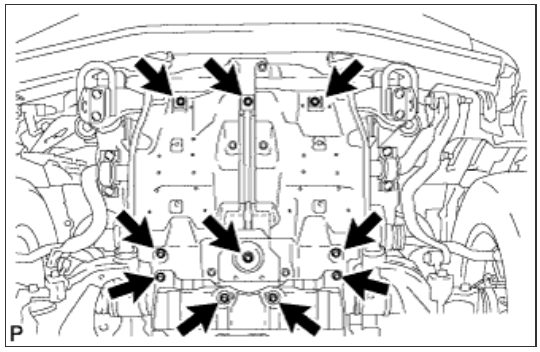
4. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedure described for the LH side.

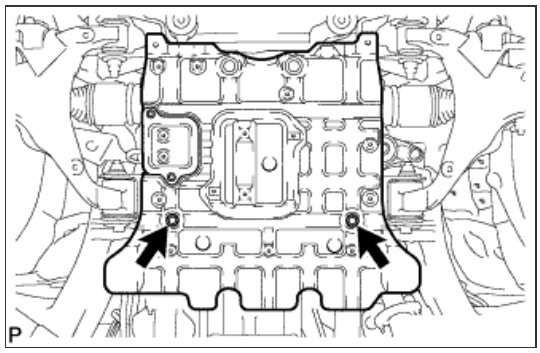
5. REMOVE NO. 1 ENGINE UNDER COVER

a. Remove the 10 bolts and No. 1 engine under cover sub-assembly.



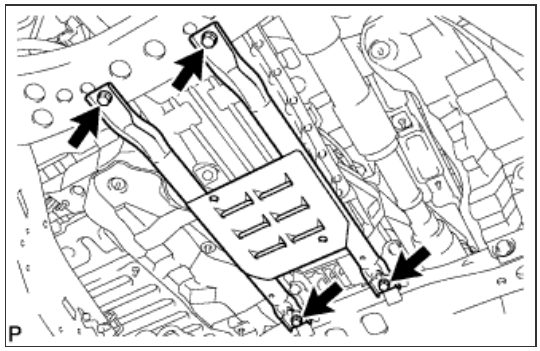
6. REMOVE NO. 2 ENGINE UNDER COVER

a. Remove the 2 bolts and No. 2 engine under cover.



7. REMOVE OIL PAN PROTECTOR ASSEMBLY

a. Remove the 4 bolts and oil pan protector assembly.



8. DRAIN AUTOMATIC TRANSMISSION FLUID

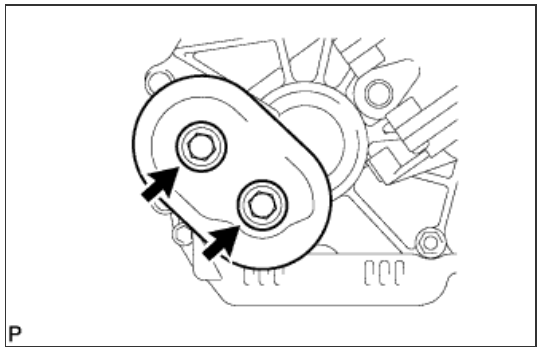
a. Remove the drain plug and gasket, and drain the ATF.

b. Install a new gasket and the drain plug.

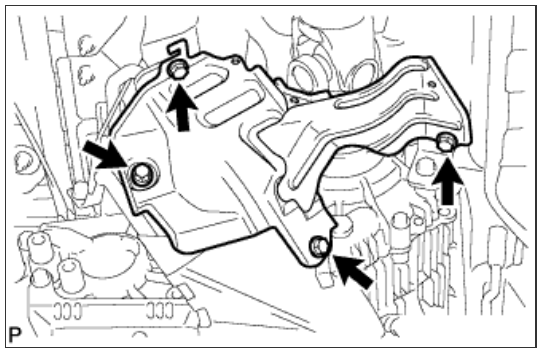
Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }

9. DRAIN TRANSFER OIL

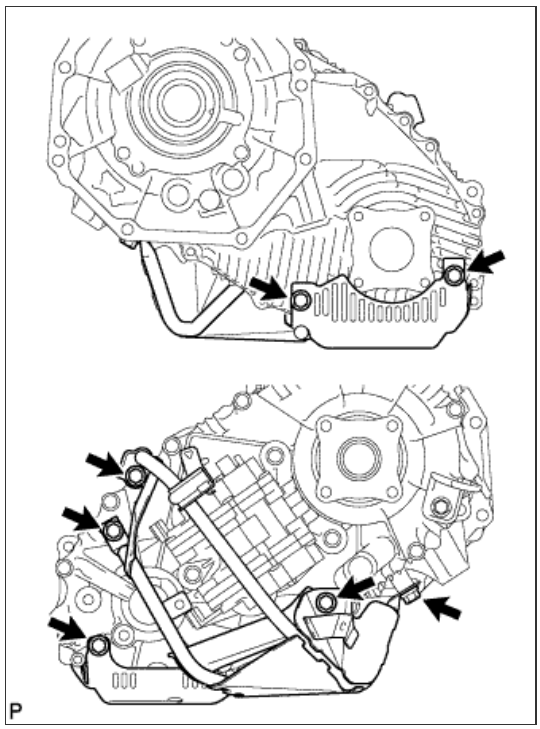
a. Remove the 2 bolts and transfer dynamic damper.



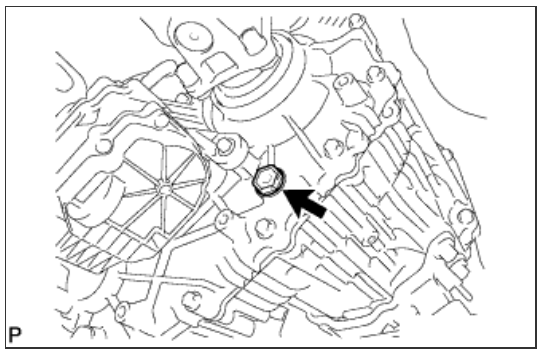
b. Remove the 4 bolts and transfer heat insulator.



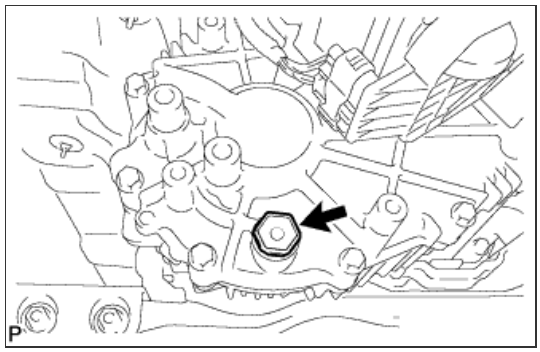
c. Remove the 7 bolts and lower transfer case protector.



d. Remove the filler plug and gasket.



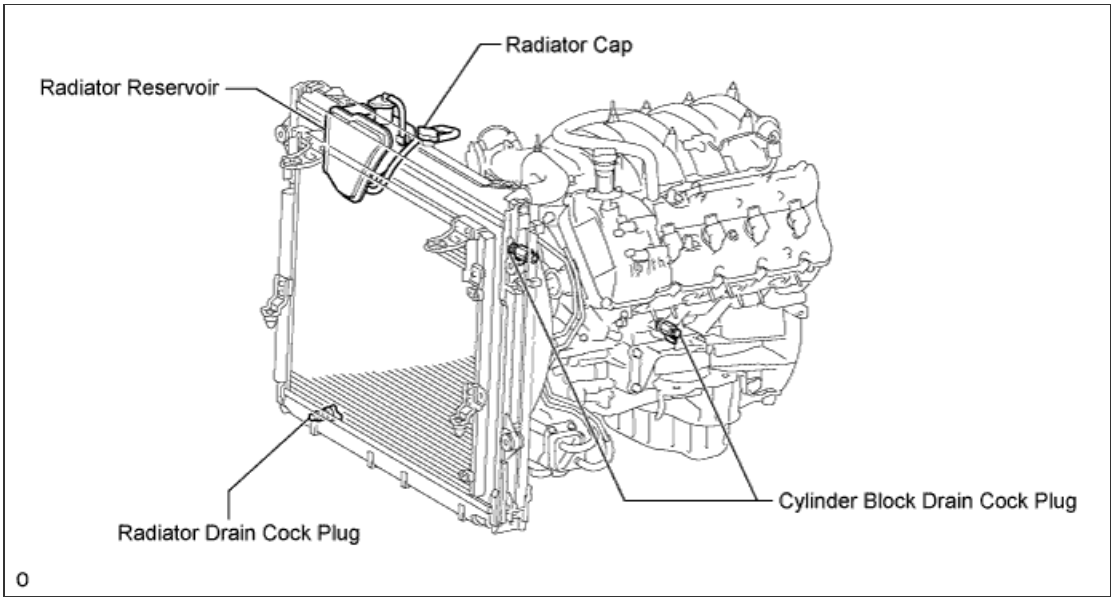
e. Remove the drain plug and gasket, and drain the transfer oil.



10. DRAIN ENGINE COOLANT

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.



a. Loosen the radiator drain cock plug.

HINT:

Collect the coolant in a container and dispose of it according to the regulations in your area.

b. Remove the radiator cap. Then drain the coolant from the radiator.

c. Loosen the 2 cylinder block drain cock plugs. Then drain the coolant from the engine.

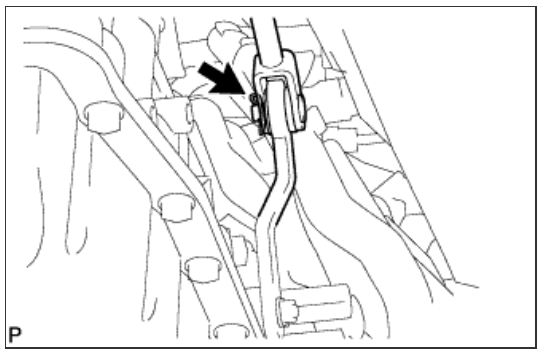
d. Tighten the 2 cylinder block drain cock plugs.

Torque:
13 N*m{ 130 kgf*cm , 10 ft.*lbf }

e. Tighten the radiator drain cock plug by hand.

11. DISCONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Remove the clip and pin, and disconnect the gear shifting rod from the transmission control shaft lever RH.



12. REMOVE FRONT PROPELLER SHAFT ASSEMBLY

(Click here)

13. REMOVE PROPELLER SHAFT ASSEMBLY

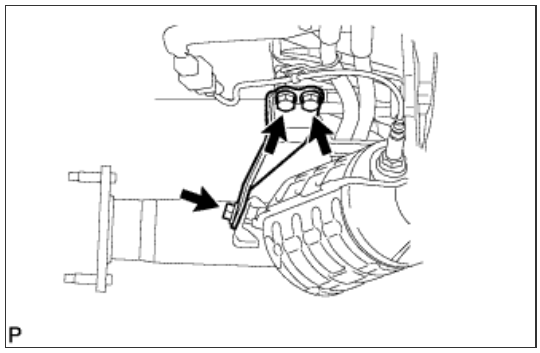
(Click here)

14. REMOVE EXHAUST PIPE

(Click here)

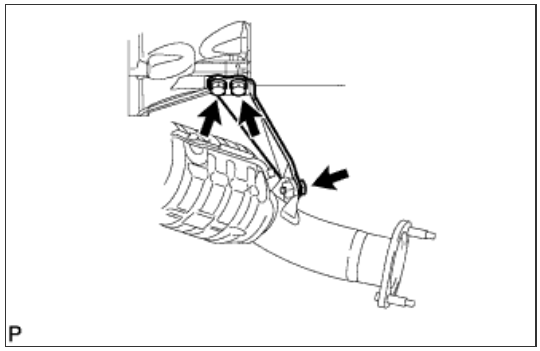
15. REMOVE MANIFOLD STAY

a. Remove the 3 bolts and manifold stay.



16. REMOVE NO. 2 MANIFOLD STAY

a. Remove the 3 bolts and No. 2 manifold stay.

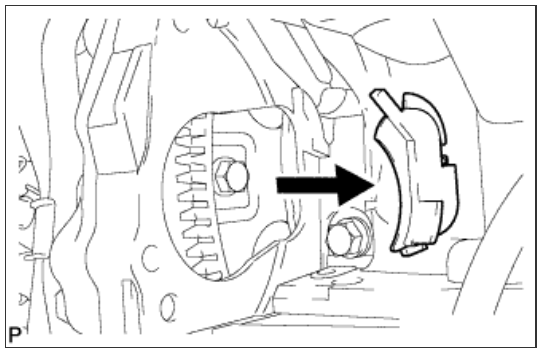


17. REMOVE STARTER ASSEMBLY

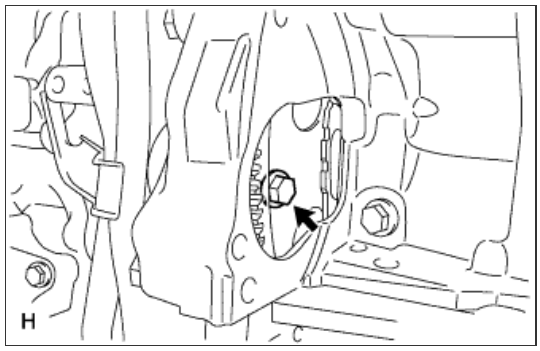
(Click here)

18. REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT

a. Remove the flywheel housing side cover.



b. Turn the crankshaft to gain access to the 6 bolts and remove the bolts while holding the crankshaft pulley setting bolt with a wrench.

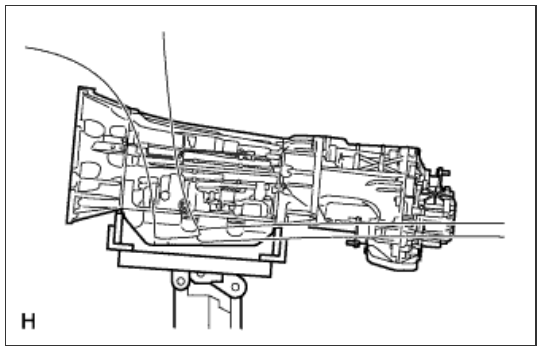


19. SUPPORT AUTOMATIC TRANSMISSION ASSEMBLY

a. Support the transmission with a transmission jack. Lift the transmission slightly from the crossmember.

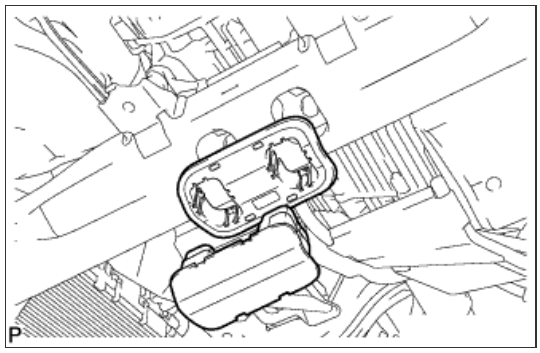
NOTICE:

Support the oil pan bolts to prevent damage to the oil pan gasket.

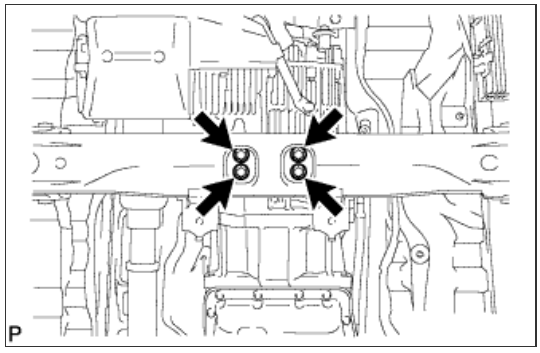


20. REMOVE NO. 2 FRAME CROSSMEMBER SUB-ASSEMBLY

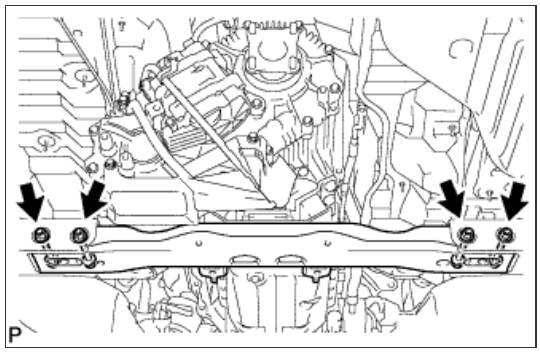
a. Remove the engine mounting hole cover.



b. Remove the 4 bolts of the rear engine mounting insulator.



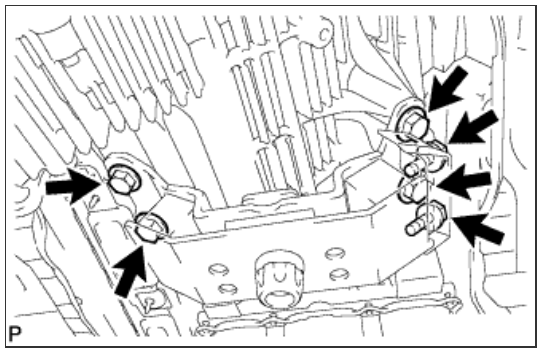
c. Remove the 4 nuts, 4 bolts and frame crossmember.



21. REMOVE REAR NO. 1 ENGINE MOUNTING INSULATOR

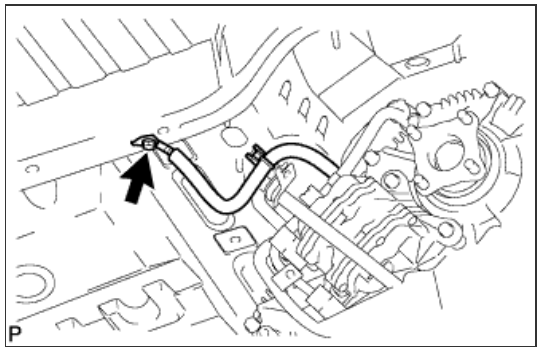
a. Remove the 2 bolts and engine mounting heat insulator.

b. Remove the 4 bolts and rear engine mounting insulator from the transmission.



22. DISCONNECT WIRE HARNESS AND CONNECTOR

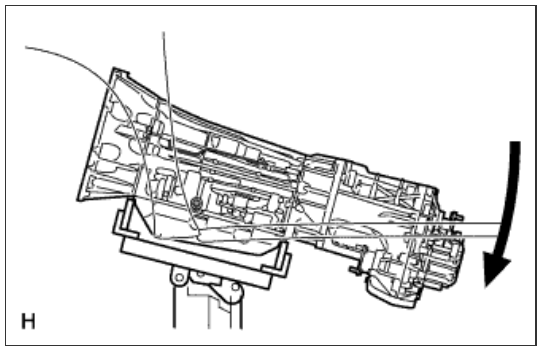
a. Remove the bolt and disconnect the ground cable.



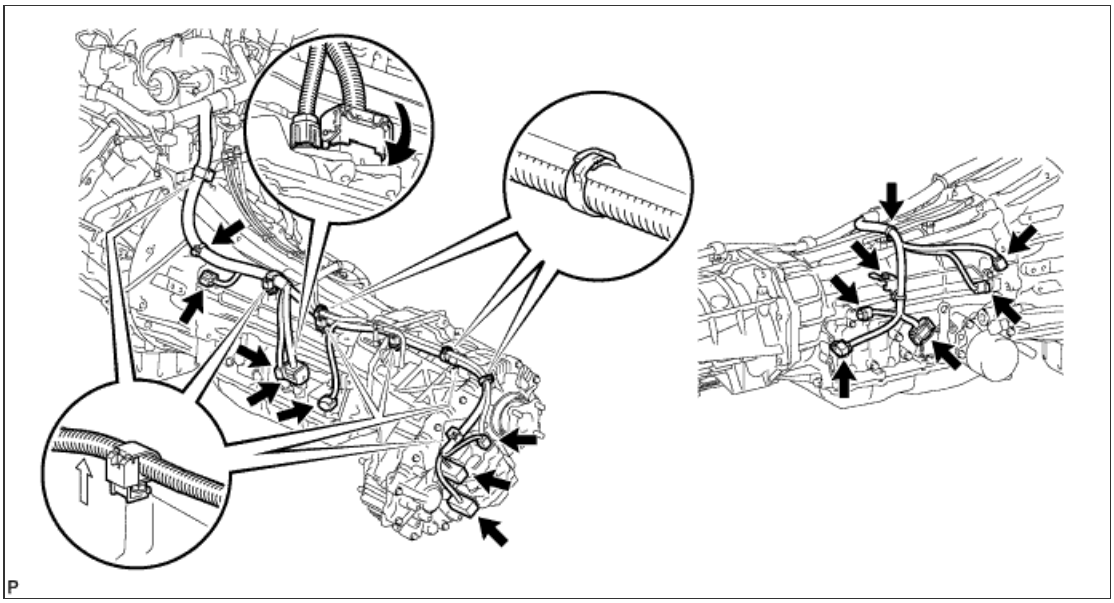
b. Tilt the transmission downward.

NOTICE:

- **Support the oil pan bolts to prevent damage to the oil pan gasket.**
- **Make sure the cooling fan does not contact the fan shroud.**



c. Disconnect the park/neutral position switch connector, 2 transmission wire connectors, 2 speed sensor connectors and 3 transfer control side connectors.



HINT:

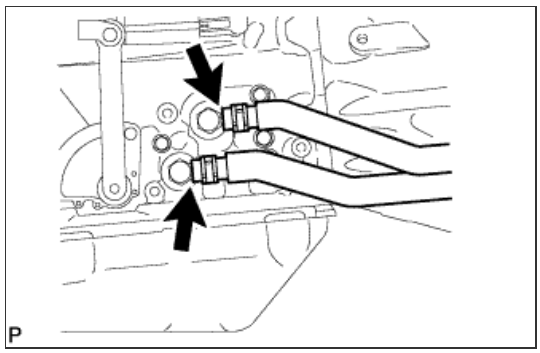
Detach the claw, press down the lever, and then disconnect the transmission wire connector.

d. Disconnect the 4 connector clamps and 6 harness clamps.

e. Remove the bolt and disconnect the wire harness.

23. DISCONNECT TRANSMISSION OIL COOLER HOSE

a. Disconnect the 2 transmission oil cooler hoses from the oil cooler tube union.

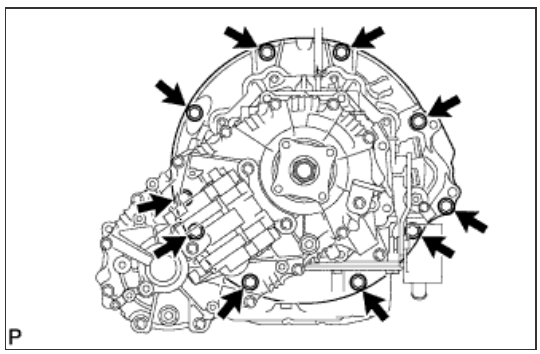


24. REMOVE AUTOMATIC TRANSMISSION ASSEMBLY

a. Remove the 10 bolts and transmission.

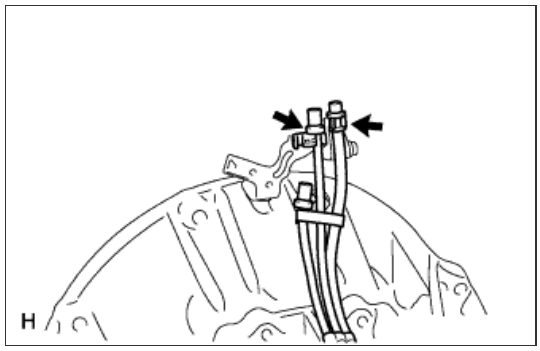
NOTICE:

Do not use excess force to pry off the transmission assembly.

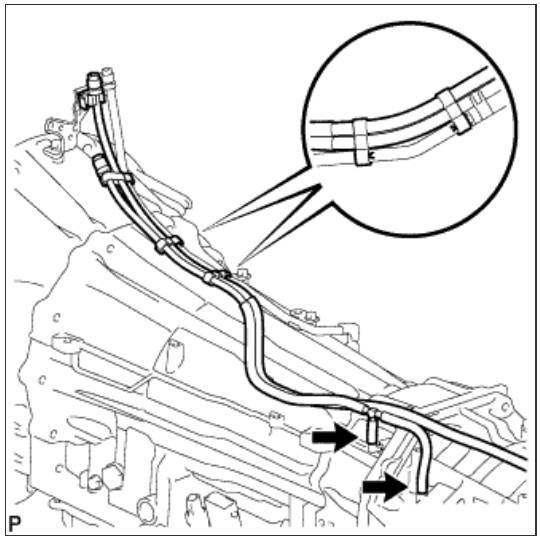


25. DISCONNECT BREATHER PLUG HOSE

a. Disconnect the 2 breather plug hoses from the harness clamp bracket.



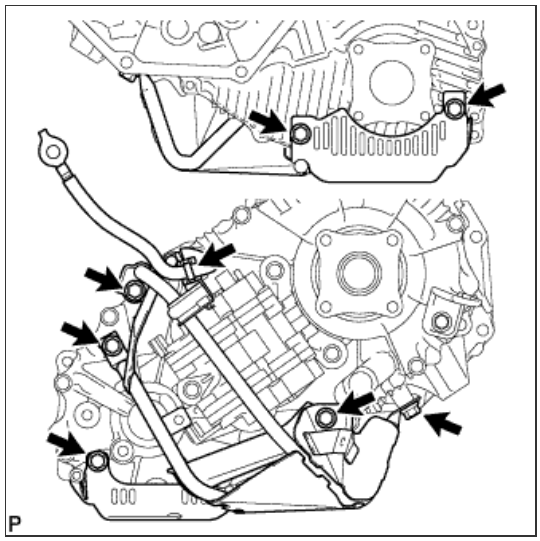
b. Detach the 3 breather hose clamps from the automatic transmission breather tube.



26. REMOVE TRANSFER CASE LOWER PROTECTOR

a. Disconnect the clamp of the ground cable from the transfer case lower protector.

b. Remove the 7 bolts and transfer case lower protector.



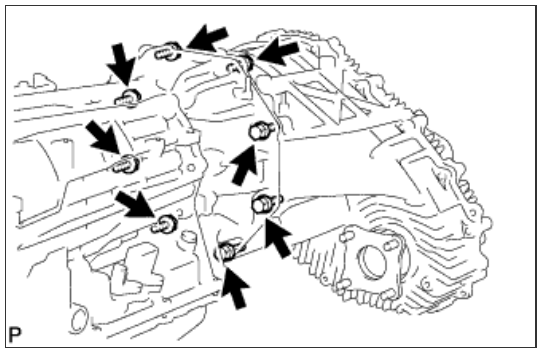
27. REMOVE TRANSFER ASSEMBLY

a. Remove the 8 transfer adaptor rear mounting bolts.

b. Pull the transfer straight up and remove it from the transmission.

NOTICE:

Take care not to damage the adaptor oil seal with the transfer input shaft spline.



28. REMOVE HARNESS CLAMP BRACKET

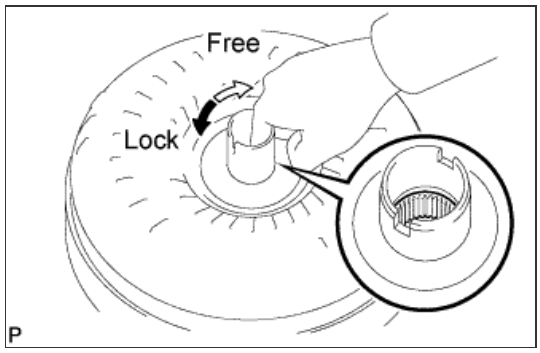
a. Remove the 5 bolts and 5 brackets.

29. REMOVE TORQUE CONVERTER ASSEMBLY

30. INSPECT TORQUE CONVERTER ASSEMBLY

a. Inspect the 1-way clutch.

i. Press on the serrations of the starter with a finger and rotate it. Check that it rotates smoothly when turned clockwise and locks when turned counterclockwise.
If necessary, clean the converter and recheck the 1-way clutch.
Replace the converter if the 1-way clutch still fails the check.



b. Determine the condition of the torque converter clutch.

i. Check that the following conditions are met:

- During the stall test or when the shift lever is in N, metallic sounds are not emitted from the torque converter clutch.
- The 1-way clutch turns in one direction and locks in the other direction.
- The amount of powder in the ATF is not more than the sample shown in the illustration.

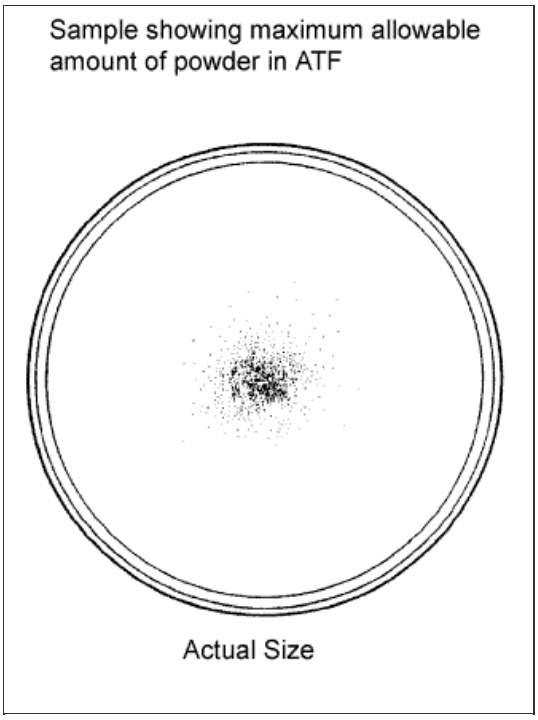
If the results are not as specified, replace the torque converter clutch assembly.

HINT:

The sample illustration shows approximately 0.25 liters (0.26 US qts., 0.22 Imp. qts.) of ATF taken from a removed torque converter clutch.

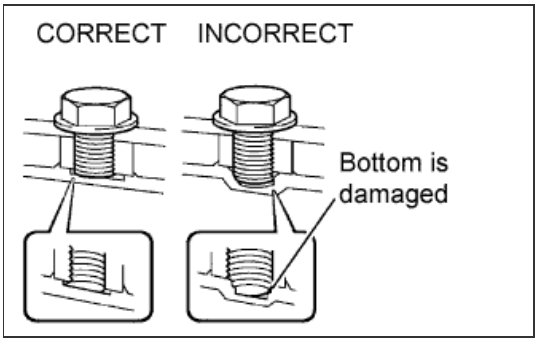
c. Replace the ATF in the torque converter clutch.

i. If the ATF is discolored and/or has a foul odor, stir the ATF in the torque converter clutch thoroughly and drain the ATF with the torque converter facing upward.



d. Prevent deformation of the torque converter clutch and damage to the oil pump gear.

- **i.** When any marks due to interference are found on the end of the bolt for the torque converter clutch and on the bottom of the bolt hole, replace the bolt and torque converter clutch.
- **ii.** All of the bolts should be the same length.
- **iii.** Make sure no spring washers are missing.

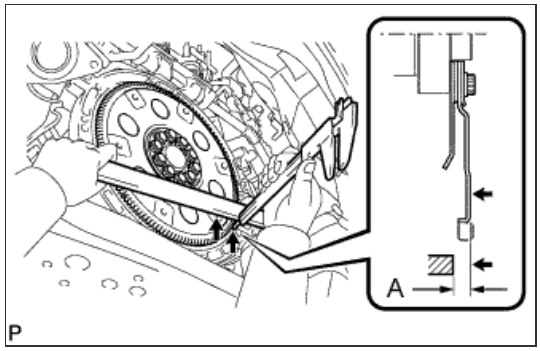


for Preparation Click here

1. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

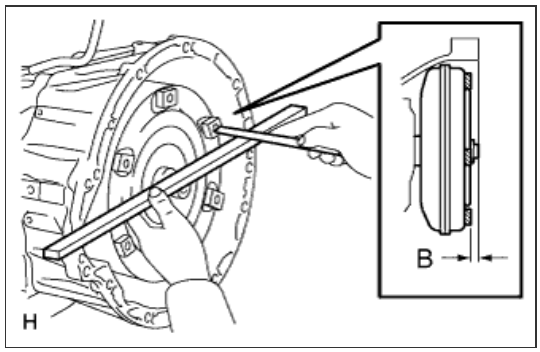
a. Using a vernier caliper and straightedge, measure dimension A between the transmission and the end surface of the drive plate.

b. Install the torque converter to the transmission housing.



c. Using a vernier caliper and straightedge, measure dimension B shown in the illustration and check that B is more than A measured in the first step.

Standard distance:
B = A + 1.00 mm (0.0394 in.) or more



2. INSTALL WIRE HARNESS CLAMP BRACKET

a. Install the front bracket LH with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

b. Install the rear bracket LH with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

c. Install the rear bracket RH with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

d. Install the front bracket RH with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

e. Install the rear engine bracket with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

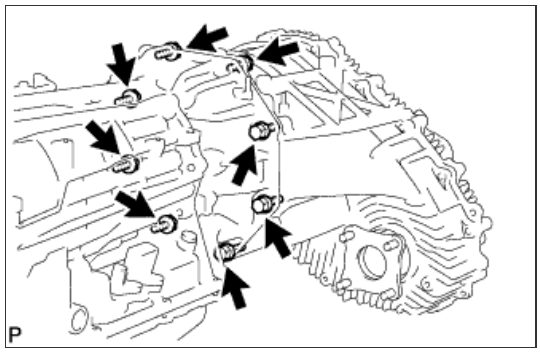
3. INSTALL TRANSFER ASSEMBLY

a. Install the transfer with the 8 bolts.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }

NOTICE:

Take care not to damage the adaptor oil seal with the transfer input shaft spline.



4. INSTALL TRANSFER CASE LOWER PROTECTOR

a. Install the transfer case lower protector with the 7 bolts.

Torque:
14 N*m{ 143 kgf*cm , 10 ft.*lbf }

b. Connect the clamp of grand cable to the transfer case lower protector.

5. CONNECT BREATHER PLUG HOSE

a. Attach the 3 breather hose clamps to connect the transfer breather hose to the automatic transmission breather tube.

b. Connect the 2 breather plug hoses to the harness clamp bracket.

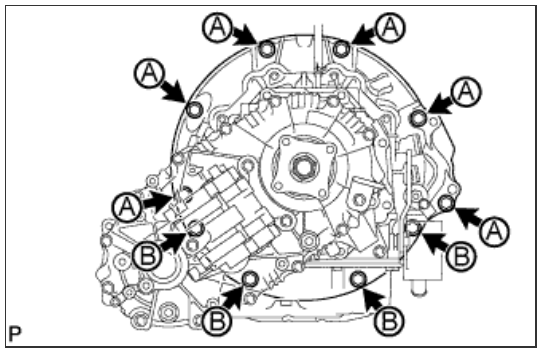
6. INSTALL AUTOMATIC TRANSMISSION ASSEMBLY

NOTICE:

Confirm that the 2 knock pins are attached to the transmission contact surface of the engine block before the installing the transmission.

a. Install the transmission with the 10 bolts.

Torque:
for 17 mm head bolt A:
71 N*m{ 724 kgf*cm , 52 ft.*lbf }
for 14 mm head bolt B:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }

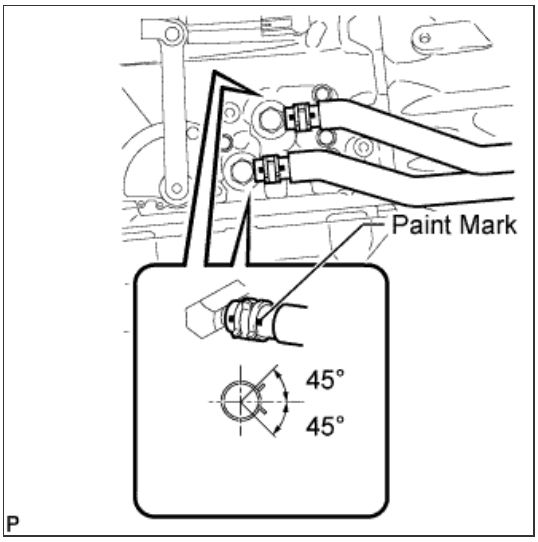


7. CONNECT TRANSMISSION OIL COOLER HOSE

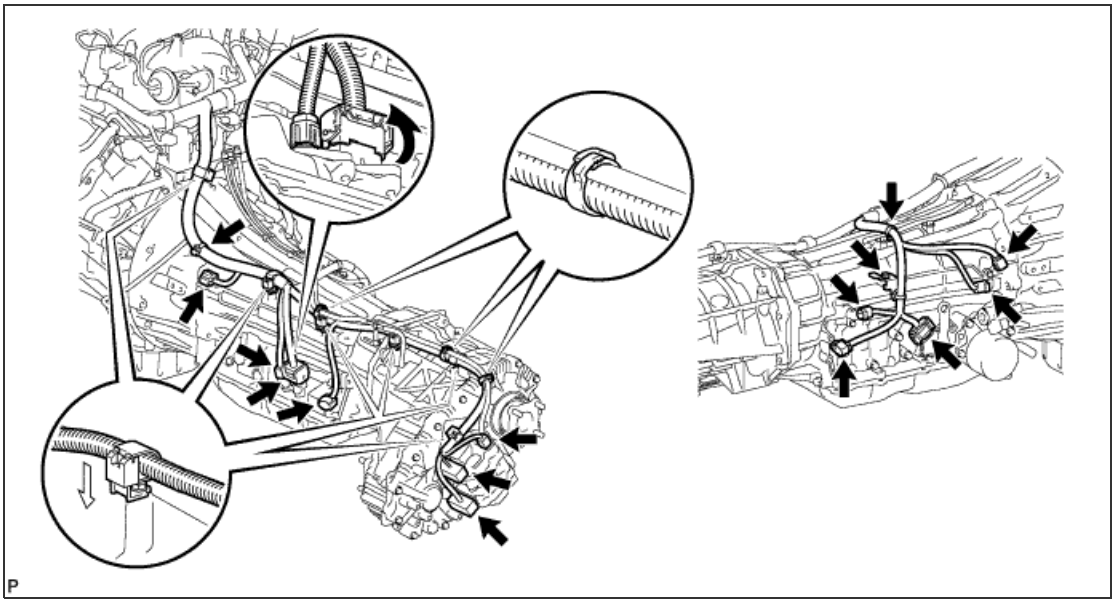
a. Connect the 2 transmission oil cooler hoses to the oil cooler tube union.

NOTICE:

- **Make sure the pinching portion of each clip is facing the direction shown in the illustration.**
- **Make sure the paint mark of each hose is facing outward.**



8. CONNECT WIRE HARNESS AND CONNECTOR



a. Connect the park/neutral position switch connector, 2 transmission wire connectors, 2 speed sensor connectors and 3 transfer control side connectors.

HINT:

Push up the lever until the claw of the transmission wire connector makes a connection sound.

b. Connect the 4 connector clamps and 6 harness clamps.

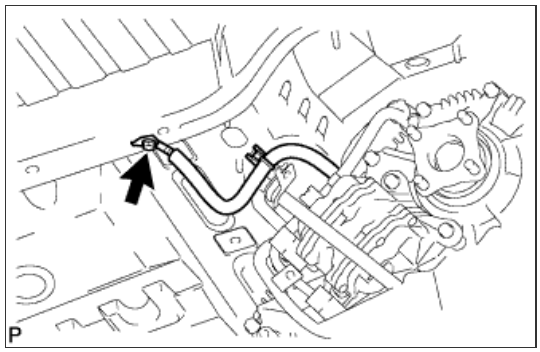
c. Connect the wire harness with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

d. Tilt up the automatic transmission.

e. Connect the ground cable with the bolt.

Torque:
8.4 N*m{ 86 kgf*cm , 74 in.*lbf }



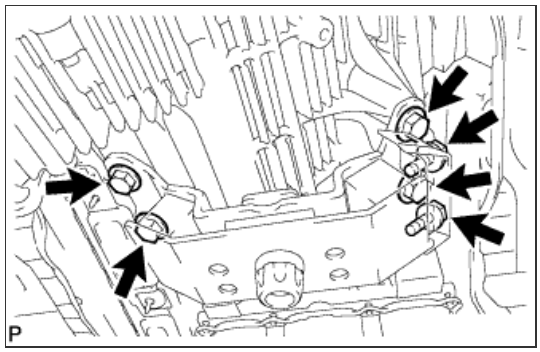
9. INSTALL REAR NO. 1 ENGINE MOUNTING INSULATOR

a. Install the rear engine mounting insulator to the transmission with the 4 bolts.

Torque:
59 N*m{ 602 kgf*cm , 44 ft.*lbf }

b. Install the engine mounting heat insulator with the 2 bolts.

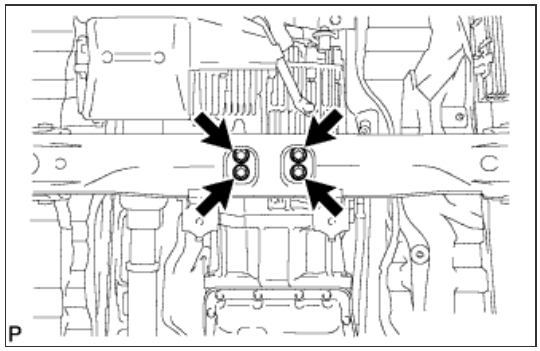
Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



10. INSTALL NO. 2 FRAME CROSSMEMBER SUB-ASSEMBLY

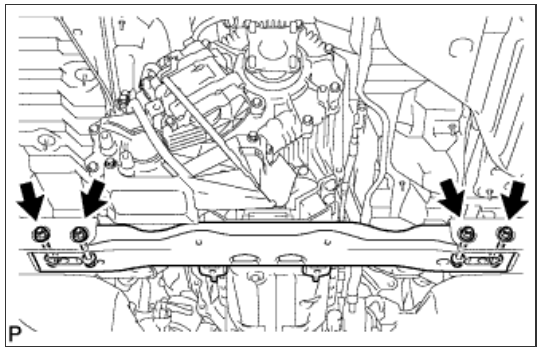
a. Install the frame crossmember to the rear engine mounting insulator with the 4 bolts.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }

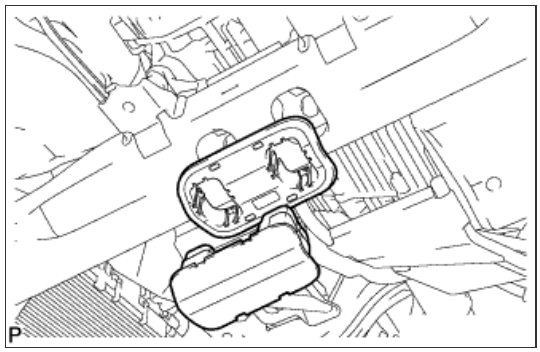


b. Install the frame crossmember to the frame with the 4 bolts and 4 nuts.

Torque:
110 N*m{ 1122 kgf*cm , 81 ft.*lbf }



c. Install the engine mounting hole cover.



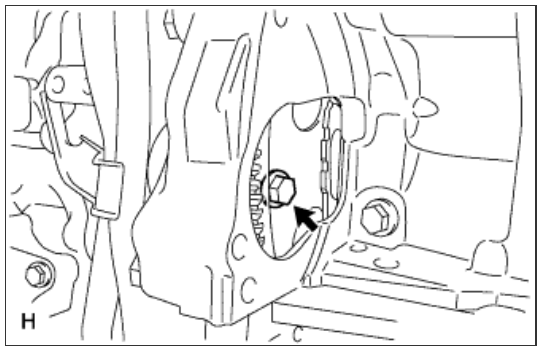
11. INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT

a. Turn the crankshaft to gain access to the installation locations of the 6 bolts and install the bolts while holding the crankshaft pulley set bolt with a wrench.

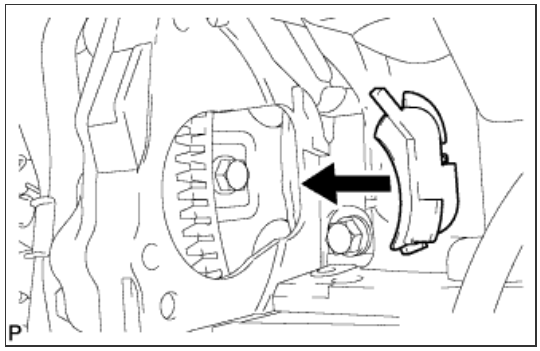
Torque:
53 N*m{ 535 kgf*cm , 39 ft.*lbf }

NOTICE:

First install the black colored bolt and then the remaining 5 bolts.



b. Install the flywheel housing side cover.



12. INSTALL STARTER ASSEMBLY

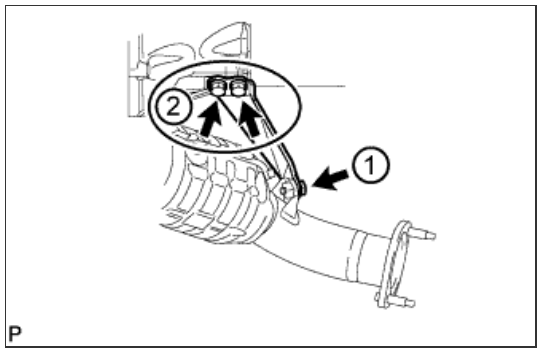
(Click here)

13. INSTALL NO. 2 MANIFOLD STAY

a. Temporarily install the manifold stay with the 3 bolts.

b. Tighten the 3 bolts in the sequence shown in the illustration.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }

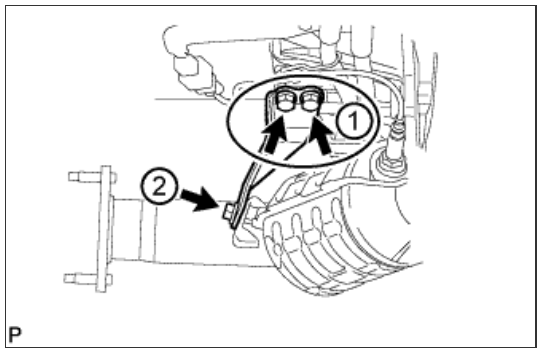


14. INSTALL MANIFOLD STAY

a. Temporarily install the manifold stay with the 3 bolts.

b. Tighten the 3 bolts in the sequence shown in the illustration.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }



15. INSTALL EXHAUST PIPE

(Click here)

16. INSTALL PROPELLER SHAFT ASSEMBLY

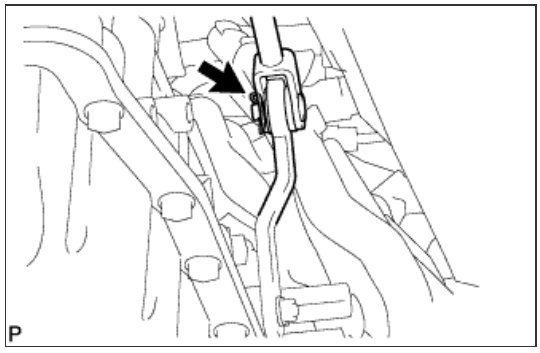
(Click here)

17. INSTALL FRONT PROPELLER SHAFT ASSEMBLY

(Click here)

18. CONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Connect the gear shifting rod to the transmission control shaft lever RH with the pin and a new clip.



19. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

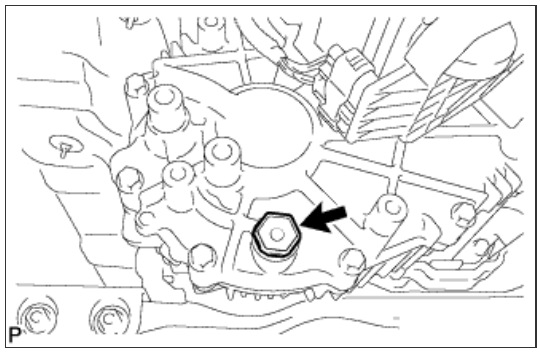
20. ADD AUTOMATIC TRANSMISSION FLUID

(Click here)

21. ADD TRANSFER OIL

a. Install a new gasket to the drain plug and then install the plug.

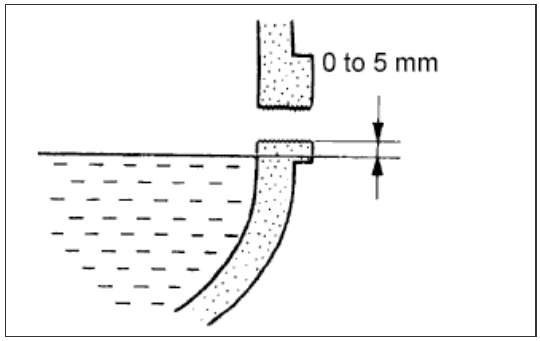
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



b. Add oil so that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.

NOTICE:

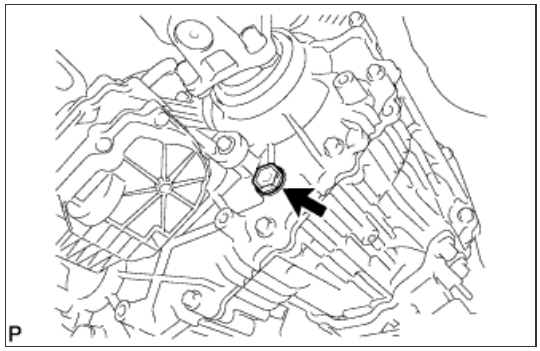
- **Add oil slowly.**
- **Add oil a little at a time, waiting several minutes between each addition of oil.**



c. Wait approximately 5 minutes and check that the oil level has not changed.

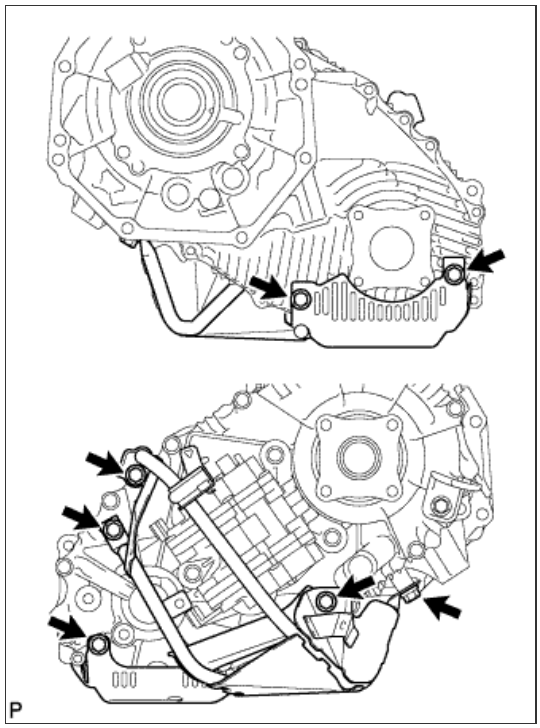
d. Install a new gasket to the filler plug and then install the plug.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



e. Install the lower transfer case protector with the 7 bolts.

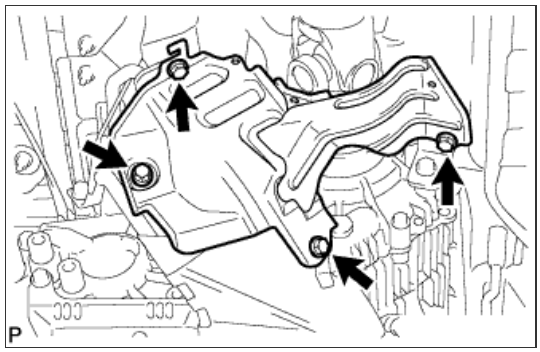
Torque:
14 N*m{ 139 kgf*cm , 10 ft.*lbf }



f. Install the transfer heat insulator with the 4 bolts.

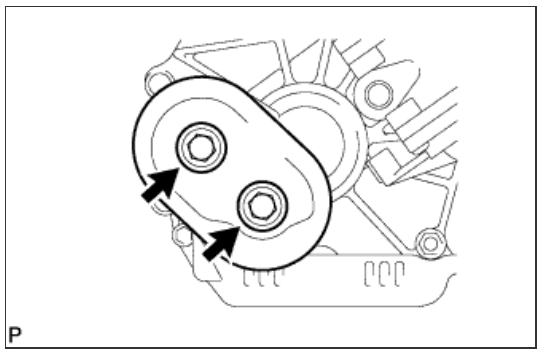
Torque:

30 N*m{ 306 kgf*cm , 22 ft.*lbf }



g. Install the transfer dynamic damper with the 2 bolts.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



22. ADD ENGINE COOLANT

a. Add engine coolant.

Standard capacity:
16.5 liters (17.4 US qts, 14.5 Imp. qts)

NOTICE:

Do not substitute plain water for engine coolant.

HINT:

- **TOYOTA vehicles are filled with TOYOTA SLLC at the factory. In order to avoid damage to the engine cooling system and other technical problems, only use TOYOTA SLLC or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).**
- **Press the No. 1 and No. 2 radiator hoses several times by hand, and then check the coolant level. If the coolant level is low, add coolant.**

b. Slowly pour coolant into the radiator reservoir until it reaches the F line.

c. Install the reservoir cap.

d. Install the radiator cap.*1

e. Start the engine and stop it immediately.*2

f. Allow approximately 10 seconds to pass. Then remove the radiator cap and check the coolant level. If the coolant level has decreased, add coolant.*3

g. Repeat steps *1, *2 and *3 until the coolant level does not decrease.

HINT:

Be sure to perform this step while the engine is cold, as air in the No. 1 radiator hose will flow into the radiator if the engine is warmed up and the thermostat opens.

h. Install the radiator cap.*4

i. Set the air conditioning as follows.*5

Item	Condition
Fan speed	Any setting except off
Temperature	Toward WARM
Air conditioning switch	Off

j. Start the engine, warm it up until the thermostat opens, and then continue to run the engine for several minutes to circulate the coolant.*6

CAUTION:

- **Wear protective gloves. Hot areas on the parts may injure your hands.**
- **Be careful of the fan.**
- **Be careful as the engine, radiator and radiator hoses are hot and can cause burns.**

NOTICE:

- **Immediately after starting the engine, if the radiator reservoir does not have any coolant, perform the following: 1) stop the engine, 2) wait until the coolant has cooled down, and 3) add coolant until the coolant is filled to the F line.**
- **Do not start the engine when there is no coolant in the radiator reservoir.**
- **Pay attention to the needle of the engine coolant temperature receiver gauge. Make sure that the needle does not show an abnormally high temperature.**
- **If there is not enough coolant, the engine may burn out or overheat.**

HINT:

- **Press the No. 1 and No. 2 radiator hoses several times by hand to bleed air while warming up the engine.**
- **The thermostat opening timing can be confirmed by pressing the No. 2 radiator hose by hand and checking when the engine coolant starts to flow inside the hose.**

k. Stop the engine, wait until the engine coolant cools down to ambient temperature. Then remove the radiator cap and check the coolant level.*7

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

l. If the coolant level has decreased, add coolant and warm up the engine until the thermostat opens.*8

m. If the coolant level has not decreased, check that the coolant level in the radiator reservoir is at the F line.
If the coolant level is below the F line, repeat steps *4 through *8.
If the coolant level is above the F line, drain coolant until the coolant level reaches the F line.

23. INSPECT SHIFT LEVER POSITION

a. When moving the shift lever from P to R with the engine switch on (IG) and the brake pedal depressed, make sure that it moves smoothly and correctly into position.

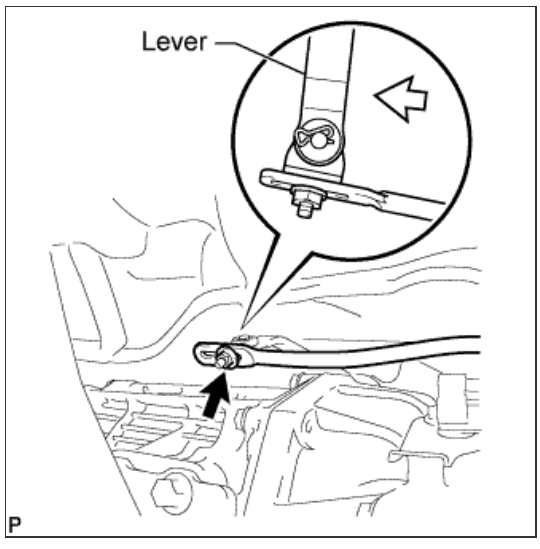
b. Check that the shift lever does not stop when moving the shift lever from R to P, and check that the shift lever does not stick when moving the shift lever from D to S.

c. Start the engine and make sure that the vehicle moves forward after moving the shift lever from N to D and moves rearward after moving the shift lever to R.
If there are problems during the above inspections, perform the adjustment using the following procedures.

i. Move the shift lever to N

ii. Loosen the nut of the floor shift gear shifting rod. Then, with the lever of the floor shift assembly lightly pushed towards the rear of the vehicle, tighten the nut.

Torque:
13 N*m{ 133 kgf*cm , 10 ft.*lbf }



24. INSPECT OIL LEAK

25. INSPECT FOR ENGINE COOLANT LEAK

CAUTION:

To avoid being burned, do not remove the radiator reservoir cap while the engine and radiator are still hot. Thermal expansion may cause hot engine coolant and steam to blow out from the radiator.

a. Fill the radiator with engine coolant, and then attach a radiator cap tester.

b. Warm up the engine.

c. Using the radiator cap tester, increase the pressure inside the radiator to 123 kPa (1.3 kgf/cm ^{2}, 18 psi), and then check that the pressure does not drop.
If the pressure drops, check the hoses, radiator and engine water pump for leakage. If there are no signs or traces of external engine coolant leakage, check the heater core, cylinder block and head.

26. INSPECT FOR EXHAUST GAS LEAK

27. INSTALL OIL PAN PROTECTOR ASSEMBLY

a. Install the oil pan protector assembly with the 4 bolts.

Torque:
63 N*m{ 642 kgf*cm , 46 ft.*lbf }

28. INSTALL NO. 2 ENGINE UNDER COVER

a. Install the No. 2 engine under cover with the 2 bolts.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

29. INSTALL NO. 1 ENGINE UNDER COVER

a. Install the No. 1 engine under cover sub-assembly with the 10 bolts.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

30. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Push in the clip to install the front fender splash shield sub-assembly LH.

b. Install the 3 bolts and 2 screws.

31. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

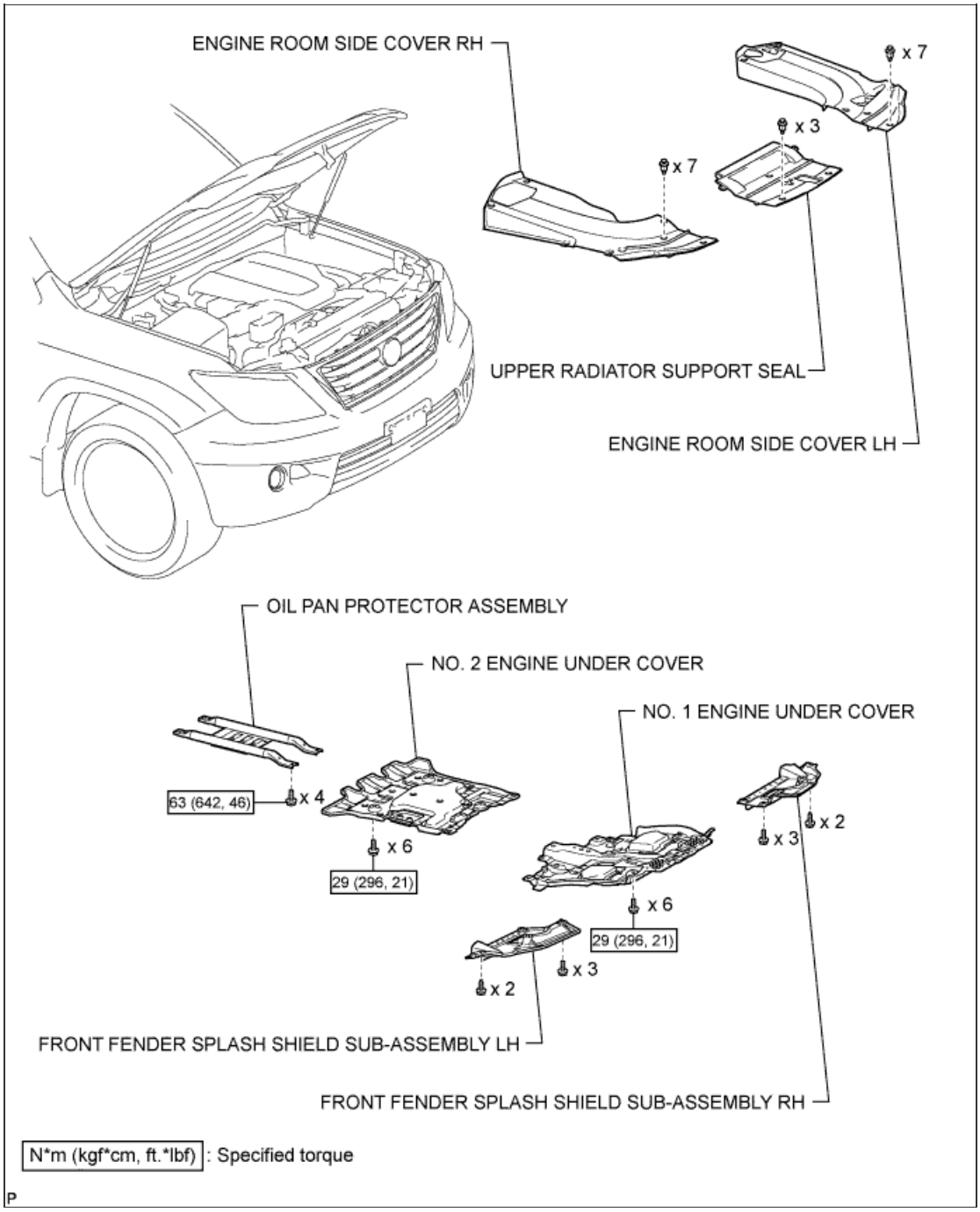
HINT:

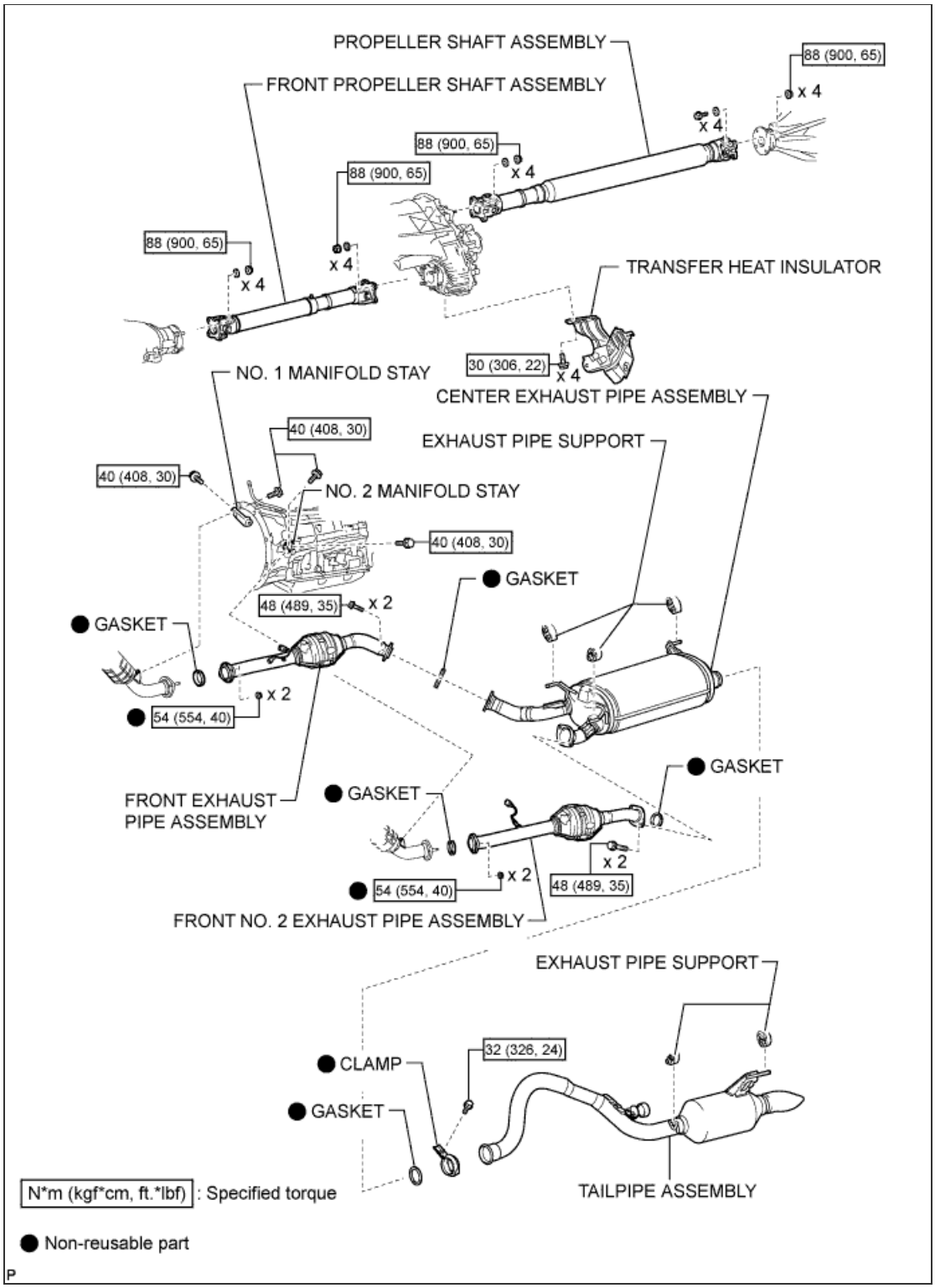
Use the same procedure described for the LH side.

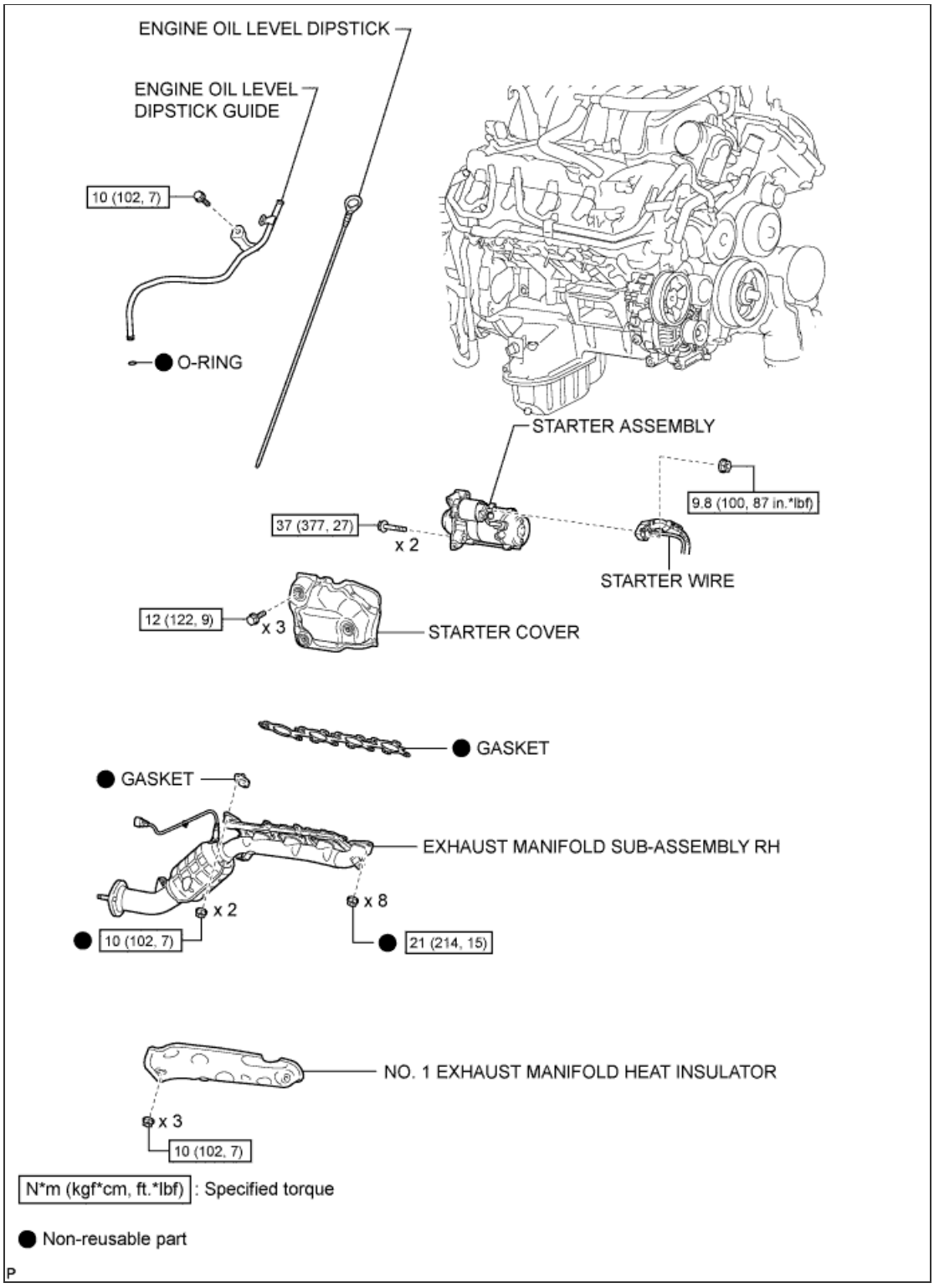
32. RESET MEMORY

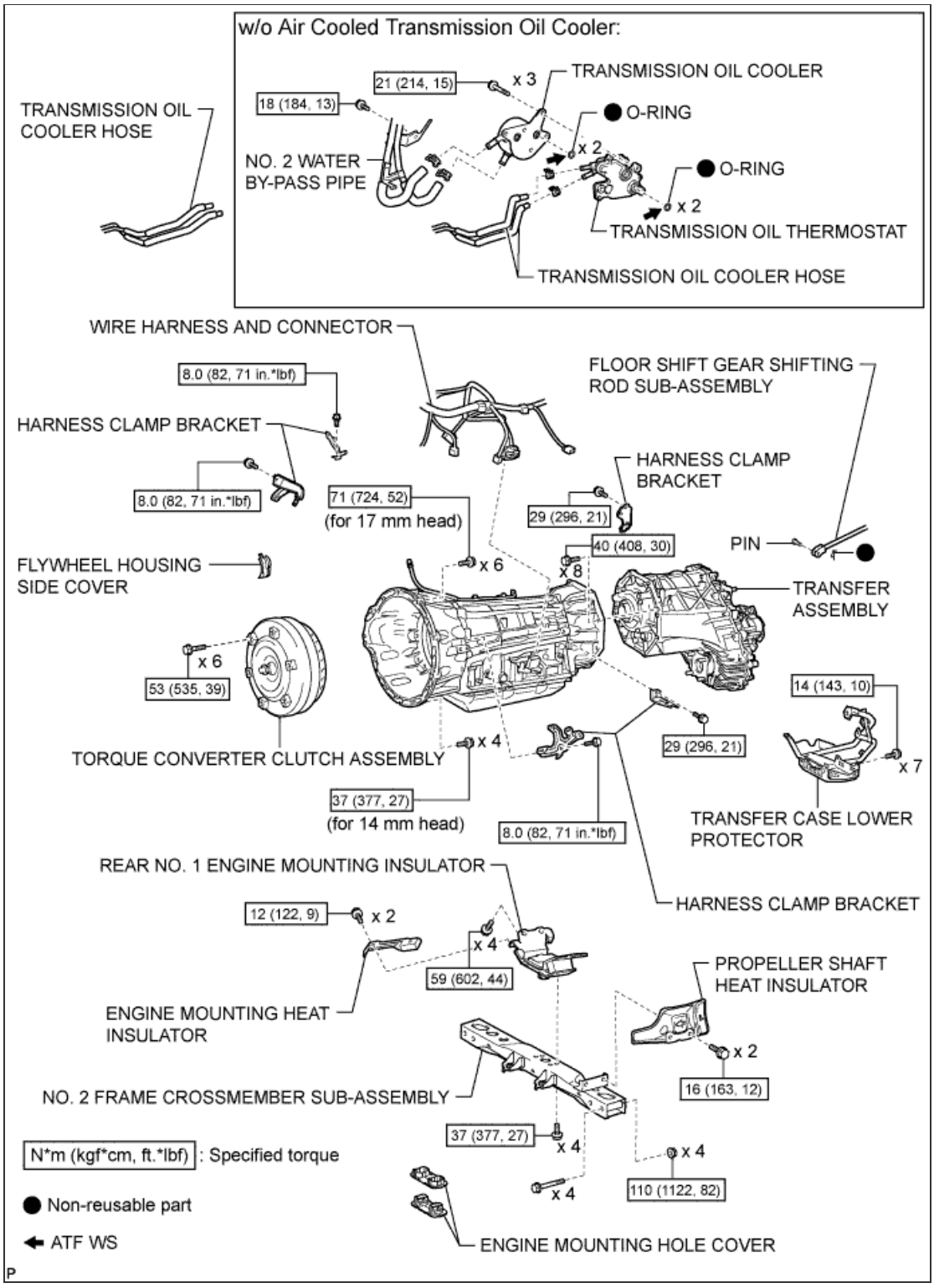
(Click here)

for Preparation Click here




PROPELLER SHAFT ASSEMBLY
FRONT PROPELLER SHAFT ASSEMBLY
88 (900, 65)
x 4
TRANSFER HEAT INSULATOR
30 (306, 22)
NO. 1 MANIFOLD STAY
CENTER EXHAUST PIPE ASSEMBLY
40 (408, 30)
EXHAUST PIPE SUPPORT
NO. 2 MANIFOLD STAY
GASKET
48 (489, 35)
x 2
54 (554, 40)
FRONT EXHAUST PIPE ASSEMBLY
FRONT NO. 2 EXHAUST PIPE ASSEMBLY
CLAMP
32 (326, 24)
TAILPIPE ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P


ENGINE OIL LEVEL DIPSTICK
ENGINE OIL LEVEL DIPSTICK GUIDE
10 (102, 7)
O-RING
STARTER ASSEMBLY
9.8 (100, 87 in.*lbf)
37 (377, 27)
x 2
STARTER WIRE
12 (122, 9)
x 3
STARTER COVER
GASKET
GASKET
EXHAUST MANIFOLD SUB-ASSEMBLY RH
x 2
x 8
10 (102, 7)
21 (214, 15)
NO. 1 EXHAUST MANIFOLD HEAT INSULATOR
x 3
10 (102, 7)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P


w/o Air Cooled Transmission Oil Cooler:
TRANSMISSION OIL COOLER HOSE
21 (214, 15)
x 3
TRANSMISSION OIL COOLER
18 (184, 13)
O-RING
NO. 2 WATER BY-PASS PIPE
x 2
O-RING
x 2
TRANSMISSION OIL THERMOSTAT
TRANSMISSION OIL COOLER HOSE
WIRE HARNESS AND CONNECTOR
8.0 (82, 71 in.*lbf)
FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY
HARNESS CLAMP BRACKET
HARNESS CLAMP BRACKET
8.0 (82, 71 in.*lbf)
71 (724, 52)
(for 17 mm head)
29 (296, 21)
40 (408, 30)
PIN
FLYWHEEL HOUSING SIDE COVER
x 6
x 8
TRANSFER ASSEMBLY
x 6
53 (535, 39)
14 (143, 10)
x 4
29 (296, 21)
x 7
TORQUE CONVERTER CLUTCH ASSEMBLY
37 (377, 27)
(for 14 mm head)
8.0 (82, 71 in.*lbf)
TRANSFER CASE LOWER PROTECTOR
REAR NO. 1 ENGINE MOUNTING INSULATOR
HARNESS CLAMP BRACKET
12 (122, 9)
x 2
x 4
59 (602, 44)
PROPELLER SHAFT HEAT INSULATOR
ENGINE MOUNTING HEAT INSULATOR
x 2
16 (163, 12)
NO. 2 FRAME CROSSMEMBER SUB-ASSEMBLY
37 (377, 27)
x 4
x 4
x 4
110 (1122, 82)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
ATF WS
ENGINE MOUNTING HOLE COVER
P

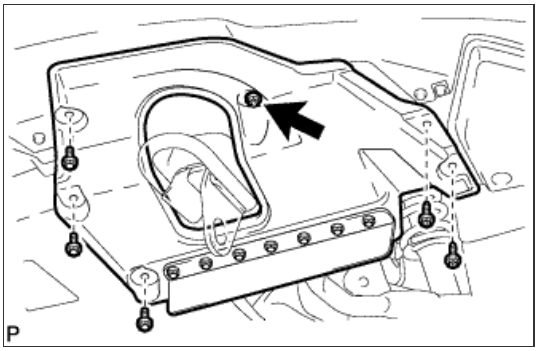
for Preparation Click here

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Remove the 3 bolts and 2 screws.

b. Turn the clip indicated by the arrow in the illustration to remove the fender splash shield.



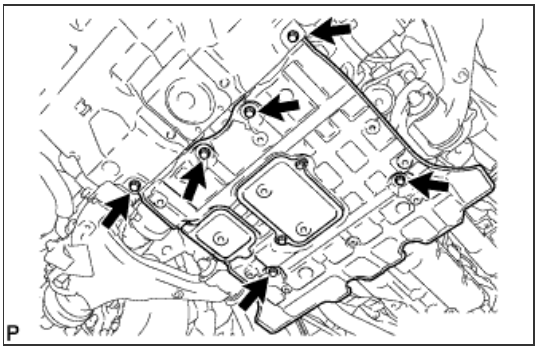
3. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

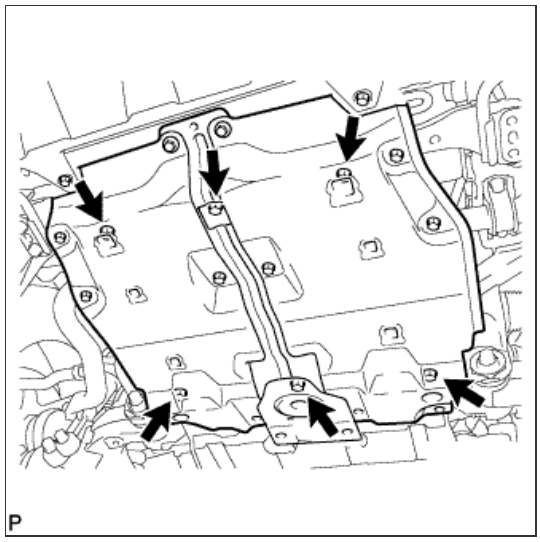
4. REMOVE NO. 2 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.



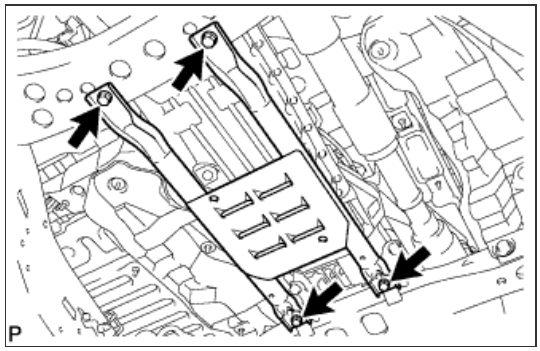
5. REMOVE NO. 1 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.



6. REMOVE OIL PAN PROTECTOR ASSEMBLY

a. Remove the 4 bolts and oil pan protector.



7. DRAIN AUTOMATIC TRANSMISSION FLUID

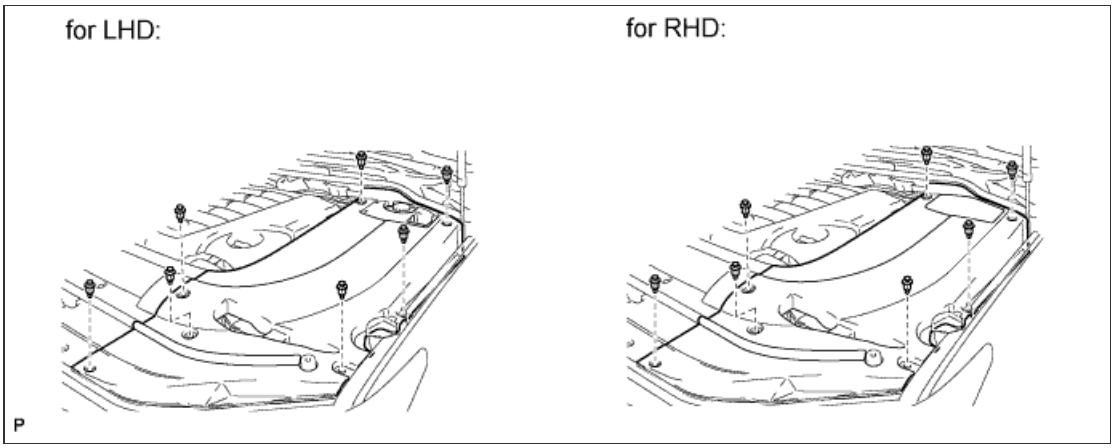
a. Remove the drain plug and gasket, and drain the ATF.

b. Install a new gasket and the drain plug.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }

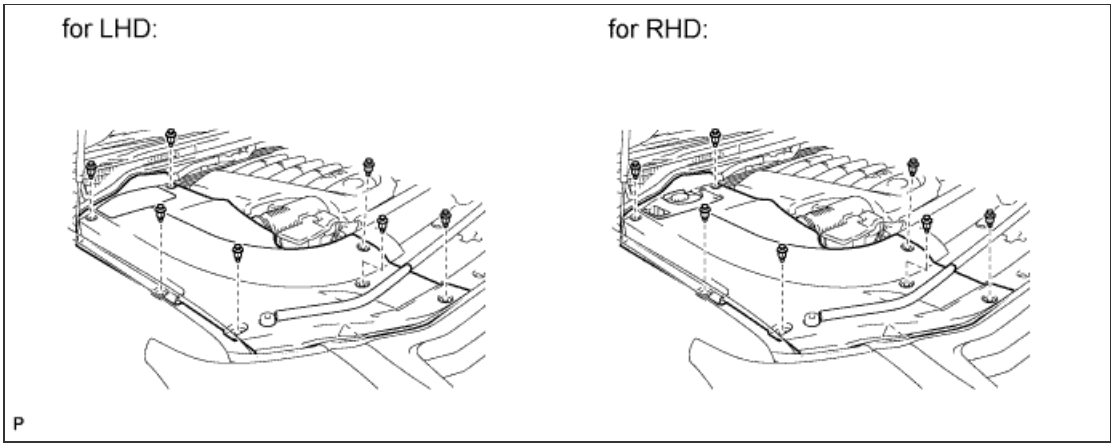
8. REMOVE ENGINE ROOM SIDE COVER LH

a. Remove the 7 clips and engine room side cover.



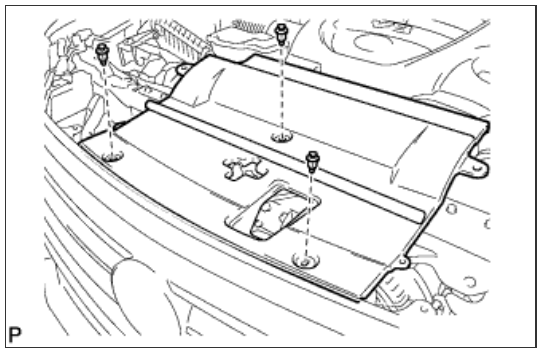
9. REMOVE ENGINE ROOM SIDE COVER RH

a. Remove the 7 clips and engine room side cover.



10. REMOVE UPPER RADIATOR SUPPORT SEAL

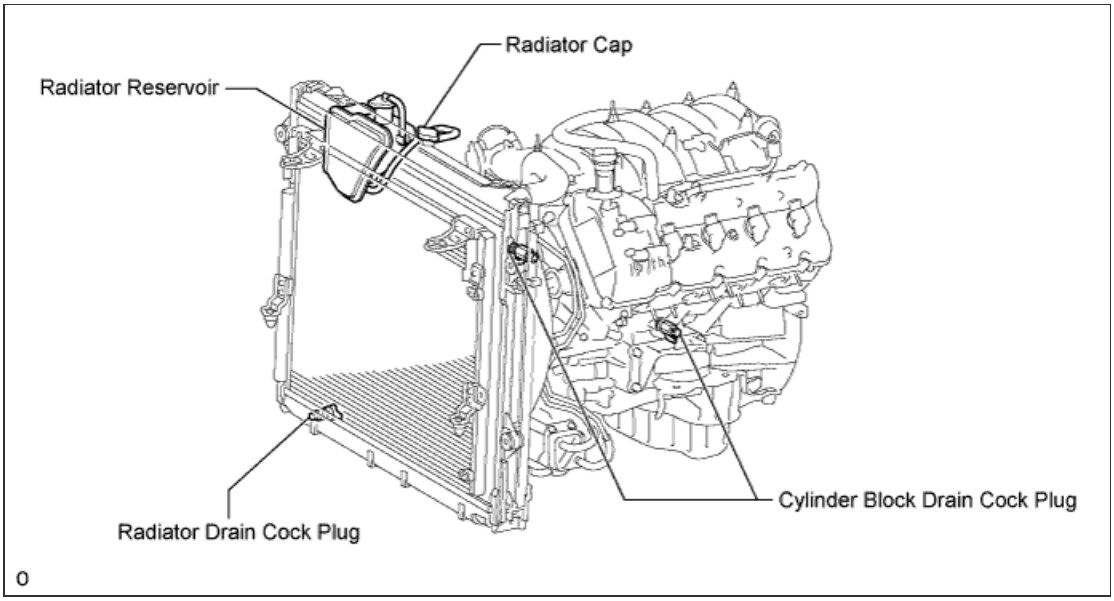
a. Remove the 3 clips and upper radiator support seal.



11. DRAIN ENGINE COOLANT

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.



a. Loosen the radiator drain cock plug.

HINT:

Collect the coolant in a container and dispose of it according to the regulations in your area.

b. Remove the radiator cap. Then drain the coolant from the radiator.

c. Loosen the 2 cylinder block drain cock plugs. Then drain the coolant from the engine.

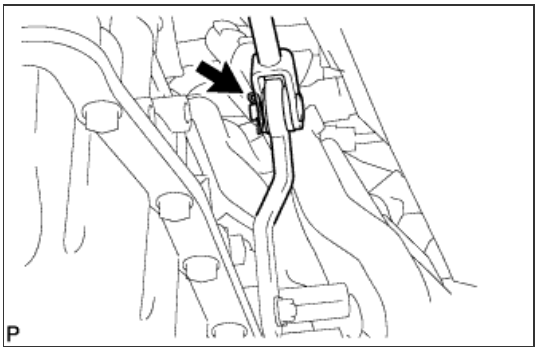
d. Tighten the 2 cylinder block drain cock plugs.

Torque:
13 N*m{ 130 kgf*cm , 10 ft.*lbf }

e. Tighten the radiator drain cock plug by hand.

12. DISCONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Remove the clip and pin, and disconnect the gear shifting rod from the transmission control shaft lever RH.



13. REMOVE FRONT PROPELLER SHAFT ASSEMBLY

a. Remove the front propeller shaft (Click here).

14. REMOVE PROPELLER SHAFT ASSEMBLY

a. Remove the propeller shaft (Click here).

15. REMOVE TAILPIPE ASSEMBLY

a. Remove the bolt, clamp and gasket.

b. Remove the tailpipe from the 2 exhaust pipe supports.

c. Remove the bolt and clamp, and then disconnect the tailpipe from the center exhaust pipe.

16. REMOVE CENTER EXHAUST PIPE ASSEMBLY

a. Remove the 4 bolts.

b. Remove the center exhaust pipe from the 3 exhaust pipe supports.

c. Remove the 2 gaskets from the front exhaust pipe and front No. 2 exhaust pipe.

17. REMOVE FRONT NO. 2 EXHAUST PIPE ASSEMBLY

a. Disconnect the heated oxygen sensor connector.

b. Remove the bolt and disconnect the wire harness clamp bracket of the oxygen sensor from the transmission.

c. Remove the 2 nuts, front No. 2 exhaust pipe and gasket from the exhaust manifold LH.

18. REMOVE FRONT EXHAUST PIPE ASSEMBLY

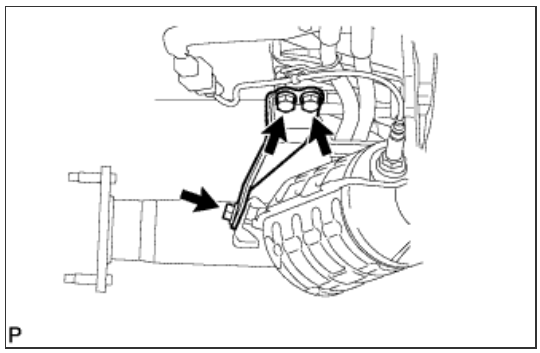
a. Disconnect the heated oxygen sensor connector.

b. Remove the bolt and disconnect the wire harness clamp bracket of the oxygen sensor from the transmission.

c. Remove the 2 nuts, front exhaust pipe and gasket from the exhaust manifold RH.

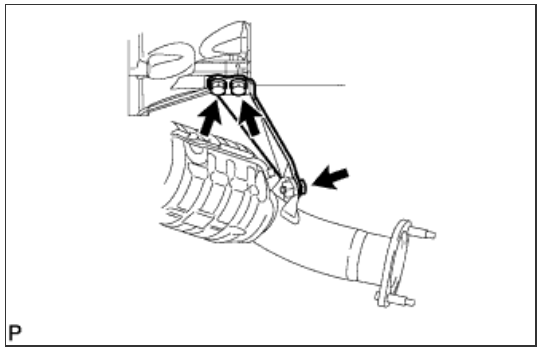
19. REMOVE NO. 1 MANIFOLD STAY

a. Remove the 3 bolts and manifold stay.



20. REMOVE NO. 2 MANIFOLD STAY

a. Remove the 3 bolts and manifold stay.

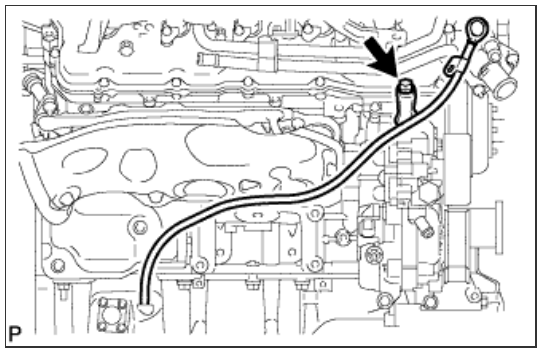


21. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE

a. Remove the dipstick.

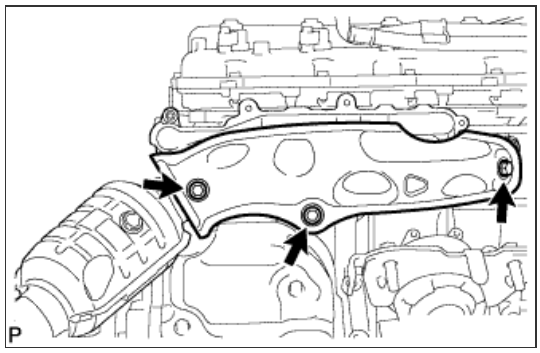
b. Remove the bolt and dipstick guide.

c. Remove the O-ring from the dipstick guide.



22. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

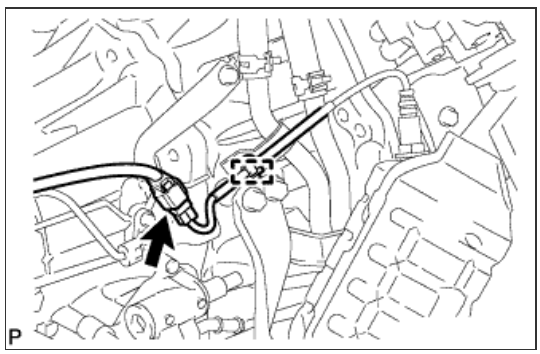
a. Remove the 3 bolts and heat insulator.



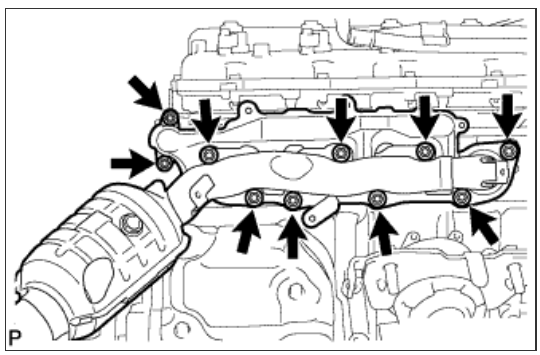
23. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY RH

a. Disconnect the connector.

b. Using a clip remover, detach the wire harness clamp.

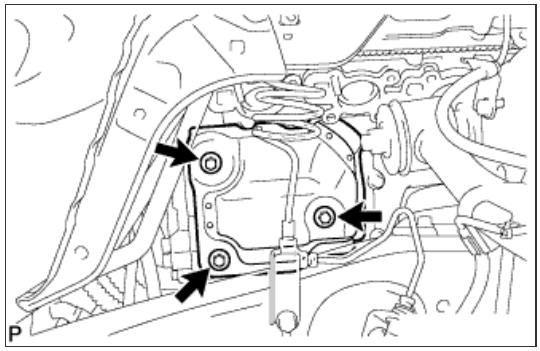


c. Remove the 10 nuts, exhaust manifold and 2 gaskets.



24. REMOVE STARTER COVER

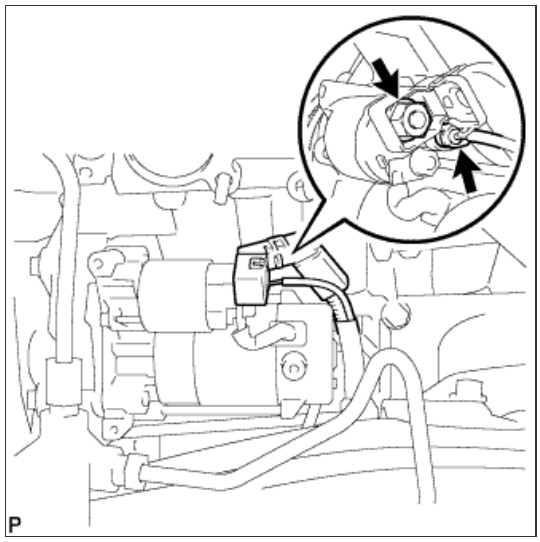
a. Remove the 3 bolts and starter cover.



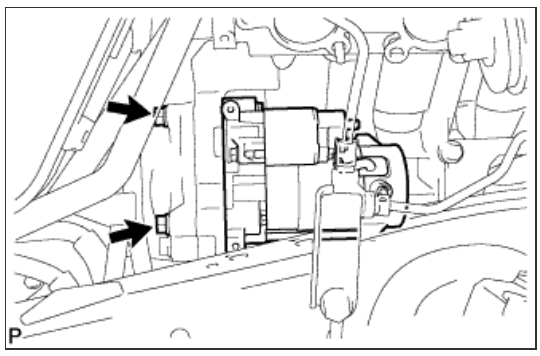
25. REMOVE STARTER ASSEMBLY

a. Disconnect the starter connector.

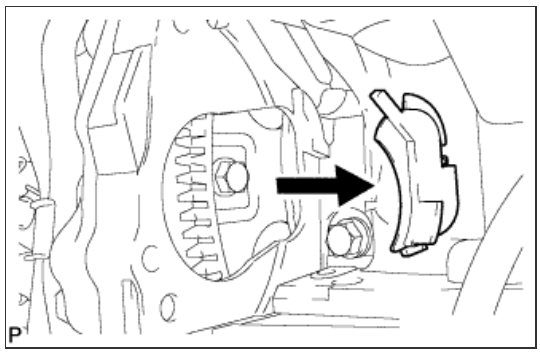
b. Remove the nut and disconnect the starter wire.



c. Remove the 2 bolts and starter.

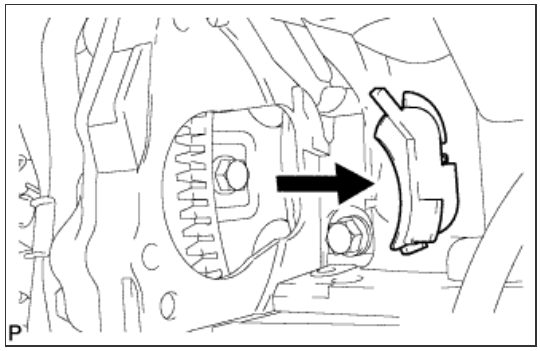


d. Remove the flywheel housing side cover.

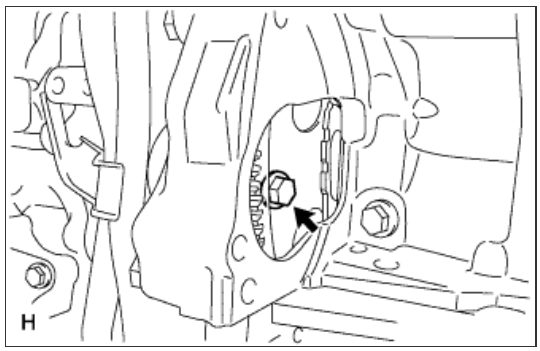


26. REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT

a. Remove the flywheel housing side cover.



b. Turn the crankshaft to gain access to the 6 bolts and remove the bolts while holding the crankshaft pulley setting bolt with a wrench.

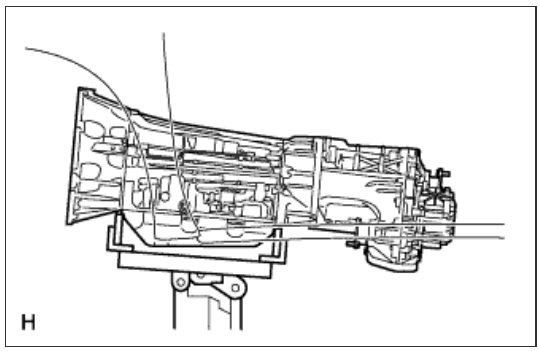


27. SUPPORT AUTOMATIC TRANSMISSION ASSEMBLY

a. Support the transmission with a transmission jack. Lift the transmission slightly from the crossmember.

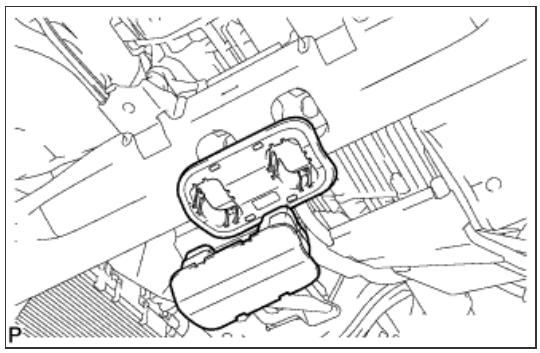
NOTICE:

Support the oil pan bolts to prevent damage to the oil pan gasket.

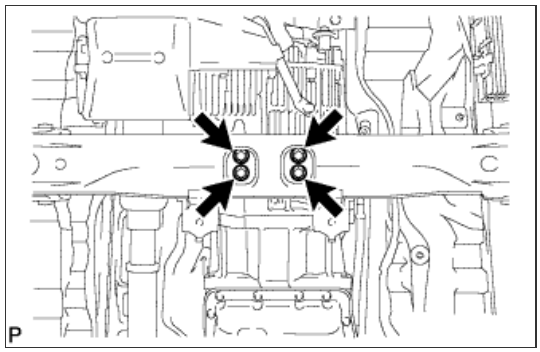


28. REMOVE NO. 2 FRAME CROSSMEMBER SUB-ASSEMBLY

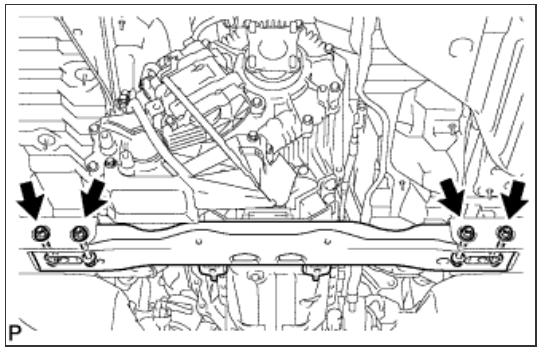
a. Remove the engine mounting hole cover.



b. Remove the 4 bolts of the rear engine mounting insulator.



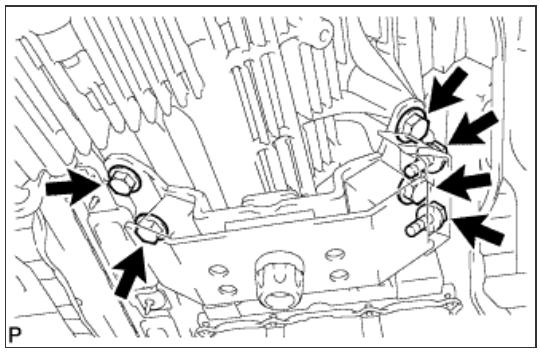
c. Remove the 4 nuts, 4 bolts and frame crossmember.



29. REMOVE REAR NO. 1 ENGINE MOUNTING INSULATOR

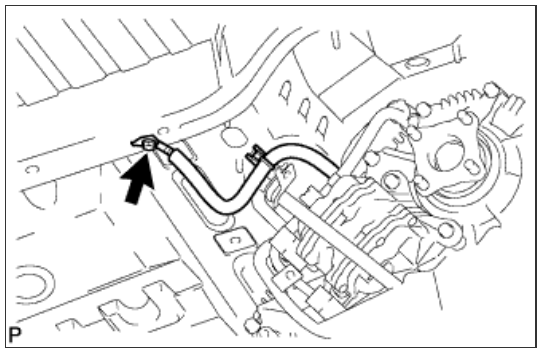
a. Remove the 2 bolts and engine mounting heat insulator.

b. Remove the 4 bolts and rear engine mounting insulator from the transmission.



30. DISCONNECT WIRE HARNESS AND CONNECTOR

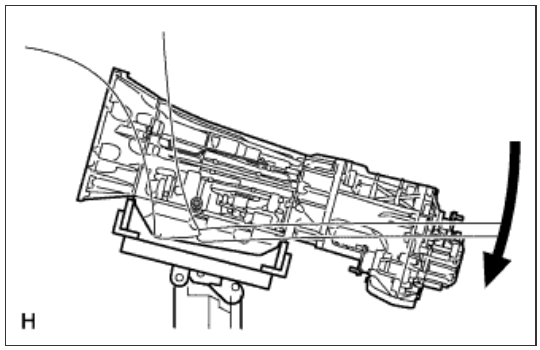
a. Remove the bolt and disconnect the ground cable.



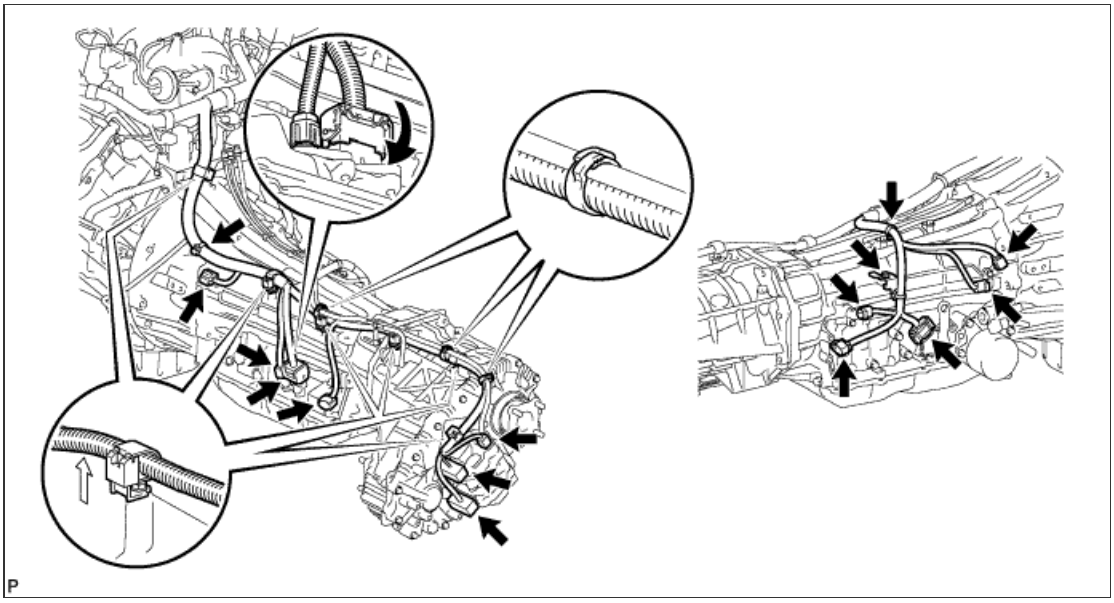
b. Tilt the transmission downward.

NOTICE:

- **Support the oil pan bolts to prevent damage to the oil pan gasket.**
- **Make sure the cooling fan does not contact the fan shroud.**



c. Disconnect the park/neutral position switch connector, 2 transmission wire connectors, 2 speed sensor connectors and 3 transfer control side connectors.



HINT:

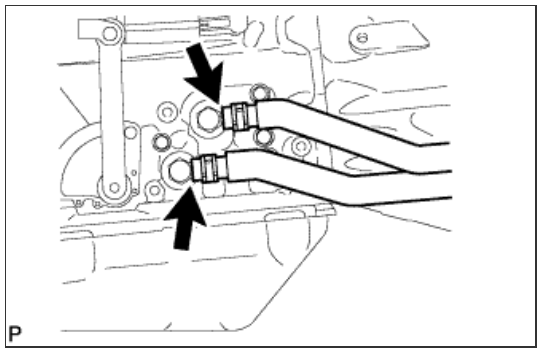
Detach the claw, press down the lever, and then disconnect the transmission wire connector.

d. Disconnect the 4 connector clamps and 6 harness clamps.

e. Remove the bolt and disconnect the wire harness.

31. DISCONNECT TRANSMISSION OIL COOLER HOSE (w/ Air Cooled Transmission Oil Cooler)

a. Disconnect the 2 transmission oil cooler hoses from the oil cooler tube union.

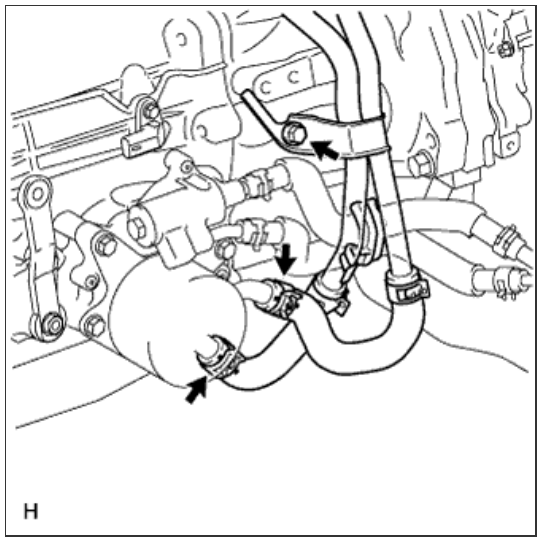


32. DISCONNECT NO. 2 WATER BY-PASS PIPE (w/o Air Cooled Transmission Oil Cooler)

a. Remove the bolt and disconnect the 2 water by-pass hoses from the transmission oil cooler. Then separate the by-pass pipe from the automatic transmission.

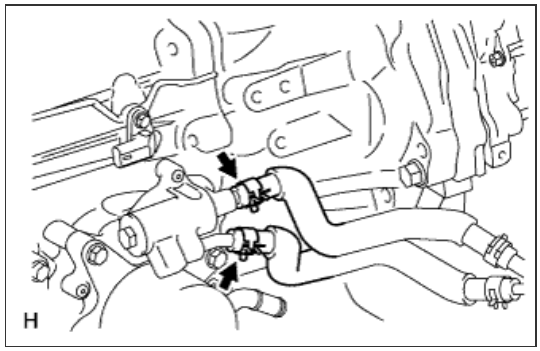
NOTICE:

Use a container to catch any coolant which flows out of the water by-pass hoses.



33. DISCONNECT TRANSMISSION OIL COOLER HOSE (w/o Air Cooled Transmission Oil Cooler)

a. Disconnect the 2 transmission oil cooler hoses from the transmission oil thermostat.

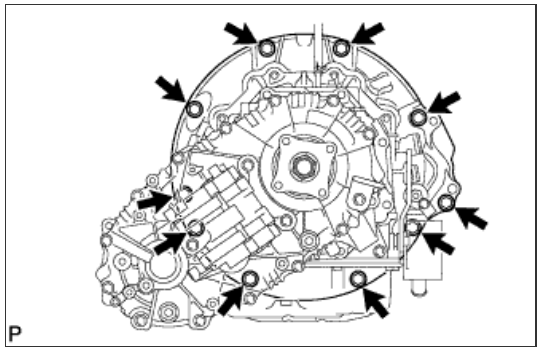


34. REMOVE AUTOMATIC TRANSMISSION ASSEMBLY

a. Remove the 10 bolts and transmission.

NOTICE:

Do not use excess force to pry off the transmission assembly.

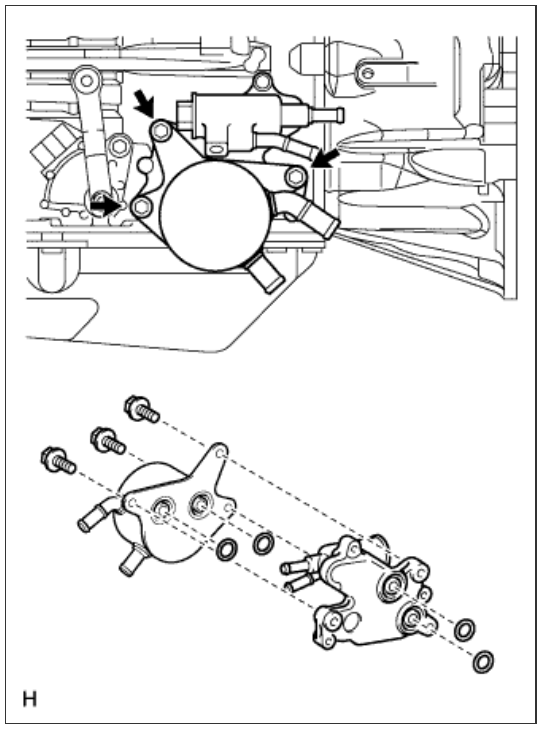


35. REMOVE TRANSMISSION OIL COOLER ASSEMBLY (w/o Air Cooled Transmission Oil Cooler)

a. Remove the 3 bolts and transmission oil cooler with transmission oil thermostat.

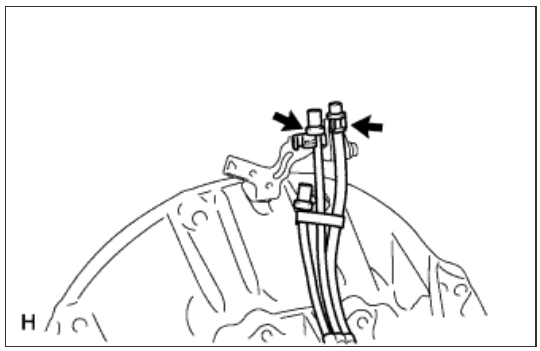
b. Separate the transmission oil cooler from the transmission oil thermostat.

c. Remove the 4 O-rings.



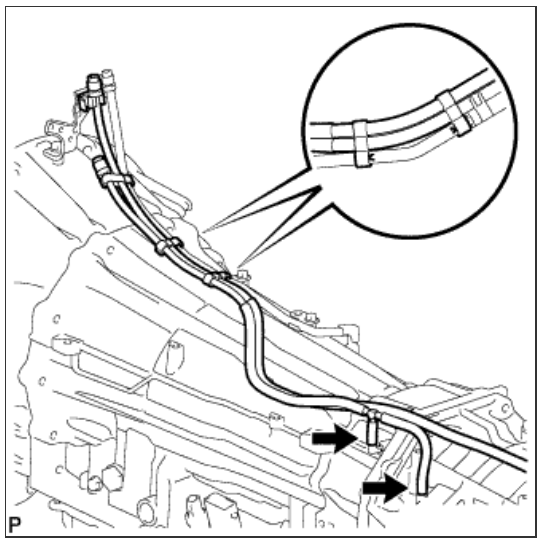
36. DISCONNECT BREATHER PLUG HOSE

a. Disconnect the 2 breather plug hoses from the harness clamp bracket.



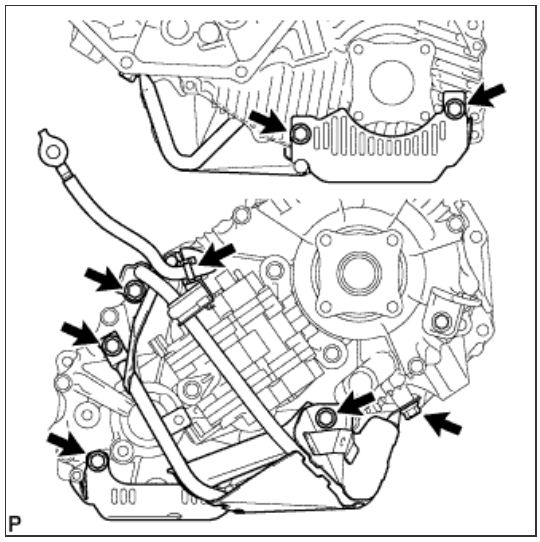
37. REMOVE TRANSFER ASSEMBLY

a. Detach the 3 breather hose clamps from the automatic transmission breather tube.

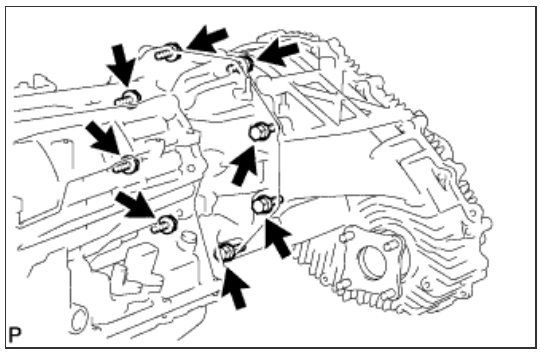


b. Disconnect the clamp of the ground cable from the transfer case lower protector.

c. Remove the 7 bolts and transfer case lower protector.



d. Remove the 8 bolts and transfer.



38. REMOVE HARNESS CLAMP BRACKET

a. Remove the 5 bolts and 5 brackets.

39. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

40. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Inspect the torque converter clutch (Click here).

for Preparation Click here

1. PRECAUTION

NOTICE:

After turning the engine switch off, waiting time may be required before disconnecting the cable from the battery terminal. Therefore, make sure to read the disconnecting the cable from the battery terminal notice before proceeding with work (Click here).

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

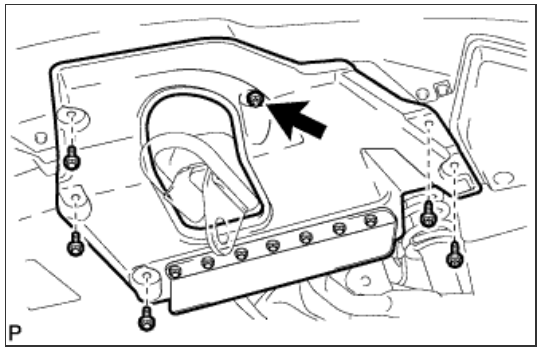
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

3. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Remove the 3 bolts and 2 screws.

b. Turn the clip indicated by the arrow in the illustration to remove the front fender splash shield sub-assembly LH.



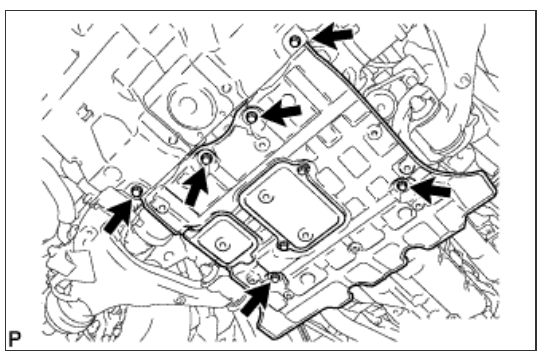
4. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedure described for the LH side.

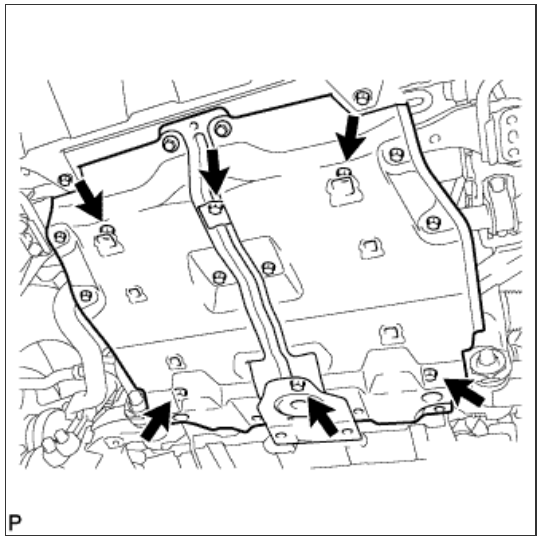
5. REMOVE NO. 2 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.



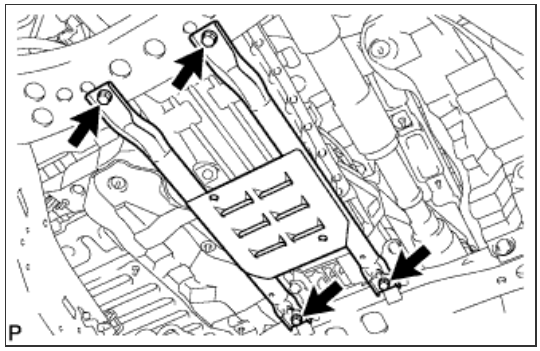
6. REMOVE NO. 1 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.



7. REMOVE OIL PAN PROTECTOR ASSEMBLY

a. Remove the 4 bolts and oil pan protector.



8. DRAIN AUTOMATIC TRANSMISSION FLUID

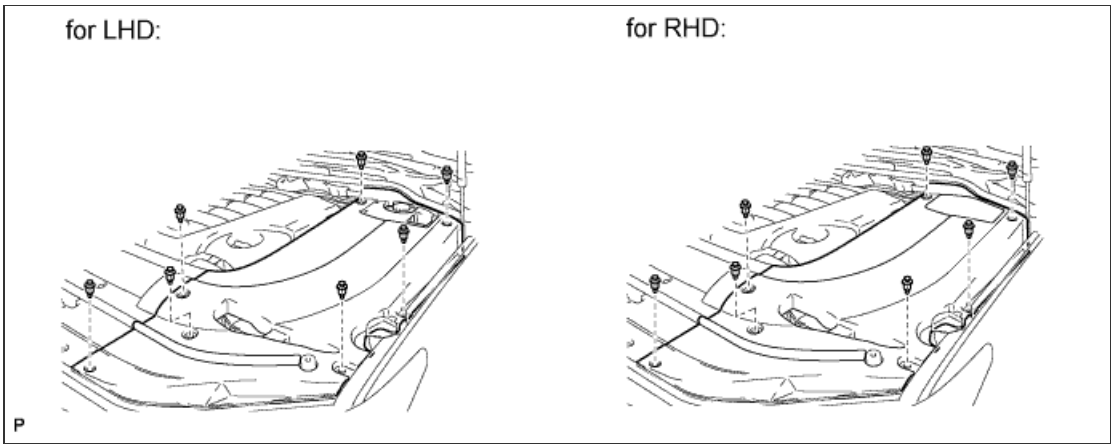
a. Remove the drain plug and gasket, and drain the ATF.

b. Install a new gasket and the drain plug.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }

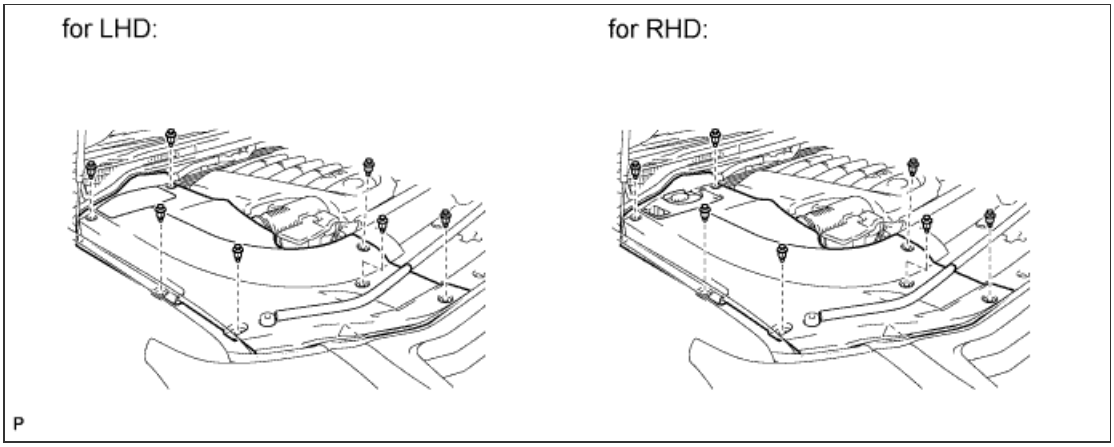
9. REMOVE ENGINE ROOM SIDE COVER LH

a. Remove the 7 clips and engine room side cover LH.



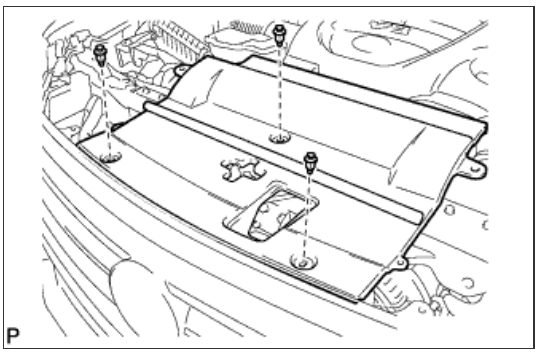
10. REMOVE ENGINE ROOM SIDE COVER RH

a. Remove the 7 clips and engine room side cover RH.



11. REMOVE UPPER RADIATOR SUPPORT SEAL

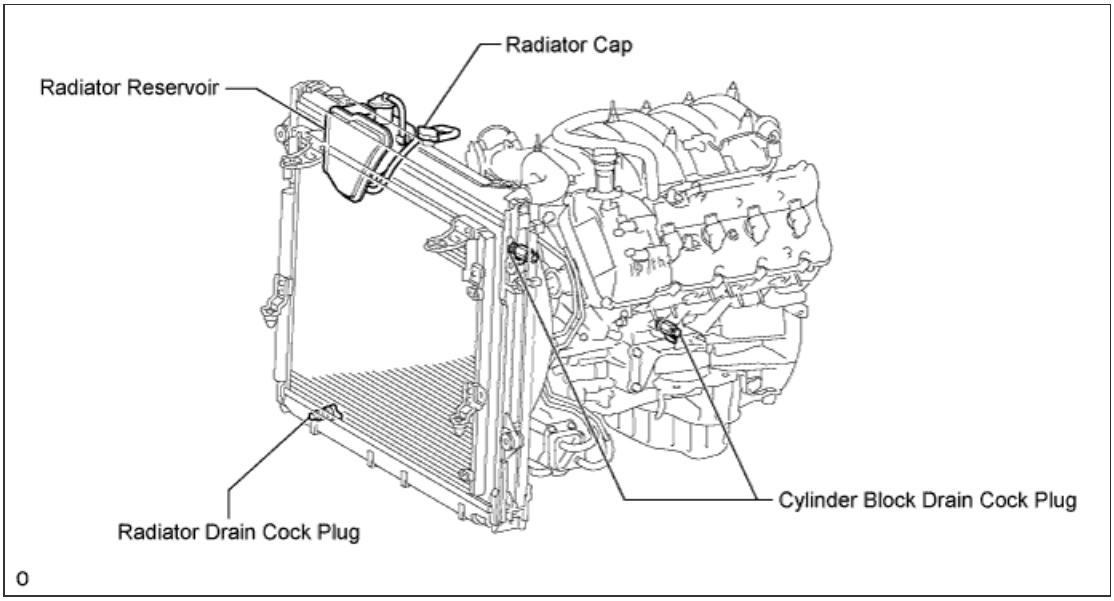
a. Remove the 3 clips and upper radiator support seal.



12. DRAIN ENGINE COOLANT

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.



a. Loosen the radiator drain cock plug.

HINT:

Collect the coolant in a container and dispose of it according to the regulations in your area.

b. Remove the radiator cap. Then drain the coolant from the radiator.

c. Loosen the 2 cylinder block drain cock plugs. Then drain the coolant from the engine.

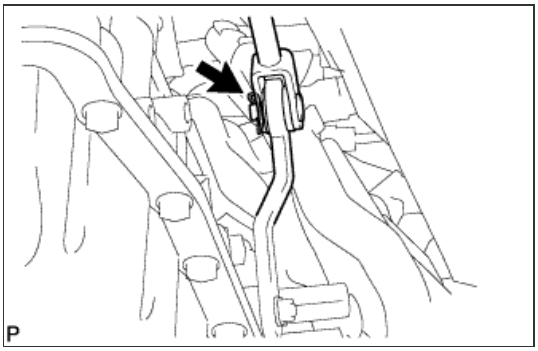
d. Tighten the 2 cylinder block drain cock plugs.

Torque:
13 N*m{ 130 kgf*cm , 10 ft.*lbf }

e. Tighten the radiator drain cock plug by hand.

13. DISCONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Remove the clip and pin, and disconnect the gear shifting rod from the transmission control shaft lever RH.



14. REMOVE FRONT PROPELLER SHAFT ASSEMBLY

a. Remove the front propeller shaft (Click here).

15. REMOVE PROPELLER SHAFT ASSEMBLY

a. Remove the propeller shaft (Click here).

16. REMOVE TAILPIPE ASSEMBLY

a. Remove the bolt, clamp and gasket.

b. Remove the tailpipe from the 2 exhaust pipe supports.

c. Remove the bolt and clamp, and then disconnect the tailpipe from the center exhaust pipe.

17. REMOVE CENTER EXHAUST PIPE ASSEMBLY

a. Remove the 4 bolts.

b. Remove the center exhaust pipe from the 3 exhaust pipe supports.

c. Remove the 2 gaskets from the front exhaust pipe and front No. 2 exhaust pipe.

18. REMOVE FRONT NO. 2 EXHAUST PIPE ASSEMBLY

a. Disconnect the heated oxygen sensor connector.

b. Remove the bolt and disconnect the wire harness clamp bracket of the oxygen sensor from the transmission.

c. Remove the 2 nuts, front No. 2 exhaust pipe and gasket from the exhaust manifold LH.

19. REMOVE FRONT EXHAUST PIPE ASSEMBLY

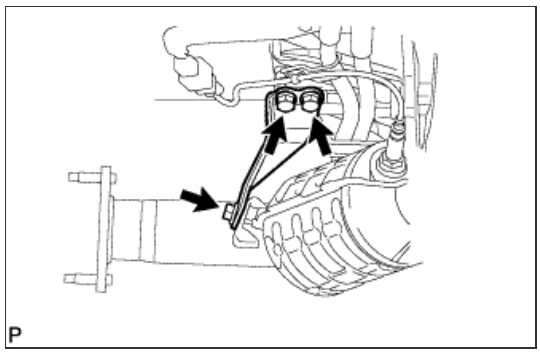
a. Disconnect the heated oxygen sensor connector.

b. Remove the bolt and disconnect the wire harness clamp bracket of the oxygen sensor from the transmission.

c. Remove the 2 nuts, front exhaust pipe and gasket from the exhaust manifold RH.

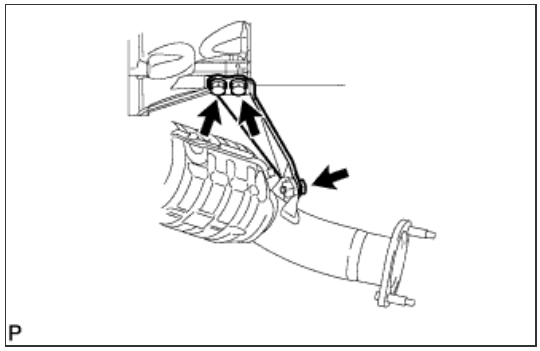
20. REMOVE NO. 1 MANIFOLD STAY

a. Remove the 3 bolts and manifold stay.



21. REMOVE NO. 2 MANIFOLD STAY

a. Remove the 3 bolts and manifold stay.

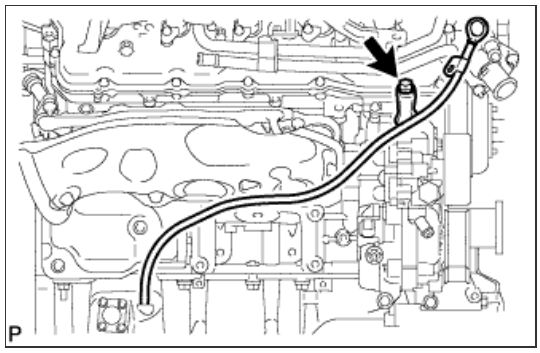


22. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE

a. Remove the dipstick.

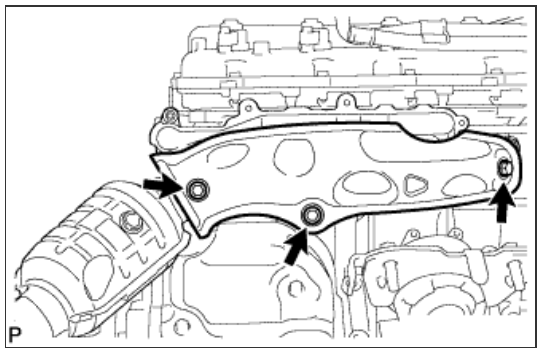
b. Remove the bolt and dipstick guide.

c. Remove the O-ring from the dipstick guide.



23. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

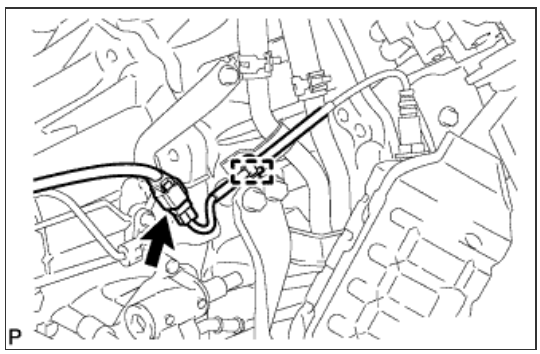
a. Remove the 3 bolts and heat insulator.



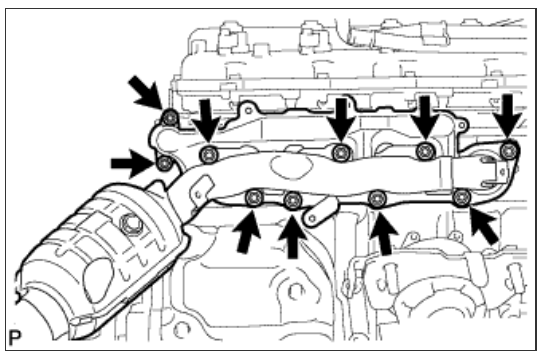
24. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY RH

a. Disconnect the connector.

b. Using a clip remover, detach the wire harness clamp.

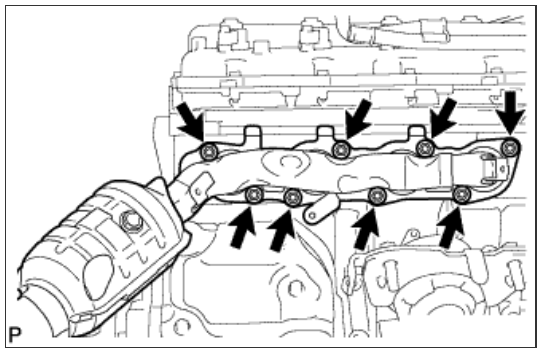


c. w/ Secondary Air Injection System:
Remove the 10 nuts, exhaust manifold and 2 gaskets.



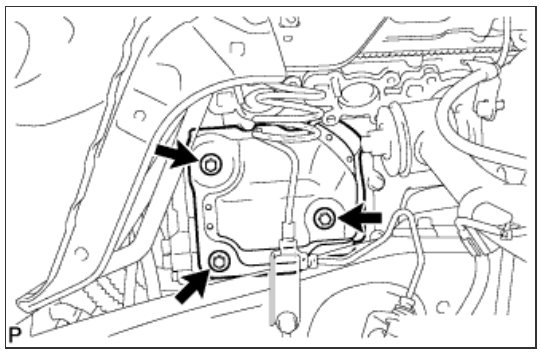
d. w/o Secondary Air Injection System:

d. w/o Secondary Air Injection System:
Remove the 8 nuts, exhaust manifold and gasket.



25. REMOVE STARTER COVER

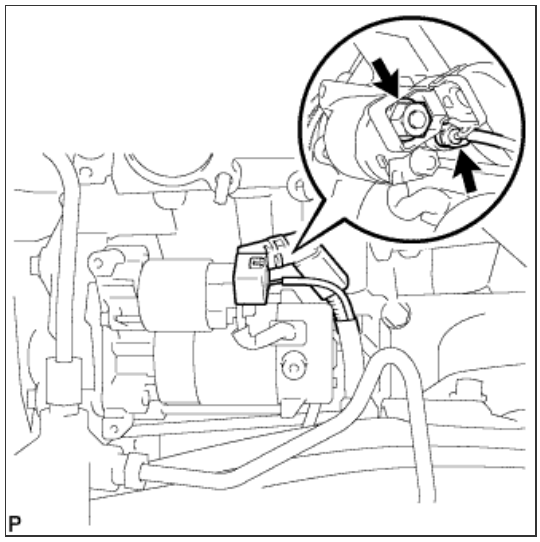
a. Remove the 3 bolts and starter cover.



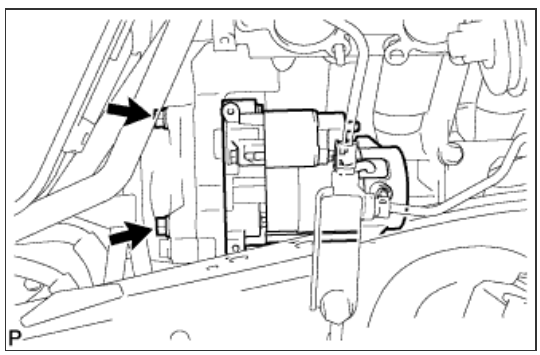
26. REMOVE STARTER ASSEMBLY

a. Disconnect the starter connector.

b. Remove the nut and disconnect the starter wire.

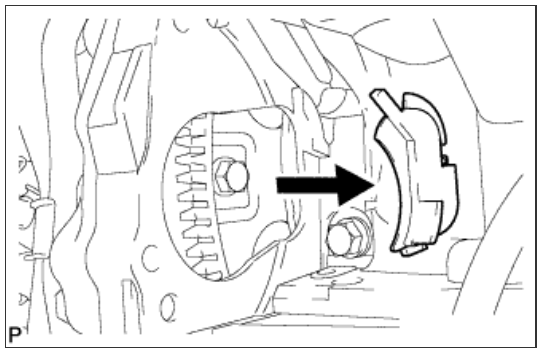


c. Remove the 2 bolts and starter.



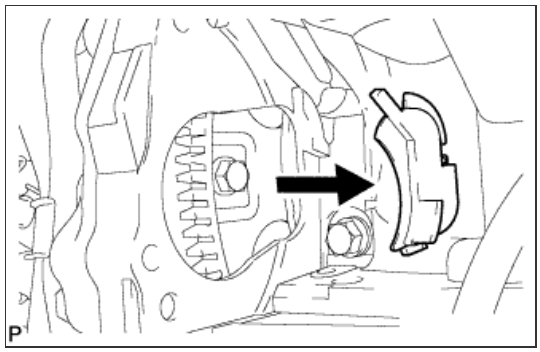
e. Remove the flexible coupling.

d. Remove the flywheel housing side cover.

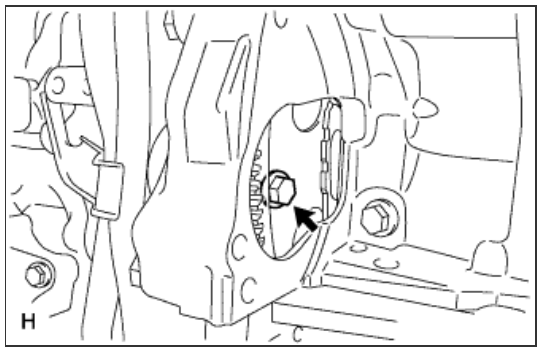


27. REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT

a. Remove the flywheel housing side cover.



b. Turn the crankshaft to gain access to the 6 bolts and remove the bolts while holding the crankshaft pulley setting bolt with a wrench.

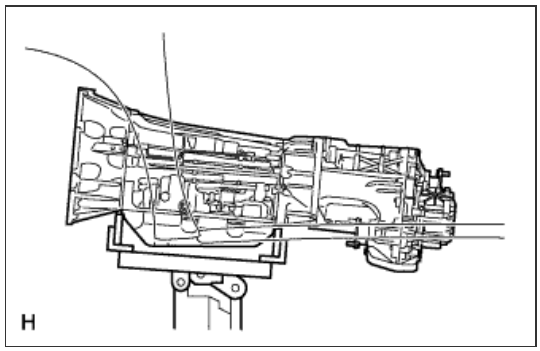


28. SUPPORT AUTOMATIC TRANSMISSION ASSEMBLY

a. Support the transmission with a transmission jack. Lift the transmission slightly from the crossmember.

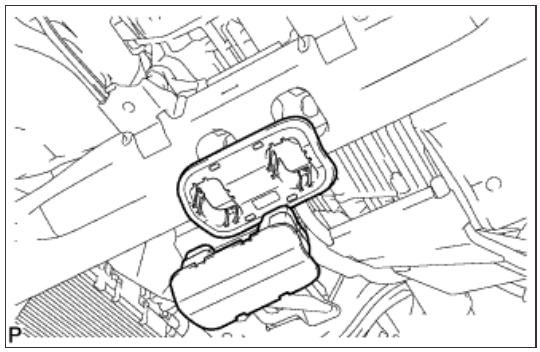
NOTICE:

Support the oil pan bolts to prevent damage to the oil pan gasket.

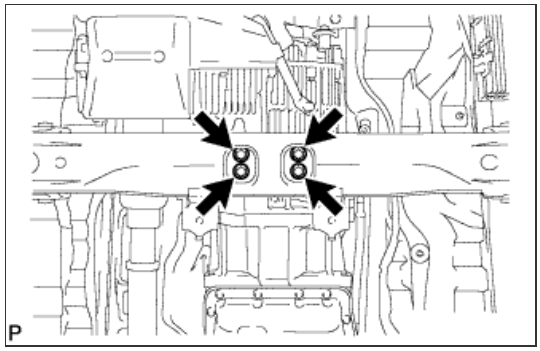


29. REMOVE NO. 2 FRAME CROSSMEMBER SUB-ASSEMBLY

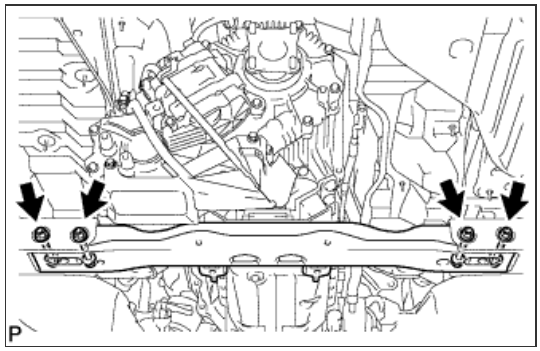
a. Remove the engine mounting hole cover.



b. Remove the 4 bolts of the rear engine mounting insulator.



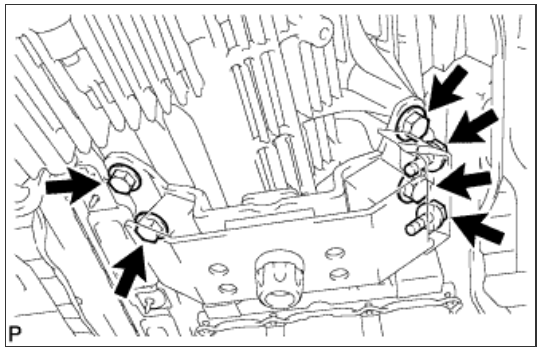
c. Remove the 4 nuts, 4 bolts and frame crossmember.



30. REMOVE REAR NO. 1 ENGINE MOUNTING INSULATOR

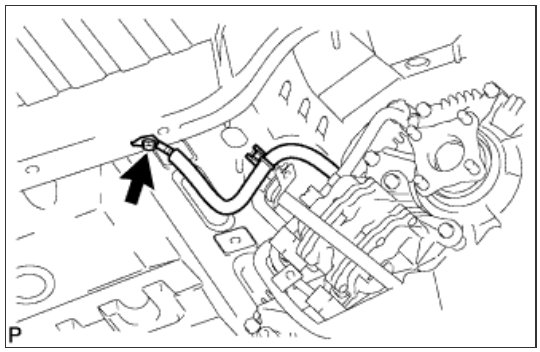
a. Remove the 2 bolts and engine mounting heat insulator.

b. Remove the 4 bolts and rear engine mounting insulator from the transmission.



31. DISCONNECT WIRE HARNESS AND CONNECTOR

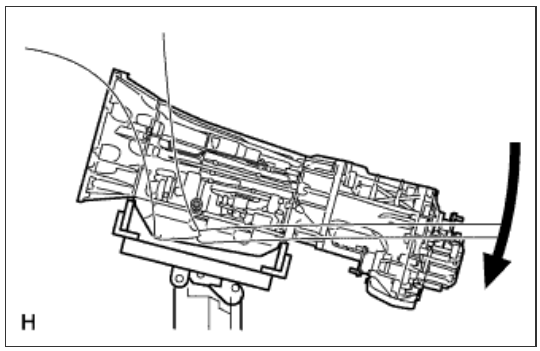
a. Remove the bolt and disconnect the ground cable.



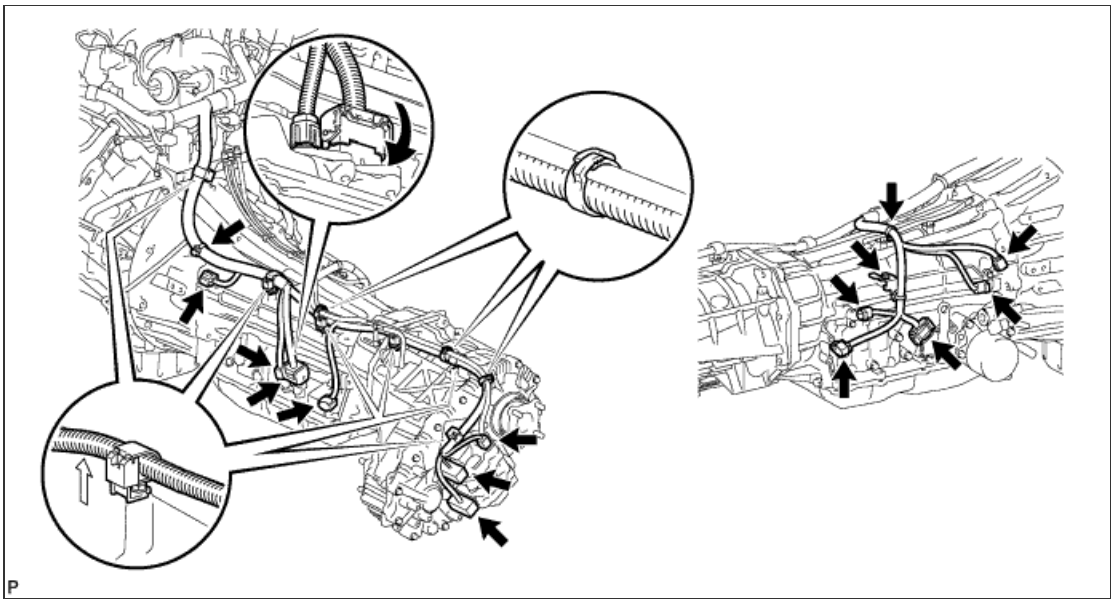
b. Tilt the transmission downward.

NOTICE:

- **Support the oil pan bolts to prevent damage to the oil pan gasket.**
- **Make sure the cooling fan does not contact the fan shroud.**



c. Disconnect the park/neutral position switch connector, 2 transmission wire connectors, 2 speed sensor connectors and 3 transfer control side connectors.



HINT:

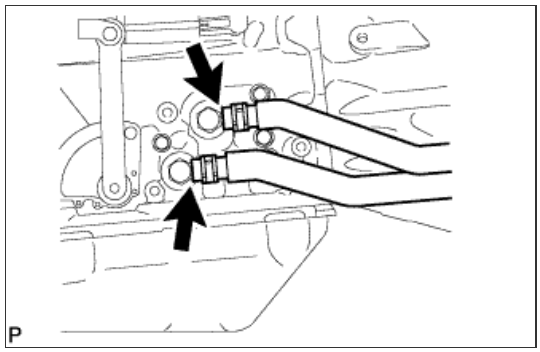
Detach the claw, press down the lever, and then disconnect the transmission wire connector.

d. Disconnect the 4 connector clamps and 6 harness clamps.

e. Remove the bolt and disconnect the wire harness.

32. DISCONNECT TRANSMISSION OIL COOLER HOSE (w/ Air Cooled Transmission Oil Cooler)

a. Disconnect the 2 transmission oil cooler hoses from the oil cooler tube union.

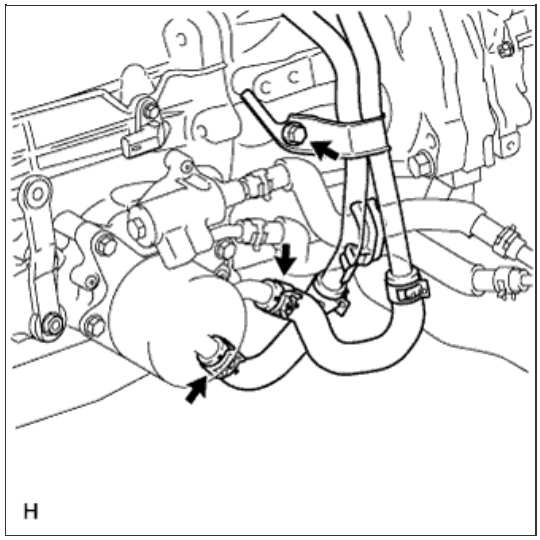


33. DISCONNECT NO. 2 WATER BY-PASS PIPE (w/o Air Cooled Transmission Oil Cooler)

a. Remove the bolt and disconnect the 2 water by-pass hoses from the transmission oil cooler. Then separate the by-pass pipe from the automatic transmission.

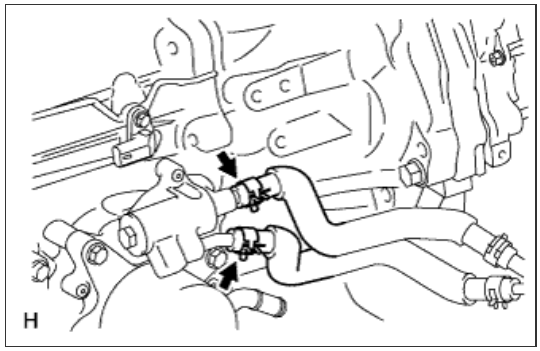
NOTICE:

Use a container to catch any coolant which flows out of the water by-pass hoses.



34. DISCONNECT TRANSMISSION OIL COOLER HOSE (w/o Air Cooled Transmission Oil Cooler)

a. Disconnect the 2 transmission oil cooler hoses from the transmission oil thermostat.

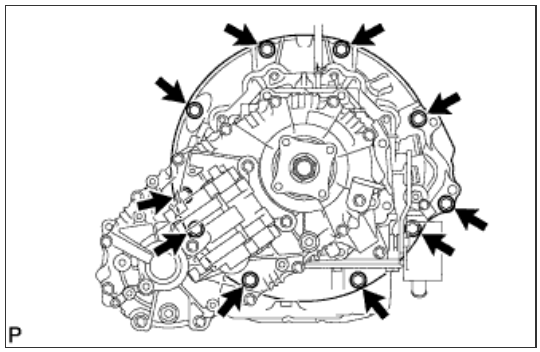


35. REMOVE AUTOMATIC TRANSMISSION ASSEMBLY

a. Remove the 10 bolts and transmission.

NOTICE:

Do not use excess force to pry off the transmission assembly.

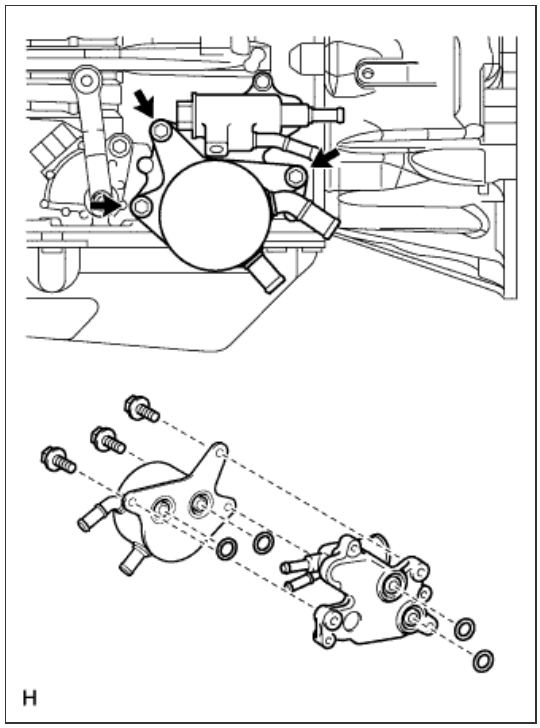


36. REMOVE TRANSMISSION OIL COOLER ASSEMBLY (w/o Air Cooled Transmission Oil Cooler)

a. Remove the 3 bolts and transmission oil cooler with transmission oil thermostat.

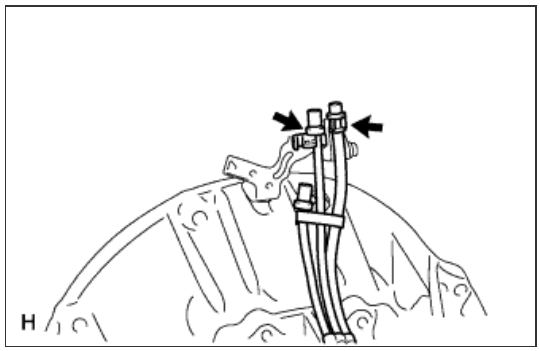
b. Separate the transmission oil cooler from the transmission oil thermostat.

c. Remove the 4 O-rings.



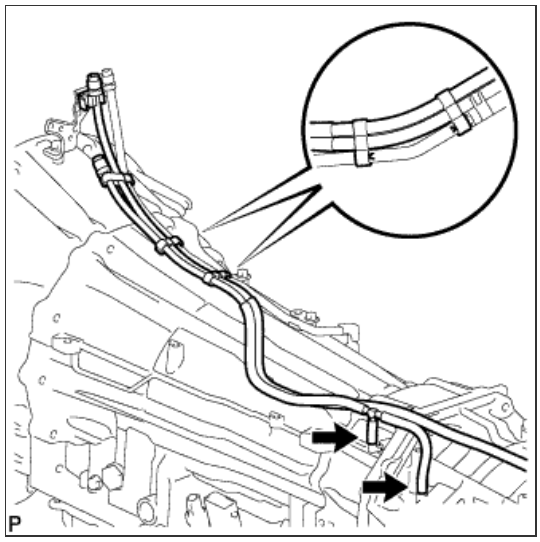
37. DISCONNECT BREATHER PLUG HOSE

a. Disconnect the 2 breather plug hoses from the harness clamp bracket.



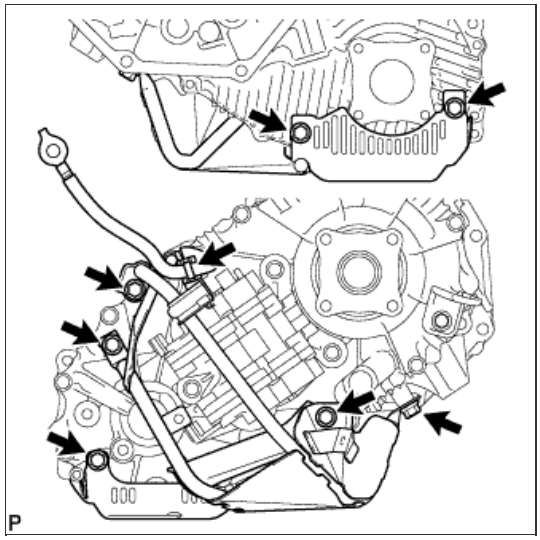
38. REMOVE TRANSFER ASSEMBLY

a. Detach the 3 breather hose clamps from the automatic transmission breather tube.

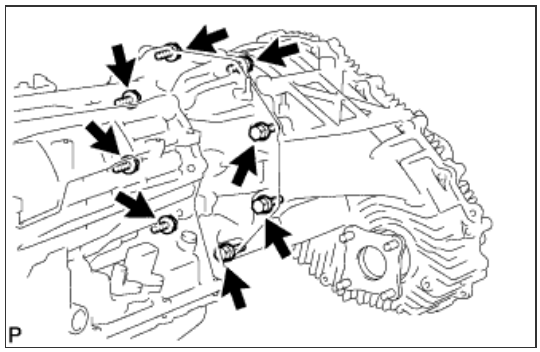


b. Disconnect the clamp of the ground cable from the transfer case lower protector.

c. Remove the 7 bolts and transfer case lower protector.



d. Remove the 8 bolts and transfer.



39. REMOVE HARNESS CLAMP BRACKET

a. Remove the 5 bolts and 5 brackets.

40. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

41. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

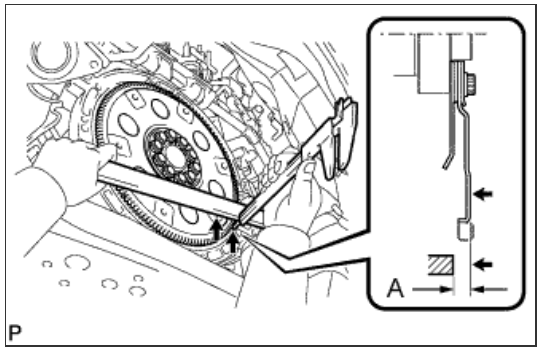
a. Inspect the torque converter clutch (Click here).

for Preparation Click here

1. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

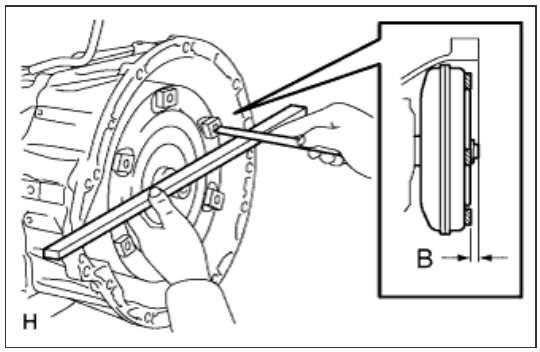
a. Using a vernier caliper and straightedge, measure dimension A between the transmission and the end surface of the drive plate.

b. Install the torque converter to the transmission housing.



c. Using a vernier caliper and straightedge, measure dimension B shown in the illustration and check that B is more than A measured in the first step.

Standard distance:
B = A + 1.00 mm (0.0394 in.) or more



2. INSTALL WIRE HARNESS CLAMP BRACKET

a. Install the front bracket LH with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

b. Install the rear bracket LH with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

c. Install the rear bracket RH with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

d. Install the front bracket RH with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

e. Install the rear engine bracket with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

3. INSTALL TRANSFER ASSEMBLY

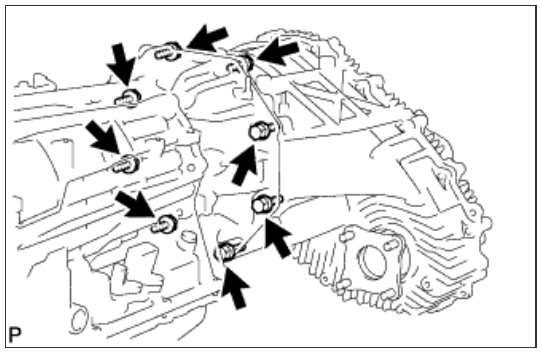
a. Install the transfer with the 8 bolts.

Torque:

40 N*m{ 408 kgf*cm , 30 ft.*lbf }

NOTICE:

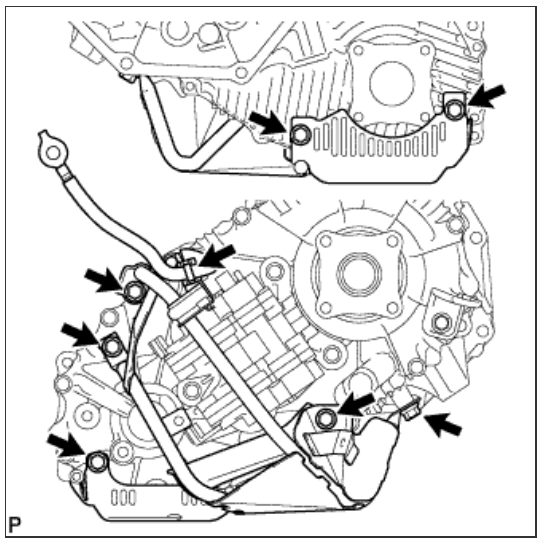
Be careful not to damage the oil seal of the transfer adapter.



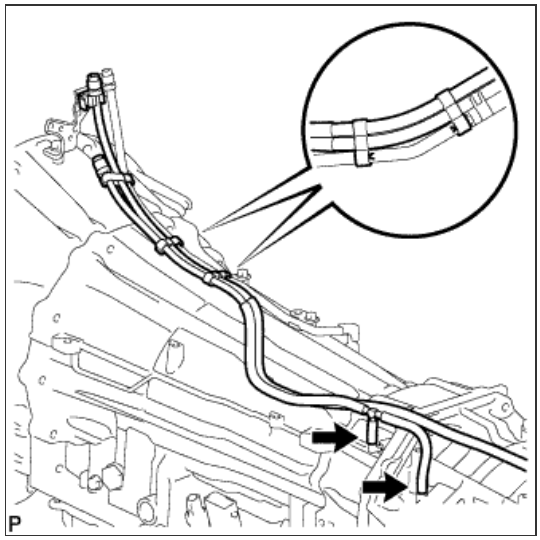
b. Install the transfer case lower protector with the 7 bolts.

Torque:
14 N*m{ 143 kgf*cm , 10 ft.*lbf }

c. Connect the clamp of grand cable to the transfer case lower protector.

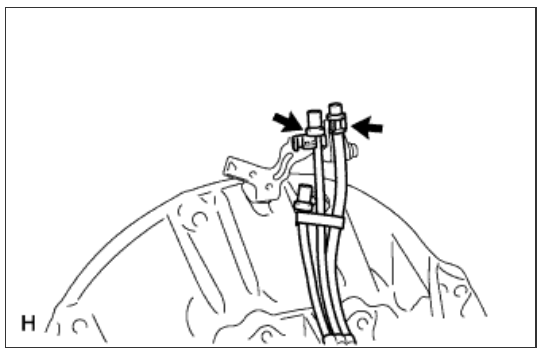


d. Attach the 3 breather hose clamps to connect the transfer breather hose to the automatic transmission breather tube.



4. CONNECT BREATHER PLUG HOSE

a. Connect the 2 breather plug hoses to the harness clamp bracket.



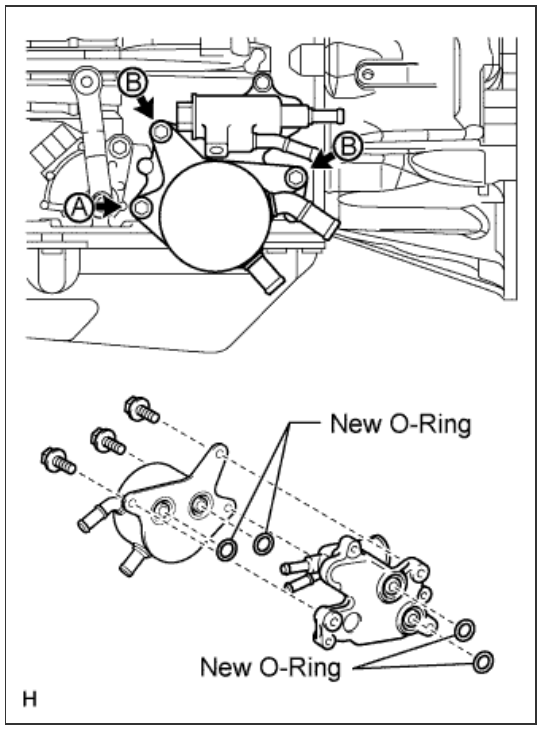
5. INSTALL TRANSMISSION OIL COOLER ASSEMBLY (w/o Air Cooled Transmission Oil Cooler)

a. Coat 4 new O-rings with ATF.

b. Install the 4 O-rings, transmission oil thermostat and transmission oil cooler to the automatic transmission.

c. Temporarily install bolt A. Install the bolts labeled B and tighten them to the specified torque. Then tighten bolt A to the specified torque.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }



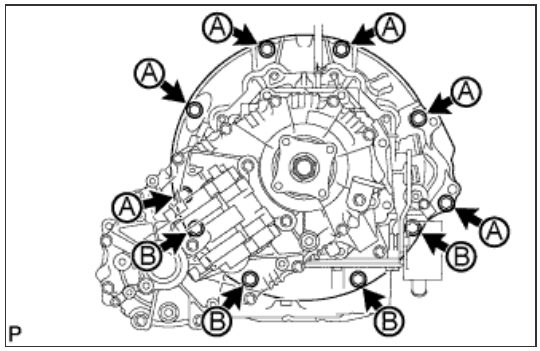
6. INSTALL AUTOMATIC TRANSMISSION ASSEMBLY

NOTICE:

Confirm that the 2 knock pins are attached to the transmission contact surface of the engine block before the installing the transmission.

a. Install the transmission with the 10 bolts.

Torque:
for 17 mm head bolt A:
71 N*m{ 724 kgf*cm , 52 ft.*lbf }
for 14 mm head bolt B:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }

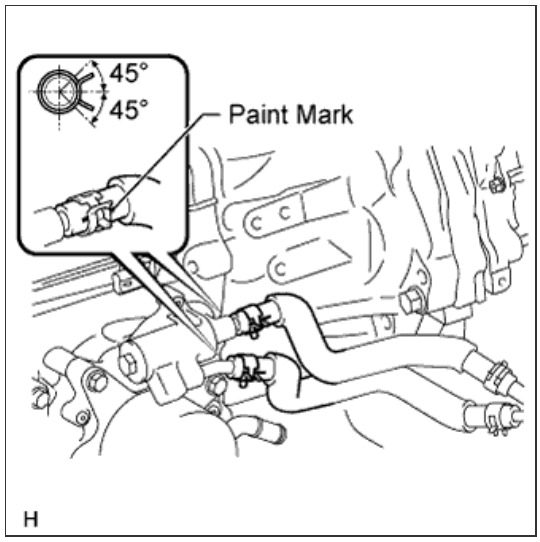


7. CONNECT TRANSMISSION OIL COOLER HOSE (w/o Air Cooled Transmission Oil Cooler)

a. Connect the 2 transmission oil cooler hoses to the transmission oil thermostat.

NOTICE:

- **Make sure the pinching portion of each clip is facing the direction shown in the illustration.**
- **Make sure the paint mark of each hose is facing outward.**



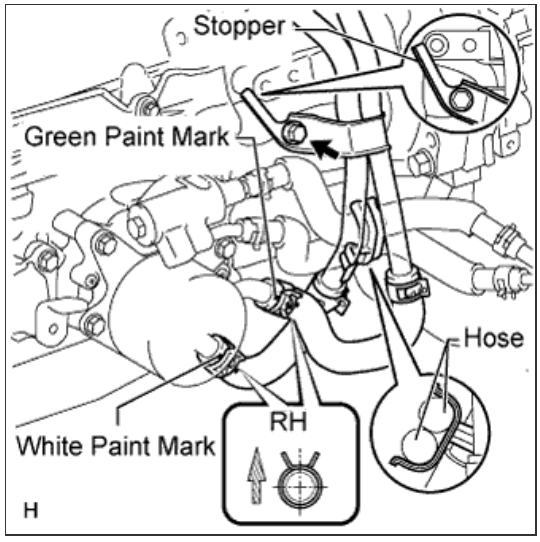
8. CONNECT NO. 2 WATER BY-PASS PIPE (w/o Air Cooled Transmission Oil Cooler)

a. Connect the 2 water by-pass hoses with the 2 clips and install the water by-pass pipe with the bolt.

Torque:
18 N*m{ 184 kgf*cm , 13 ft.*lbf }

NOTICE:

- **Make sure the pinching portion of each clip is facing the direction shown in the illustration.**
- **Make sure the paint mark of each hose is facing outward.**

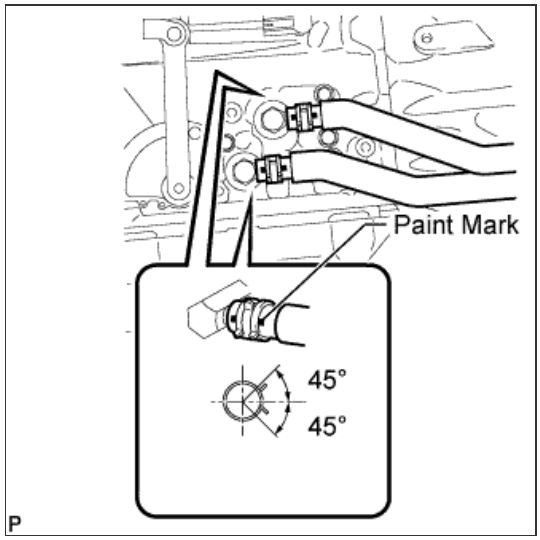


9. CONNECT TRANSMISSION OIL COOLER HOSE

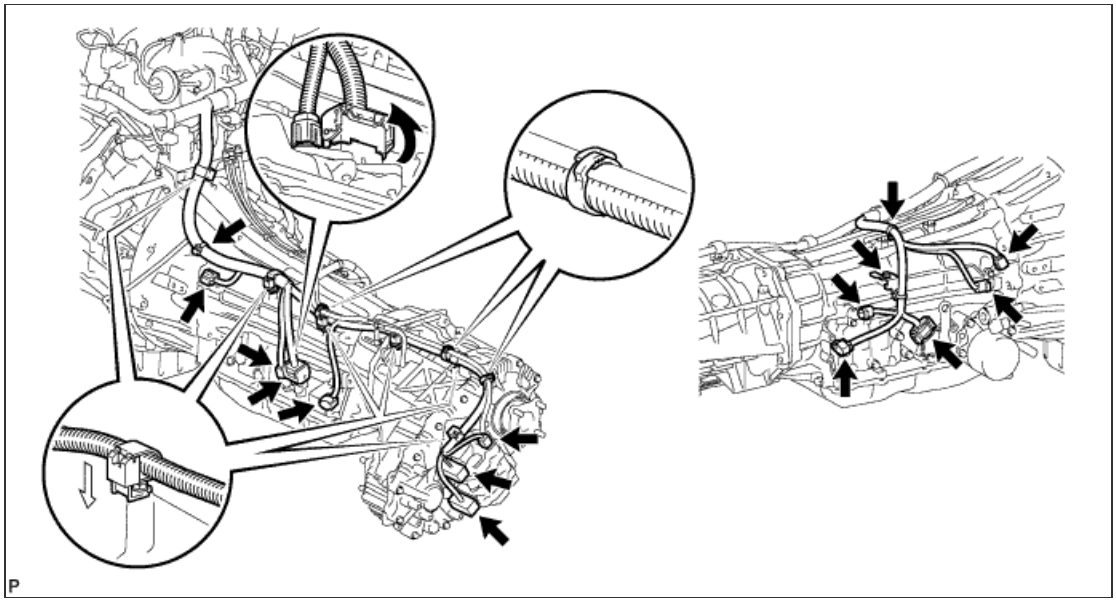
a. Connect the 2 transmission oil cooler hoses to the oil cooler tube union.

NOTICE:

- **Make sure the pinching portion of each clip is facing the direction shown in the illustration.**
- **Make sure the paint mark of each hose is facing outward.**



10. CONNECT WIRE HARNESS AND CONNECTOR



a. Connect the park/neutral position switch connector, 2 transmission wire connectors, 2 speed sensor connectors and 3 transfer control side connectors.

HINT:

Push up the lever until the claw of the transmission wire connector makes a connection sound.

b. Connect the 4 connector clamps and 6 harness clamps.

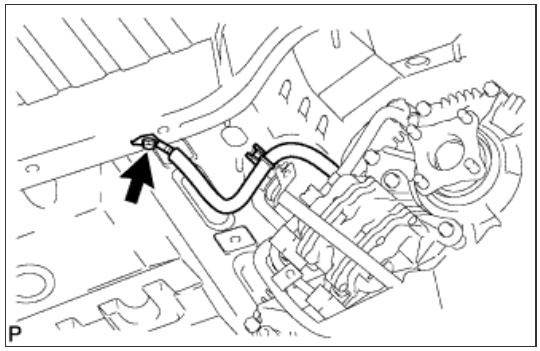
c. Connect the wire harness with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

d. Tilt up the automatic transmission.

e. Connect the ground cable with the bolt.

Torque:
8.4 N*m{ 86 kgf*cm , 74 in.*lbf }



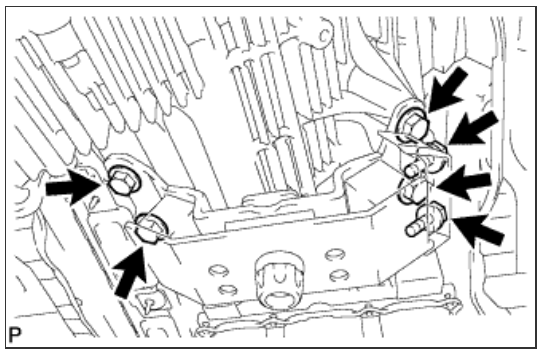
11. INSTALL REAR NO. 1 ENGINE MOUNTING INSULATOR

a. Install the rear engine mounting insulator to the transmission with the 4 bolts.

Torque:
59 N*m{ 602 kgf*cm , 44 ft.*lbf }

b. Install the engine mounting heat insulator with the 2 bolts.

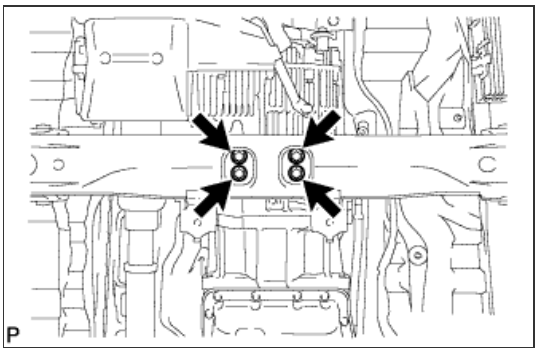
Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



12. INSTALL NO. 2 FRAME CROSSMEMBER SUB-ASSEMBLY

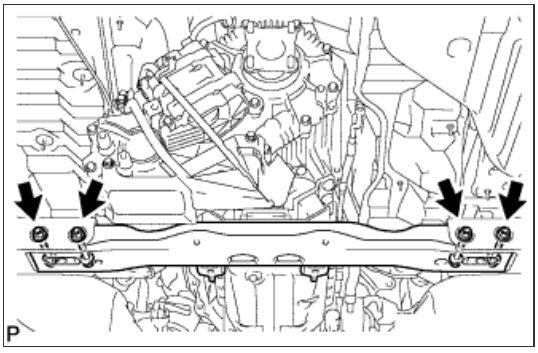
a. Install the frame crossmember to the rear engine mounting insulator with the 4 bolts.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }

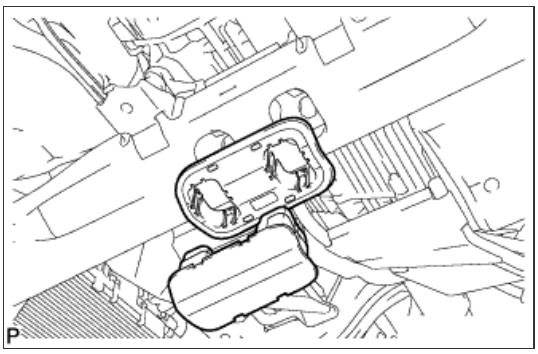


b. Install the frame crossmember to the frame with the 4 bolts and 4 nuts.

Torque:
110 N*m{ 1122 kgf*cm , 81 ft.*lbf }



c. Install the engine mounting hole cover.



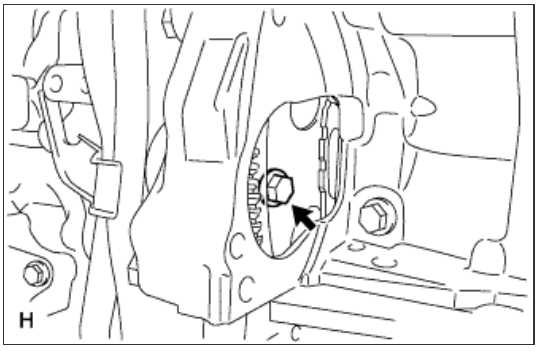
13. INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT

a. Turn the crankshaft to gain access to the installation locations of the 6 bolts and install the bolts while holding the crankshaft pulley set bolt with a wrench.

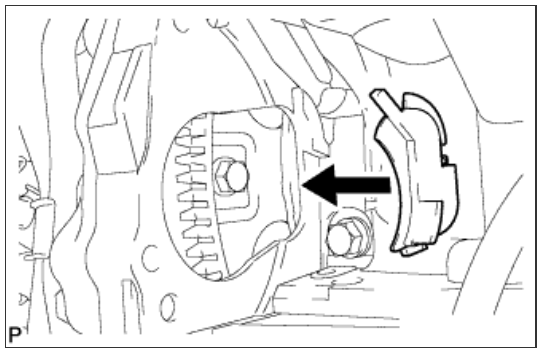
Torque:
53 N*m{ 535 kgf*cm , 39 ft.*lbf }

NOTICE:

First install the black colored bolt and then the remaining 5 bolts.

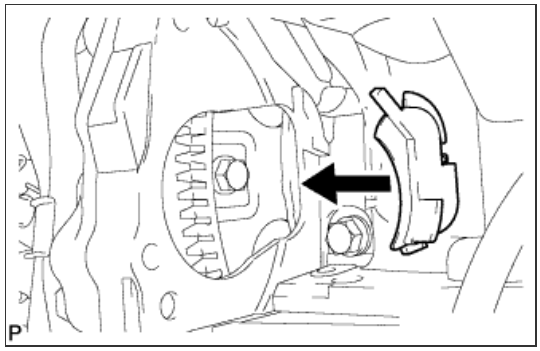


b. Install the flywheel housing side cover.



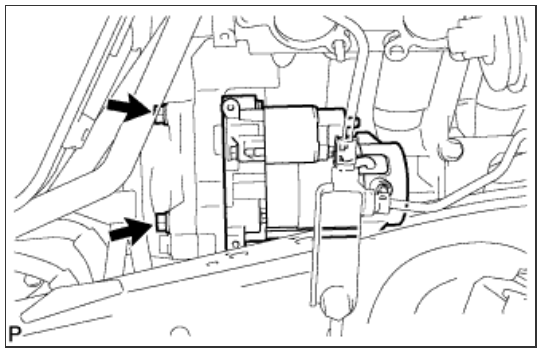
14. INSTALL STARTER ASSEMBLY

a. Install the flywheel housing side cover.



b. Install the starter with the 2 bolts.

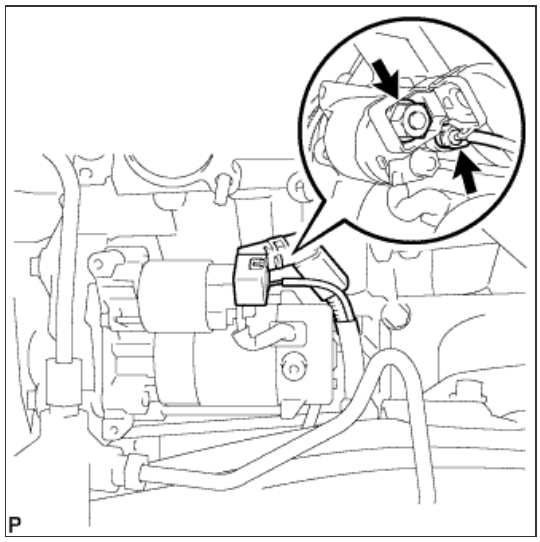
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



c. Install the starter wire with the nut.

Torque:
9.8 N*m{ 100 kgf*cm , 87 in.*lbf }

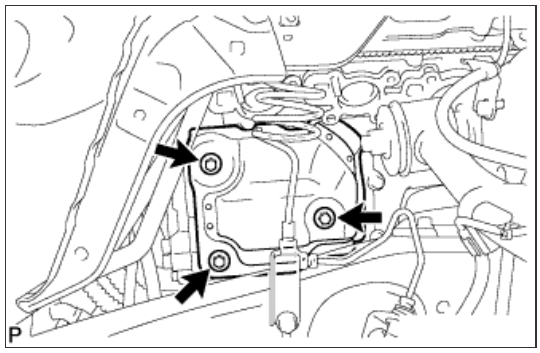
d. Connect the starter connector.



15. INSTALL STARTER COVER

a. Install the starter cover with the 3 bolts.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }

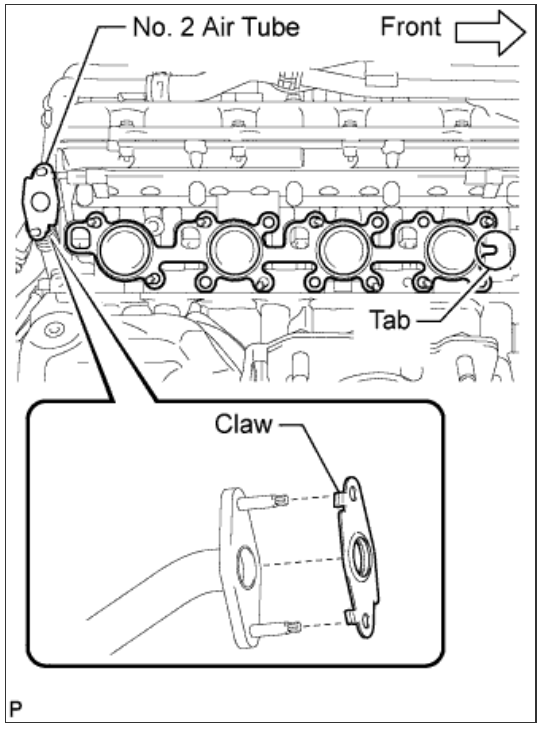


16. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY RH

a. Install a new gasket to the cylinder head and a new gasket to the No. 2 air tube.

HINT:

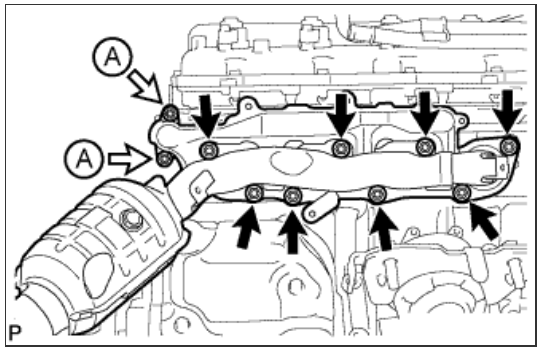
- **Install the exhaust manifold gasket with the gasket tab facing toward the front of the engine.**
- **Install the air tube gasket with the gasket claws facing the tube side.**



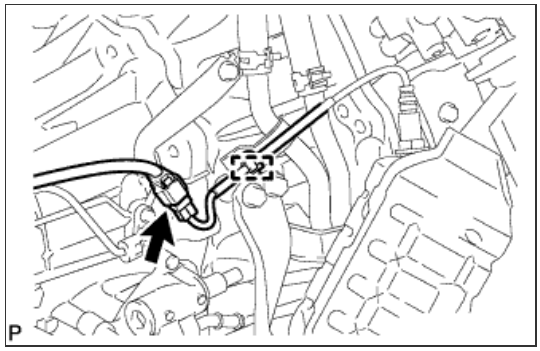
b. Temporarily install the exhaust manifold with the 2 nuts labeled A and 8 new nuts.

c. Uniformly tighten the nuts that are not labeled A, and then tighten the 2 nuts labeled A.

Torque:
for nut A:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }
except nut A:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }



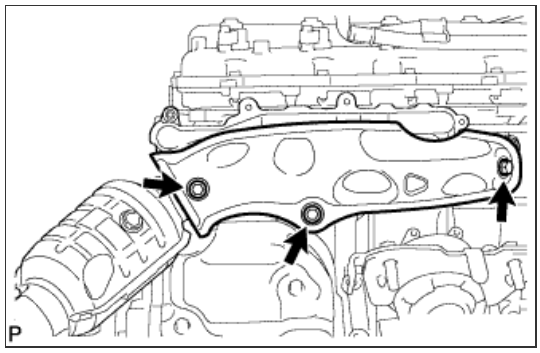
d. Attach the wire harness clamp to the bracket and connect the connector.



17. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

a. Install the heat insulator with the 3 bolts.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



18. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE

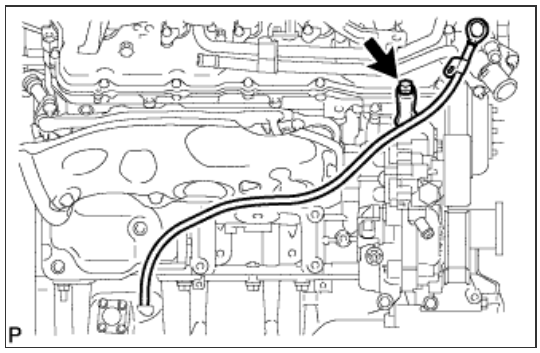
a. Apply a light coat of engine oil to a new O-ring.

b. Install the O-ring to the guide.

c. Install the dipstick guide with the bolt.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }

d. Install the dipstick.

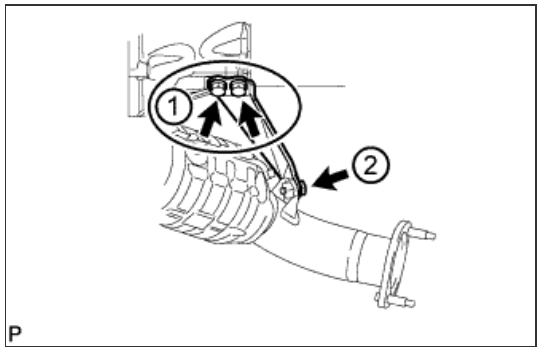


19. INSTALL NO. 2 MANIFOLD STAY

a. Temporarily install the manifold stay with the 3 bolts.

b. Tighten the 3 bolts in the order shown in the illustration.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }

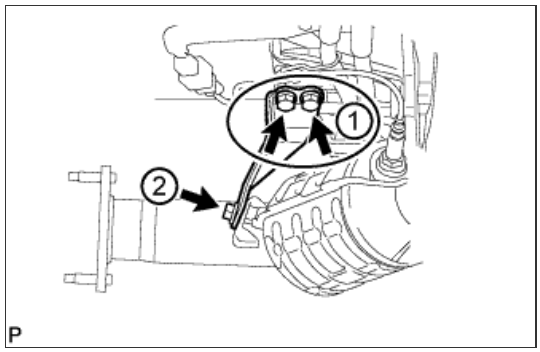


20. INSTALL NO. 1 MANIFOLD STAY

a. Temporarily install the manifold stay with the 3 bolts.

b. Tighten the 3 bolts in the order shown in the illustration.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }



21. INSTALL FRONT EXHAUST PIPE ASSEMBLY

a. Install a new gasket and the front exhaust pipe to the exhaust manifold RH with 2 new nuts.

Torque:
54 N*m{ 551 kgf*cm , 40 ft.*lbf }

b. Install the wire harness clamp bracket of the oxygen sensor to the transmission with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

c. Connect the heated oxygen sensor connector.

22. INSTALL FRONT NO. 2 EXHAUST PIPE ASSEMBLY

a. Install a new gasket and the front No. 2 exhaust pipe to the exhaust manifold LH with 2 new nuts.

Torque:
54 N*m{ 551 kgf*cm , 40 ft.*lbf }

b. Install the wire harness clamp bracket of the oxygen sensor to the transmission with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

c. Connect the heated oxygen sensor connector.

23. INSTALL CENTER EXHAUST PIPE ASSEMBLY

a. Install 2 new gaskets to the front exhaust pipe and front No. 2 exhaust pipe.

b. Install the center exhaust pipe to the 3 exhaust pipe supports, and then install the 4 bolts.

Torque:
48 N*m{ 489 kgf*cm , 35 ft.*lbf }

24. INSTALL TAILPIPE ASSEMBLY

a. Install the tailpipe to the 2 exhaust pipe supports.

b. Install a new gasket to the center exhaust pipe.

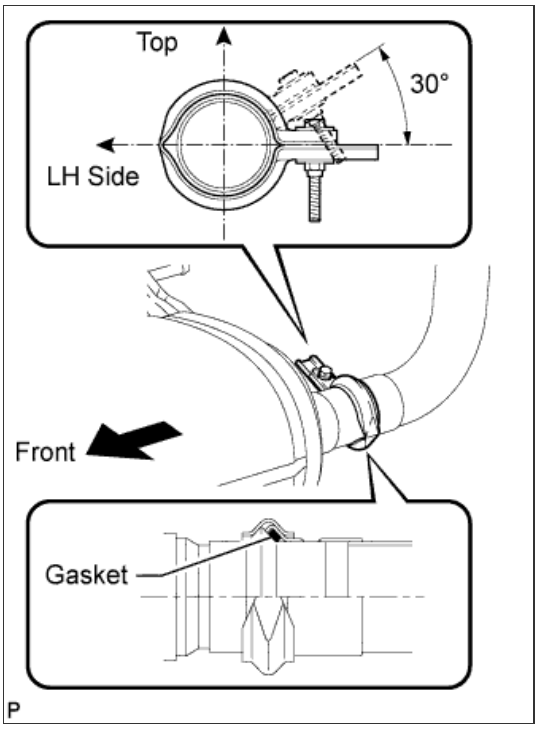
c. Connect the tailpipe to the center exhaust pipe.

d. Attach a new clamp to the tailpipe and center exhaust pipe. Then install the bolt to the clamp.

Torque:
32 N*m{ 326 kgf*cm , 24 ft.*lbf }

HINT:

Install the clamp within the angle range shown in the illustration.



25. INSTALL PROPELLER SHAFT ASSEMBLY

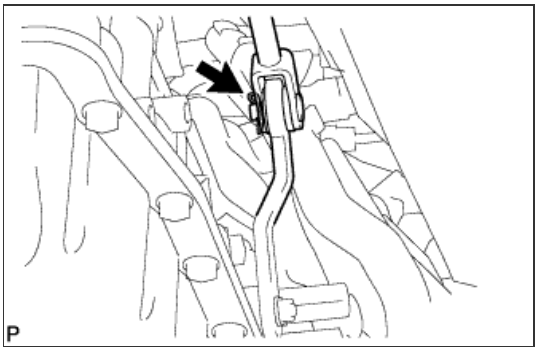
a. Install the propeller shaft (Click here).

26. INSTALL FRONT PROPELLER SHAFT ASSEMBLY

a. Install the front propeller shaft (Click here).

27. CONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Connect the gear shifting rod to the transmission control shaft lever RH with the pin and a new clip.



28. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

29. ADD AUTOMATIC TRANSMISSION FLUID

a. Add automatic transmission fluid (Click here).

30. ADD ENGINE COOLANT

a. Add engine coolant.

Standard Capacity:

Item	Specified Condition
with transmission oil cooler	16.7 liters (17.6 US qts, 14.7 Imp. qts)
without transmission oil cooler	16.2 liters (17.1 US qts, 14.3 Imp. qts)

NOTICE:

Do not substitute plain water for engine coolant.

HINT:

TOYOTA vehicles are filled with TOYOTA SLLC at the factory. In order to avoid damage to the engine cooling system and other technical problems, only use TOYOTA SLLC or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

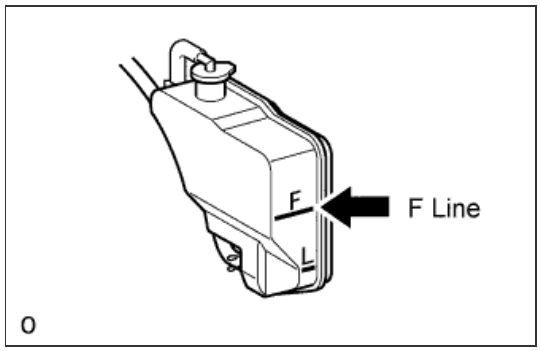
b. Slowly pour coolant into the radiator reservoir until it reaches the F line.

c. Install the reservoir cap.

d. Press the No. 1 and No. 2 radiator hoses several times by hand, and then check the coolant level. If the coolant level is low, add coolant.

e. Install the radiator cap.

f. Start the engine and warm it up until the thermostat opens.



NOTICE:

Switch off the A/C.

g. Maintain the engine speed at 2000 to 2500 rpm.

NOTICE:

- **Make sure that the radiator reservoir still has some coolant in it.**
- **Pay attention to the needle of the water temperature meter. Make sure that the needle does not show an abnormally high temperature.**
- **If there is not enough coolant, the engine may burn out or overheat.**
- **Immediately after starting the engine, if the radiator reservoir does not have any coolant, perform the following: 1) stop the engine, 2) wait until the coolant has cooled down, and 3) add coolant until the coolant is filled to the F line.**
- **Run the engine at 2000 rpm until the coolant level has stabilized.**

h. Press the No. 1 and No. 2 radiator hoses several times by hand to bleed air.

CAUTION:

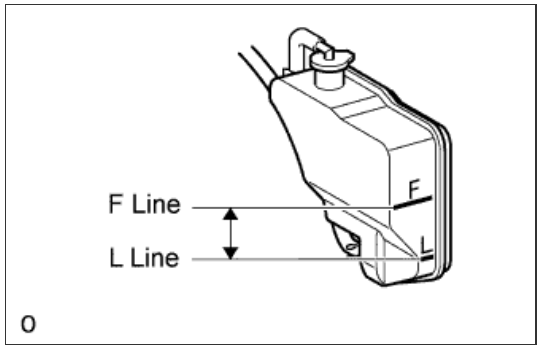
- **Wear protective gloves.**
- **Be careful as the radiator hoses are hot.**
- **Keep your hands away from the fan.**

i. Stop the engine, and wait until the engine coolant cools down to ambient temperature.

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

j. Check that the coolant level is between the F and L lines.
If the coolant level is below the L line, repeat all of the procedures above.
If the coolant level is above the F line, drain coolant so that the coolant level is between the F and L lines.

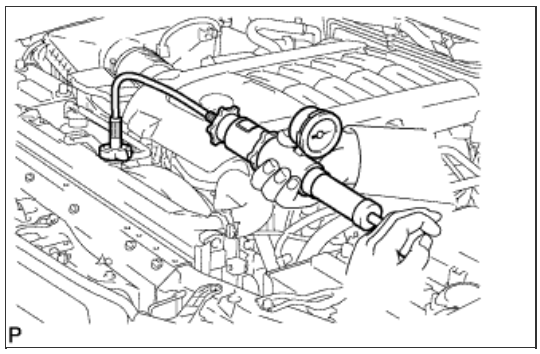


31. INSPECT FOR ENGINE COOLANT LEAK

a. Fill the radiator with coolant and attach a radiator cap tester.

b. Warm up the engine.

c. Using the radiator cap tester, increase the pressure inside the radiator to 123 kPa (1.3 kgf/cm^2, 18 psi), and check that the pressure does not drop.
If the pressure drops, check the hoses, radiator and water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.



32. INSPECT SHIFT LEVER POSITION

a. When moving the shift lever from P to R with the engine switch on (IG) and the brake pedal depressed, make sure that it moves smoothly and correctly into position.

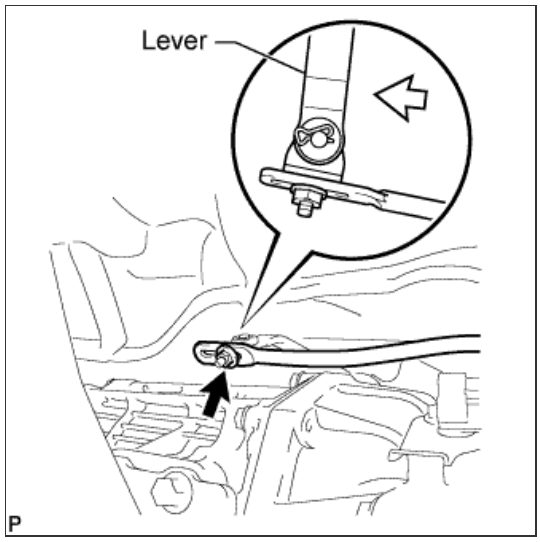
b. Check that the shift lever does not stop when moving the shift lever from R to P, and check that the shift lever does not stick when moving the shift lever from D to S.

c. Start the engine and make sure that the vehicle moves forward after moving the shift lever from N to D and moves rearward after moving the shift lever to R.
If there are problems during the above inspections, perform the adjustment using the following procedures.

i. Move the shift lever to N

ii. Loosen the nut of the floor shift gear shifting rod. Then, with the lever of the floor shift assembly lightly pushed towards the rear of the vehicle, tighten the nut.

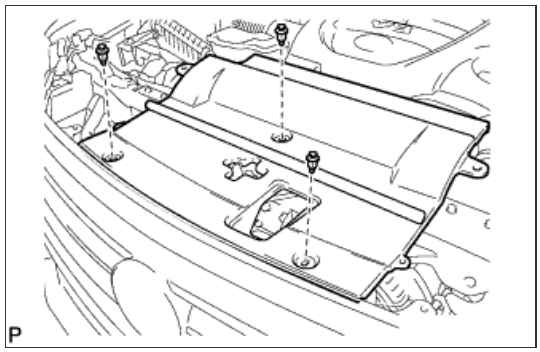
Torque:
13 N*m{ 133 kgf*cm , 10 ft.*lbf }



33. INSPECT FOR EXHAUST GAS LEAK

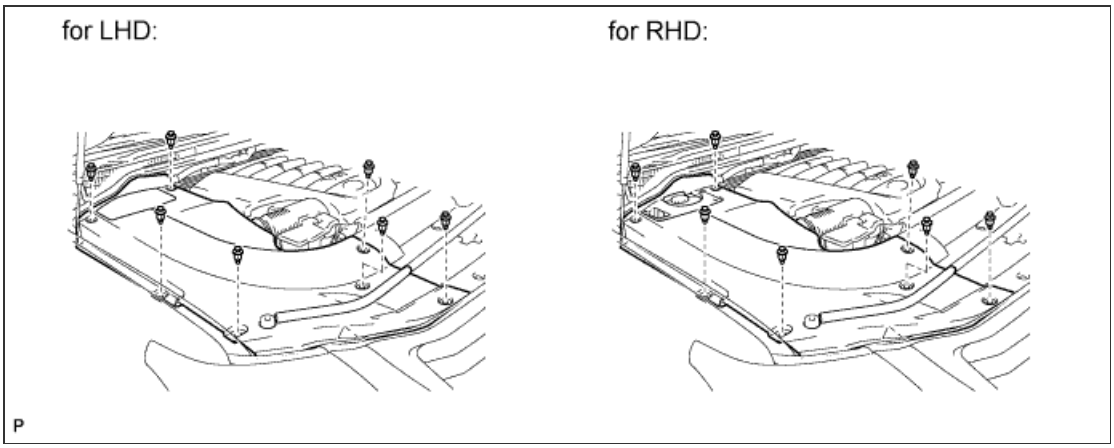
34. INSTALL UPPER RADIATOR SUPPORT SEAL

a. Install the upper radiator support seal with the 3 clips.



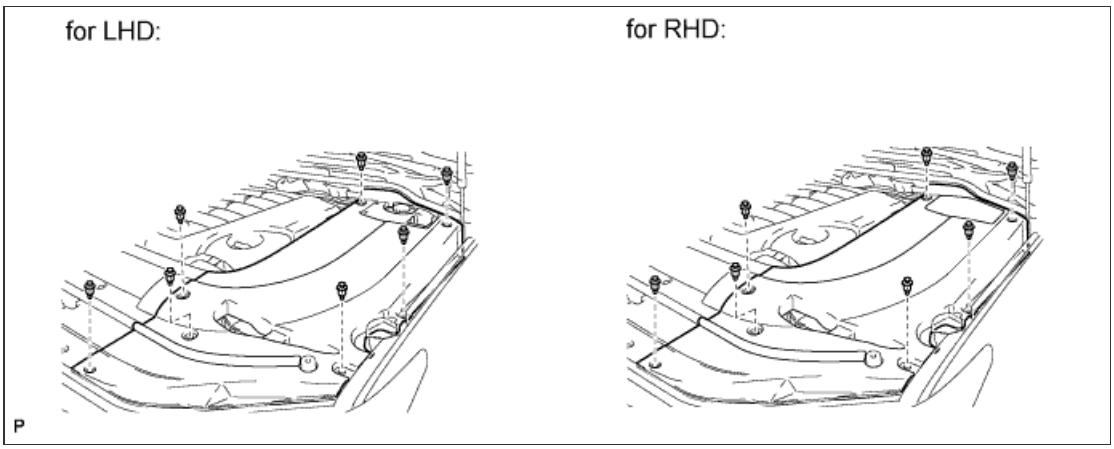
35. INSTALL ENGINE ROOM SIDE COVER RH

a. Install the engine room side cover with the 7 clips.



36. INSTALL ENGINE ROOM SIDE COVER LH

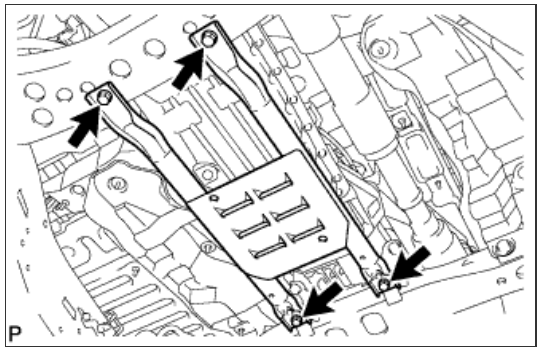
a. Install the engine room side cover with the 7 clips.



37. INSTALL OIL PAN PROTECTOR ASSEMBLY

a. Install the oil pan protector with the 4 bolts.

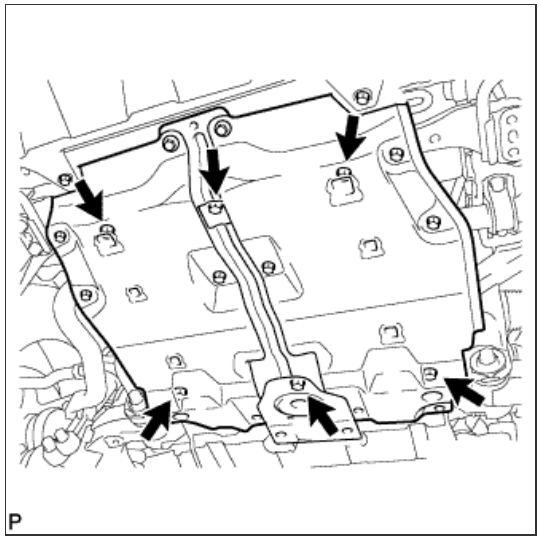
Torque:
63 N*m{ 642 kgf*cm , 46 ft.*lbf }



38. INSTALL NO. 1 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

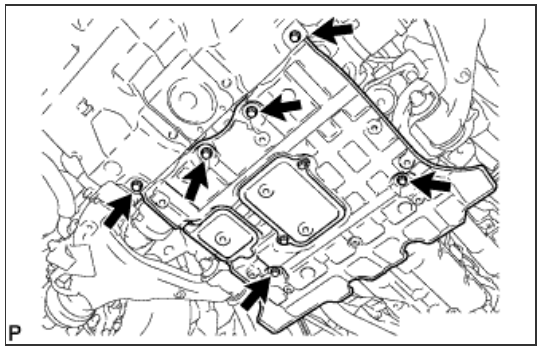
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



39. INSTALL NO. 2 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

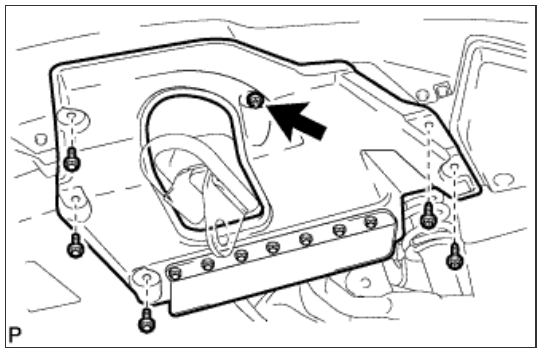
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



40. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Push in the clip indicated by the arrow in the illustration to install the fender splash shield.

b. Install the 3 bolts and 2 screws.



41. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

42. RESET MEMORY

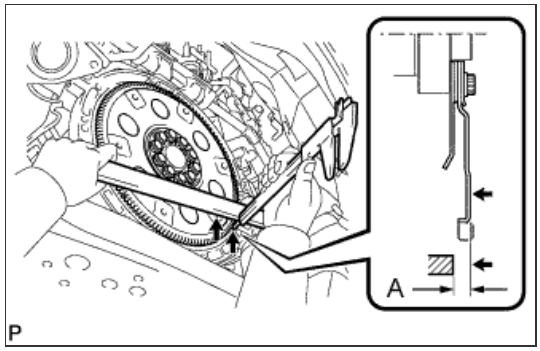
a. Perform the Reset Memory procedures (A/T initialization) (Click here).

for Preparation Click here

1. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

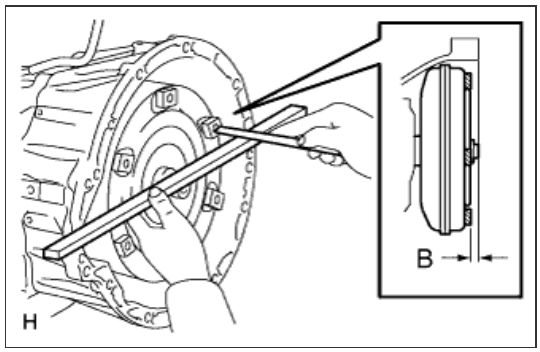
a. Using a vernier caliper and straightedge, measure dimension A between the transmission and the end surface of the drive plate.

b. Install the torque converter to the transmission housing.



c. Using a vernier caliper and straightedge, measure dimension B shown in the illustration and check that B is more than A measured in the first step.

Standard distance:
B = A + 1.00 mm (0.0394 in.) or more



2. INSTALL WIRE HARNESS CLAMP BRACKET

a. Install the front bracket LH with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

b. Install the rear bracket LH with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

c. Install the rear bracket RH with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

d. Install the front bracket RH with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

e. Install the rear engine bracket with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

3. INSTALL TRANSFER ASSEMBLY

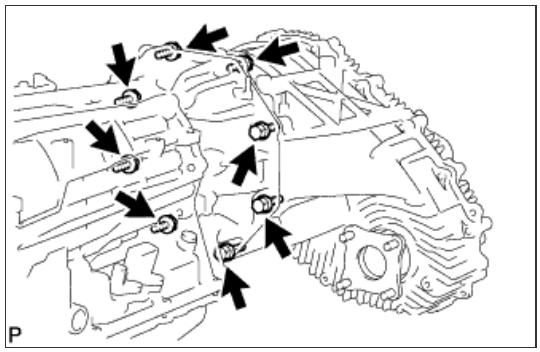
a. Install the transfer with the 8 bolts.

Torque:

40 N*m{ 408 kgf*cm , 30 ft.*lbf }

NOTICE:

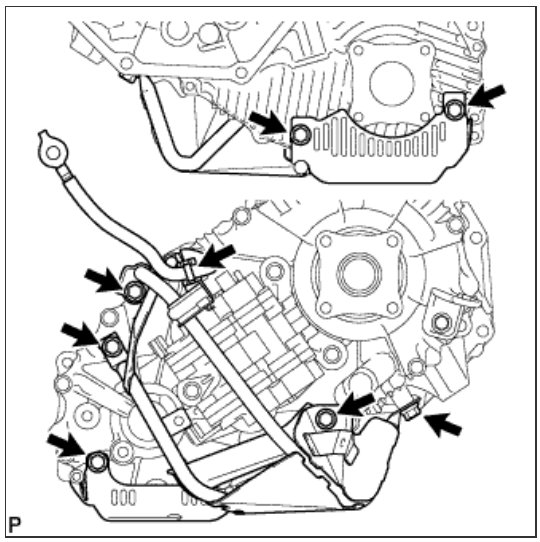
Be careful not to damage the oil seal of the transfer adapter.



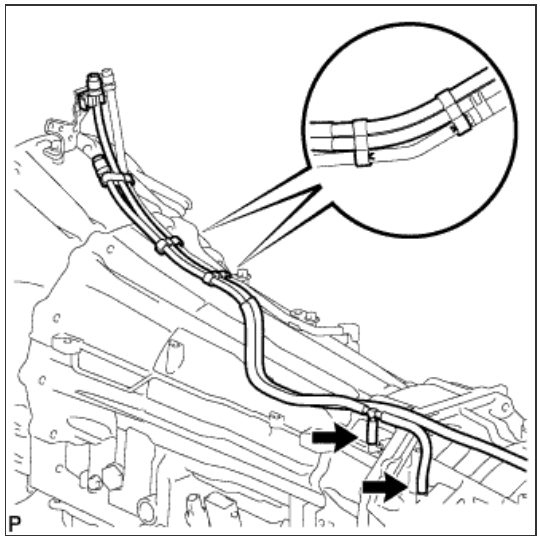
b. Install the transfer case lower protector with the 7 bolts.

Torque:
14 N*m{ 143 kgf*cm , 10 ft.*lbf }

c. Connect the clamp of grand cable to the transfer case lower protector.

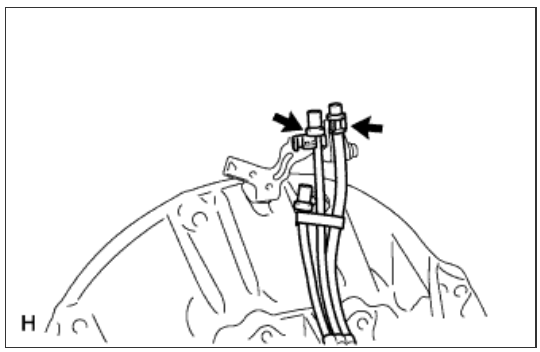


d. Attach the 3 breather hose clamps to connect the transfer breather hose to the automatic transmission breather tube.



4. CONNECT BREATHER PLUG HOSE

a. Connect the 2 breather plug hoses to the harness clamp bracket.



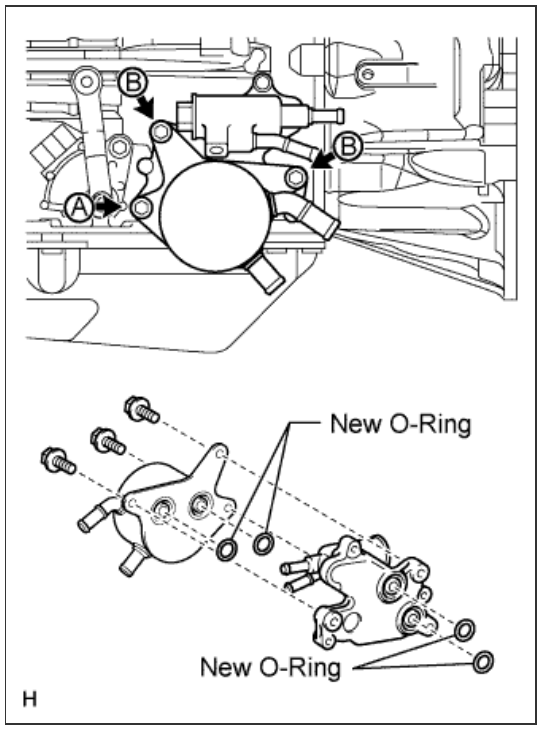
5. INSTALL TRANSMISSION OIL COOLER ASSEMBLY (w/o Air Cooled Transmission Oil Cooler)

a. Coat 4 new O-rings with ATF.

b. Install the 4 O-rings, transmission oil thermostat and transmission oil cooler to the automatic transmission.

c. Temporarily install bolt A. Install the bolts labeled B and tighten them to the specified torque. Then tighten bolt A to the specified torque.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }



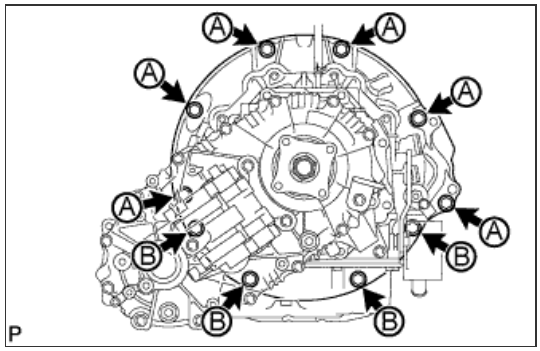
6. INSTALL AUTOMATIC TRANSMISSION ASSEMBLY

NOTICE:

Confirm that the 2 knock pins are attached to the transmission contact surface of the engine block before the installing the transmission.

a. Install the transmission with the 10 bolts.

Torque:
for 17 mm head bolt A:
71 N*m{ 724 kgf*cm , 52 ft.*lbf }
for 14 mm head bolt B:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }

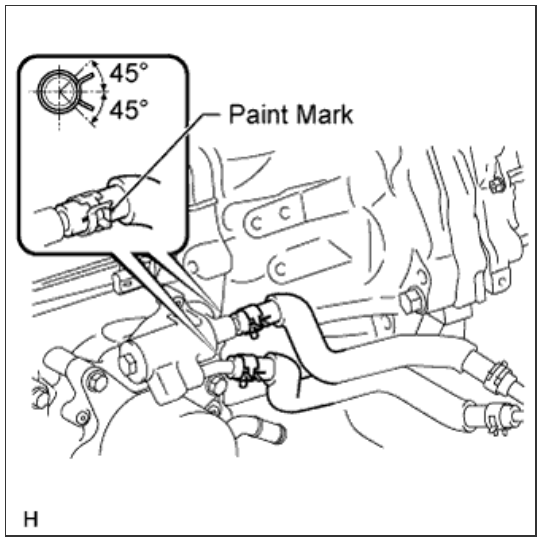


7. CONNECT TRANSMISSION OIL COOLER HOSE (w/o Air Cooled Transmission Oil Cooler)

a. Connect the 2 transmission oil cooler hoses to the transmission oil thermostat.

NOTICE:

- **Make sure the pinching portion of each clip is facing the direction shown in the illustration.**
- **Make sure the paint mark of each hose is facing outward.**



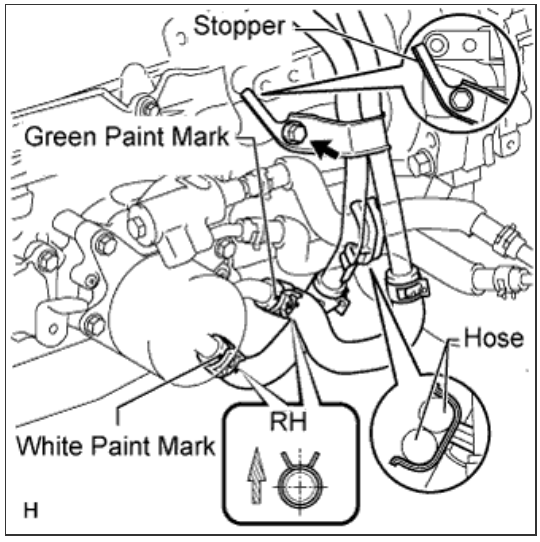
8. CONNECT NO. 2 WATER BY-PASS PIPE (w/o Air Cooled Transmission Oil Cooler)

a. Connect the 2 water by-pass hoses with the 2 clips and install the water by-pass pipe with the bolt.

Torque:
18 N*m{ 184 kgf*cm , 13 ft.*lbf }

NOTICE:

- **Make sure the pinching portion of each clip is facing the direction shown in the illustration.**
- **Make sure the paint mark of each hose is facing outward.**

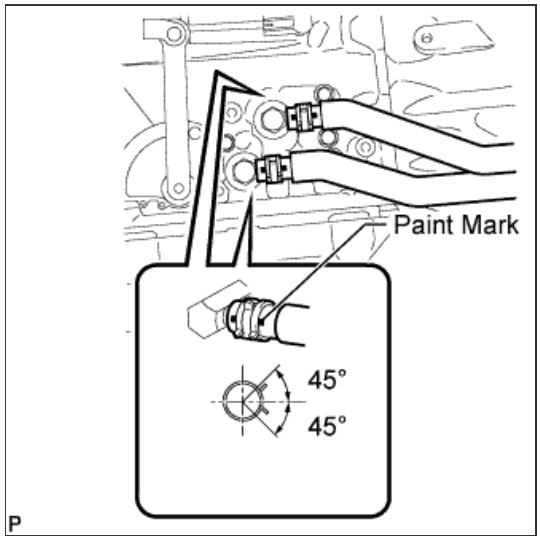


9. CONNECT TRANSMISSION OIL COOLER HOSE

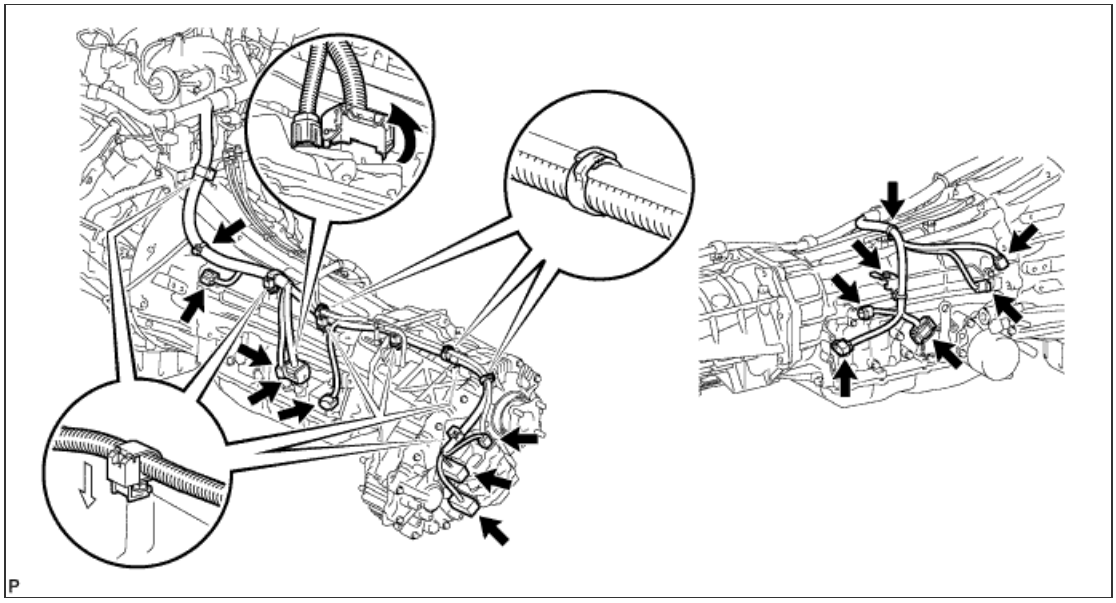
a. Connect the 2 transmission oil cooler hoses to the oil cooler tube union.

NOTICE:

- **Make sure the pinching portion of each clip is facing the direction shown in the illustration.**
- **Make sure the paint mark of each hose is facing outward.**



10. CONNECT WIRE HARNESS AND CONNECTOR



a. Connect the park/neutral position switch connector, 2 transmission wire connectors, 2 speed sensor connectors and 3 transfer control side connectors.

HINT:

Push up the lever until the claw of the transmission wire connector makes a connection sound.

b. Connect the 4 connector clamps and 6 harness clamps.

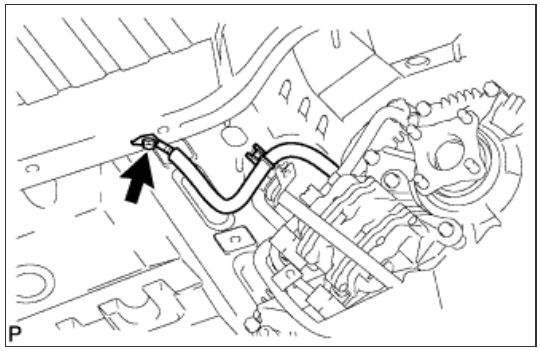
c. Connect the wire harness with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

d. Tilt up the automatic transmission.

e. Connect the ground cable with the bolt.

Torque:
8.4 N*m{ 86 kgf*cm , 74 in.*lbf }



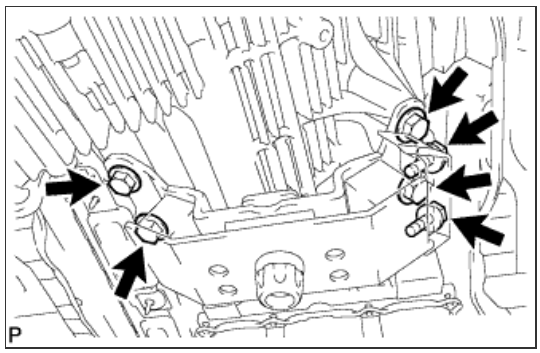
11. INSTALL REAR NO. 1 ENGINE MOUNTING INSULATOR

a. Install the rear engine mounting insulator to the transmission with the 4 bolts.

Torque:
59 N*m{ 602 kgf*cm , 44 ft.*lbf }

b. Install the engine mounting heat insulator with the 2 bolts.

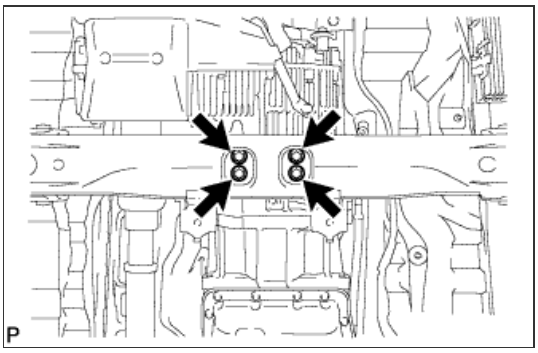
Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



12. INSTALL NO. 2 FRAME CROSSMEMBER SUB-ASSEMBLY

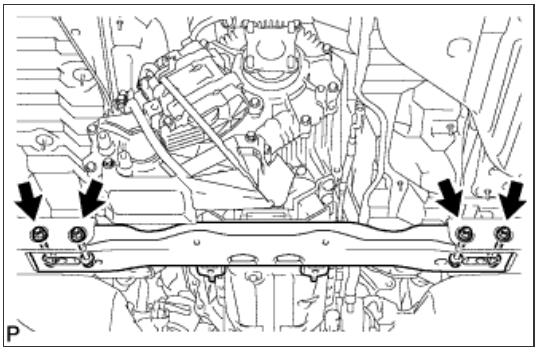
a. Install the frame crossmember to the rear engine mounting insulator with the 4 bolts.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }

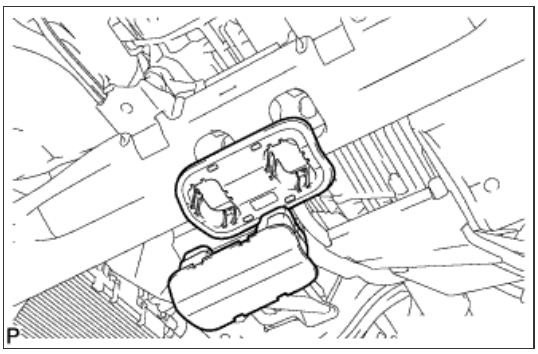


b. Install the frame crossmember to the frame with the 4 bolts and 4 nuts.

Torque:
110 N*m{ 1122 kgf*cm , 81 ft.*lbf }



c. Install the engine mounting hole cover.



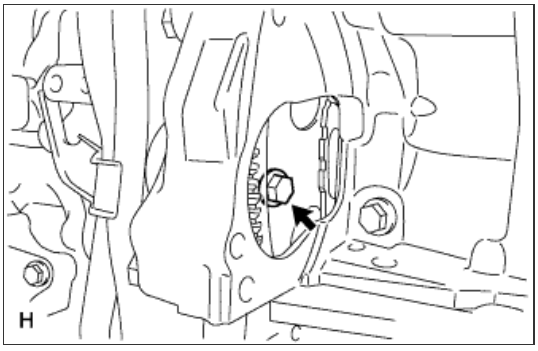
13. INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT

a. Turn the crankshaft to gain access to the installation locations of the 6 bolts and install the bolts while holding the crankshaft pulley set bolt with a wrench.

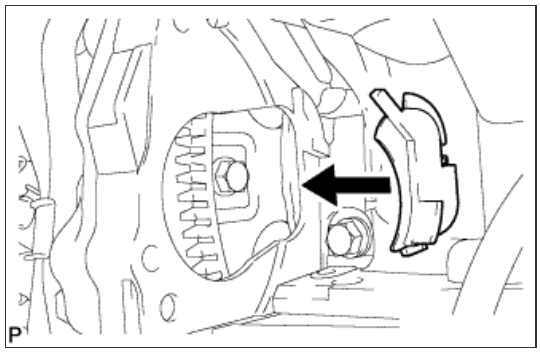
Torque:
53 N*m{ 535 kgf*cm , 39 ft.*lbf }

NOTICE:

First install the black colored bolt and then the remaining 5 bolts.

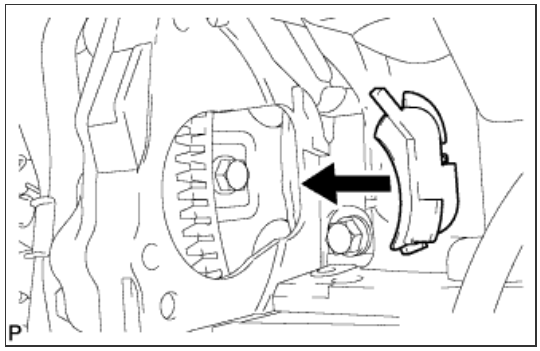


b. Install the flywheel housing side cover.



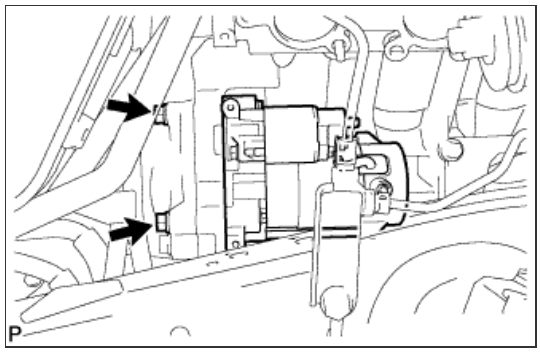
14. INSTALL STARTER ASSEMBLY

a. Install the flywheel housing side cover.



b. Install the starter with the 2 bolts.

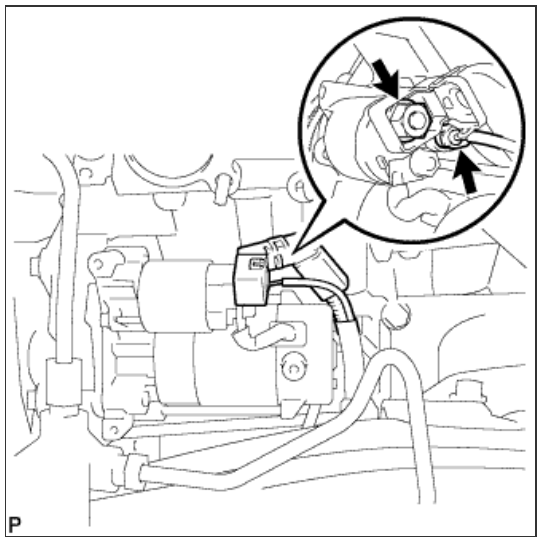
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



c. Install the starter wire with the nut.

Torque:
9.8 N*m{ 100 kgf*cm , 87 in.*lbf }

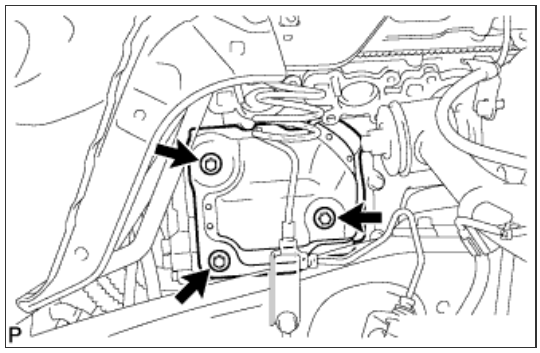
d. Connect the starter connector.



15. INSTALL STARTER COVER

a. Install the starter cover with the 3 bolts.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



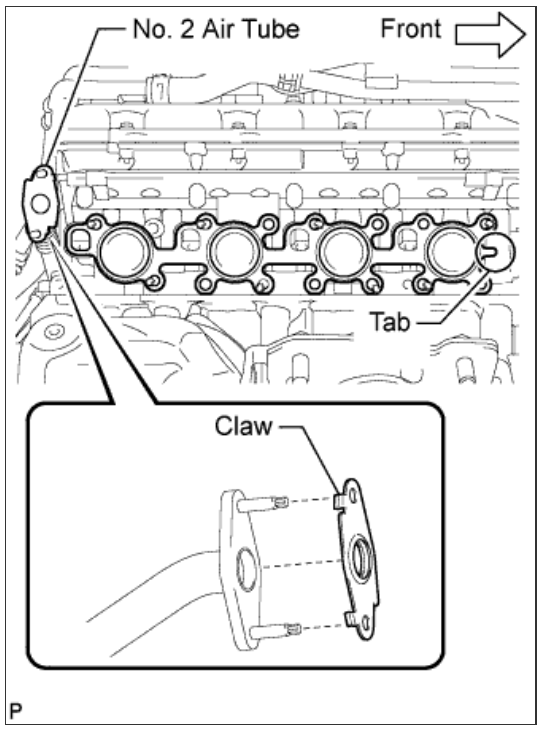
16. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY RH

a. w/ Secondary Air Injection System:

i. Install a new gasket to the cylinder head and a new gasket to the No. 2 air tube.

HINT:

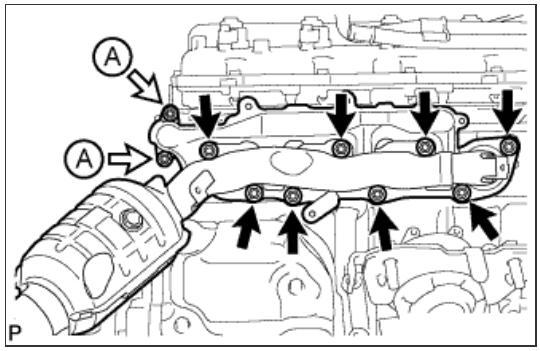
- **Install the exhaust manifold gasket with the gasket tab facing toward the front of the engine.**
- **Install the air tube gasket with the gasket claws facing the tube side.**



ii. Temporarily install the exhaust manifold with the 2 nuts labeled A and 8 new nuts.

iii. Uniformly tighten the nuts that are not labeled A, and then tighten the 2 nuts labeled A.

Torque:
for nut A:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }
except nut A:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }

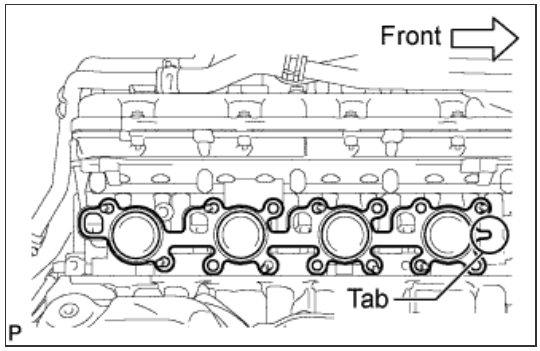


b. w/o Secondary Air Injection System:

i. Install a new gasket to the cylinder head.

HINT:

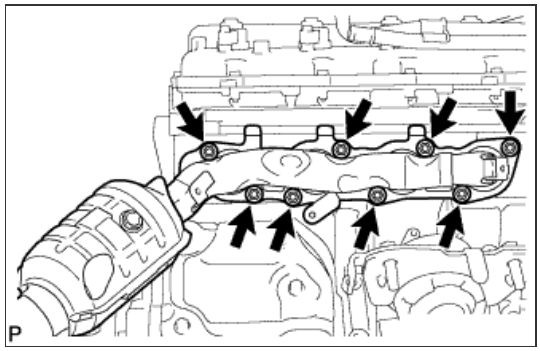
Install the exhaust manifold gasket with the gasket tab facing toward the front of the engine.



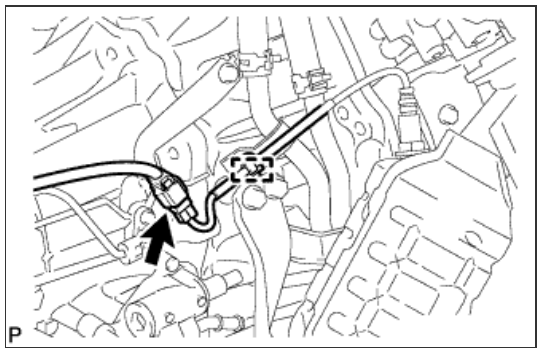
ii. Temporarily install the exhaust manifold with the 8 new nuts.

iii. Uniformly tighten the 8 nuts.

Torque:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }



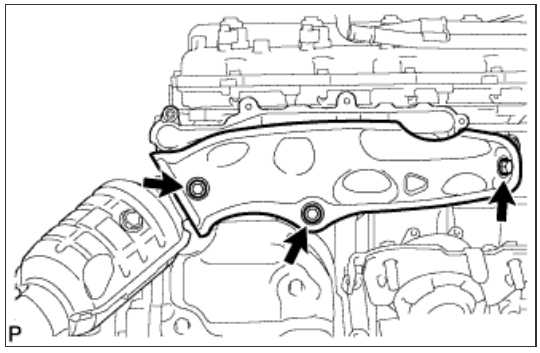
c. Attach the wire harness clamp to the bracket and connect the connector.



17. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

a. Install the heat insulator with the 3 bolts.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



18. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE

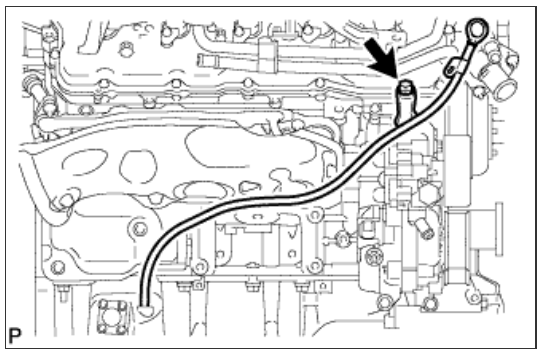
a. Apply a light coat of engine oil to a new O-ring.

b. Install the O-ring to the guide.

c. Install the dipstick guide with the bolt.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }

d. Install the dipstick.



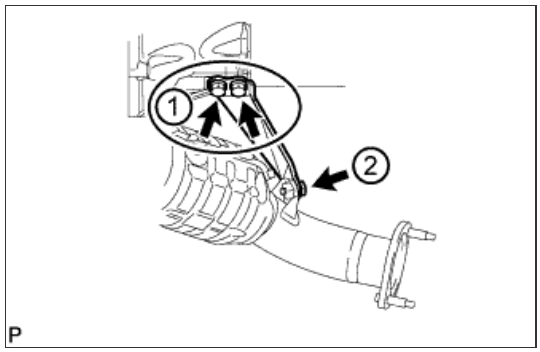
19. INSTALL NO. 2 MANIFOLD STAY

a. Temporarily install the manifold stay with the 3 bolts.

a. Temporarily install the manifold stay with the 3 bolts.

b. Tighten the 3 bolts in the order shown in the illustration.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }

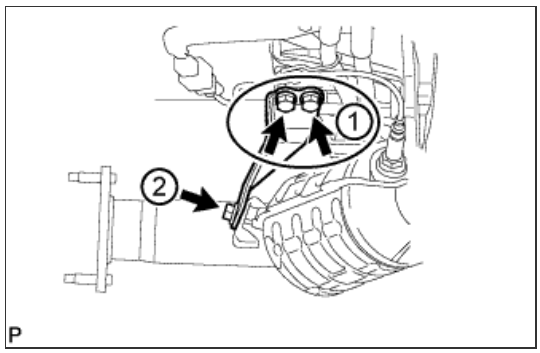


20. INSTALL NO. 1 MANIFOLD STAY

a. Temporarily install the manifold stay with the 3 bolts.

b. Tighten the 3 bolts in the order shown in the illustration.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }



21. INSTALL FRONT EXHAUST PIPE ASSEMBLY

a. Install a new gasket and the front exhaust pipe to the exhaust manifold RH with 2 new nuts.

Torque:
54 N*m{ 551 kgf*cm , 40 ft.*lbf }

b. Install the wire harness clamp bracket of the oxygen sensor to the transmission with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

c. Connect the heated oxygen sensor connector.

22. INSTALL FRONT NO. 2 EXHAUST PIPE ASSEMBLY

a. Install a new gasket and the front No. 2 exhaust pipe to the exhaust manifold LH with 2 new nuts.

Torque:
54 N*m{ 551 kgf*cm , 40 ft.*lbf }

b. Install the wire harness clamp bracket of the oxygen sensor to the transmission with the bolt.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

c. Connect the heated oxygen sensor connector.

23. INSTALL CENTER EXHAUST PIPE ASSEMBLY

a. Install 2 new gaskets to the front exhaust pipe and front No. 2 exhaust pipe.

b. Install the center exhaust pipe to the 3 exhaust pipe supports, and then install the 4 bolts.

Torque:
48 N*m{ 489 kgf*cm , 35 ft.*lbf }

24. INSTALL TAILPIPE ASSEMBLY

a. Install the tailpipe to the 2 exhaust pipe supports.

b. Install a new gasket to the center exhaust pipe.

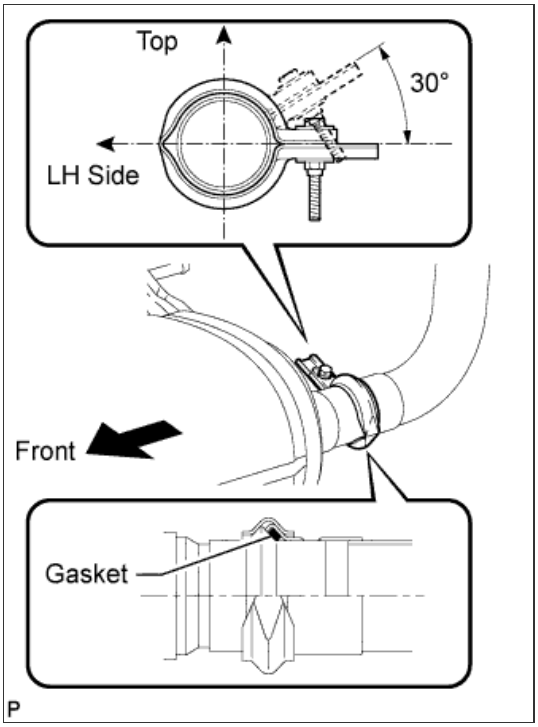
c. Connect the tailpipe to the center exhaust pipe.

d. Attach a new clamp to the tailpipe and center exhaust pipe. Then install the bolt to the clamp.

Torque:
32 N*m{ 326 kgf*cm , 24 ft.*lbf }

HINT:

Install the clamp within the angle range shown in the illustration.



25. INSTALL PROPELLER SHAFT ASSEMBLY

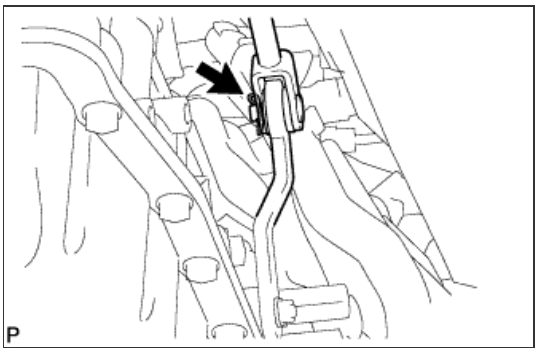
a. Install the propeller shaft (Click here).

26. INSTALL FRONT PROPELLER SHAFT ASSEMBLY

a. Install the front propeller shaft (Click here).

27. CONNECT FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSEMBLY

a. Connect the gear shifting rod to the transmission control shaft lever RH with the pin and a new clip.



28. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

29. ADD AUTOMATIC TRANSMISSION FLUID

a. Add automatic transmission fluid (Click here).

30. ADD ENGINE COOLANT

a. Add engine coolant.

Standard Capacity:

Item	Specified Condition
with transmission oil cooler	16.7 liters (17.6 US qts, 14.7 Imp. qts)
without transmission oil cooler	16.2 liters (17.1 US qts, 14.3 Imp. qts)

NOTICE:

Do not substitute plain water for engine coolant.

HINT:

TOYOTA vehicles are filled with TOYOTA SLLC at the factory. In order to avoid damage to the engine cooling system and other technical problems, only use TOYOTA SLLC or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

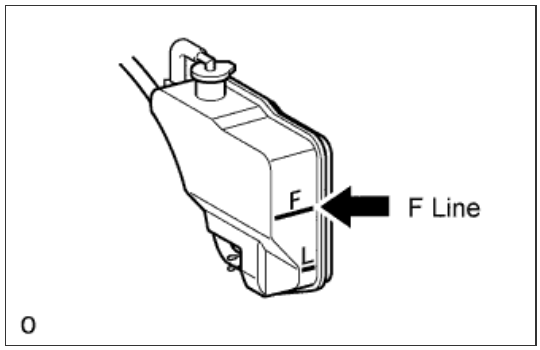
b. Slowly pour coolant into the radiator reservoir until it reaches the F line.

c. Install the reservoir cap.

d. Press the No. 1 and No. 2 radiator hoses several times by hand, and then check the coolant level. If the coolant level is low, add coolant.

e. Install the radiator cap.

f. Start the engine and warm it up until the thermostat opens.



NOTICE:

Switch off the A/C.

g. Maintain the engine speed at 2000 to 2500 rpm.

NOTICE:

- **Make sure that the radiator reservoir still has some coolant in it.**
- **Pay attention to the needle of the water temperature meter. Make sure that the needle does not show an abnormally high temperature.**
- **If there is not enough coolant, the engine may burn out or overheat.**
- **Immediately after starting the engine, if the radiator reservoir does not have any coolant, perform the following: 1) stop the engine, 2) wait until the coolant has cooled down, and 3) add coolant until the coolant is filled to the F line.**
- **Run the engine at 2000 rpm until the coolant level has stabilized.**

h. Press the No. 1 and No. 2 radiator hoses several times by hand to bleed air.

CAUTION:

- **Wear protective gloves.**
- **Be careful as the radiator hoses are hot.**
- **Keep your hands away from the fan.**

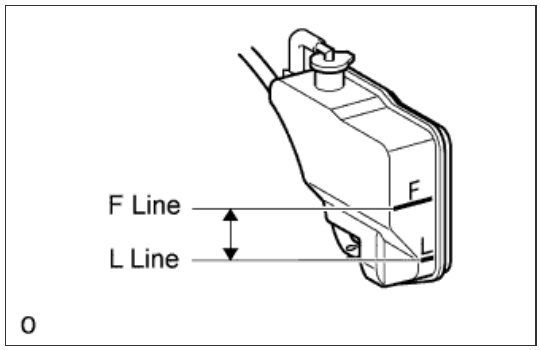
i. Stop the engine, and wait until the engine coolant cools down to ambient temperature.

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

j. Check that the coolant level is between the F and L lines.

If the coolant level is below the L line, repeat all of the procedures above.
If the coolant level is above the F line, drain coolant so that the coolant level is between the F and L lines.

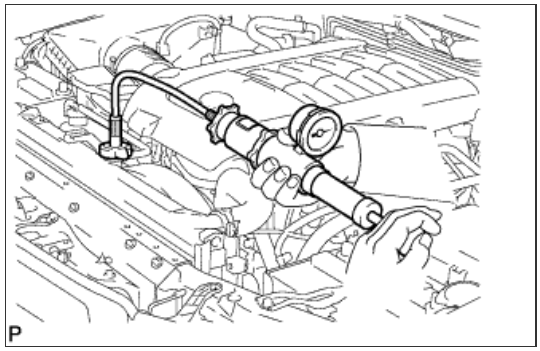


31. INSPECT FOR ENGINE COOLANT LEAK

a. Fill the radiator with coolant and attach a radiator cap tester.

b. Warm up the engine.

c. Using the radiator cap tester, increase the pressure inside the radiator to 123 kPa (1.3 kgf/cm^2, 18 psi), and check that the pressure does not drop.
If the pressure drops, check the hoses, radiator and water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.



32. INSPECT SHIFT LEVER POSITION

a. When moving the shift lever from P to R with the engine switch on (IG) and the brake pedal depressed, make sure that it moves smoothly and correctly into position.

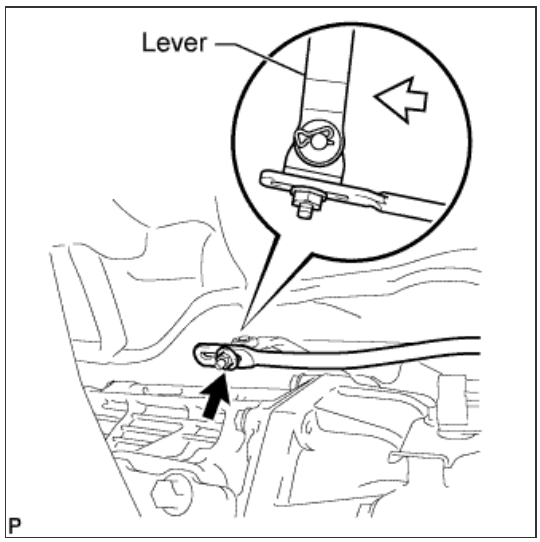
b. Check that the shift lever does not stop when moving the shift lever from R to P, and check that the shift lever does not stick when moving the shift lever from D to S.

c. Start the engine and make sure that the vehicle moves forward after moving the shift lever from N to D and moves rearward after moving the shift lever to R.
If there are problems during the above inspections, perform the adjustment using the following procedures.

i. Move the shift lever to N

ii. Loosen the nut of the floor shift gear shifting rod. Then, with the lever of the floor shift assembly lightly pushed towards the rear of the vehicle, tighten the nut.

Torque:
13 N*m{ 133 kgf*cm , 10 ft.*lbf }



33. INSPECT FOR EXHAUST GAS LEAK

34. INSTALL UPPER RADIATOR SUPPORT SEAL

a. Attach the 14 clips to install the upper radiator seal.

35. INSTALL ENGINE ROOM SIDE COVER RH

a. Install the engine room side cover RH with the 7 clips.

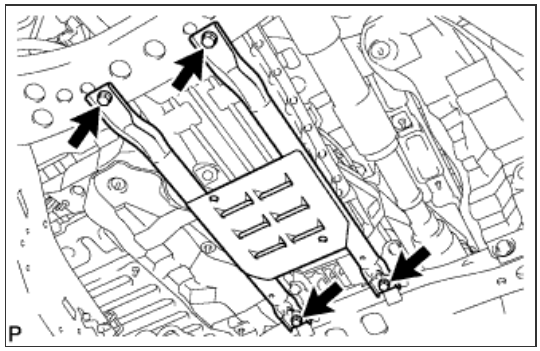
36. INSTALL ENGINE ROOM SIDE COVER LH

a. Install the engine room side cover LH with the 7 clips.

37. INSTALL OIL PAN PROTECTOR ASSEMBLY

a. Install the oil pan protector with the 4 bolts.

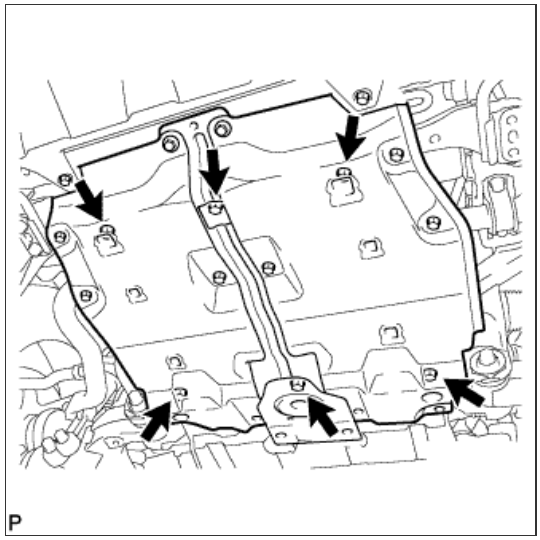
Torque:
63 N*m{ 642 kgf*cm , 46 ft.*lbf }



38. INSTALL NO. 1 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

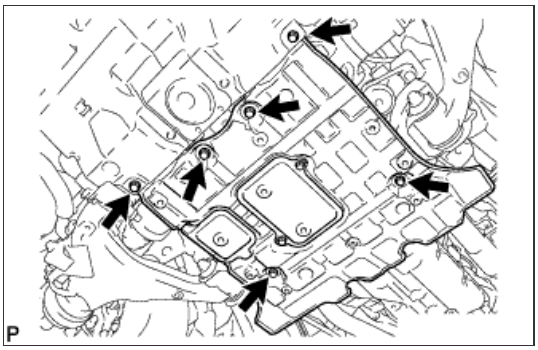


39. INSTALL NO. 2 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

Torque:

29 N*m{ 296 kgf*cm , 21 ft.*lbf }



40. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Push in the clip to install the front fender splash shield sub-assembly LH.

b. Install the 3 bolts and 2 screws.

41. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

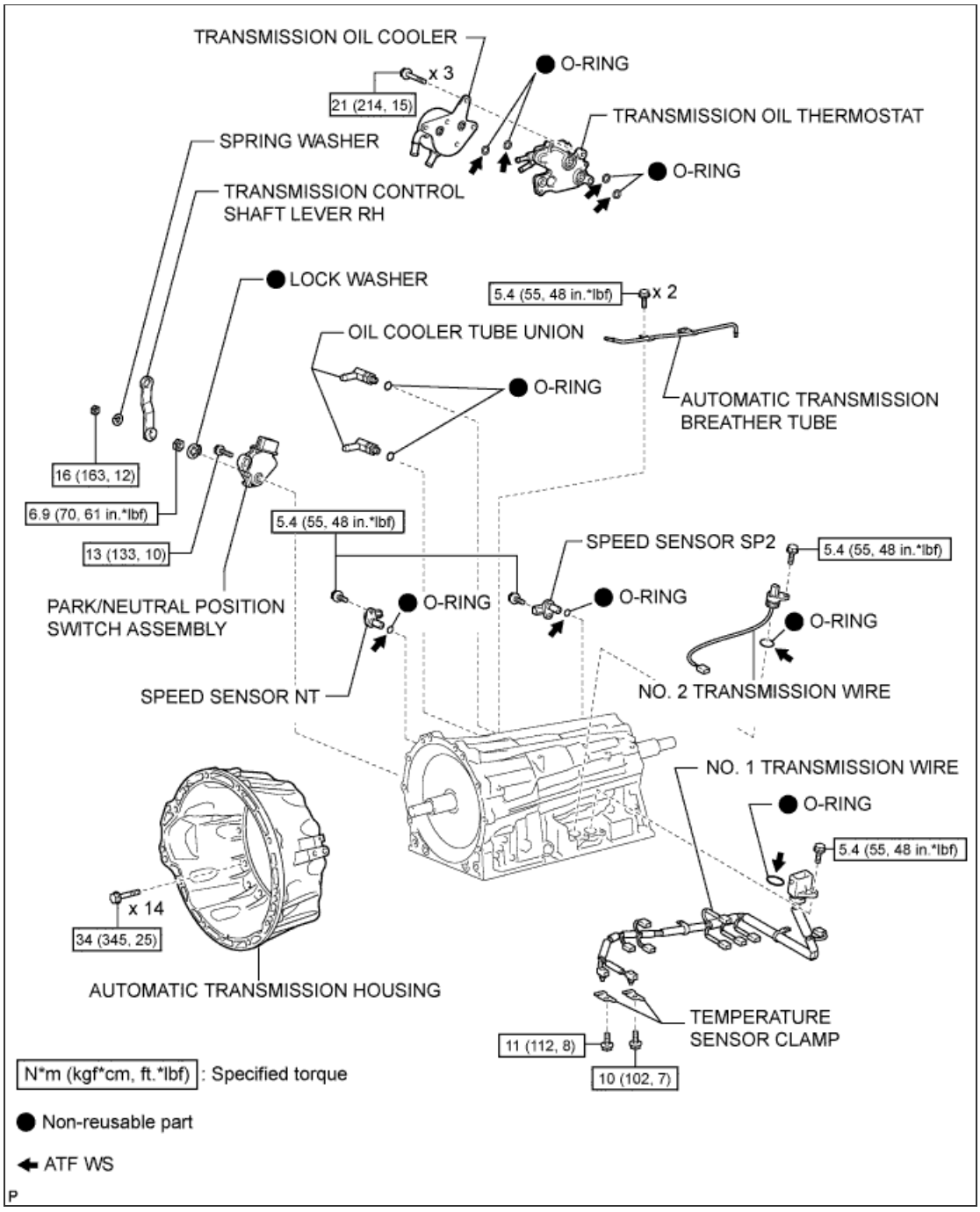
HINT:

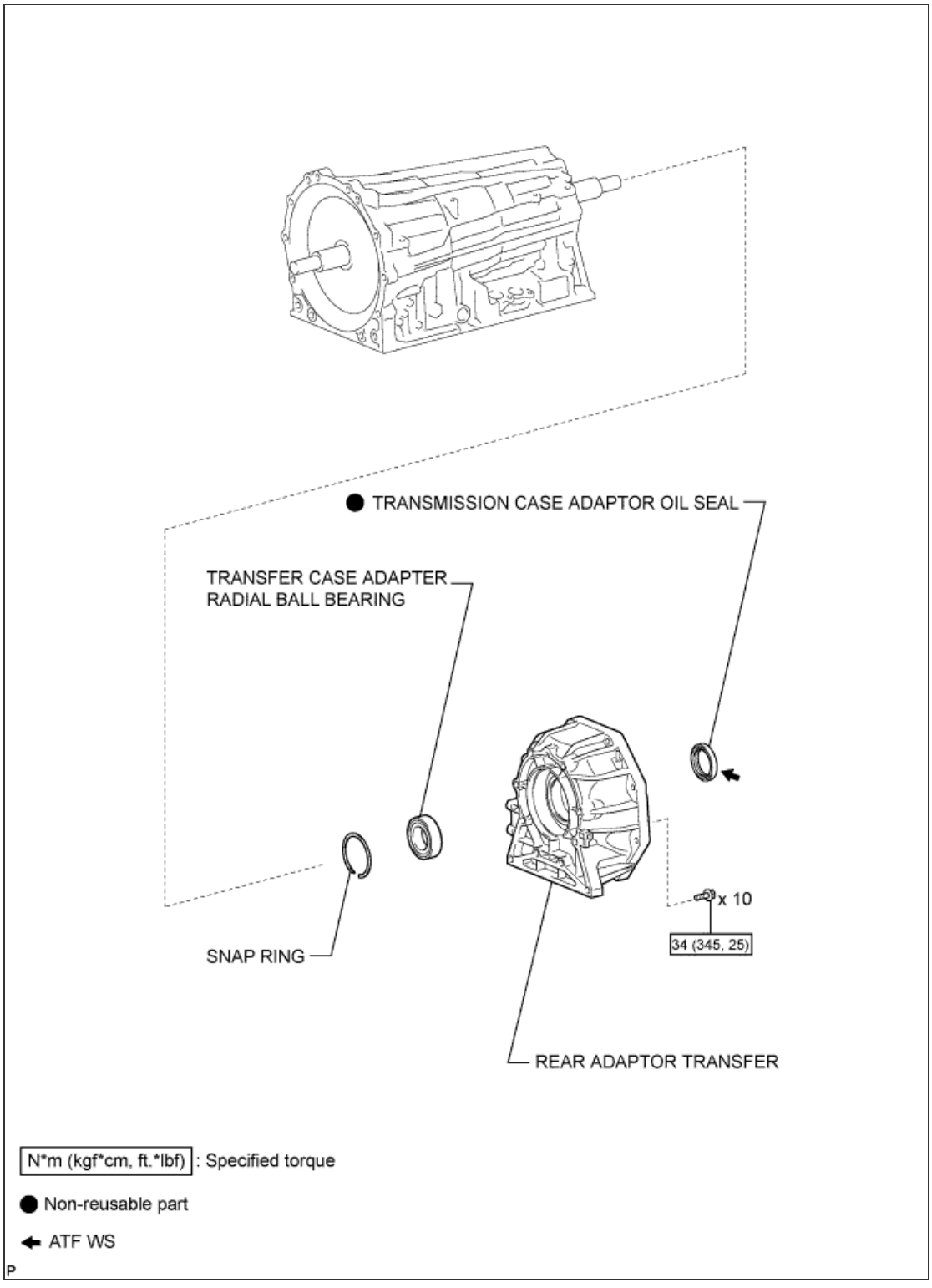
Use the same procedure described for the LH side.

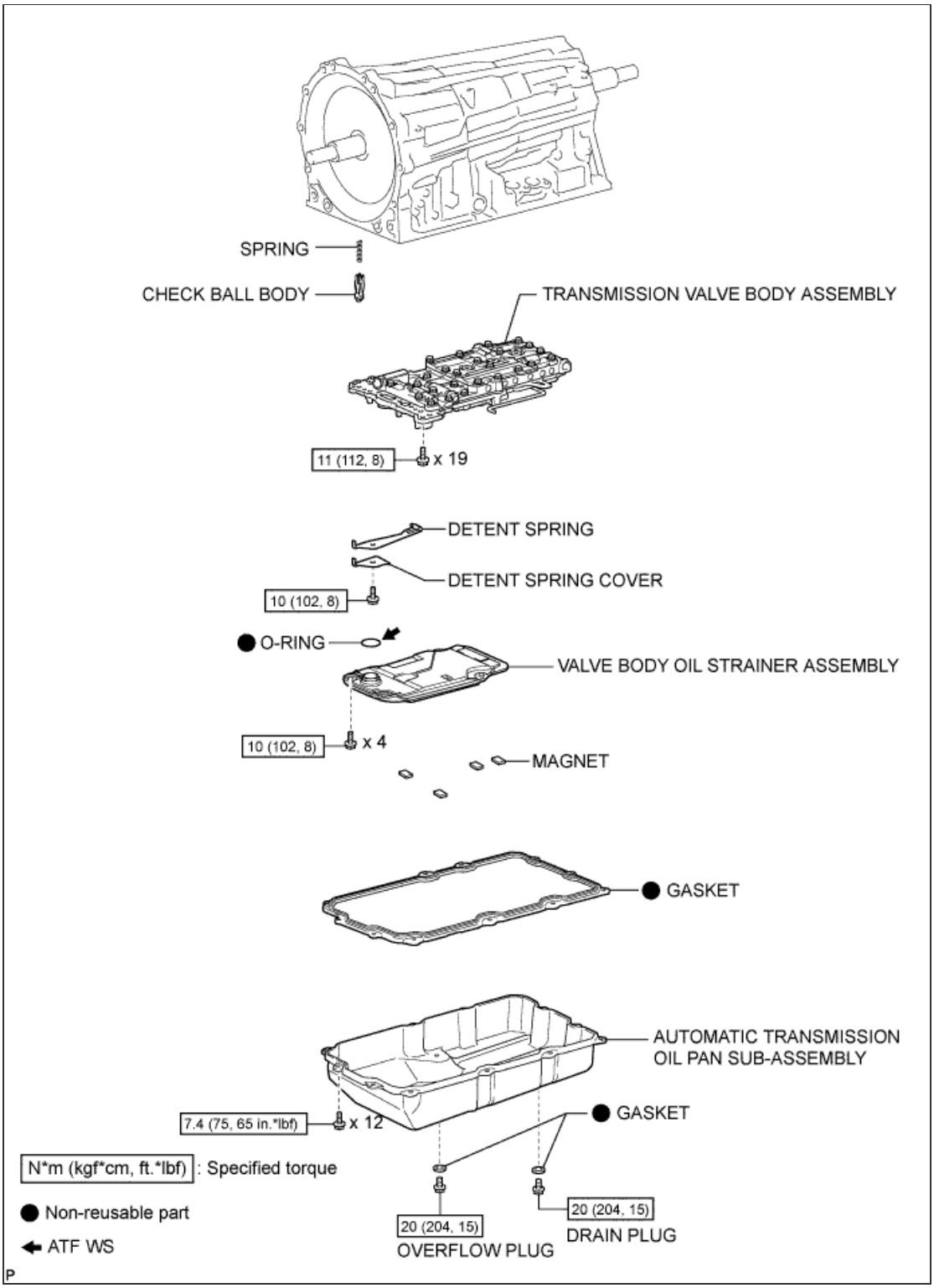
42. RESET MEMORY

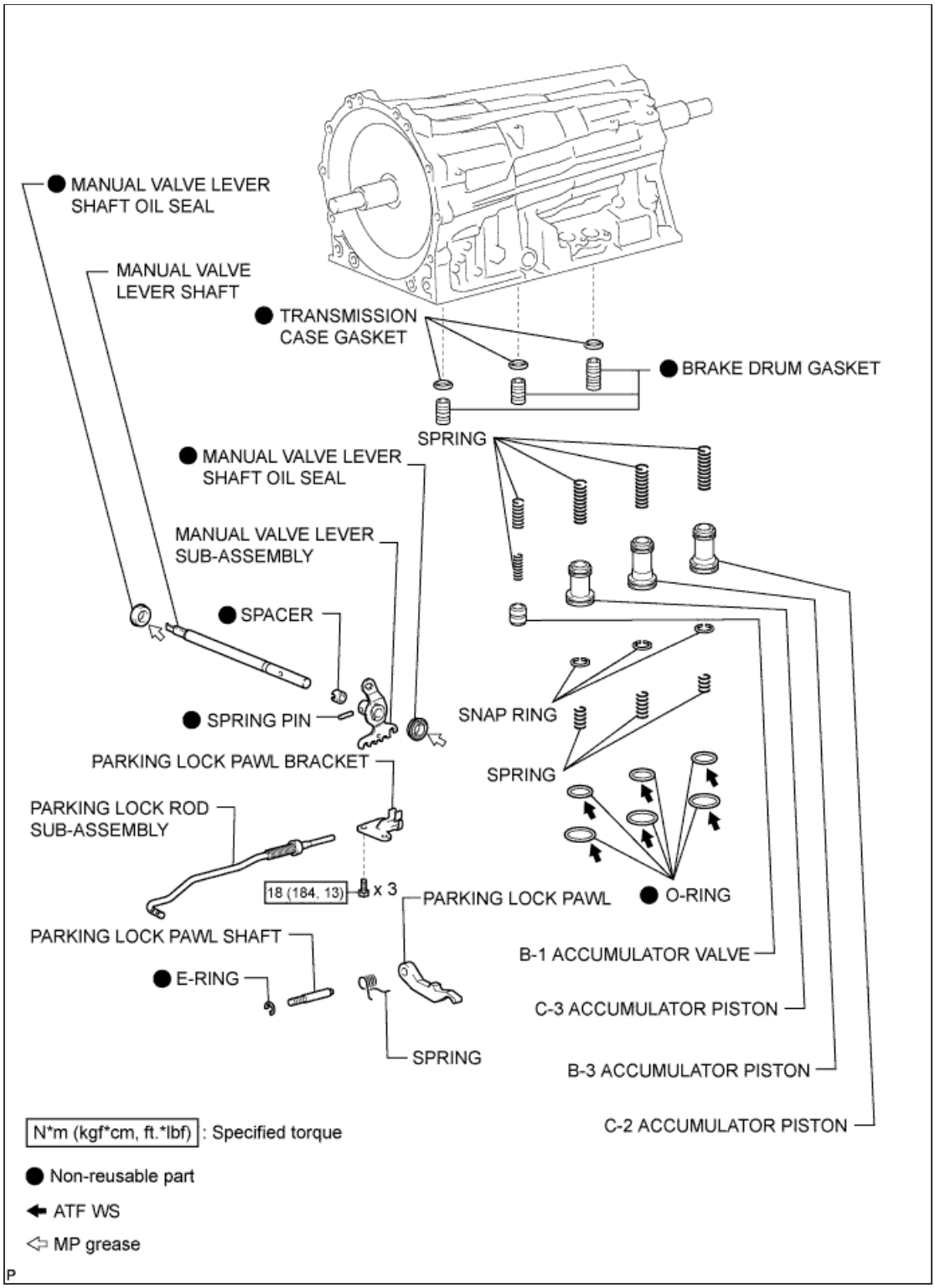
a. Perform the Reset Memory procedures (A/T initialization) (Click here).

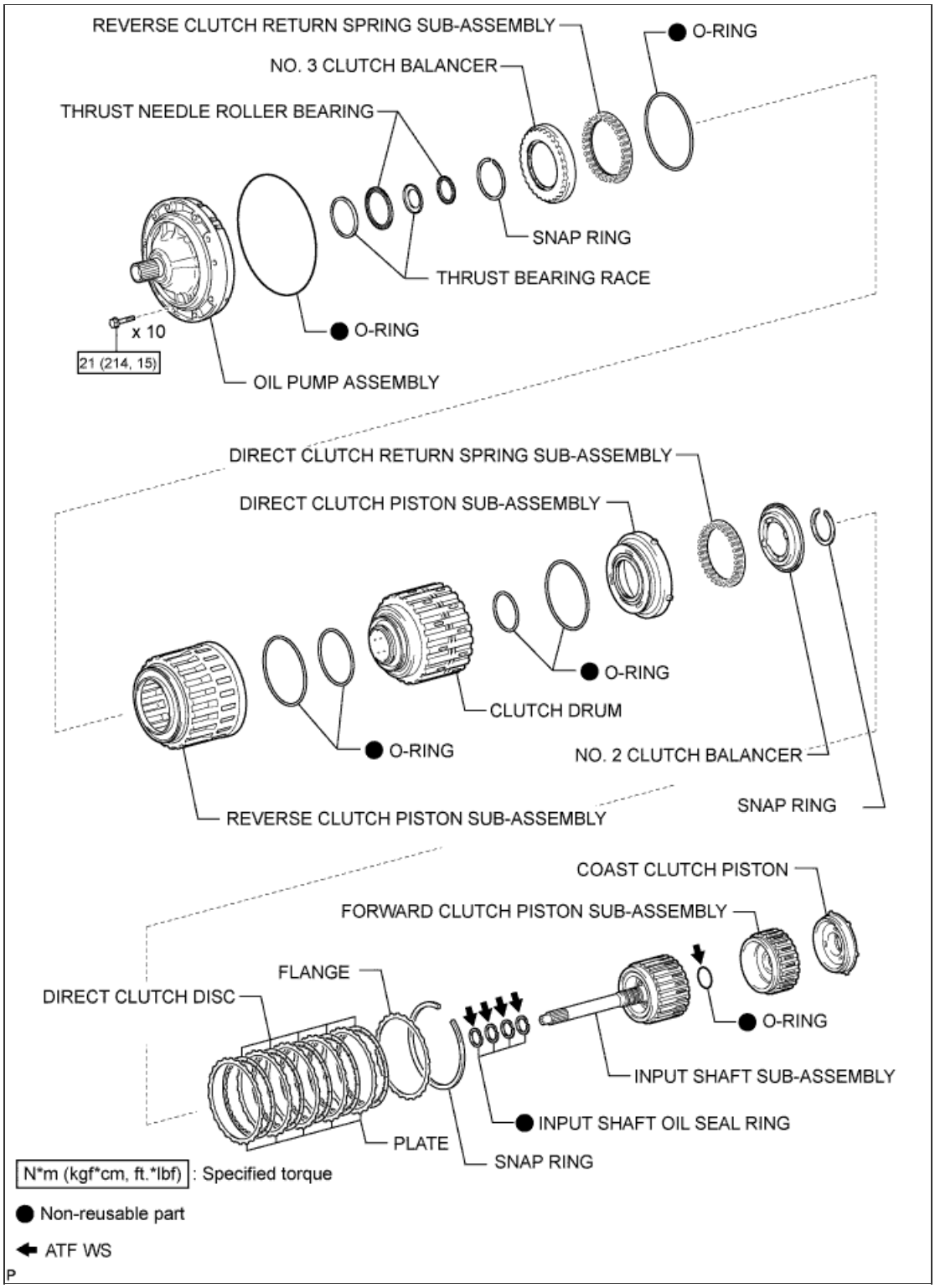
for Preparation Click here

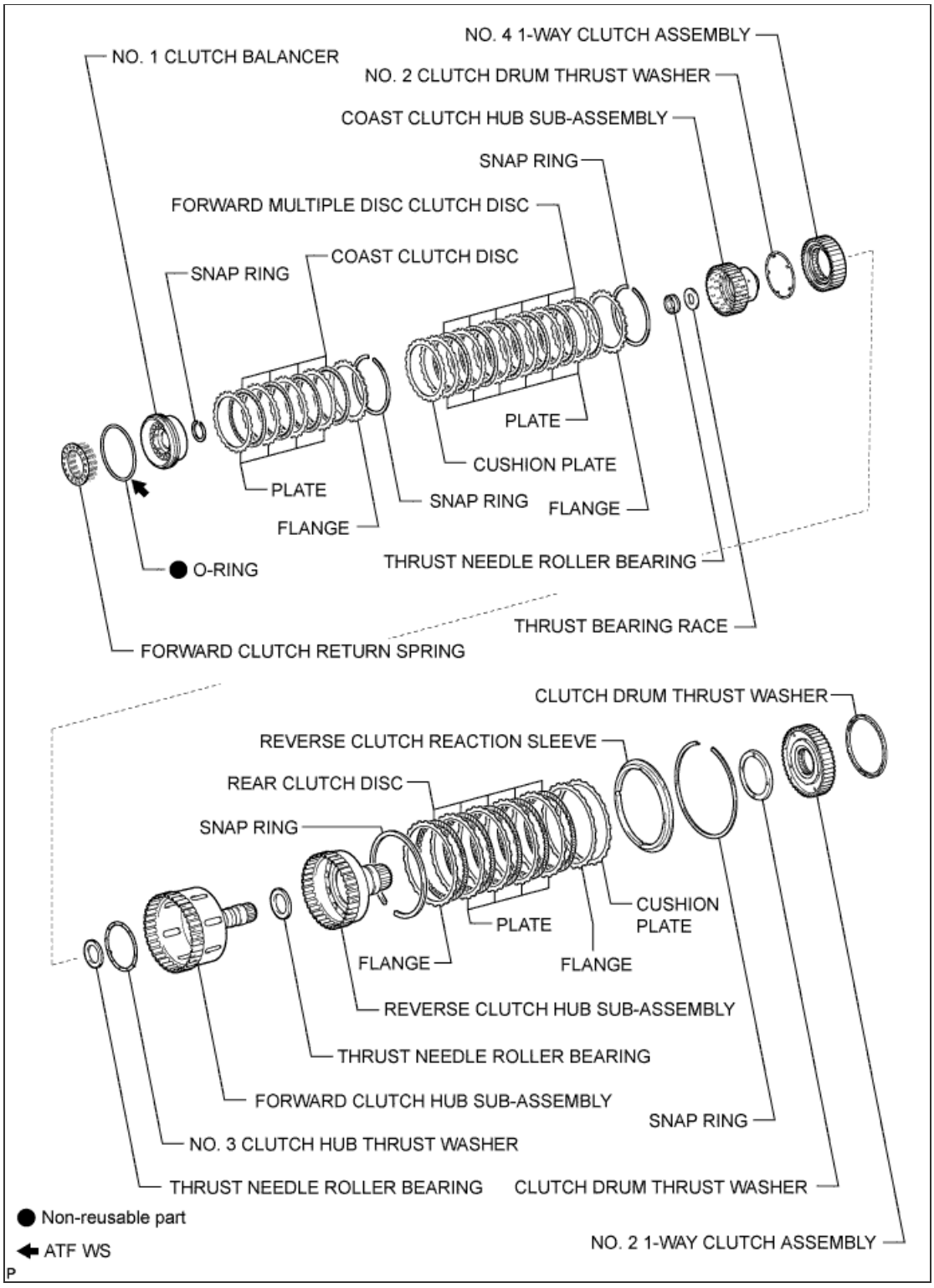


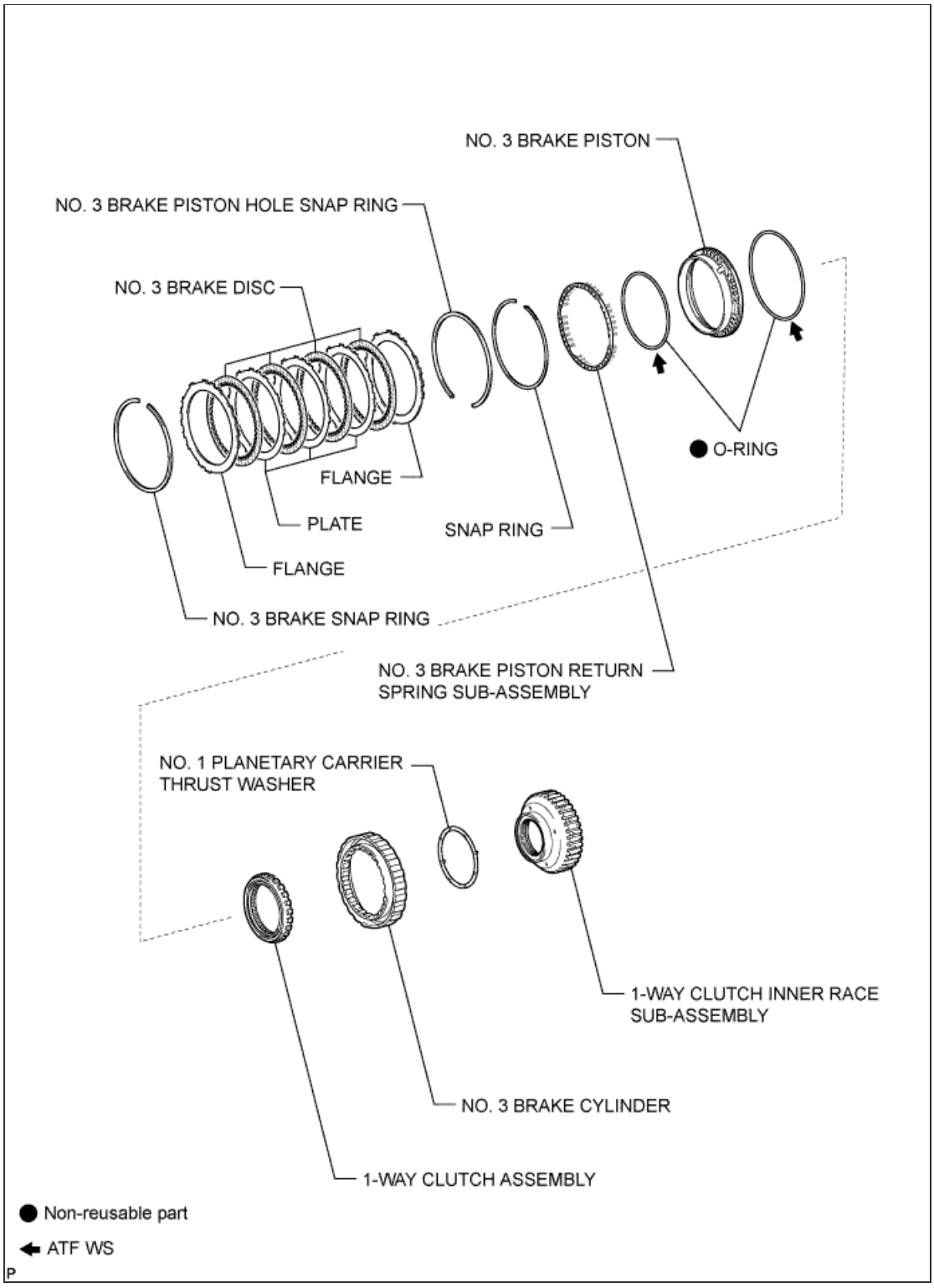

TRANSMISSION CASE ADAPTOR OIL SEAL
TRANSFER CASE ADAPTER
RADIAL BALL BEARING
x 10
34 (345, 25)
SNAP RING
REAR ADAPTOR TRANSFER
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
ATF WS
P

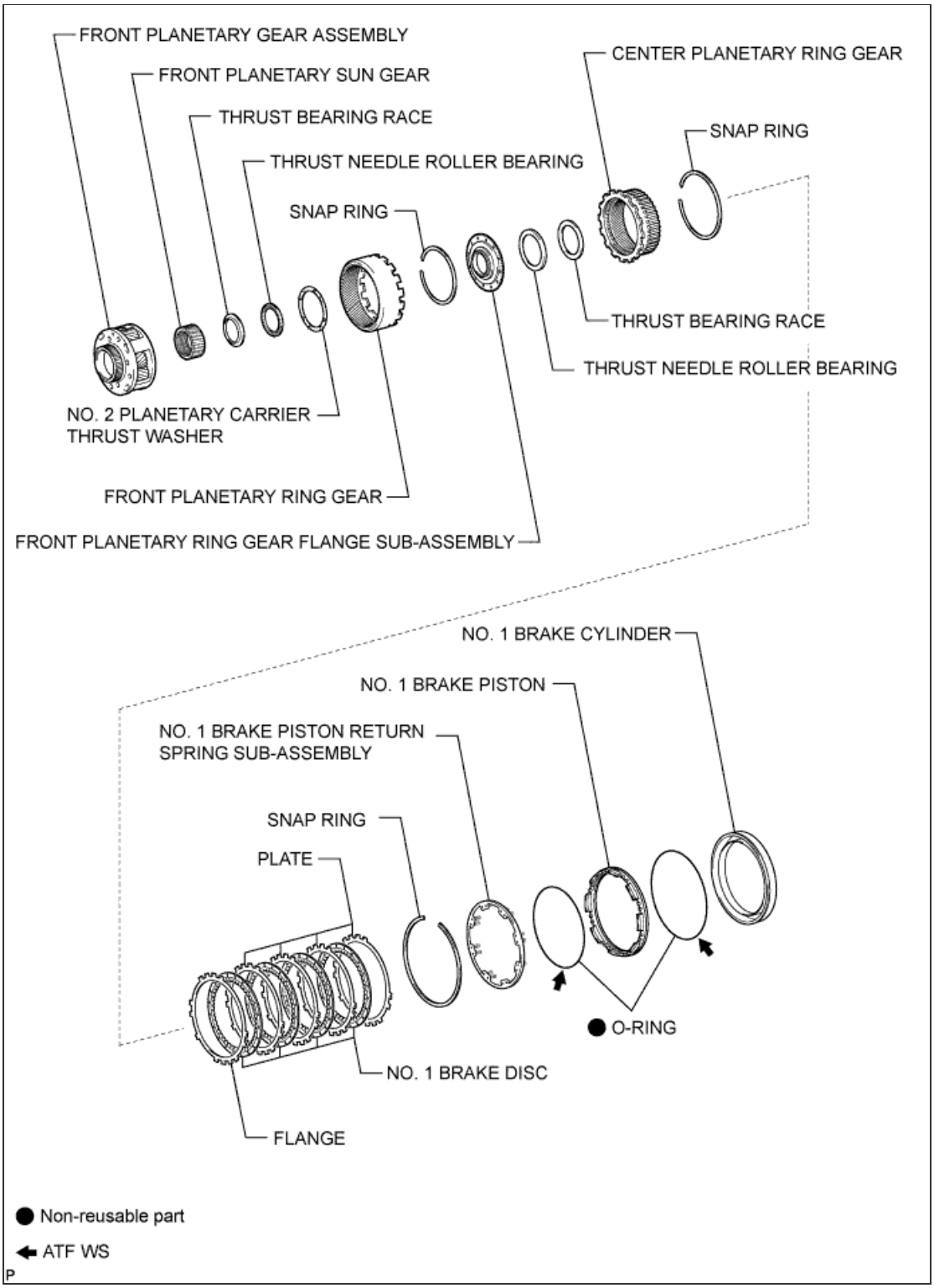

SPRING
CHECK BALL BODY
TRANSMISSION VALVE BODY ASSEMBLY
11 (112, 8)
x 19
DETENT SPRING
DETENT SPRING COVER
10 (102, 8)
O-RING
VALVE BODY OIL STRAINER ASSEMBLY
10 (102, 8)
x 4
MAGNET
GASKET
AUTOMATIC TRANSMISSION
OIL PAN SUB-ASSEMBLY
7.4 (75, 65 in.*lbf)
x 12
GASKET
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
ATF WS
20 (204, 15)
OVERFLOW PLUG
20 (204, 15)
DRAIN PLUG
P

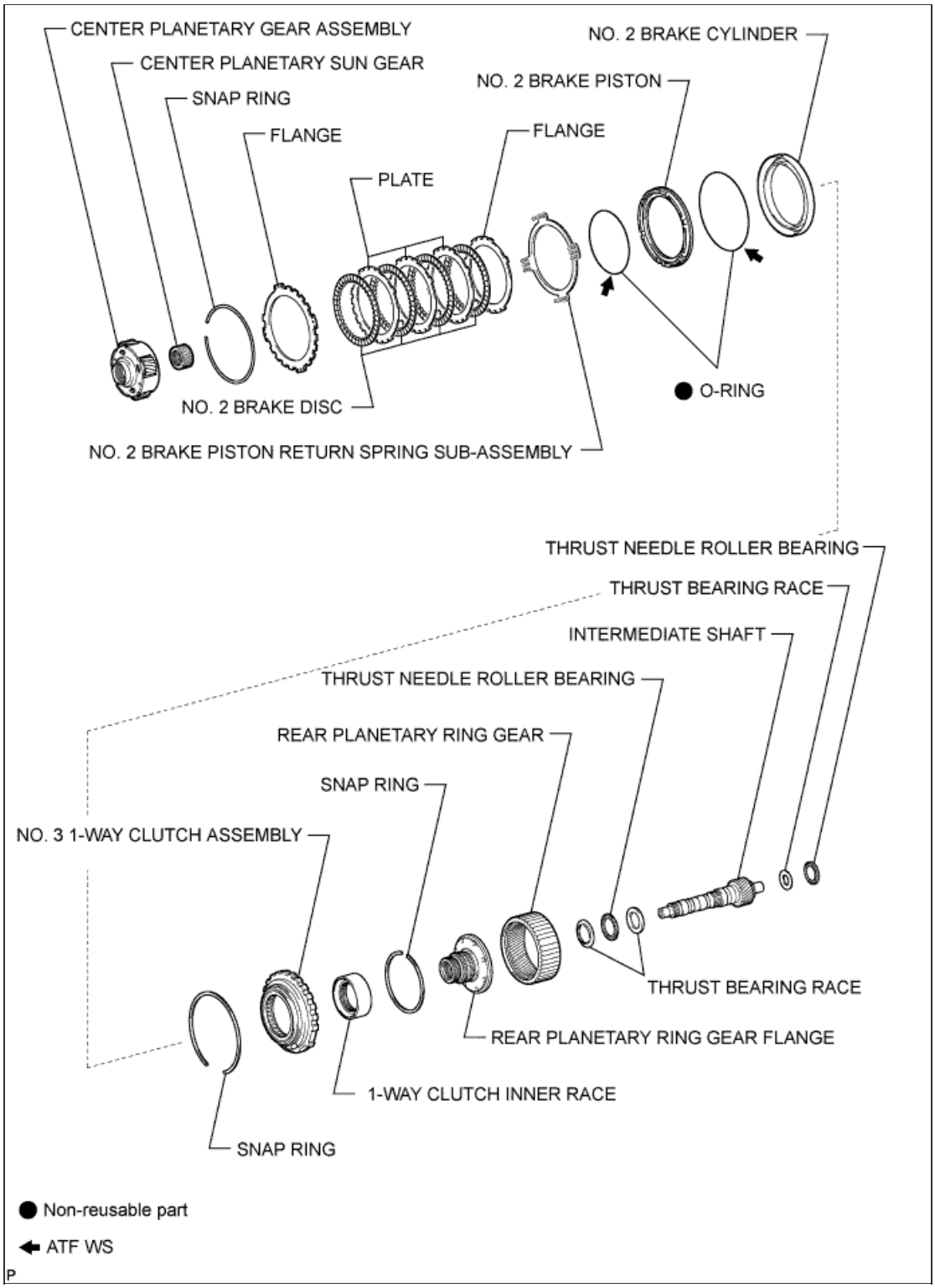

MANUAL VALVE LEVER SHAFT OIL SEAL
MANUAL VALVE LEVER SHAFT
TRANSMISSION CASE GASKET
BRAKE DRUM GASKET
SPRING
MANUAL VALVE LEVER SHAFT OIL SEAL
MANUAL VALVE LEVER SUB-ASSEMBLY
SPACER
SPRING PIN
SNAP RING
SPRING
PARKING LOCK PAWL BRACKET
PARKING LOCK ROD SUB-ASSEMBLY
18 (184, 13) x 3
PARKING LOCK PAWL
O-RING
PARKING LOCK PAWL SHAFT
E-RING
B-1 ACCUMULATOR VALVE
C-3 ACCUMULATOR PISTON
SPRING
B-3 ACCUMULATOR PISTON
C-2 ACCUMULATOR PISTON
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
ATF WS
MP grease
P

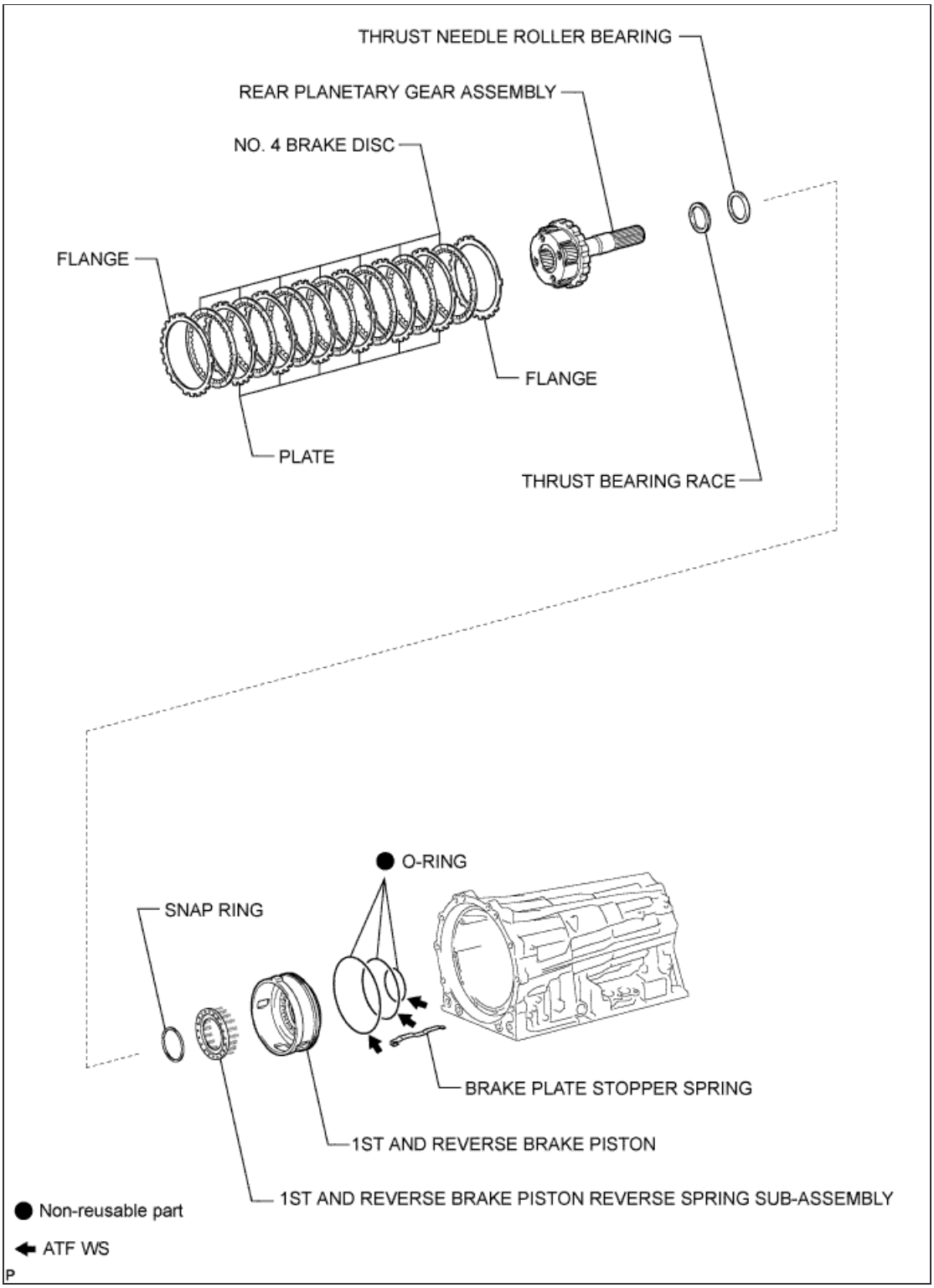

REVERSE CLUTCH RETURN SPRING SUB-ASSEMBLY
O-RING
NO. 3 CLUTCH BALANCER
THRUST NEEDLE ROLLER BEARING
SNAP RING
THRUST BEARING RACE
O-RING
x 10
21 (214, 15)
OIL PUMP ASSEMBLY
DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY
DIRECT CLUTCH PISTON SUB-ASSEMBLY
O-RING
CLUTCH DRUM
O-RING
NO. 2 CLUTCH BALANCER
SNAP RING
REVERSE CLUTCH PISTON SUB-ASSEMBLY
COAST CLUTCH PISTON
FORWARD CLUTCH PISTON SUB-ASSEMBLY
FLANGE
DIRECT CLUTCH DISC
O-RING
INPUT SHAFT SUB-ASSEMBLY
INPUT SHAFT OIL SEAL RING
PLATE
SNAP RING
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
ATF WS
P


NO. 4 1-WAY CLUTCH ASSEMBLY
NO. 1 CLUTCH BALANCER
NO. 2 CLUTCH DRUM THRUST WASHER
COAST CLUTCH HUB SUB-ASSEMBLY
SNAP RING
FORWARD MULTIPLE DISC CLUTCH DISC
COAST CLUTCH DISC
SNAP RING
PLATE
CUSHION PLATE
PLATE
SNAP RING
FLANGE
FLANGE
O-RING
THRUST NEEDLE ROLLER BEARING
THRUST BEARING RACE
FORWARD CLUTCH RETURN SPRING
CLUTCH DRUM THRUST WASHER
REVERSE CLUTCH REACTION SLEEVE
REAR CLUTCH DISC
SNAP RING
CUSHION PLATE
PLATE
FLANGE
FLANGE
REVERSE CLUTCH HUB SUB-ASSEMBLY
THRUST NEEDLE ROLLER BEARING
FORWARD CLUTCH HUB SUB-ASSEMBLY
SNAP RING
NO. 3 CLUTCH HUB THRUST WASHER
THRUST NEEDLE ROLLER BEARING
CLUTCH DRUM THRUST WASHER
Non-reusable part
ATF WS
NO. 2 1-WAY CLUTCH ASSEMBLY
P


NO. 3 BRAKE PISTON
NO. 3 BRAKE PISTON HOLE SNAP RING
NO. 3 BRAKE DISC
O-RING
FLANGE
PLATE
SNAP RING
FLANGE
NO. 3 BRAKE SNAP RING
NO. 3 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY
NO. 1 PLANETARY CARRIER THRUST WASHER
1-WAY CLUTCH INNER RACE SUB-ASSEMBLY
NO. 3 BRAKE CYLINDER
1-WAY CLUTCH ASSEMBLY
Non-reusable part
ATF WS
P


FRONT PLANETARY GEAR ASSEMBLY
FRONT PLANETARY SUN GEAR
THRUST BEARING RACE
THRUST NEEDLE ROLLER BEARING
SNAP RING
CENTER PLANETARY RING GEAR
SNAP RING
THRUST BEARING RACE
THRUST NEEDLE ROLLER BEARING
NO. 2 PLANETARY CARRIER THRUST WASHER
FRONT PLANETARY RING GEAR
FRONT PLANETARY RING GEAR FLANGE SUB-ASSEMBLY
NO. 1 BRAKE CYLINDER
NO. 1 BRAKE PISTON
NO. 1 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY
SNAP RING
PLATE
O-RING
NO. 1 BRAKE DISC
FLANGE
Non-reusable part
ATF WS
P

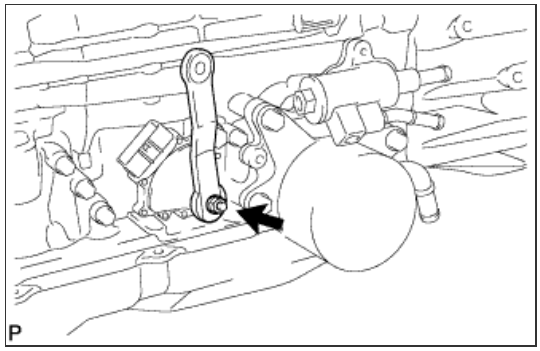

CENTER PLANETARY GEAR ASSEMBLY
CENTER PLANETARY SUN GEAR
SNAP RING
FLANGE
PLATE
FLANGE
NO. 2 BRAKE PISTON
NO. 2 BRAKE CYLINDER
O-RING
NO. 2 BRAKE DISC
NO. 2 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY
THRUST NEEDLE ROLLER BEARING
THRUST BEARING RACE
INTERMEDIATE SHAFT
THRUST NEEDLE ROLLER BEARING
REAR PLANETARY RING GEAR
SNAP RING
NO. 3 1-WAY CLUTCH ASSEMBLY
THRUST BEARING RACE
REAR PLANETARY RING GEAR FLANGE
1-WAY CLUTCH INNER RACE
SNAP RING
Non-reusable part
ATF WS
P


THRUST NEEDLE ROLLER BEARING
REAR PLANETARY GEAR ASSEMBLY
NO. 4 BRAKE DISC
FLANGE
FLANGE
PLATE
THRUST BEARING RACE
O-RING
SNAP RING
BRAKE PLATE STOPPER SPRING
1ST AND REVERSE BRAKE PISTON
1ST AND REVERSE BRAKE PISTON REVERSE SPRING SUB-ASSEMBLY
Non-reusable part
ATF WS
P

for Preparation Click here

1. REMOVE TRANSMISSION CONTROL SHAFT LEVER RH

a. Remove the nut, spring washer and control shaft lever.



2. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

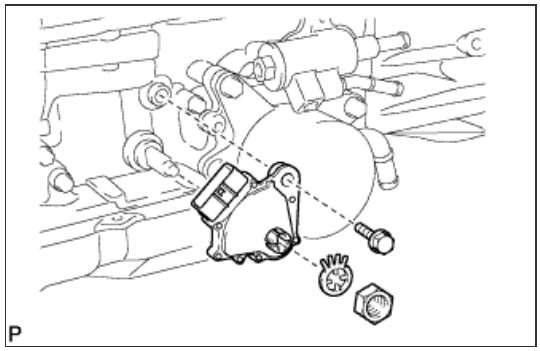
a. Using a screwdriver, bend the tabs of the lock washer.

b. Remove the nut, lock washer and bolt.

c. Remove the park/neutral position switch.

HINT:

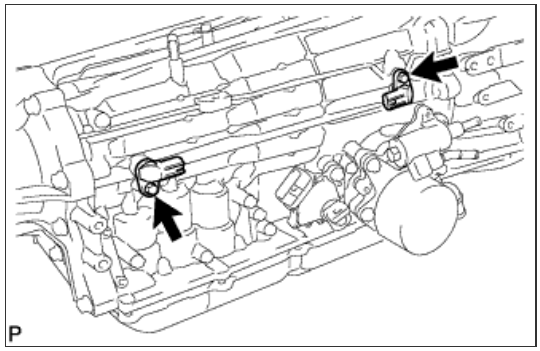
Make sure that the manual valve lever shaft has not been rotated prior to installing the park/neutral position switch as the detent spring may become detached from the manual valve lever shaft.



3. REMOVE SPEED SENSOR

a. Remove the 2 bolts and 2 speed sensors.

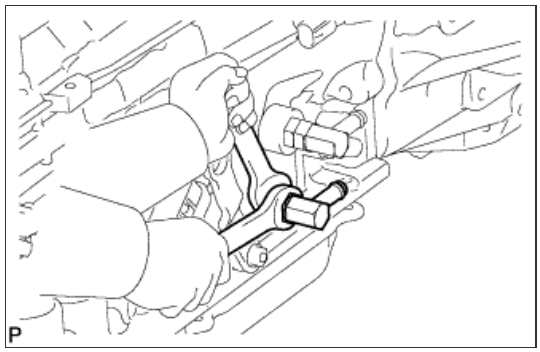
b. Remove the 2 O-rings from the sensors.



4. REMOVE OIL COOLER TUBE UNION (w/ Air Cooled Transmission Oil Cooler)

a. Remove the 2 oil cooler tube unions.

b. Remove the 2 O-rings from each oil cooler tube union.

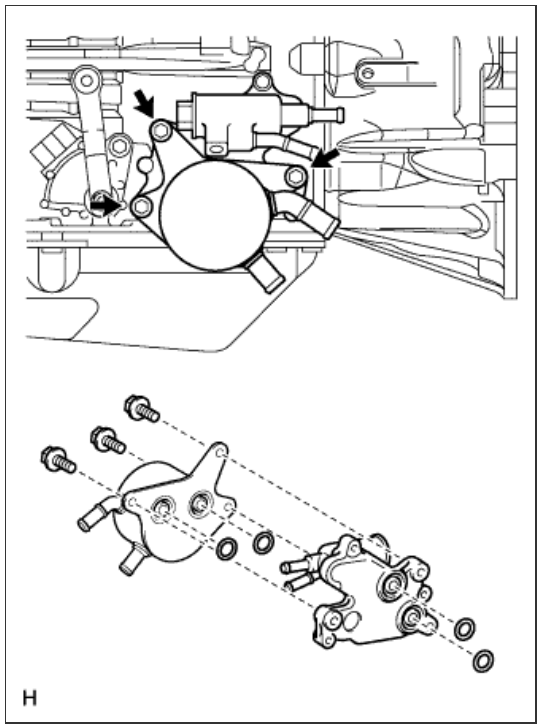


5. REMOVE TRANSMISSION OIL COOLER ASSEMBLY (w/o Air Cooled Transmission Oil Cooler)

a. Remove the 3 bolts and transmission oil cooler with transmission oil thermostat.

b. Separate the transmission oil cooler from the transmission oil thermostat.

c. Remove the 4 O-rings.

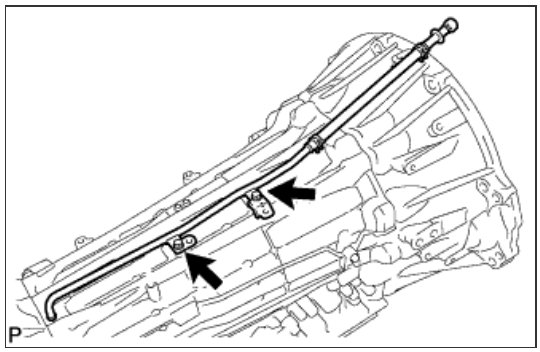


6. REMOVE AUTOMATIC TRANSMISSION BREATHER TUBE

a. Remove the 2 bolts.

b. Remove the breather tube.

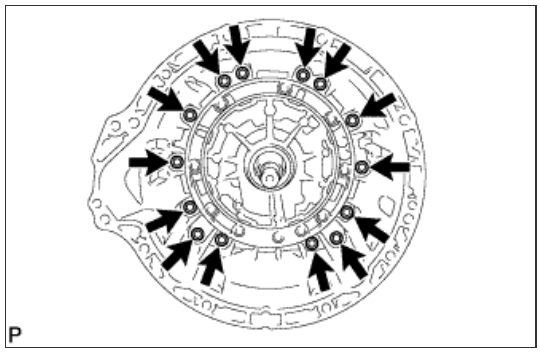
c. Remove the O-ring from the tube.



7. REMOVE AUTOMATIC TRANSMISSION HOUSING

a. Remove the 14 bolts.

b. Remove the transmission housing.



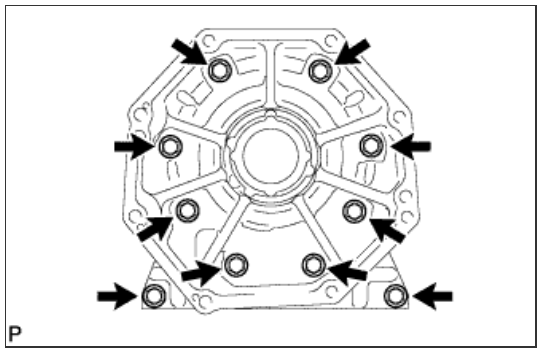
8. REMOVE TRANSFER ADAPTER REAR

a. Remove the 10 bolts.

b. Remove the rear adaptor transfer.

HINT:

Tap on the circumference of the extension housing with a plastic-faced hammer to remove the rear adaptor transfer.



9. REMOVE TRANSMISSION CASE ADAPTER OIL SEAL

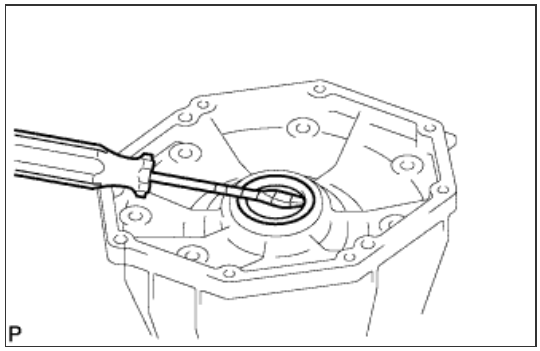
a. Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the rear adaptor transfer.

HINT:

Wrap the tip of the screwdriver with tape.



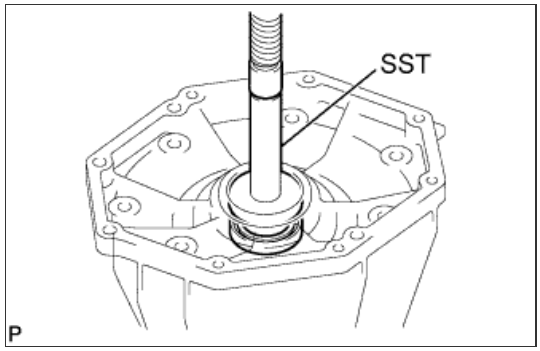
10. REMOVE TRANSFER CASE ADAPTER RADIAL BALL BEARING

a. Using a screwdriver, remove the snap ring.

b. Using SST and a press, press out the bearing.

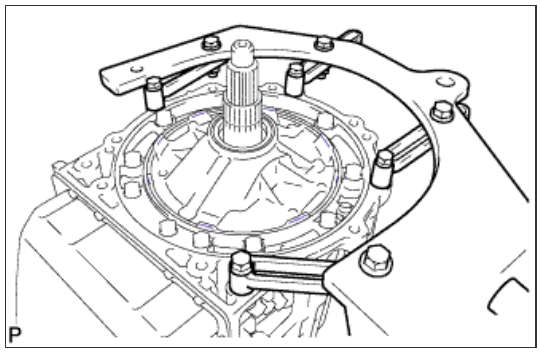
SST

09950-60010 (09951-00650)
09950-70010 (09951-07150)



11. FIX AUTOMATIC TRANSMISSION CASE SUB-ASSEMBLY

a. Install the transmission case to an overhaul attachment.

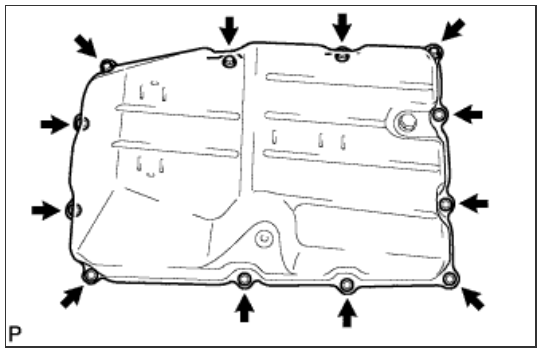


12. REMOVE AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY

NOTICE:

Do not turn the transmission over as this will contaminate the valve body with foreign matter on the bottom of the pan.

a. Remove the drain plug, 12 bolts, oil pan and gasket.

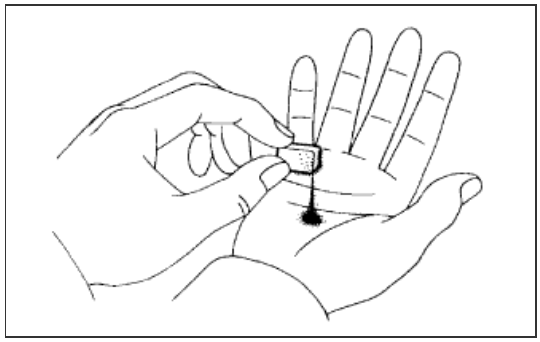


13. INSPECT AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY

a. Remove the magnets, and use them to collect steel particles.

b. Carefully look at the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.

- Steel (magnetic): bearing, gear and clutch plate wear
- Brass (non-magnetic): bush wear

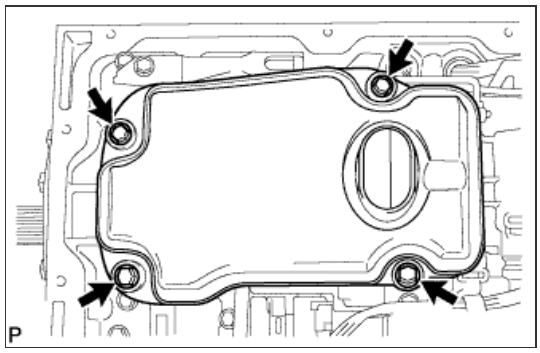


14. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

a. Turn over the transmission.

b. Remove the 4 bolts and oil strainer from the valve body.

c. Remove the O-ring from the oil strainer.

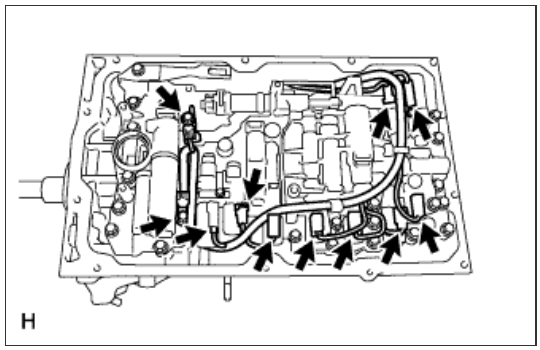


15. REMOVE TRANSMISSION WIRE

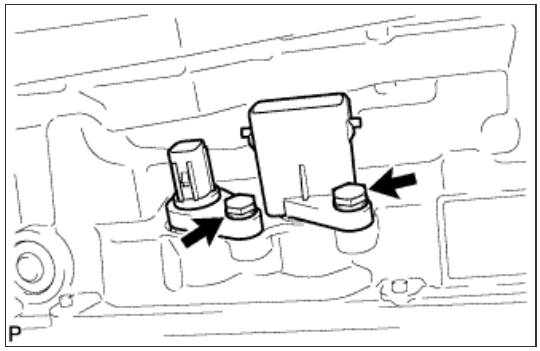
a. Remove the 2 bolts and 2 temperature sensor clamps.

b. Disconnect the 2 ATF temperature sensors.

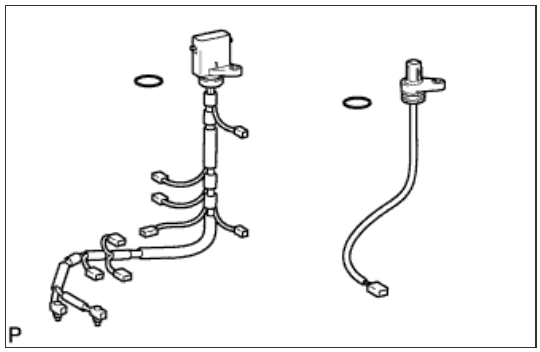
c. Disconnect the 9 connectors from the solenoid valves.



d. Remove the 2 bolts and pull out the No. 1 and No. 2 transmission wires.



e. Remove the 2 O-rings from the transmission wire connectors.

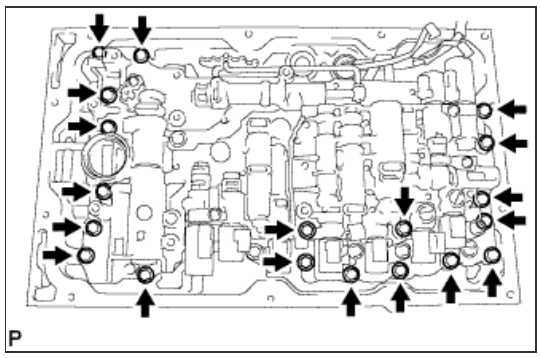


16. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

a. Remove the bolt, detent spring cover and detent spring.

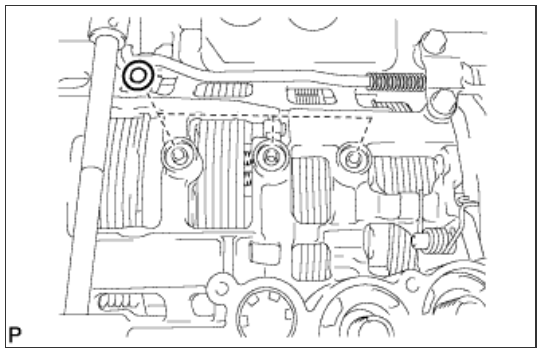
b. Remove the 19 bolts.

c. Remove the valve body assembly.



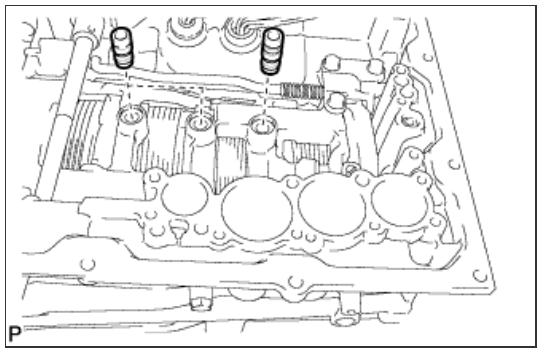
17. REMOVE TRANSMISSION CASE GASKET

a. Remove the 3 gaskets.



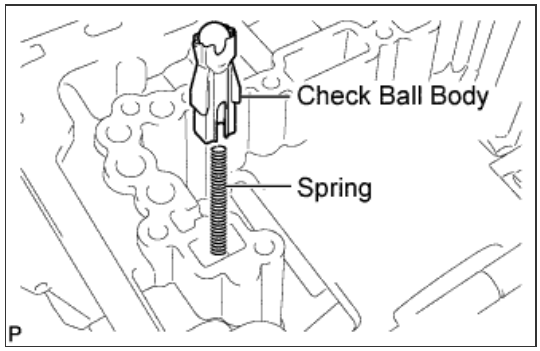
18. REMOVE BRAKE DRUM GASKET

a. Remove the 3 gaskets.



19. REMOVE CHECK BALL BODY

a. Remove the check ball body and spring.



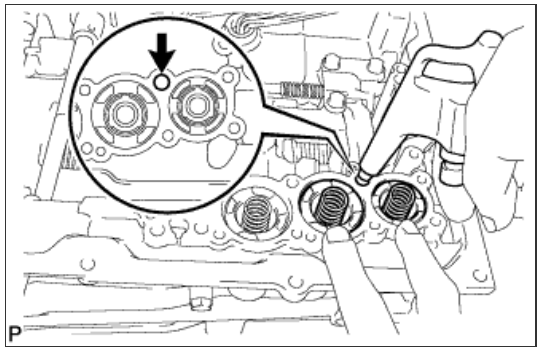
20. REMOVE C-2 ACCUMULATOR PISTON

a. While applying compressed air to the oil hole, remove the C-2 accumulator piston and spring.

b. Remove the 2 O-rings from the piston.

NOTICE:

Be careful as the C-3 and B-3 accumulator pistons may jump out.



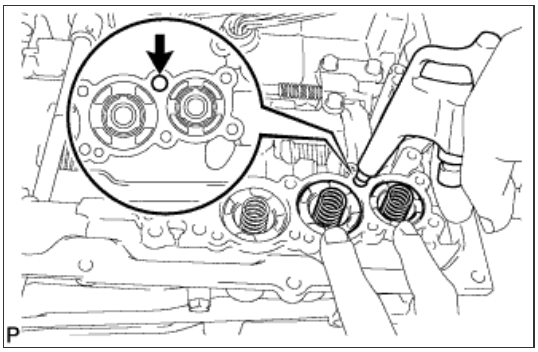
21. REMOVE B-3 ACCUMULATOR PISTON

a. While applying compressed air to the oil hole, remove the B-3 accumulator piston and spring.

b. Remove the 2 O-rings from the piston.

NOTICE:

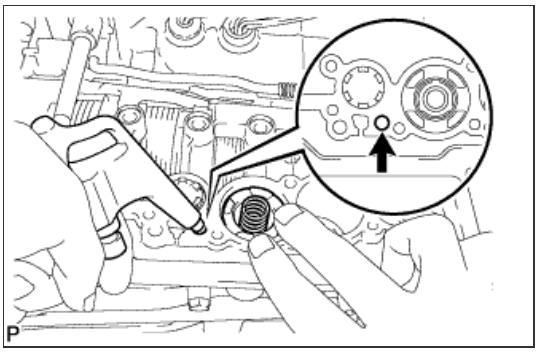
Be careful as the C-3 accumulator piston may jump out.



22. REMOVE C-3 ACCUMULATOR PISTON

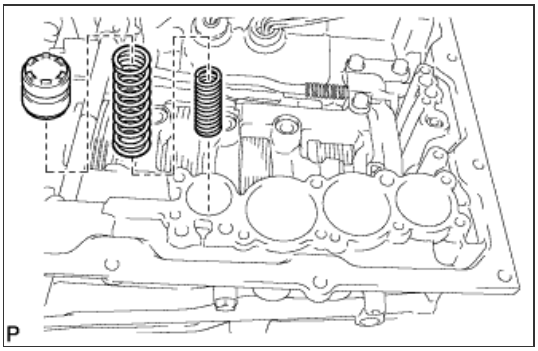
a. While applying compressed air to the oil hole, remove the C-3 accumulator piston and spring.

b. Remove the 2 O-rings from the piston.



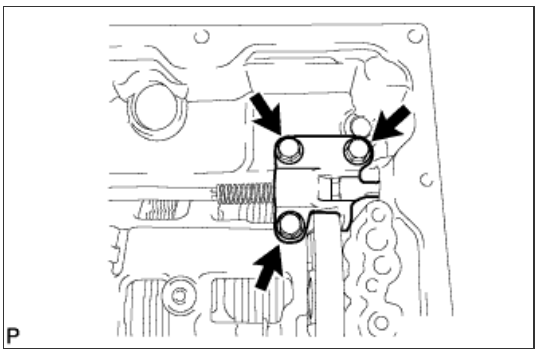
23. REMOVE B-1 ACCUMULATOR VALVE

a. Remove the B-1 accumulator valve and 2 springs.



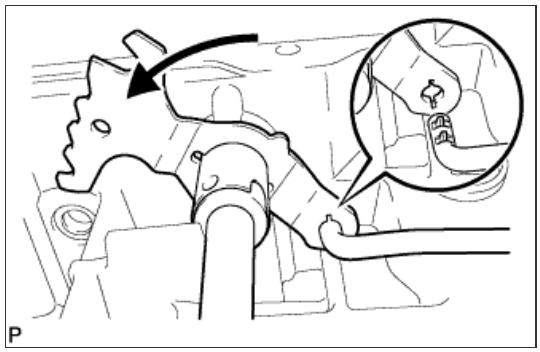
24. REMOVE PARKING LOCK PAWL BRACKET

a. Remove the 3 bolts and bracket.



25. REMOVE PARKING LOCK ROD SUB-ASSEMBLY

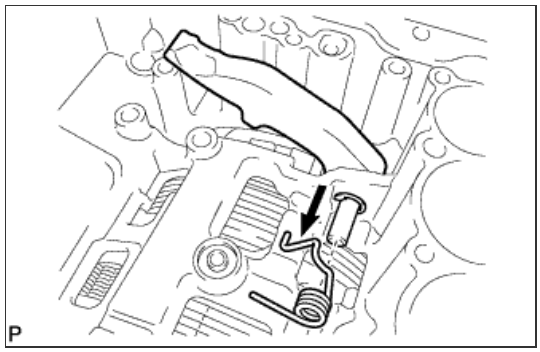
a. Disconnect the parking lock rod from the manual valve lever.



26. REMOVE PARKING LOCK PAWL

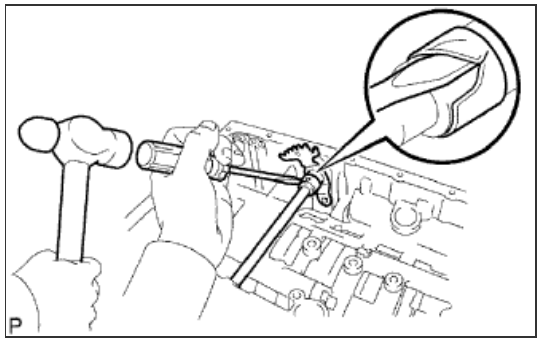
a. Pull out the parking lock pawl shaft from the front side, and then remove the lock pawl and spring.

b. Remove the E-ring from the shaft.



27. REMOVE MANUAL VALVE LEVER SUB-ASSEMBLY

a. Using a screwdriver and hammer, cut off the spacer and remove it from the shaft.

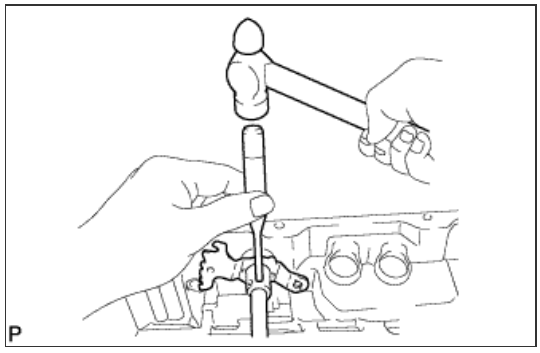


b. Using a pin punch and hammer, tap out the spring pin.

HINT:

Slowly tap out the spring pin so that it does not fall into the transmission case.

c. Pull the manual valve lever shaft out through the transmission case, and remove the manual valve lever.



28. REMOVE MANUAL VALVE LEVER SHAFT OIL SEAL

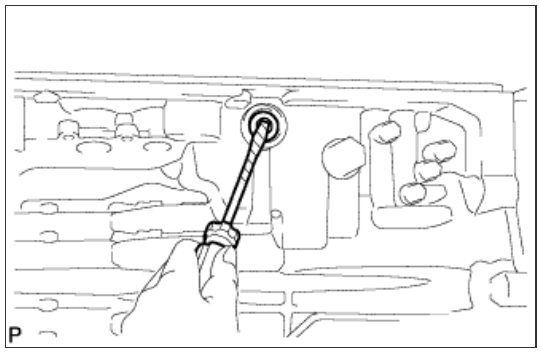
a. Using a screwdriver, pry out the 2 oil seals.

NOTICE:

Be careful not to damage the transmission case.

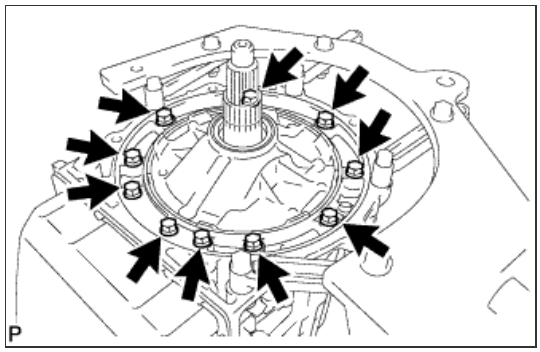
HINT:

Wrap the tip of the screwdriver with tape before use.



29. REMOVE OIL PUMP ASSEMBLY

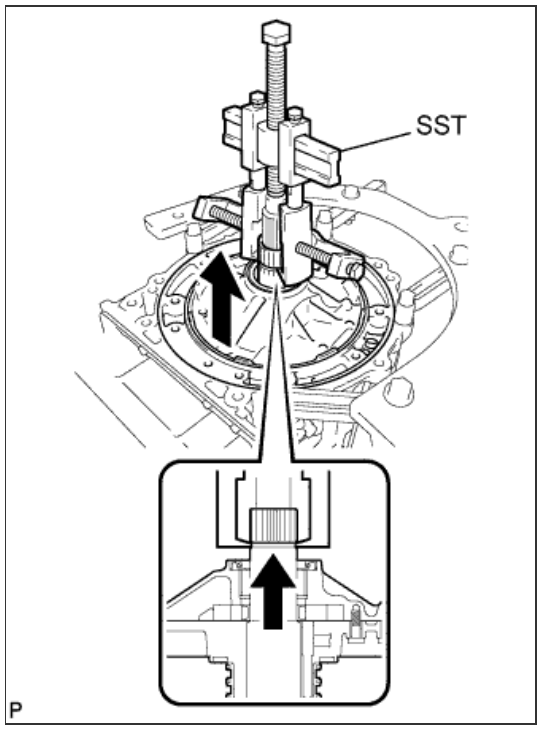
a. Remove the 10 bolts.



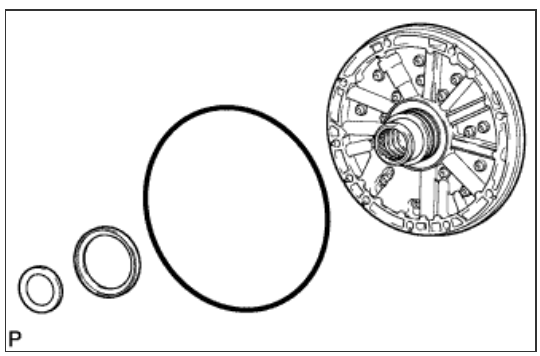
b. Using SST, pull out the oil pump.

SST

09950-40011 (09951-04010, 09953-04020, 09958-04011, 09952-04010, 09954-04010, 09955-04031, 09955-04031)

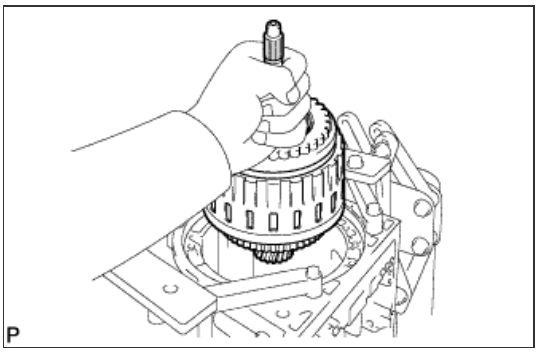


c. Remove the O-ring and 2 thrust bearing races from the oil pump.

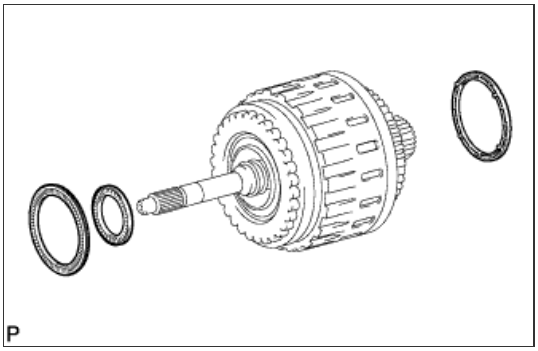


30. REMOVE CLUTCH DRUM AND INPUT SHAFT ASSEMBLY

a. Remove the clutch drum and input shaft assembly from the transmission case.

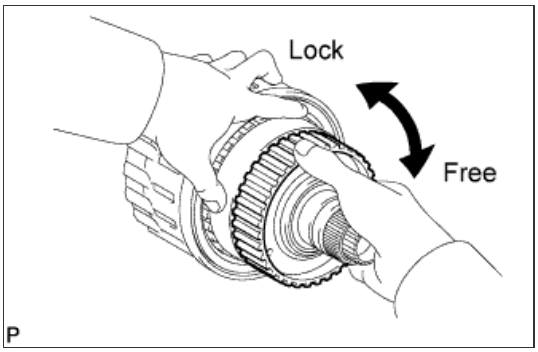


b. Remove the clutch drum thrust washer and 2 thrust needle roller bearings.



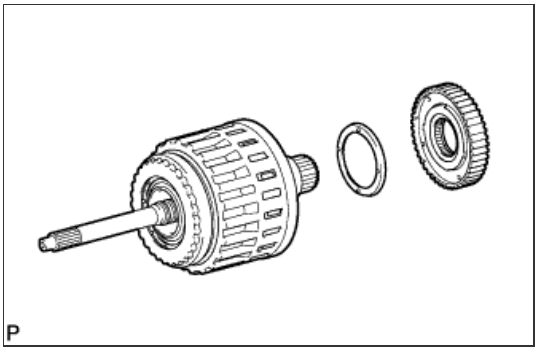
31. INSPECT NO. 2 1-WAY CLUTCH ASSEMBLY

a. Hold the reverse clutch hub and turn the 1-way clutch assembly. Check that the 1-way clutch turns freely clockwise and locks when turned counterclockwise.



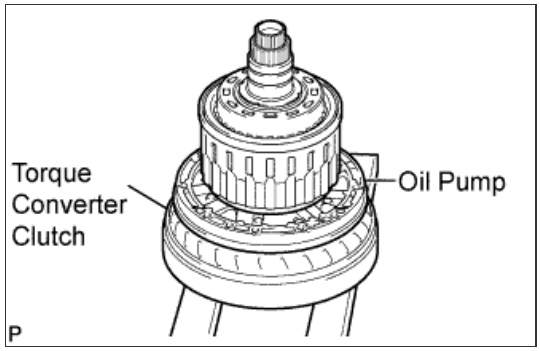
32. REMOVE NO. 2 1-WAY CLUTCH ASSEMBLY

a. Remove the No. 2 1-way clutch and clutch drum thrust washer from the clutch drum and input shaft assembly.



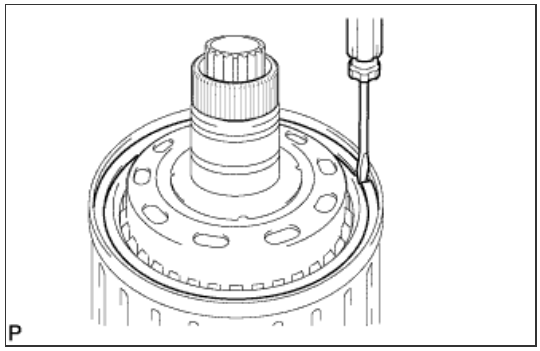
33. FIX CLUTCH DRUM AND INPUT SHAFT ASSEMBLY

a. Place the oil pump onto the torque converter clutch, and then place the clutch drum and input shaft assembly onto the oil pump.

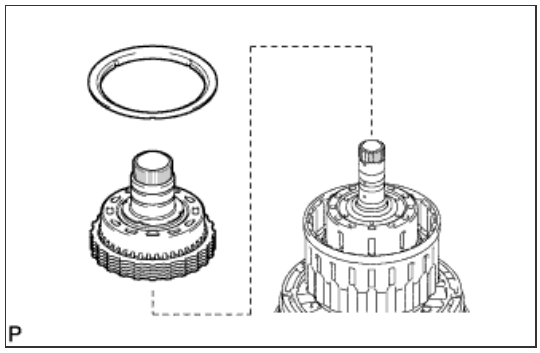


34. REMOVE REVERSE CLUTCH HUB SUB-ASSEMBLY

a. Using a screwdriver, remove the snap ring.

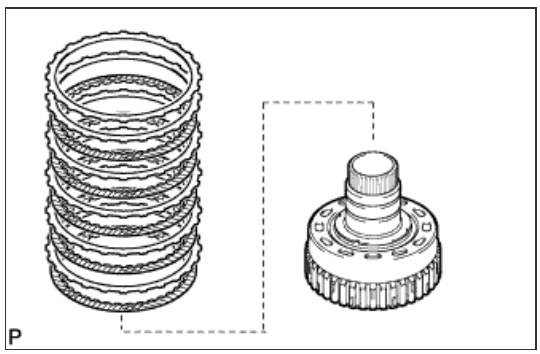


b. Remove the reverse clutch reaction sleeve and reverse clutch hub sub-assembly with the rear clutch disc set from the clutch drum.

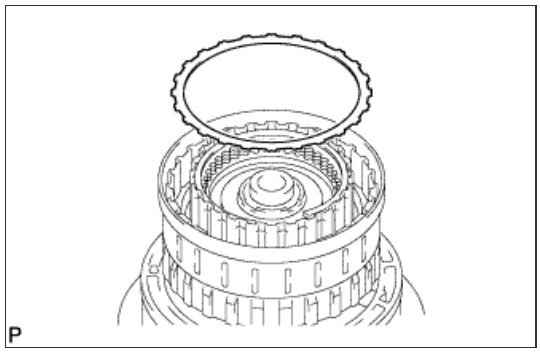


35. REMOVE REAR CLUTCH DISC SET

a. Remove the cushion plate, selected reverse clutch flange, 5 discs and 4 plates from the reverse clutch hub.



b. Remove the reverse clutch flange from the clutch drum.

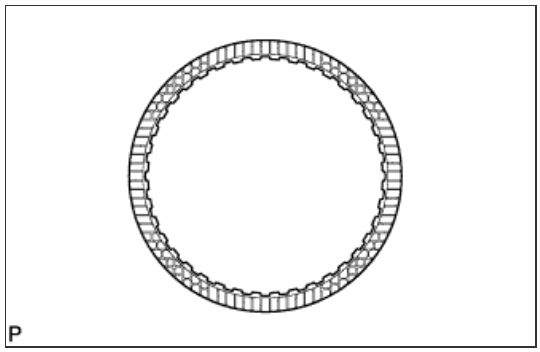


36. INSPECT REAR CLUTCH DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves have even a little bit of damage.

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

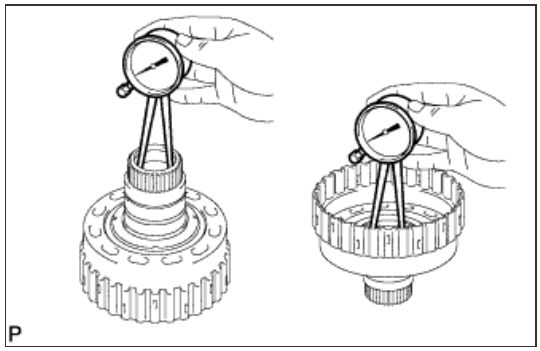


37. INSPECT REVERSE CLUTCH HUB SUB-ASSEMBLY

a. Using a dial indicator, measure the inside diameter of the reverse clutch hub bush.

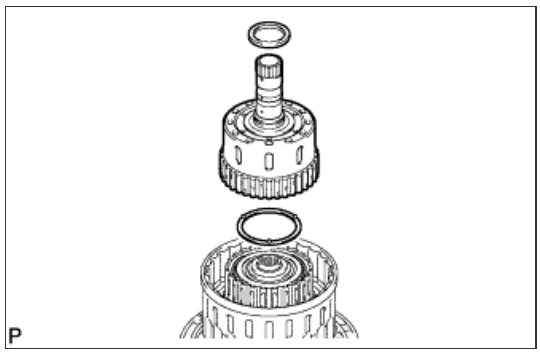
Standard inside diameter:
41.912 to 41.937 mm (1.410 to 1.411 in.)

If the inside diameter is more than the standard, replace the reverse clutch hub.



38. REMOVE FORWARD CLUTCH HUB SUB-ASSEMBLY

a. Remove the thrust needle roller bearing, forward clutch hub and No. 3 clutch hub thrust washer from the clutch drum.

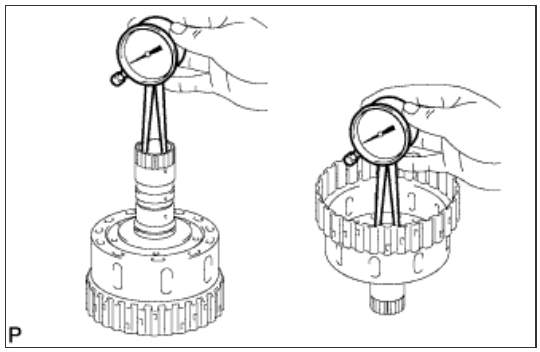


39. INSPECT FORWARD CLUTCH HUB SUB-ASSEMBLY

a. Using a dial indicator, measure the inside diameter of the forward clutch hub bush.

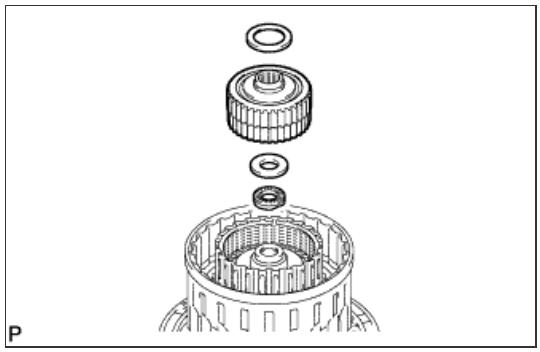
Standard inside diameter:
30.200 to 30.225 mm (1.189 to 1.190 in.)

If the inside diameter is more than the standard, replace the forward clutch hub.



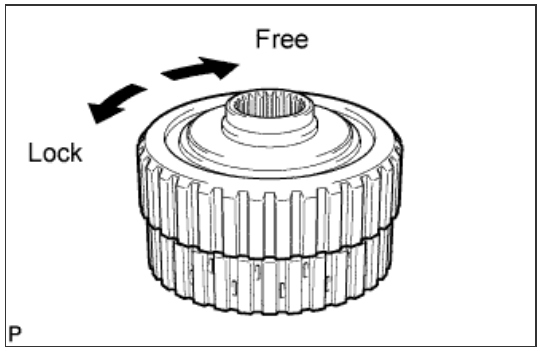
40. REMOVE COAST CLUTCH HUB SUB-ASSEMBLY WITH NO. 4 1-WAY CLUTCH ASSEMBLY

a. Remove the 2 thrust needle roller bearings, coast clutch hub with the No. 4 1-way clutch, and thrust bearing race from the clutch drum.



41. INSPECT NO. 4 1-WAY CLUTCH ASSEMBLY

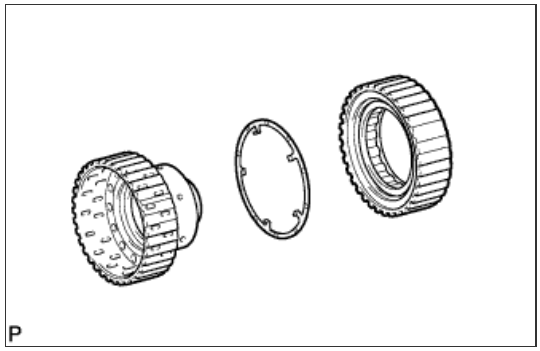
a. Hold the coast clutch hub and turn the 1-way clutch assembly. Check that the 1-way clutch turns freely clockwise and locks when turned counterclockwise.



42. REMOVE NO. 4 1-WAY CLUTCH ASSEMBLY

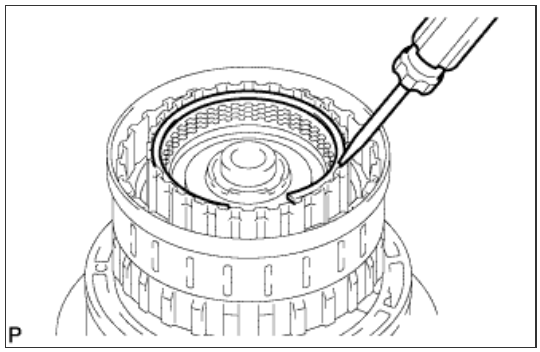
a. Separate the No. 4 1-way clutch from the coast clutch hub.

b. Remove the No. 2 clutch hub thrust washer from the coast clutch hub.

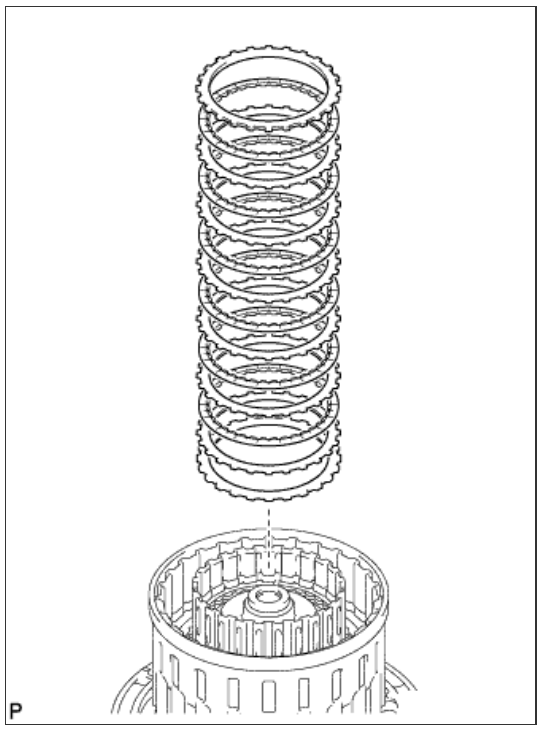


43. REMOVE FORWARD MULTIPLE DISC CLUTCH CLUTCH DISC SET

a. Using a screwdriver, remove the hole snap ring.



b. Remove the flange, 6 discs, 6 plates and cushion plate from the input shaft.

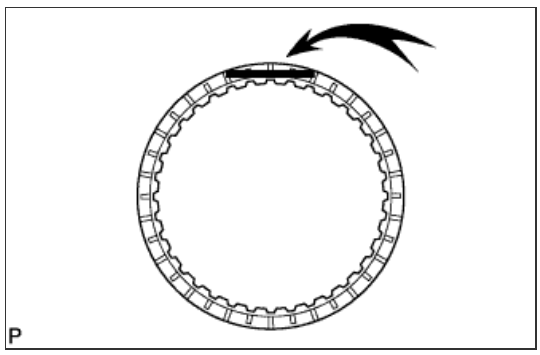


44. INSPECT FORWARD MULTIPLE DISC CLUTCH CLUTCH DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

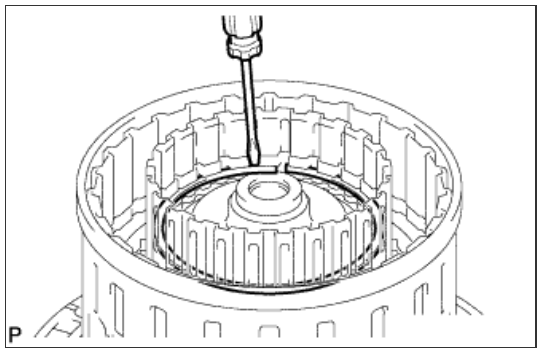
NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

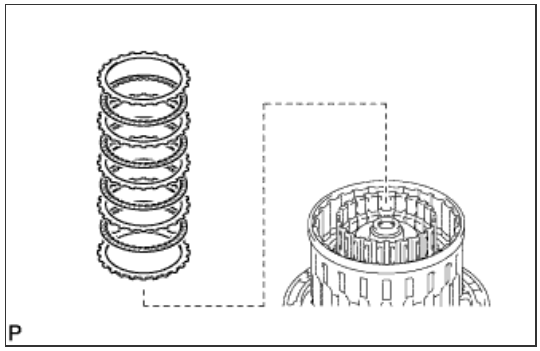


45. REMOVE COAST CLUTCH DISC SET

a. Using a screwdriver, remove the hole snap ring.



b. Remove the flange, 4 discs and 4 plates from the input shaft.

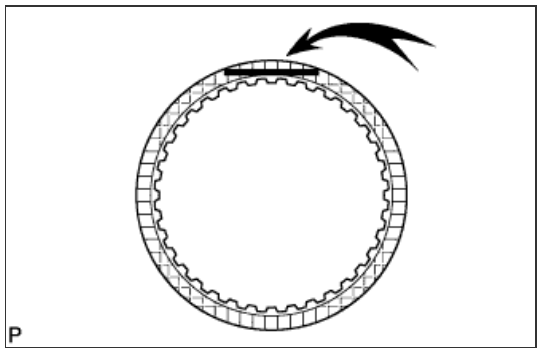


46. INSPECT COAST CLUTCH DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

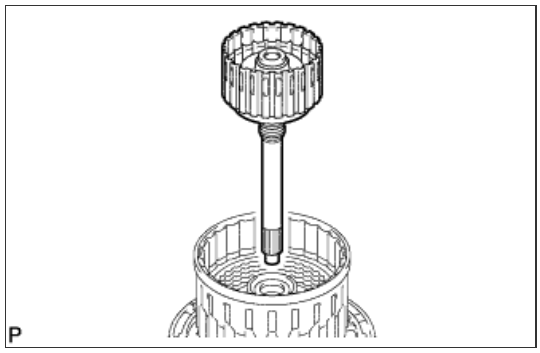
NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.



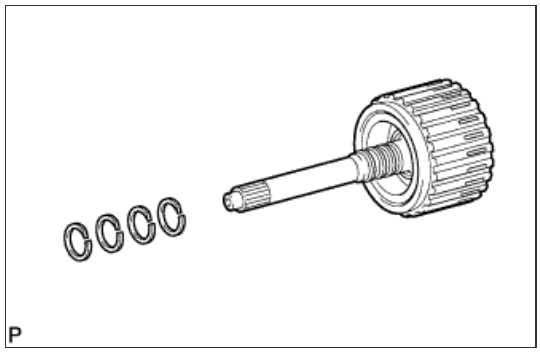
47. REMOVE INPUT SHAFT SUB-ASSEMBLY

a. Remove the input shaft from the clutch drum.



48. REMOVE INPUT SHAFT OIL SEAL RING

a. Remove the 4 oil seal rings from the input shaft.



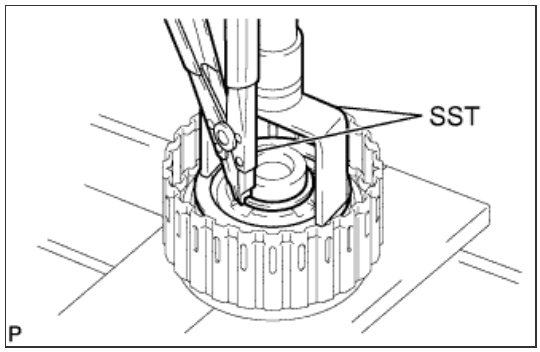
49. REMOVE COAST CLUTCH PISTON

a. Place SST on the No. 1 clutch balancer, and compress the return spring with a press.

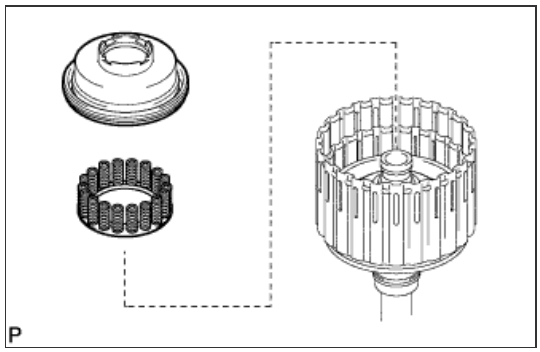
SST
09350-30020 (09350-07040)

b. Using SST, remove the snap ring.

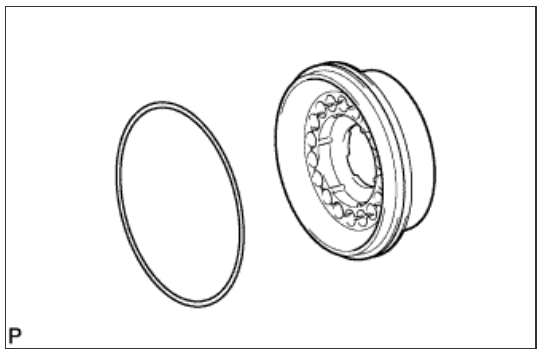
SST
09350-30020 (09350-07070)



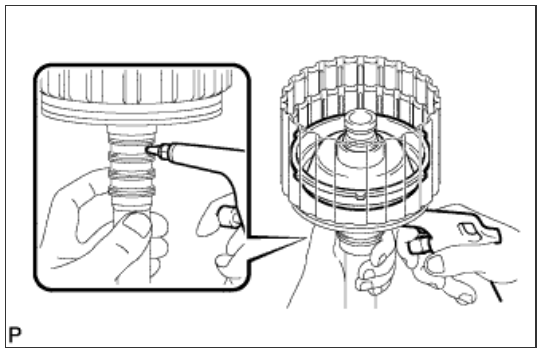
c. Remove the No. 1 clutch balancer and forward clutch return spring from the input shaft.



d. Remove the O-ring from the No. 1 clutch balancer.



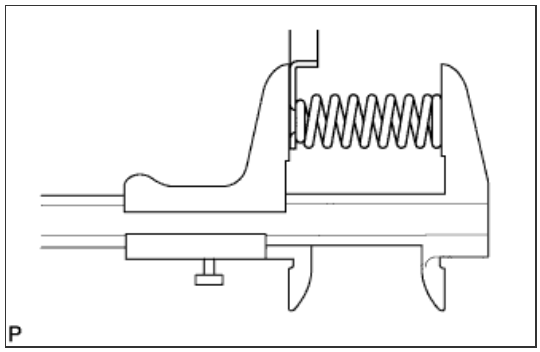
e. Hold the input shaft by hand and apply compressed air to the input shaft to remove the coast clutch piston.



50. INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

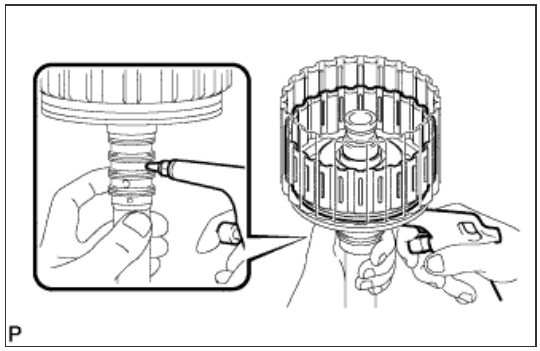
a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
29.65 mm (1.17 in.)

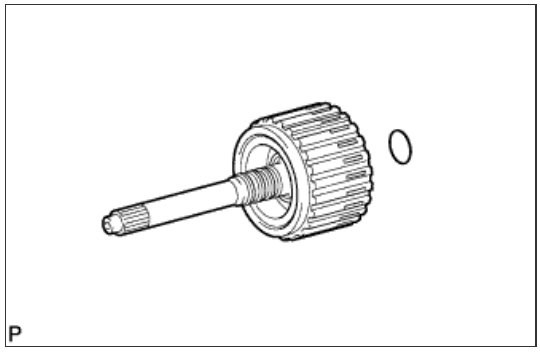


51. REMOVE FORWARD CLUTCH PISTON SUB-ASSEMBLY

a. Hold the input shaft by hand and apply compressed air to the input shaft to remove the forward clutch piston.

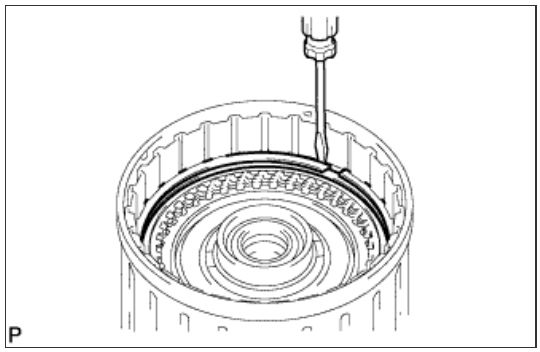


b. Remove the O-ring from the input shaft.

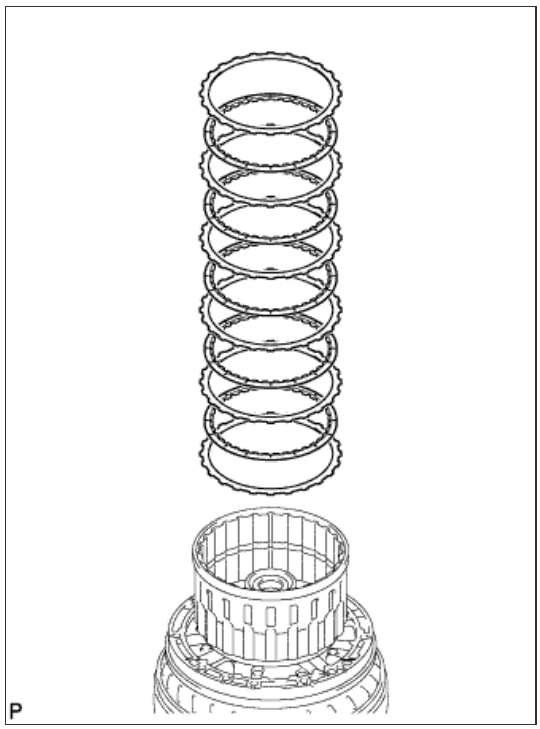


52. REMOVE DIRECT CLUTCH DISC SET

a. Using a screwdriver, remove the 2 hole snap rings from the clutch drum.



b. Remove the direct clutch flange, 5 discs and 5 plates from the clutch drum.

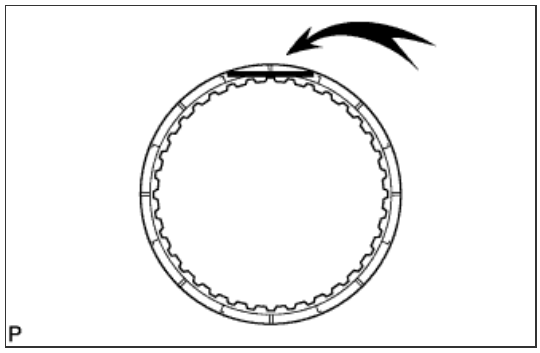


53. INSPECT DIRECT CLUTCH DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.



54. REMOVE NO. 3 CLUTCH BALANCER

a. Place SST on the No. 3 clutch balancer, and compress the return spring with a press.

SST

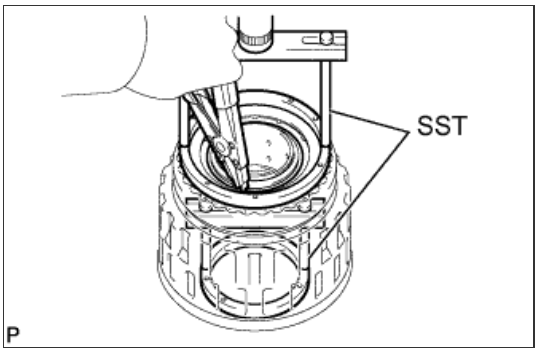
09380-60010 (09381-06020, 09381-06030, 09381-06040, 09381-06050, 09381-06080)

b. Using SST, remove the snap ring.

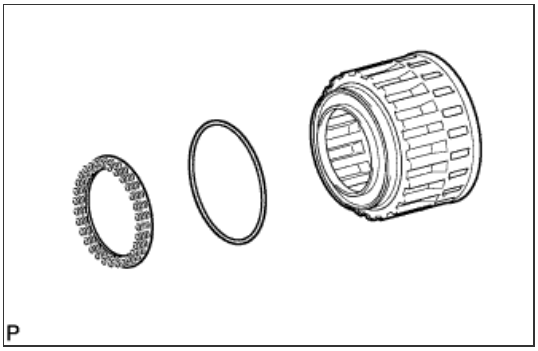
SST

09350-30020 (09350-07070)

c. Remove the No. 3 clutch balancer.



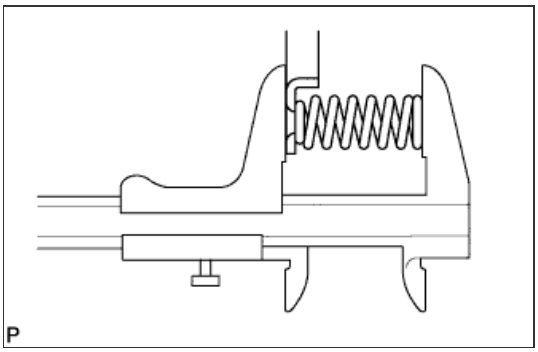
d. Remove the reverse clutch return spring and O-ring from the reverse clutch piston sub-assembly.



55. INSPECT REVERSE CLUTCH RETURN SPRING SUB-ASSEMBLY

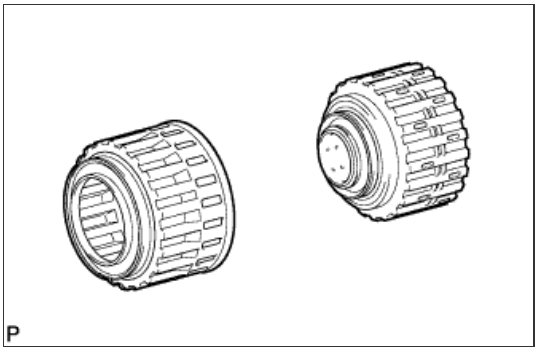
a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
21.24 mm (0.836 in.)

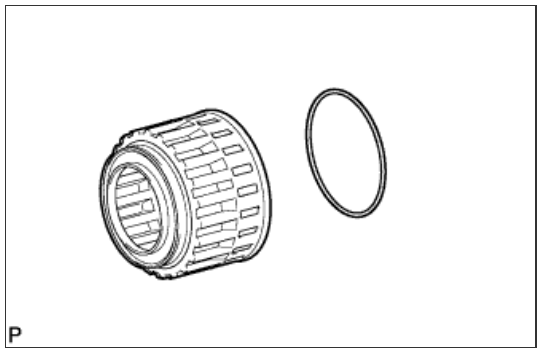


56. REMOVE REVERSE CLUTCH PISTON SUB-ASSEMBLY

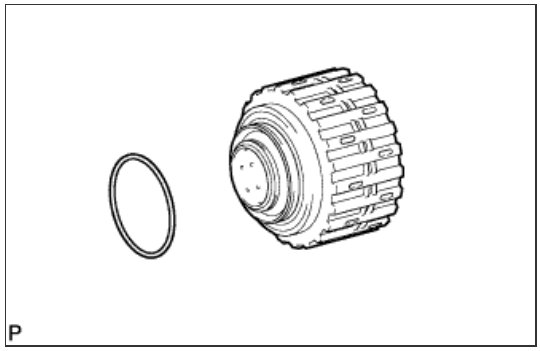
a. Remove the reverse clutch piston from the clutch drum.



b. Remove the O-ring from the reverse clutch piston.



c. Remove the O-ring from the clutch drum.



57. REMOVE DIRECT CLUTCH PISTON SUB-ASSEMBLY

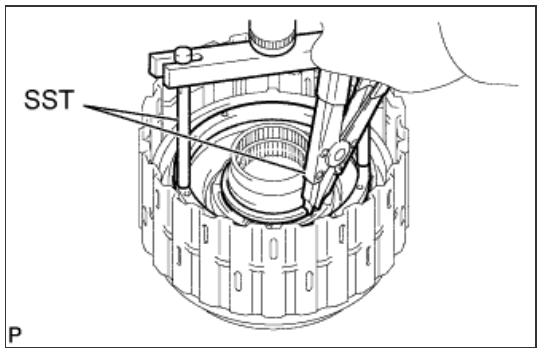
a. Place SST on the direct clutch piston, and compress the return spring with a press.

SST
09380-60010 (09381-06030, 09381-06040, 09381-06080)

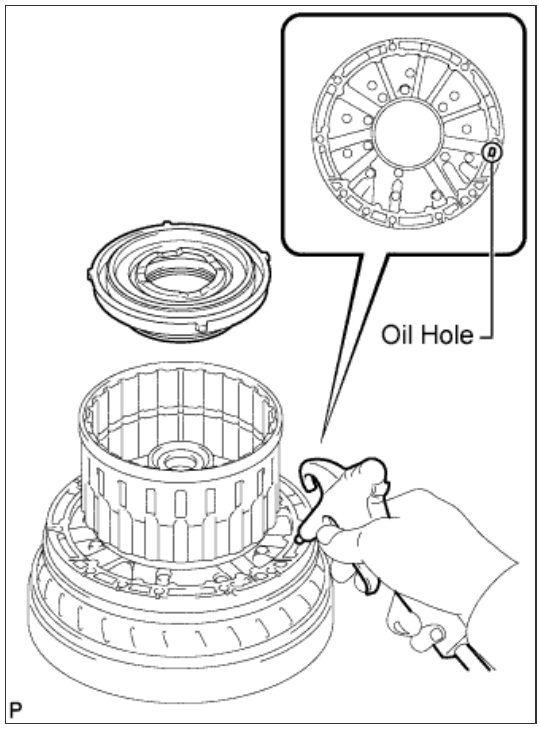
b. Using SST, remove the snap ring.

SST
09350-30020 (09350-07070)

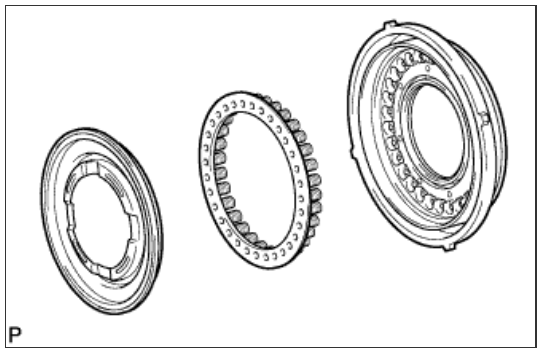
c. Place the oil pump onto the torque converter clutch, and then place the clutch drum onto the oil pump.



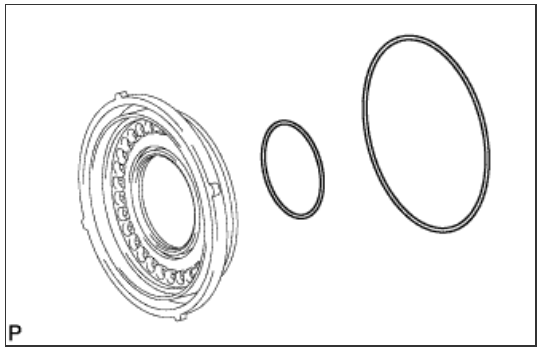
d. Hold the direct clutch piston by hand and apply compressed air to the oil hole of the oil pump as shown in the illustration to remove the direct clutch piston with the No. 2 clutch balancer and direct clutch return spring sub-assembly.



e. Remove the No. 2 clutch balancer and direct clutch return spring sub-assembly from the direct clutch piston.



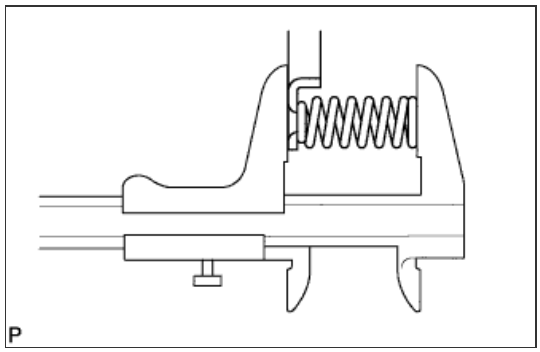
f. Remove the 2 O-rings from the direct clutch piston.



58. INSPECT DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

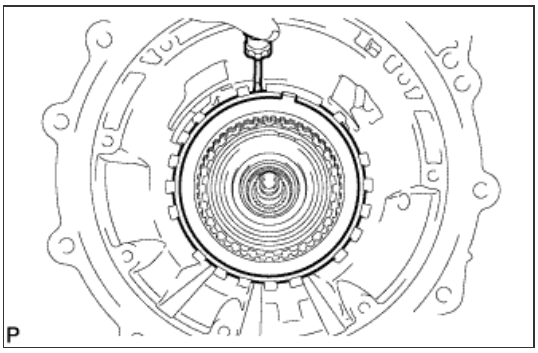
a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
19.46 mm (0.766 in.)



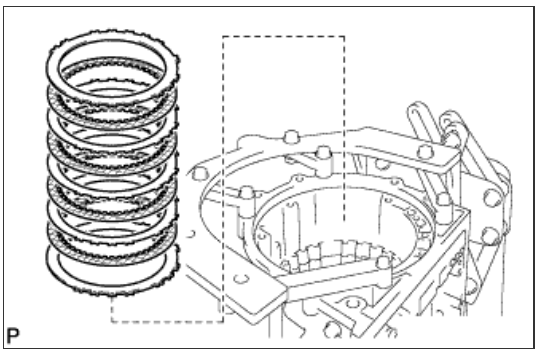
59. REMOVE NO. 3 BRAKE SNAP RING

a. Using a screwdriver, remove the No. 3 brake snap ring from the transmission case.



60. REMOVE NO. 3 BRAKE DISC SET

a. Remove the 2 flanges, 4 discs and 3 plates from the transmission case.

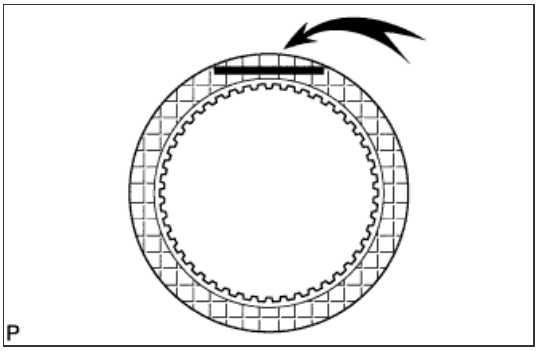


61. INSPECT NO. 3 BRAKE DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

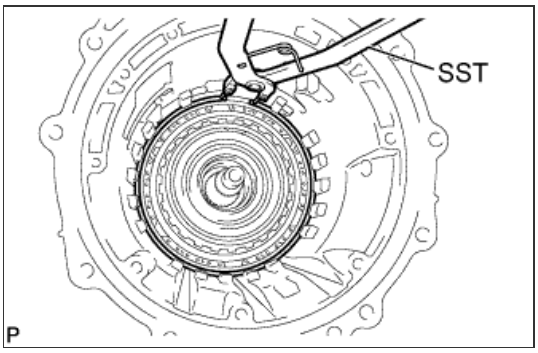


62. REMOVE NO. 3 BRAKE PISTON HOLE SNAP RING

a. Using SST, remove the snap ring.

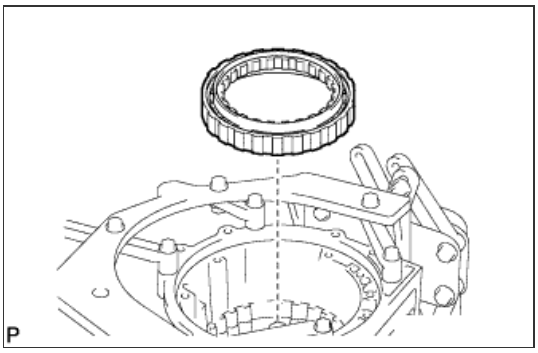
SST

09350-30020 (09350-07060)



63. REMOVE NO. 3 BRAKE CYLINDER WITH NO. 3 BRAKE PISTON AND NO. 3 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

a. Remove the No. 3 brake cylinder with the No. 3 brake piston and No. 3 brake piston return spring from the transmission case.

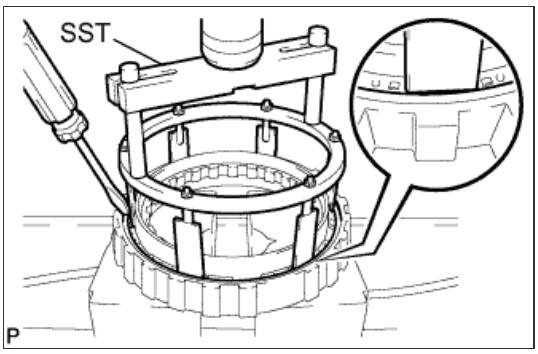


64. REMOVE NO. 3 BRAKE PISTON

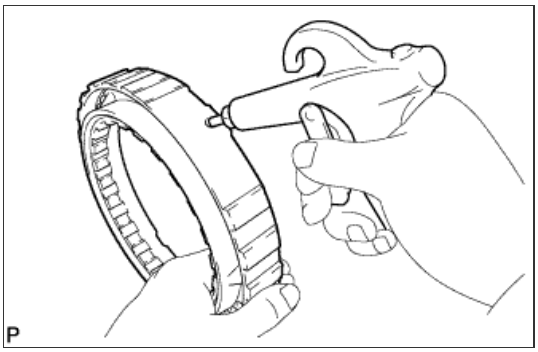
a. Using SST and a press, compress the return spring and remove the snap ring and No. 3 brake piston return spring with a screwdriver.

SST

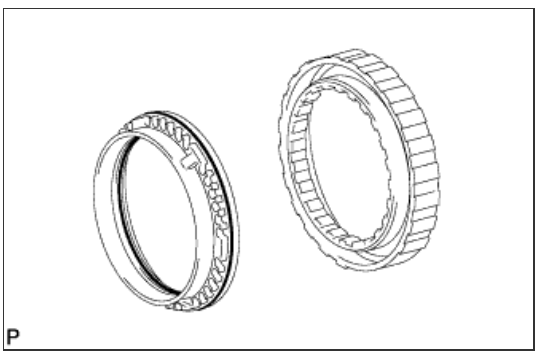
09380-60010 (09381-06020, 09381-06040, 09381-06060, 09381-06100, 09381-06110)



b. Hold the No. 3 brake piston and apply compressed air (392 kPa, 4.0 kgf/cm ^{2}, 57 psi) to the No. 3 brake cylinder to remove the No. 3 brake piston.



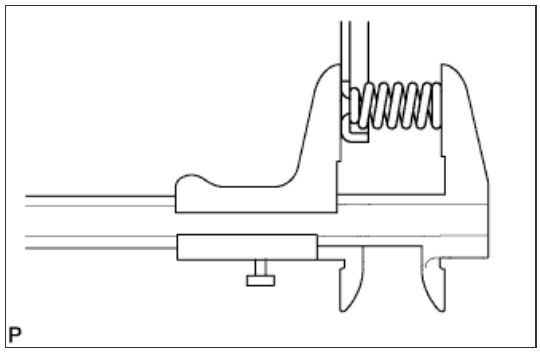
c. Remove the 2 O-rings from the No. 3 brake piston.



65. INSPECT NO. 3 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

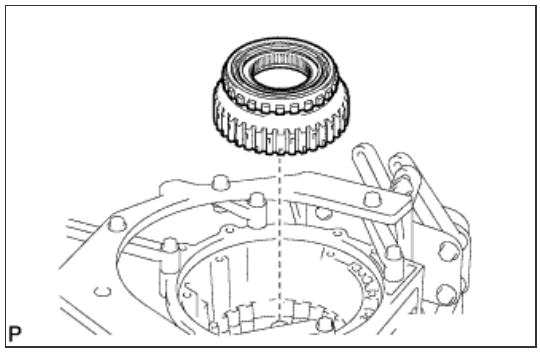
a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
15.72 mm (0.619 in.)



66. REMOVE 1-WAY CLUTCH ASSEMBLY WITH 1-WAY CLUTCH INNER RACE SUB-ASSEMBLY

a. Remove the 1-way clutch with 1-way clutch inner race from the transmission case.

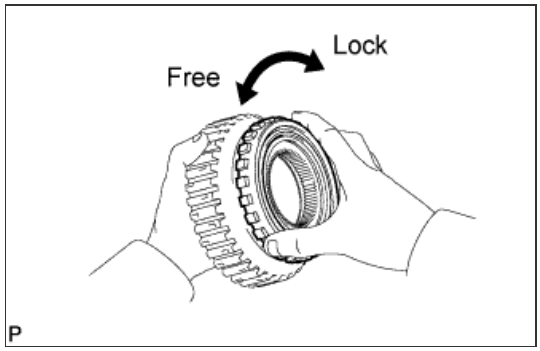


67. INSPECT 1-WAY CLUTCH ASSEMBLY

a. Install the 1-way clutch to the 1-way clutch inner race.

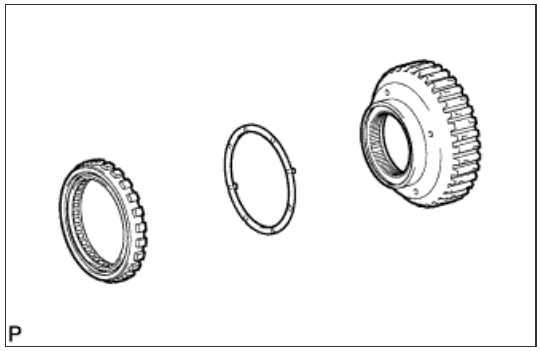
b. Hold the 1-way clutch inner race and turn the 1-way clutch. Check that the 1-way clutch turns freely counterclockwise and locks when turned clockwise.

c. Remove the 1-way clutch from the 1-way clutch inner race.



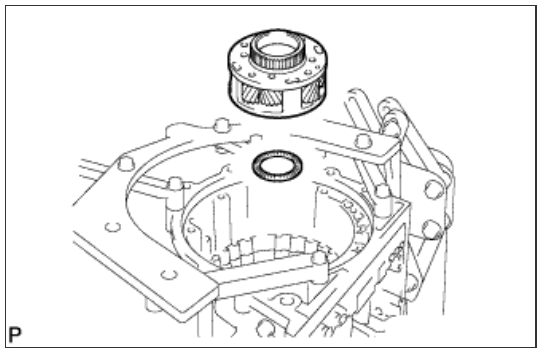
68. REMOVE 1-WAY CLUTCH INNER RACE SUB-ASSEMBLY

a. Separate the 1-way clutch inner race from the 1-way clutch and remove the No. 1 planetary carrier thrust washer.

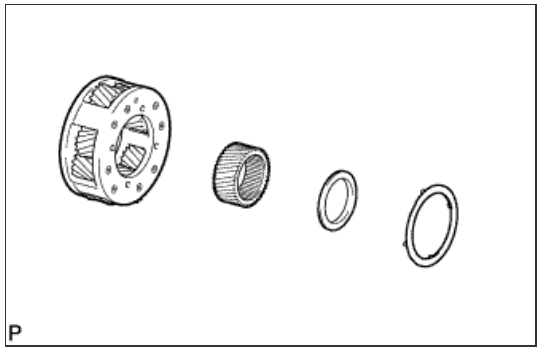


69. REMOVE FRONT PLANETARY GEAR ASSEMBLY

a. Remove the front planetary gear and thrust needle roller bearing from the transmission case.



b. Remove the No. 2 planetary carrier thrust washer, thrust bearing race and front planetary sun gear from the front planetary gear.

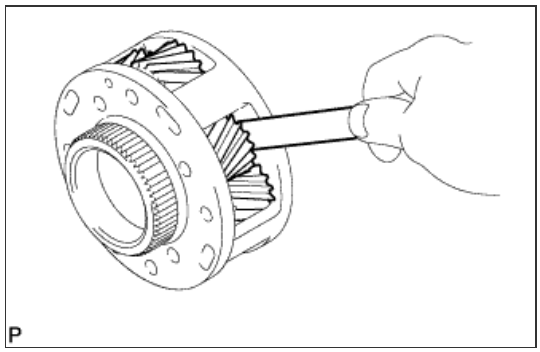


70. INSPECT FRONT PLANETARY GEAR ASSEMBLY

a. Using a feeler gauge, measure the front planetary pinion gear thrust clearance.

Standard clearance:
0.2 to 0.6 mm (0.00787 to 0.0236 in.)

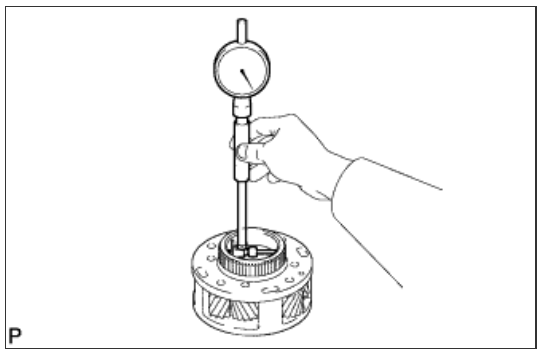
If the clearance is more than the standard, replace the front planetary gear assembly.



b. Using a cylinder gauge, measure the inside diameter of the front planetary gear bush.

Standard inside diameter:
61.005 to 61.030 mm (2.402 to 2.403 in.)

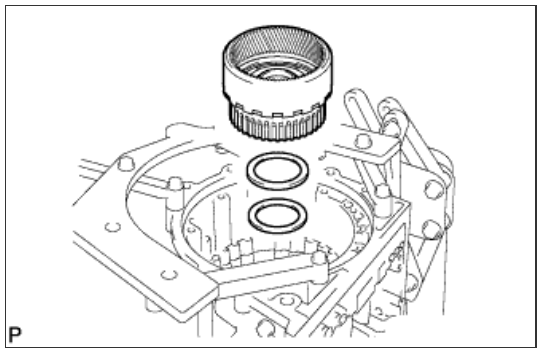
If the inside diameter is more than the standard, replace the front planetary gear.



71. REMOVE FRONT PLANETARY RING GEAR WITH FRONT PLANETARY RING GEAR FLANGE SUB-ASSEMBLY AND CENTER PLANETARY RING GEAR

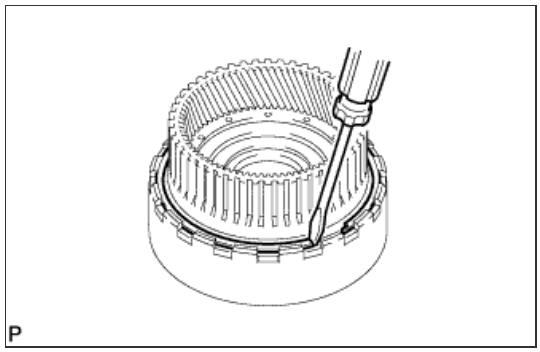
a. Remove the front planetary ring gear with the front planetary ring gear flange and center planetary ring gear from the transmission case.

b. Remove the thrust needle roller bearing and thrust bearing race.

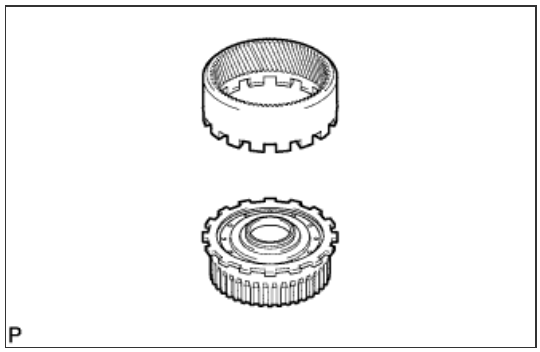


72. REMOVE FRONT PLANETARY RING GEAR

a. Using a screwdriver, remove the snap ring.

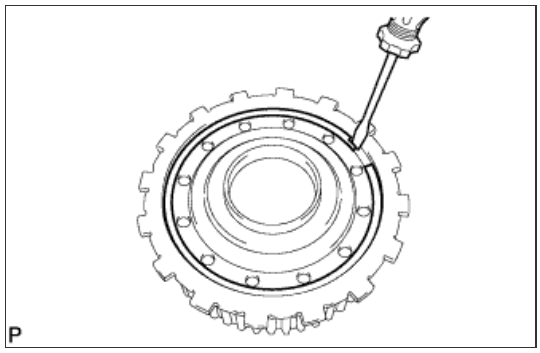


b. Remove the front planetary ring gear from the center planetary ring gear.

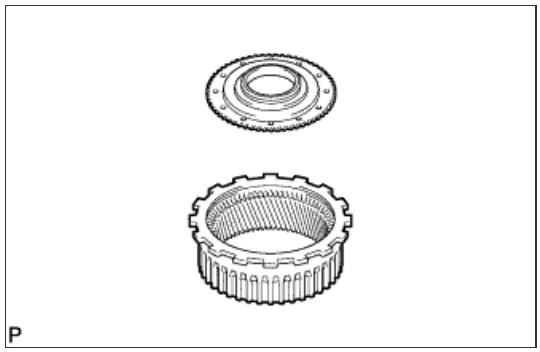


73. REMOVE CENTER PLANETARY RING GEAR

a. Using a screwdriver, remove the snap ring.

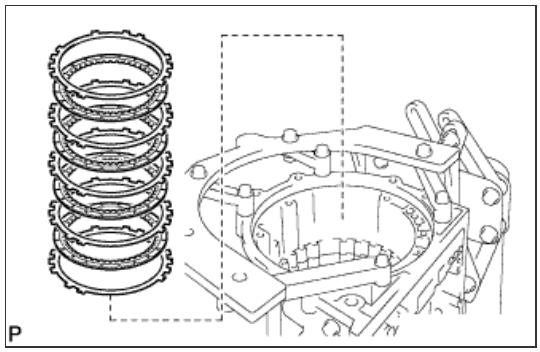


b. Remove the center planetary ring gear from the front planetary ring gear flange.



74. REMOVE NO. 1 BRAKE DISC SET

a. Remove the flange, 4 discs and 4 plates from the transmission case.

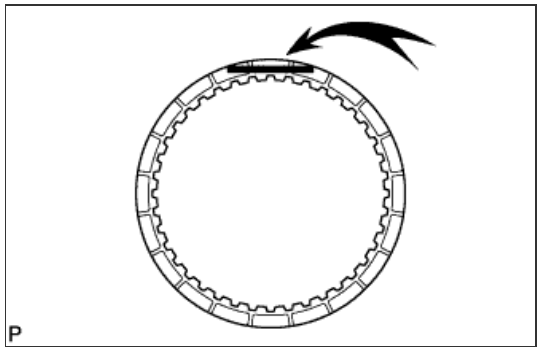


75. INSPECT NO. 1 BRAKE DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.



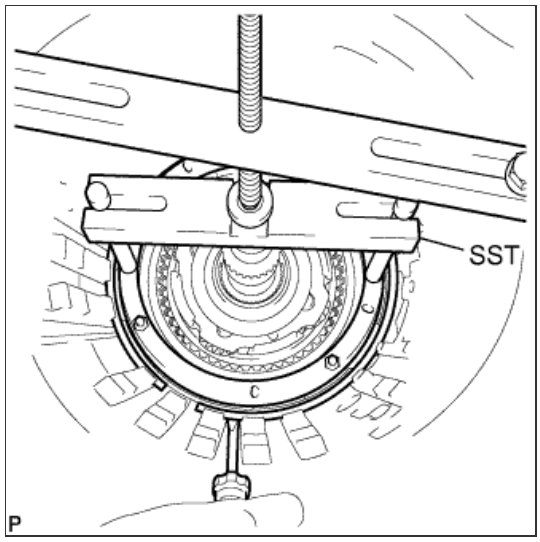
76. REMOVE NO. 1 BRAKE CYLINDER WITH NO. 1 BRAKE PISTON

a. Place SST on the No. 1 brake piston return spring, and compress the return spring.

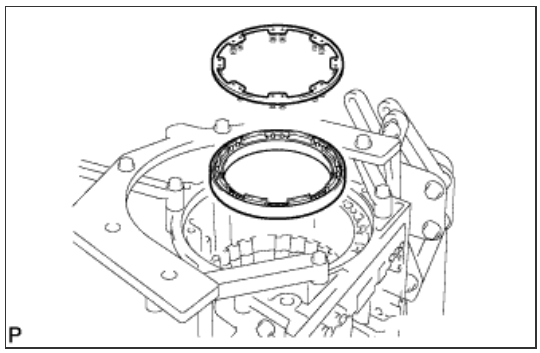
SST

09380-60010 (09381-06010, 09381-06020, 09381-06050, 09381-06060, 09381-06090, 09381-06100, 09381-06110, 09381-06120)

b. Using a screwdriver, remove the snap ring from the transmission case.



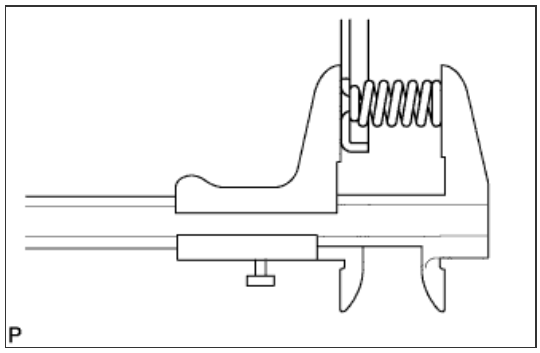
c. Remove the brake piston return spring and No. 1 brake piston with No. 1 brake cylinder from the transmission case.



77. INSPECT BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
17.05 mm (0.671 in.)

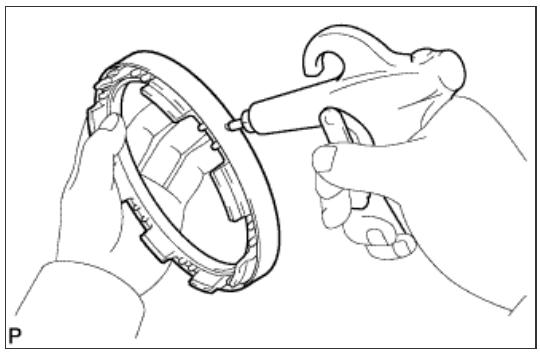


78. REMOVE NO. 1 BRAKE PISTON

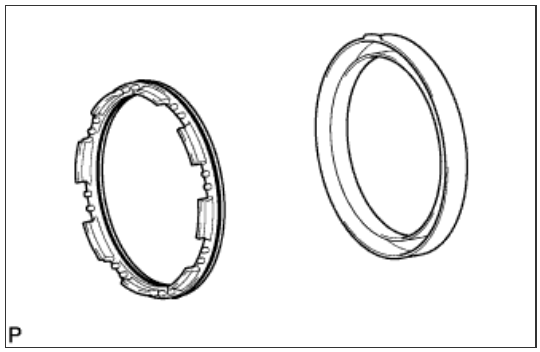
a. Hold the No. 1 brake piston and apply compressed air to the No. 1 brake cylinder to remove the No. 1 brake piston.

HINT:

If the piston does not pop out with compressed air, lift the piston out with needle-nose pliers.



b. Remove the 2 O-rings from the No. 1 brake piston.



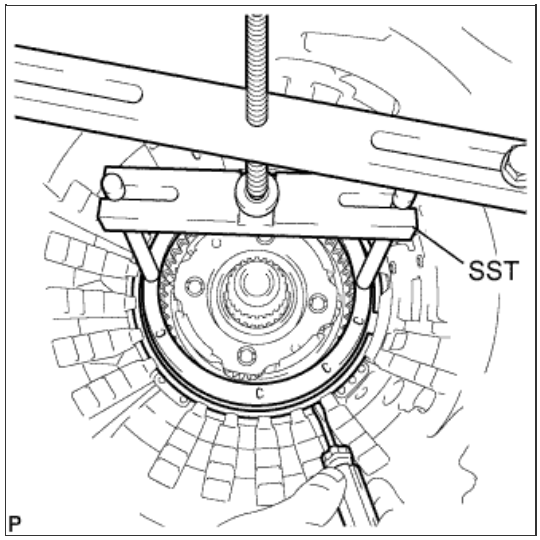
79. REMOVE NO. 2 BRAKE DISC SET

a. Place SST on the No. 2 brake flange, and compress the return spring.

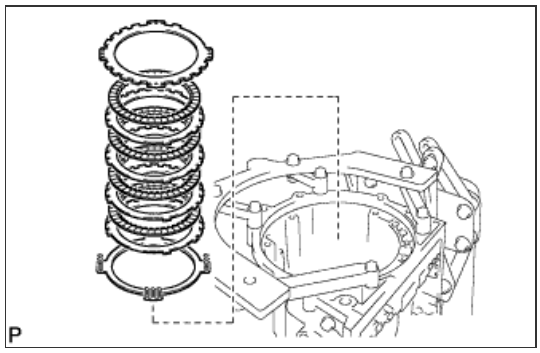
SST

09380-60010 (09381-06010, 09381-06020, 09381-06050, 09381-06070, 09381-06090, 09381-06120)

b. Using a screwdriver, remove the snap ring from the transmission case.



c. Remove the 2 flanges, 4 discs, 3 plates and brake piston return spring from the transmission case.

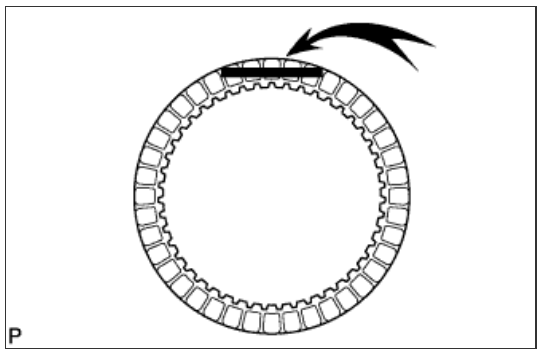


80. INSPECT NO. 2 BRAKE DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

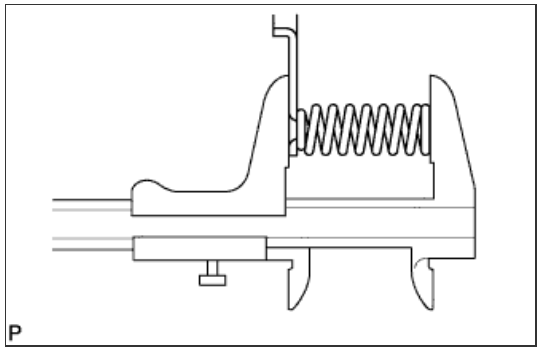
Before assembling new discs, soak them in ATF for at least 2 hours.



81. INSPECT NO. 2 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

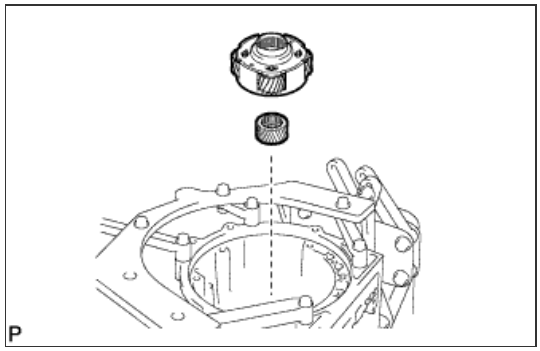
a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
22.66 mm (0.892 in.)



82. REMOVE CENTER PLANETARY GEAR ASSEMBLY

a. Remove the center planetary gear and planetary sun gear from the transmission case.

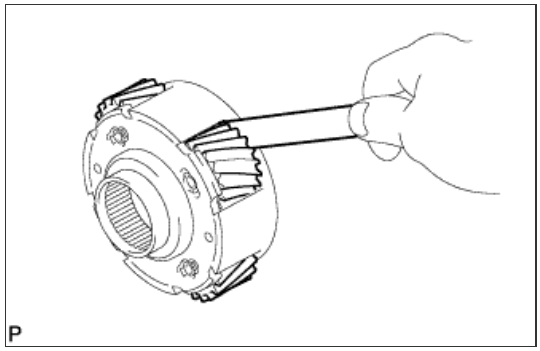


83. INSPECT CENTER PLANETARY GEAR ASSEMBLY

a. Using a feeler gauge, measure the center planetary pinion gear thrust clearance.

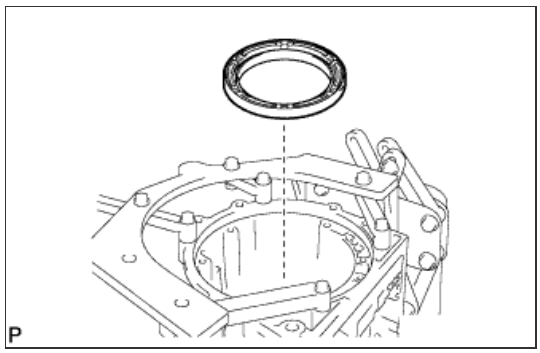
Standard clearance:
0.20 to 0.60 mm (0.00787 to 0.0236 in.)

If the clearance is more than the standard, replace the center planetary gear assembly.



84. REMOVE NO. 2 BRAKE CYLINDER WITH NO. 2 BRAKE PISTON

a. Remove the No. 2 brake cylinder with the No. 2 brake piston from the transmission case.

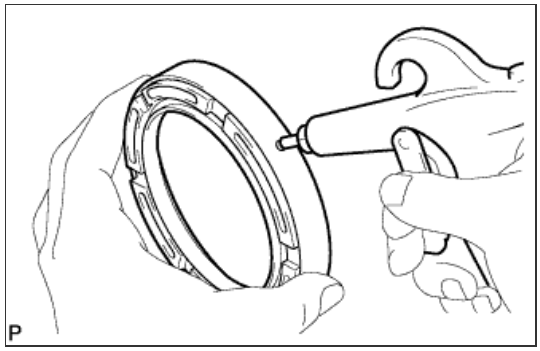


85. REMOVE NO. 2 BRAKE PISTON

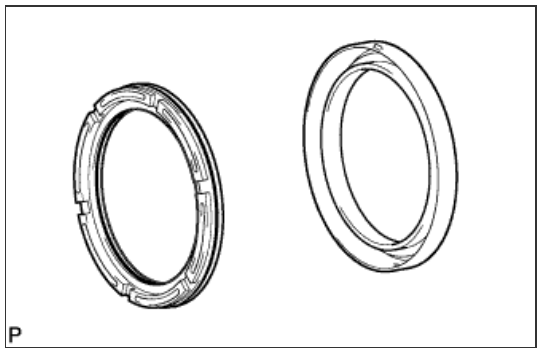
a. Hold the No. 2 brake piston and apply compressed air to the No. 2 brake cylinder to remove the No. 2 brake piston.

HINT:

If the piston does not pop out with compressed air, lift the piston out with needle-nose pliers.



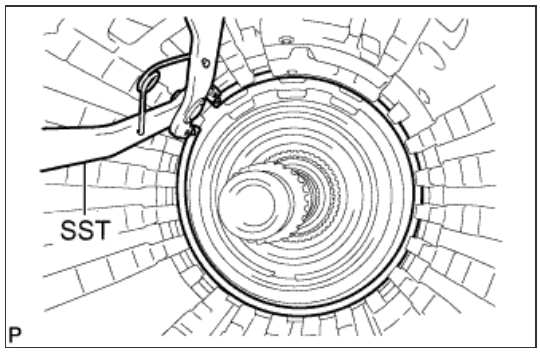
b. Remove the 2 O-rings from the No. 2 brake piston.



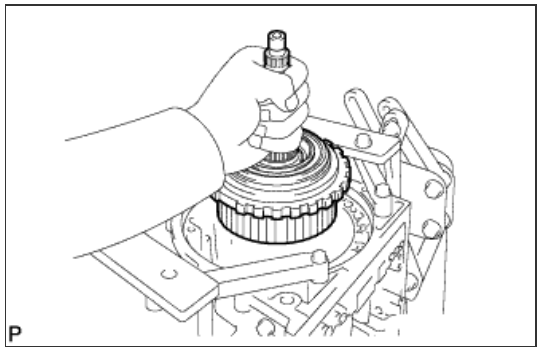
86. REMOVE INTERMEDIATE SHAFT WITH NO. 3 1-WAY CLUTCH ASSEMBLY, REAR PLANETARY RING GEAR FLANGE AND REAR PLANETARY RING GEAR

a. Using SST, remove the snap ring from the transmission case.

SST
09350-30020 (09350-07060)

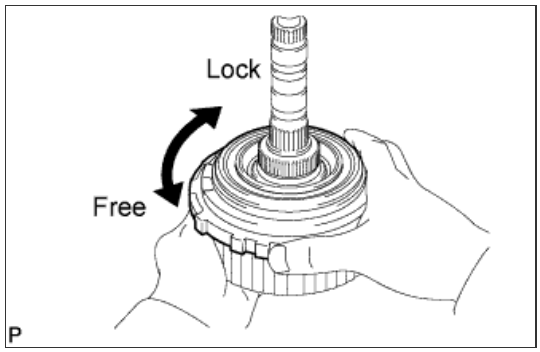


b. Remove the intermediate shaft with No. 3 1-way clutch, rear planetary ring gear flange and rear planetary ring gear from the transmission case.



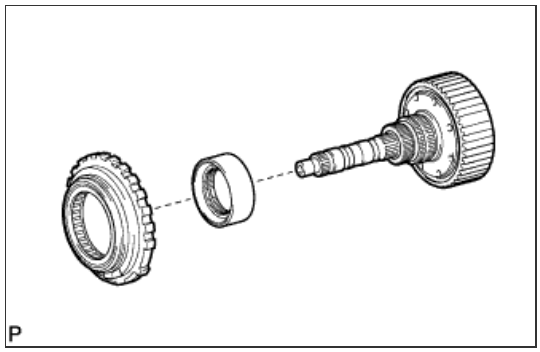
87. INSPECT NO. 3 1-WAY CLUTCH ASSEMBLY

a. Hold the rear planetary ring gear flange and turn the 1-way clutch. Check that the 1-way clutch turns freely counterclockwise and locks when turned clockwise.



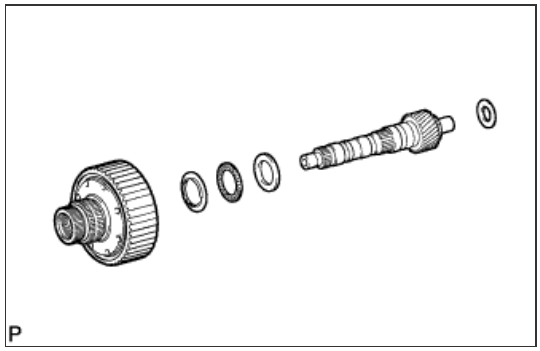
88. REMOVE NO. 3 1-WAY CLUTCH ASSEMBLY

a. Remove the No. 3 1-way clutch and 1-way clutch inner race from the intermediate shaft.



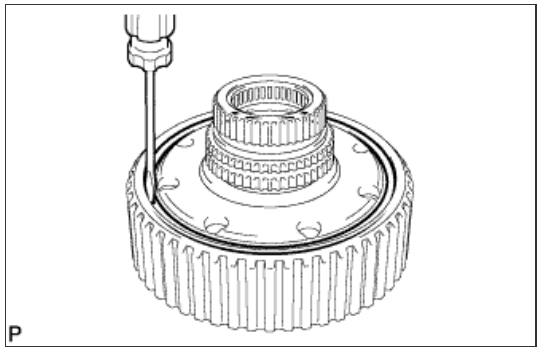
89. REMOVE REAR PLANETARY RING GEAR

a. Remove the rear planetary ring gear with rear planetary ring gear flange, 3 thrust bearing races and thrust needle roller bearing from the intermediate shaft.



b. Using a screwdriver, remove the snap ring.

c. Remove the rear planetary ring gear flange from the rear planetary ring gear.

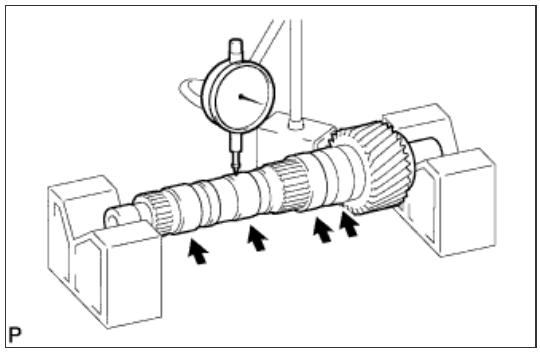


90. INSPECT INTERMEDIATE SHAFT

a. Using a dial indicator, check the intermediate shaft runout.

Standard runout:
0.03 mm (0.00118 in.)

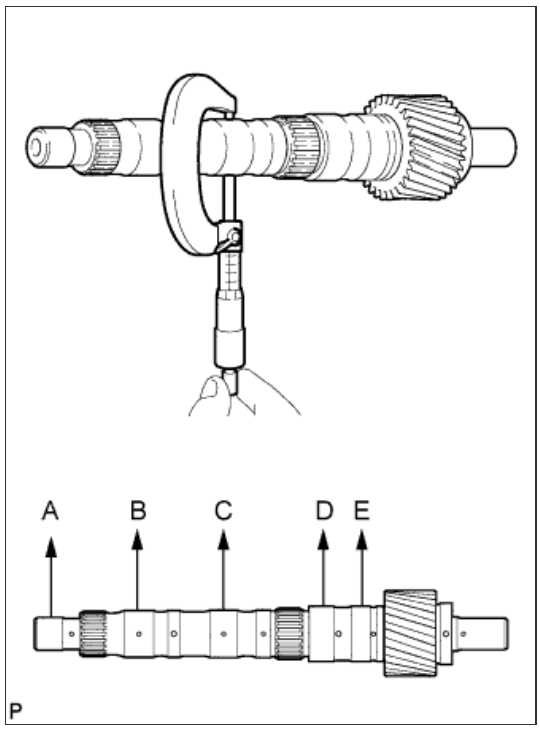
If the runout is more than the standard, replace the intermediate shaft with a new one.



b. Using a micrometer, check the diameter of the intermediate shaft at the positions shown in the diagram.

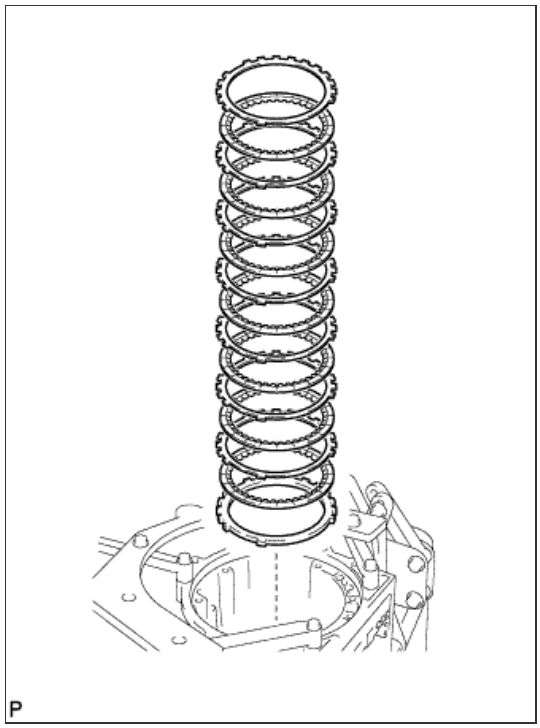
Standard diameter:
A:
19.963 to 19.976 mm (0.7859 to 0.7865 in.)
B, C:
30.150 to 30.163 mm (1.187 to 1.188 in.)
D, E:
36.404 to 36.420 mm (1.433 to 1.434 in.)

If the diameter is less than the standard, replace the intermediate shaft with a new one.



91. REMOVE NO. 4 BRAKE DISC SET

a. Remove the 2 flanges, 7 discs and 6 plates from the transmission case.

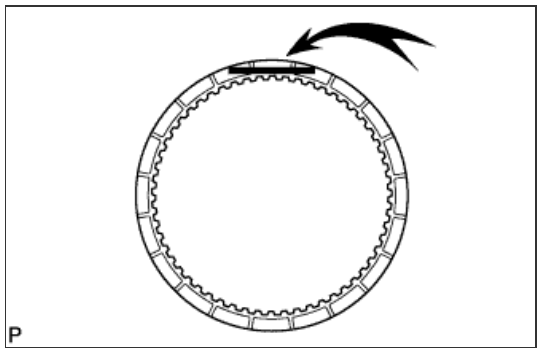


92. INSPECT NO. 4 BRAKE DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

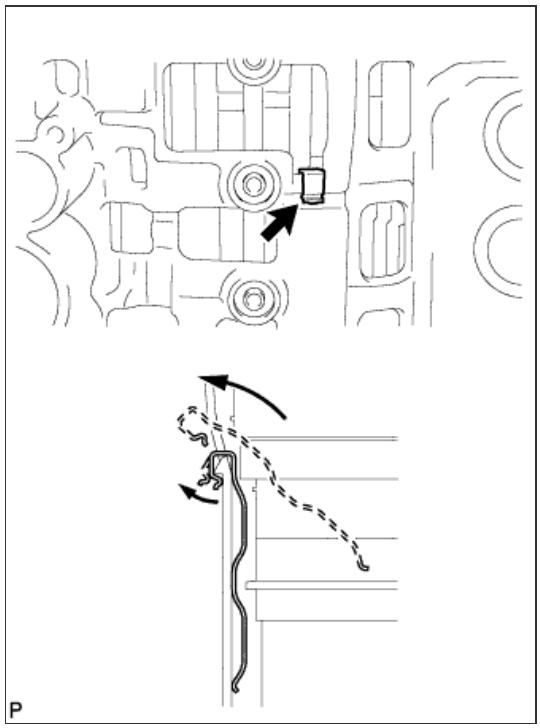
Before assembling new discs, soak them in ATF for at least 2 hours.



93. REMOVE BRAKE PLATE STOPPER SPRING

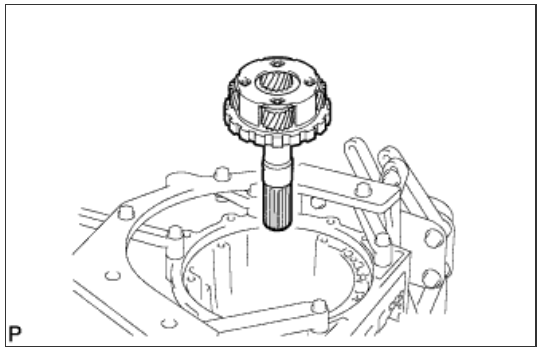
NOTICE:

When removing the stopper spring, do not apply excessive force and do not deform it.

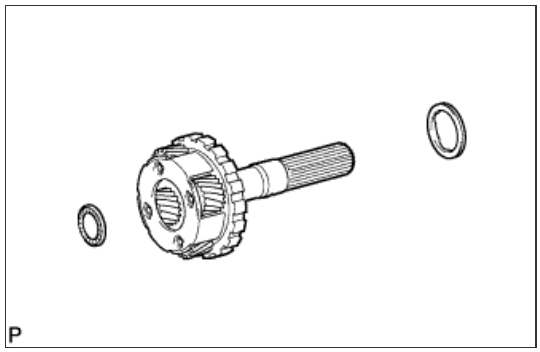


94. REMOVE REAR PLANETARY GEAR ASSEMBLY

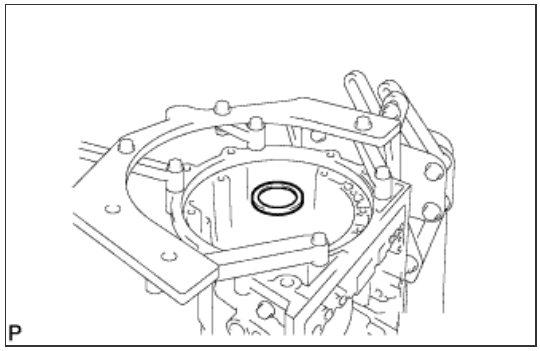
a. Remove the rear planetary gear from the transmission case.



b. Remove the 2 thrust needle roller bearings from the rear planetary gear.



c. Remove the thrust bearing race from the transmission case.

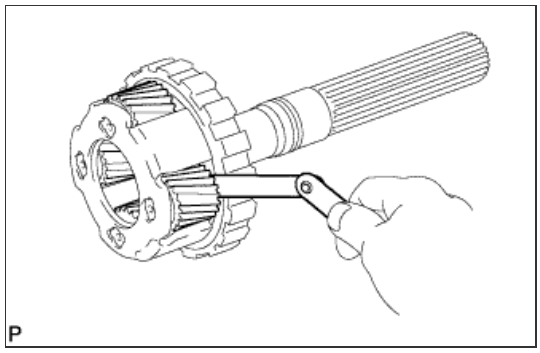


95. INSPECT REAR PLANETARY GEAR ASSEMBLY

a. Using a feeler gauge, measure the rear planetary pinion gear thrust clearance.

Standard clearance:
0.2 to 0.6 mm (0.00787 to 0.0236 in.)

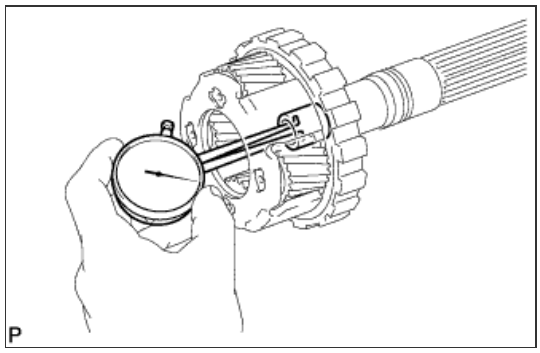
If the clearance is more than the standard, replace the planetary gear assembly.



b. Using a dial indicator, measure the inside diameter of the rear planetary gear bush.

Standard inside diameter:
20.0 to 20.025 mm (0.787 to 0.788 in.)

If the inside diameter is more than the standard, replace the rear planetary gear assembly.



96. REMOVE 1ST AND REVERSE BRAKE PISTON

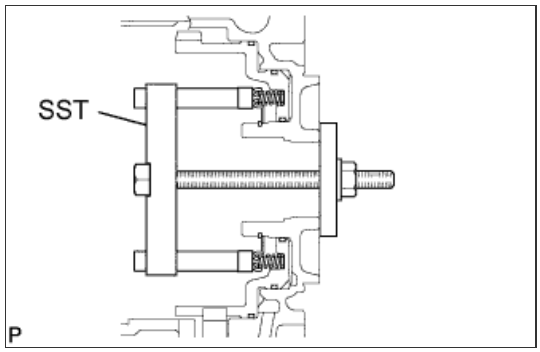
a. Place SST on the spring retainer and compress the brake return spring.

SST
09380-60010 (09381-06030, 09381-06040, 09381-06080, 09381-06120, 09381-06130, 09381-05040, 09381-05050)

b. Using SST, remove the snap ring and brake return spring.

SST

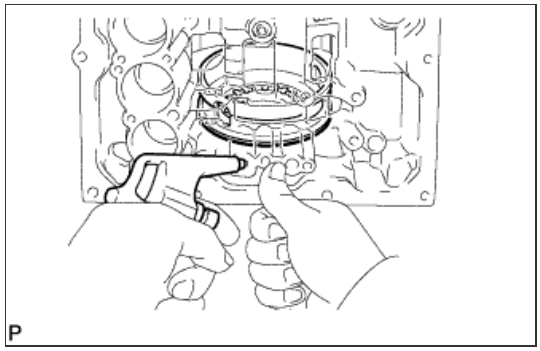
09350-30020 (09350-07070)



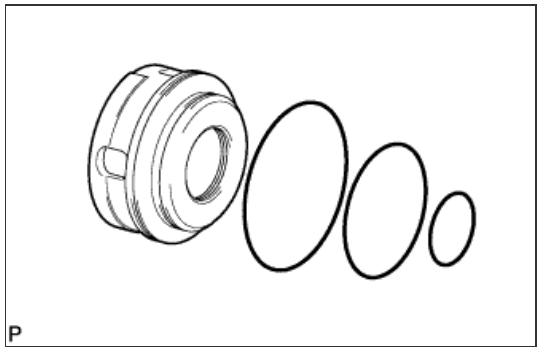
c. Hold the 1st and reverse brake piston and apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transmission case to remove the 1st and reverse brake piston.

HINT:

If the piston does not pop out with compressed air, lift the piston out with needle-nose pliers.



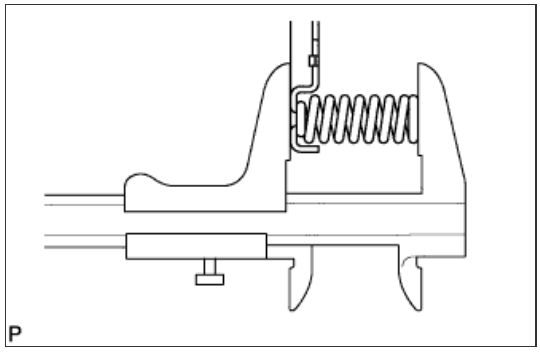
d. Remove the 3 O-rings from the 1st and reverse brake piston.



97. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
23.54 to 23.94 mm (0.927 to 0.943 in.)



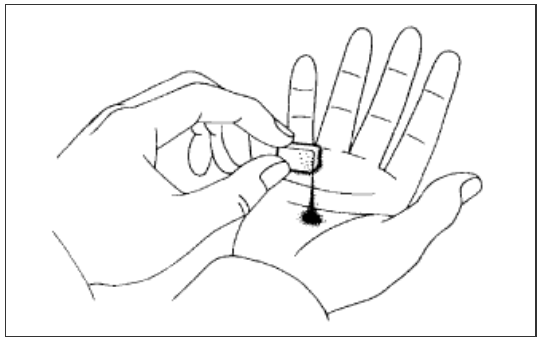
for Preparation Click here

1. INSPECT AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY

a. Remove the magnets, and use them to collect steel particles.

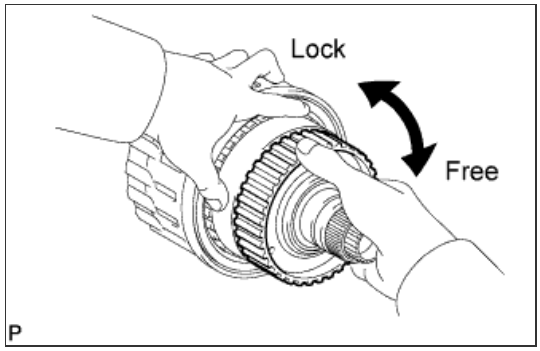
b. Carefully look at the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.

- Steel (magnetic): bearing, gear and clutch plate wear
- Brass (non-magnetic): bush wear



2. INSPECT NO. 2 1-WAY CLUTCH ASSEMBLY

a. Hold the reverse clutch hub and turn the 1-way clutch assembly. Check that the 1-way clutch turns freely clockwise and locks when turned counterclockwise.

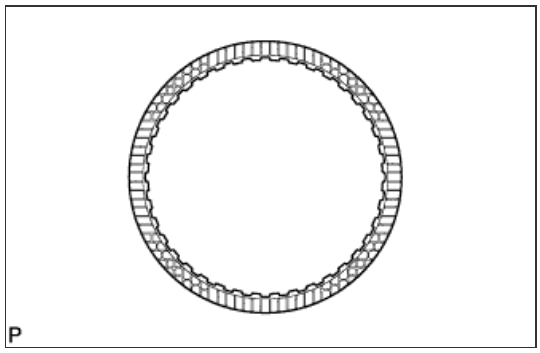


3. INSPECT REAR CLUTCH DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves have even a little bit of damage.

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

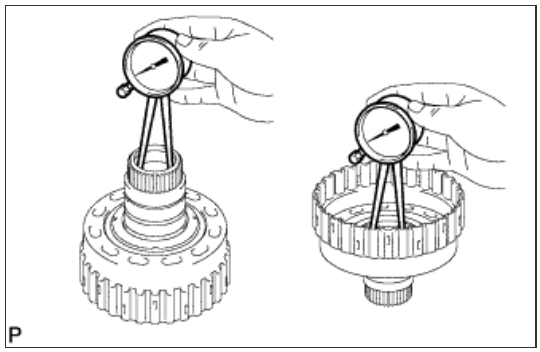


4. INSPECT REVERSE CLUTCH HUB SUB-ASSEMBLY

a. Using a dial indicator, measure the inside diameter of the reverse clutch hub bush.

Standard inside diameter:
41.912 to 41.937 mm (1.410 to 1.411 in.)

If the inside diameter is more than the standard, replace the reverse clutch hub.

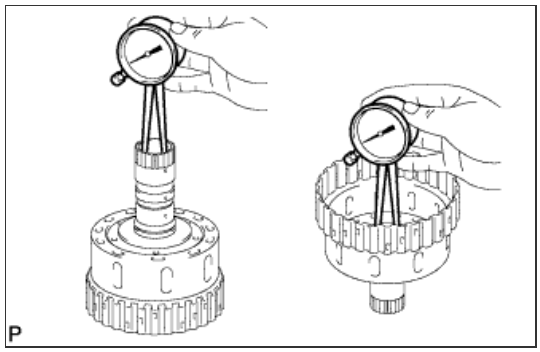


5. INSPECT FORWARD CLUTCH HUB SUB-ASSEMBLY

a. Using a dial indicator, measure the inside diameter of the forward clutch hub bush.

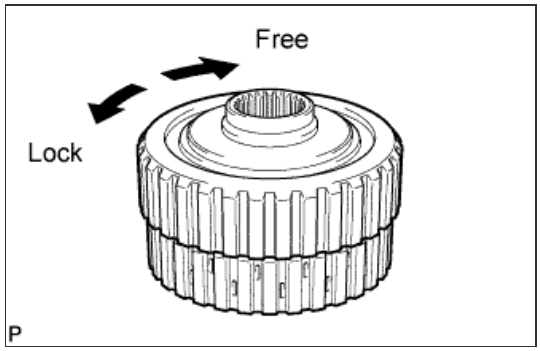
Standard inside diameter:
30.200 to 30.225 mm (1.189 to 1.190 in.)

If the inside diameter is more than the standard, replace the forward clutch hub.



6. INSPECT NO. 4 1-WAY CLUTCH ASSEMBLY

a. Hold the coast clutch hub and turn the 1-way clutch assembly. Check that the 1-way clutch turns freely clockwise and locks when turned counterclockwise.

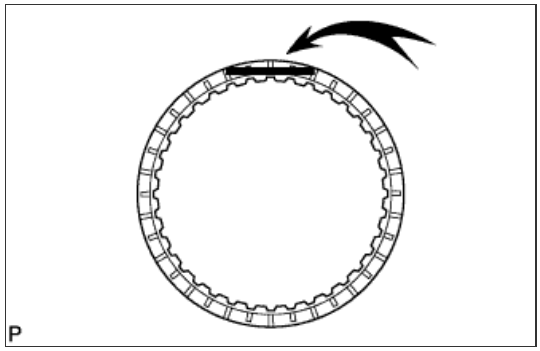


7. INSPECT FORWARD MULTIPLE DISC CLUTCH DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

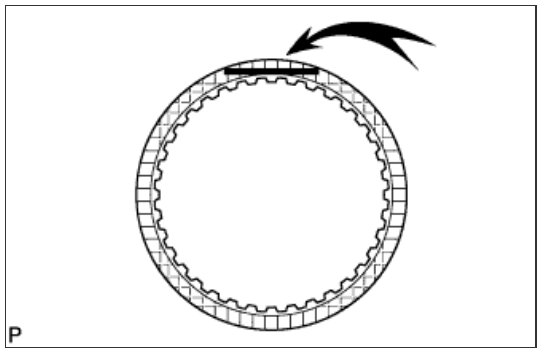


8. INSPECT COAST CLUTCH DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

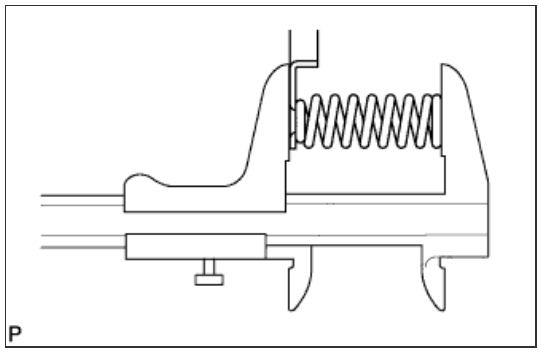
Before assembling new discs, soak them in ATF for at least 2 hours.



9. INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
29.65 mm (1.17 in.)

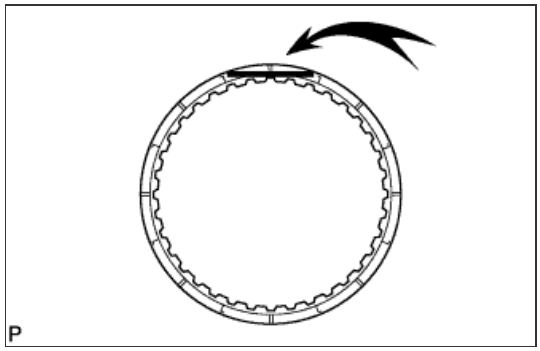


10. INSPECT DIRECT CLUTCH DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

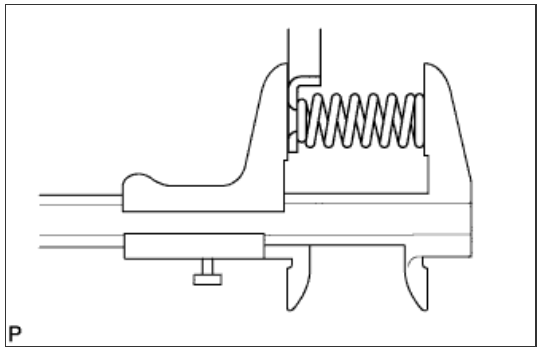
Before assembling new discs, soak them in ATF for at least 2 hours.



11. INSPECT REVERSE CLUTCH RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

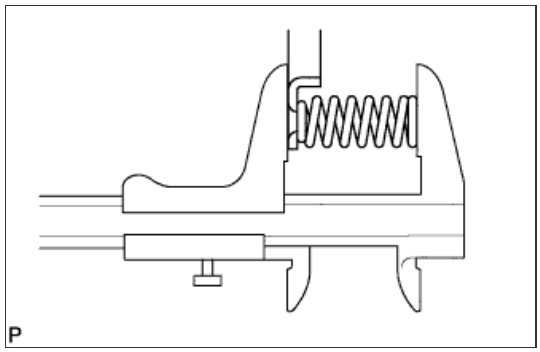
Standard free length:
21.24 mm (0.836 in.)



12. INSPECT DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
19.46 mm (0.766 in.)

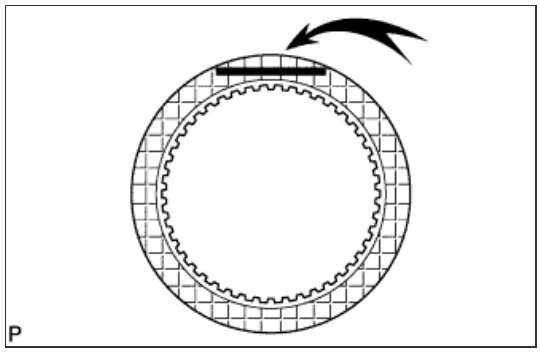


13. INSPECT NO. 3 BRAKE DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

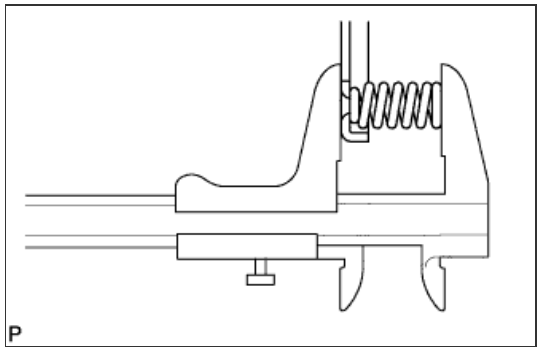
Before assembling new discs, soak them in ATF for at least 2 hours.



14. INSPECT NO. 3 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
15.72 mm (0.619 in.)

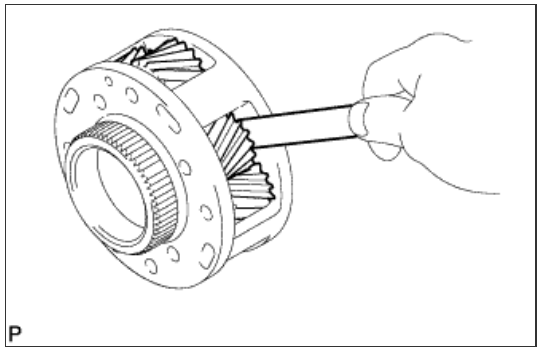


15. INSPECT FRONT PLANETARY GEAR ASSEMBLY

a. Using a feeler gauge, measure the front planetary pinion gear thrust clearance.

Standard clearance:
0.2 to 0.6 mm (0.00787 to 0.0236 in.)

If the clearance is more than the standard, replace the front planetary gear assembly.

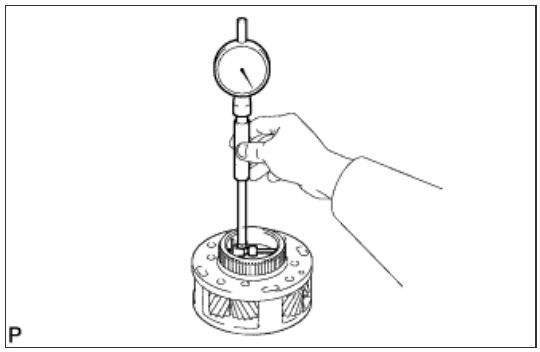


b. Using a cylinder gauge, measure the inside diameter of the front planetary gear bush.

Standard inside diameter:

61.005 to 61.030 mm (2.402 to 2.403 in.)

If the inside diameter is more than the standard, replace the front planetary gear.

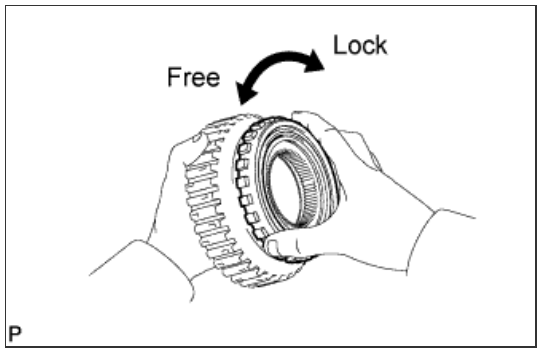


16. INSPECT 1-WAY CLUTCH ASSEMBLY

a. Install the 1-way clutch to the 1-way clutch inner race.

b. Hold the 1-way clutch inner race and turn the 1-way clutch. Check that the 1-way clutch turns freely counterclockwise and locks when turned clockwise.

c. Remove the 1-way clutch from the 1-way clutch inner race.

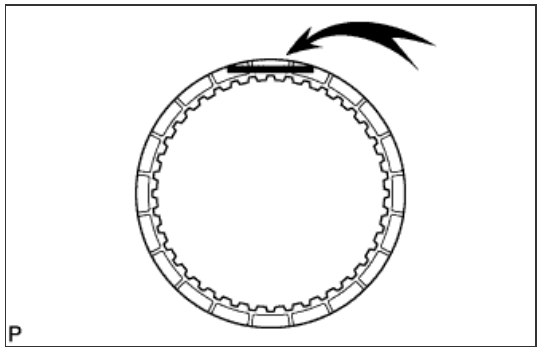


17. INSPECT NO. 1 BRAKE DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

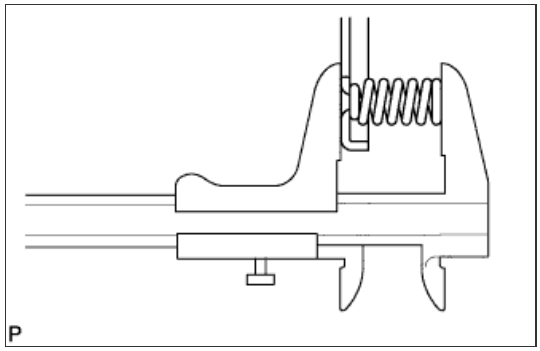
Before assembling new discs, soak them in ATF for at least 2 hours.



18. INSPECT BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
17.05 mm (0.671 in.)

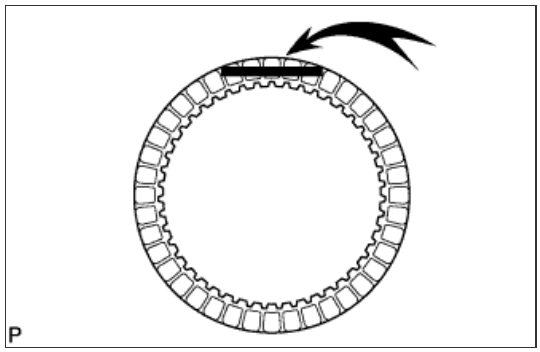


19. INSPECT NO. 2 BRAKE DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

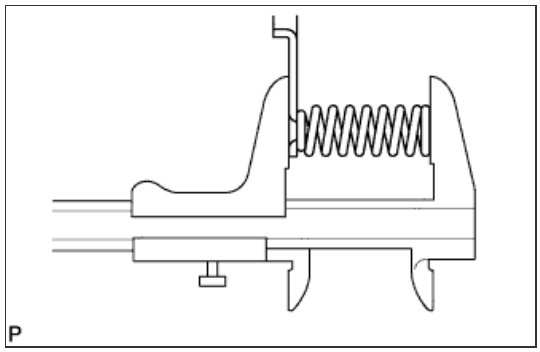
Before assembling new discs, soak them in ATF for at least 2 hours.



20. INSPECT NO. 2 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
22.66 mm (0.892 in.)

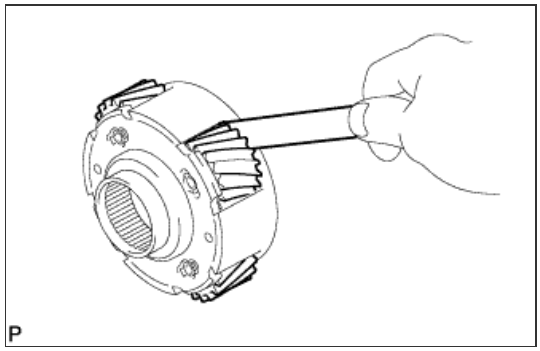


21. INSPECT CENTER PLANETARY GEAR ASSEMBLY

a. Using a feeler gauge, measure the center planetary pinion gear thrust clearance.

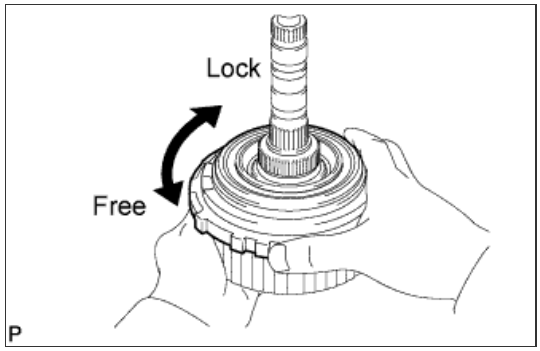
Standard clearance:
0.20 to 0.60 mm (0.00787 to 0.0236 in.)

If the clearance is more than the standard, replace the center planetary gear assembly.



22. INSPECT NO. 3 1-WAY CLUTCH ASSEMBLY

a. Hold the rear planetary ring gear flange and turn the 1-way clutch. Check that the 1-way clutch turns freely counterclockwise and locks when turned clockwise.

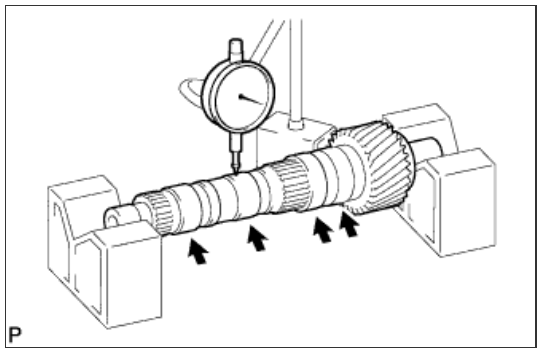


23. INSPECT INTERMEDIATE SHAFT

a. Using a dial indicator, check the intermediate shaft runout.

Standard runout:
0.03 mm (0.00118 in.)

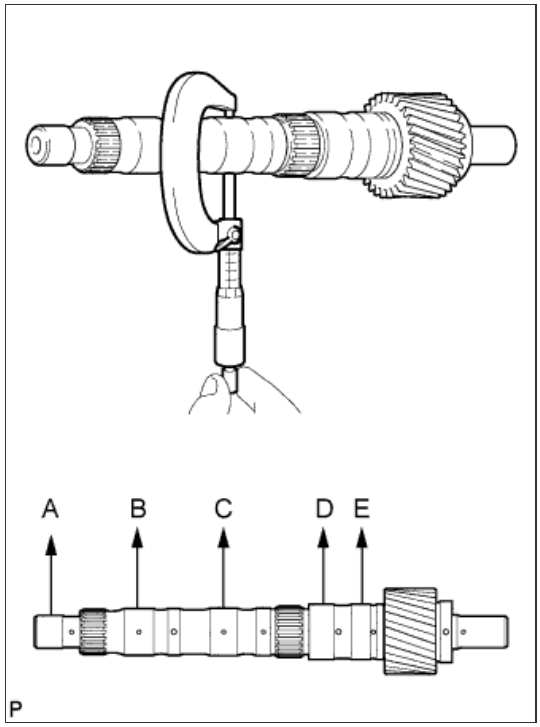
If the runout is more than the standard, replace the intermediate shaft with a new one.



b. Using a micrometer, check the diameter of the intermediate shaft at the positions shown in the diagram.

Standard diameter:
A:
19.963 to 19.976 mm (0.7859 to 0.7865 in.)
B, C:
30.150 to 30.163 mm (1.187 to 1.188 in.)
D, E:
36.404 to 36.420 mm (1.433 to 1.434 in.)

If the diameter is less than the standard, replace the intermediate shaft with a new one.

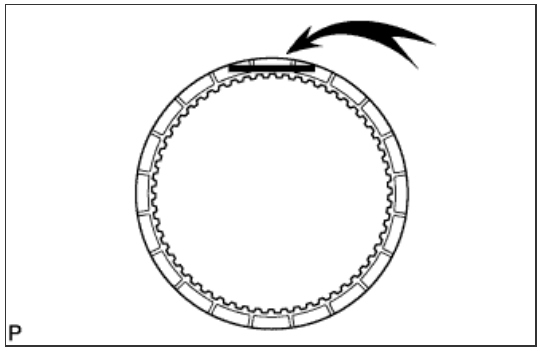


24. INSPECT NO. 4 BRAKE DISC

a. Replace all discs if one of the following problems is present: 1) a disc, plate or flange is worn or burnt, 2) the lining of a disc is peeled off or discolored, or 3) grooves or printed numbers have even a little bit of damage.

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

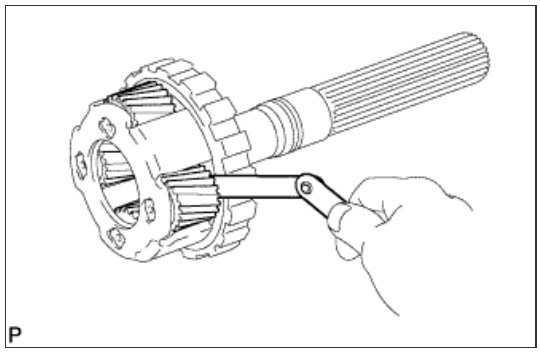


25. INSPECT REAR PLANETARY GEAR ASSEMBLY

a. Using a feeler gauge, measure the rear planetary pinion gear thrust clearance.

Standard clearance:
0.2 to 0.6 mm (0.00787 to 0.0236 in.)

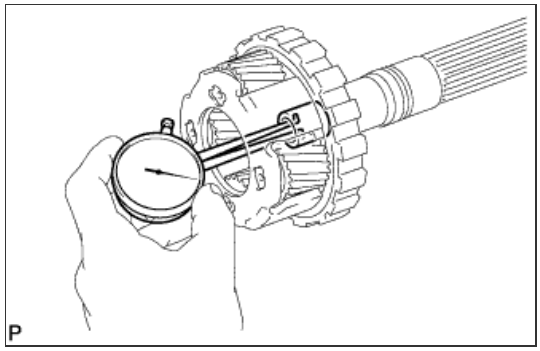
If the clearance is more than the standard, replace the planetary gear assembly.



b. Using a dial indicator, measure the inside diameter of the rear planetary gear bush.

Standard inside diameter:
20.0 to 20.025 mm (0.787 to 0.788 in.)

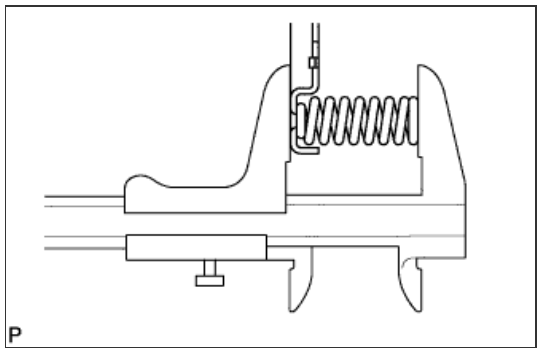
If the inside diameter is more than the standard, replace the rear planetary gear assembly.



26. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

a. Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:
23.54 to 23.94 mm (0.927 to 0.943 in.)



27. INSPECT INDIVIDUAL PISTON OPERATION

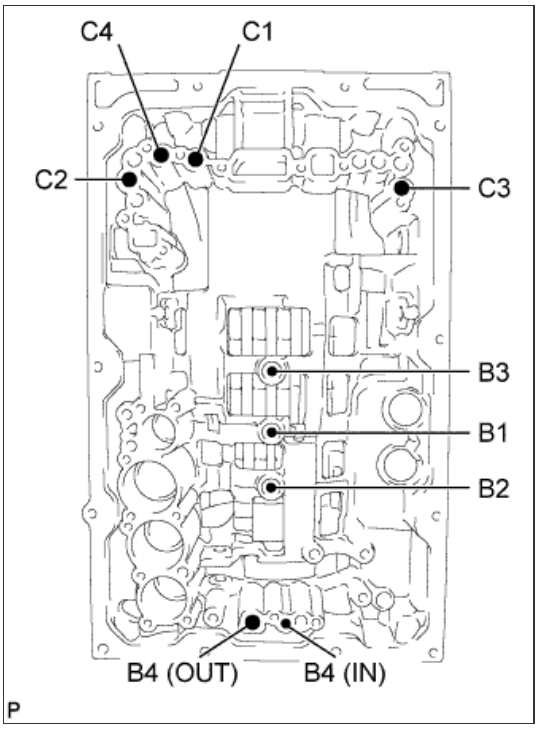
a. Check the operating sound while applying compressed air into the oil holes indicated in the illustration.

HINT:

When inspecting the direct clutch, check with the accumulator piston holes indicated in the illustration.

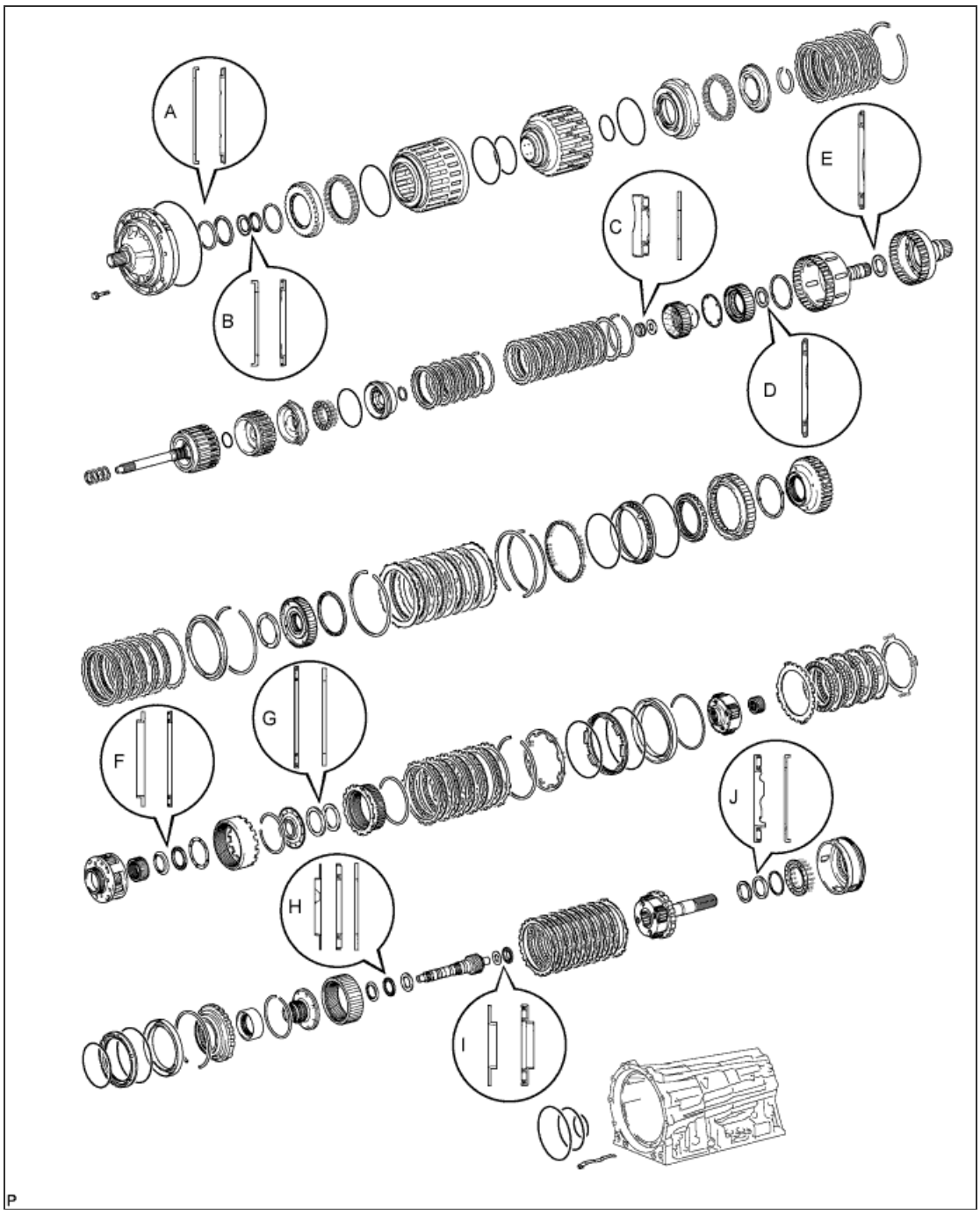
If there is no sound, disassemble and check the installation condition of the parts.

1. No. 2 clutch (C2)
2. No. 3 clutch (C3)
3. No. 4 clutch (C4)
4. No. 1 clutch (C1)
5. No. 3 brake (B3)
6. No. 1 brake (B1)
7. No. 2 brake (B2)
8. No. 4 brake (B4)


C4
C1
C2
C3
B3
B1
B2
B4 (OUT)
B4 (IN)
P

for Preparation Click here

1. BEARING POSITION



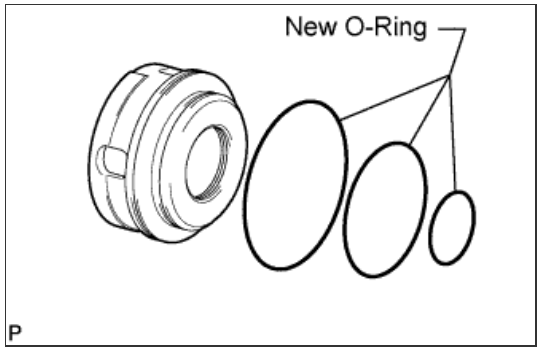
Bearing and Race Diameter:

Mark	Front Race Diameter Inside / Outside	Thrust Bearing Diameter Inside / Outside	Rear Race Diameter Inside / Outside
A	74.26 to 74.56 mm (2.92 to 2.94 in.) / 87.39 to 87.74 mm (3.44 to 3.45 in.)	71.96 to 72.26 mm (2.83 to 2.84 in.) / 85.25 to 85.6 mm (3.36 to 3.37 in.)	-
B	38.0 to 38.3 mm (1.50 to 1.51 in.) / 53.9 to 54.1 mm (2.12 to 2.13 in.)	36.45 to 36.7 mm (1.44 to 1.45 in.) / 52.96 to 53.26 mm (2.09 to 2.10 in.)	-

C	-	21.05 to 21.3 mm (0.829 to 0.839 in.) / 39.63 to 39.88 mm (1.56 to 1.57 in.)	22.8 to 23.1 mm (0.898 to 0.909 in.) / 44.5 to 44.75 mm (1.75 to 1.76 in.)
D	-	39.45 to 39.7 mm (1.55 to 1.56 in.) / 60.5 to 60.75 mm (2.38 to 2.39 in.)	-
E	-	46.45 to 46.7 mm (1.83 to 1.84 in.) / 64.3 to 64.55 mm (2.53 to 2.54 in.)	-
F	55.0 to 55.2 mm (2.165 to 2.173 in.) / 68.8 to 69.3 mm (2.71 to 2.73 in.)	54.55 to 54.8 mm (2.15 to 2.16 in.) / 70.0 to 70.5 mm (2.76 to 2.78 in.)	-
G	-	65.35 to 65.6 mm (2.57 to 2.58 in.) / 85.6 to 85.95 mm (3.37 to 3.38 in.)	62.85 to 63.1 mm (2.47 to 2.48 in.) / 82.3 to 82.6 mm (3.24 to 3.25 in.)
H	39.67 to 39.87 mm (1.56 to 1.57 in.) / 56.5 to 57.0 mm (2.22 to 2.24 in.)	36.5 to 36.6 mm (1.437 to 1.441 in.) / 56.62 to 56.92 mm (2.23 to 2.24 in.)	36.45 to 36.7 mm (1.435 to 1.445 in.) / 56.5 to 57.0 mm (2.22 to 2.24 in.)
I	21.05 to 21.3 mm (0.829 to 0.839 in.) / 39.5 to 39.8 mm (1.56 to 1.57 in.)	23.2 to 23.4 mm (0.913 to 0.921 in.) / 43.9 to 44.15 mm (1.73 to 1.74 in.)	-
J	-	43.6 to 43.9 mm (1.72 to 1.73 in.) / 62.3 to 62.8 mm (2.45 to 2.47 in.)	47.15 to 47.4 mm (1.86 to 1.87 in.) / 66.9 to 67.1 mm (2.63 to 2.64 in.)

2. INSTALL 1ST AND REVERSE BRAKE PISTON

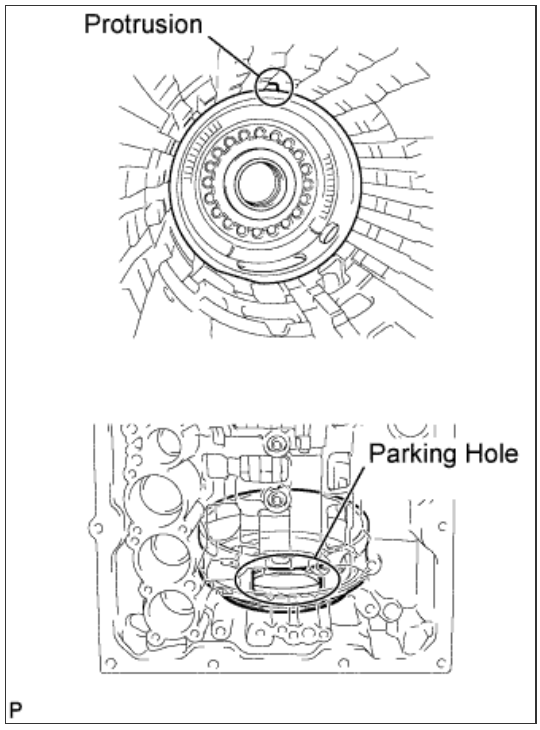
a. Coat 3 new O-rings with ATF, and install them to the 1st and reverse brake piston.



b. Install the 1st and reverse brake piston to the transmission case.

NOTICE:

- **Be careful not to damage the O-ring.**
- **Make sure that the parking hole of the brake piston is on the bottom side by engaging the brake piston protrusion to the transmission case spline grooves.**



3. INSTALL 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

a. Place the brake return spring onto the 1st and reverse brake piston.

SST

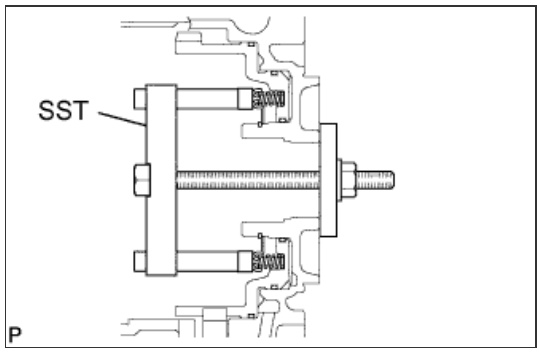
09380-60010 (09381-06030, 09381-06040, 09381-06080, 09381-06120, 09381-06130, 09381-05040, 09381-05050)

b. Place SST on the spring retainer, and compress the return spring.

c. Using SST, install the snap ring.

SST

09350-30020 (09350-07070)

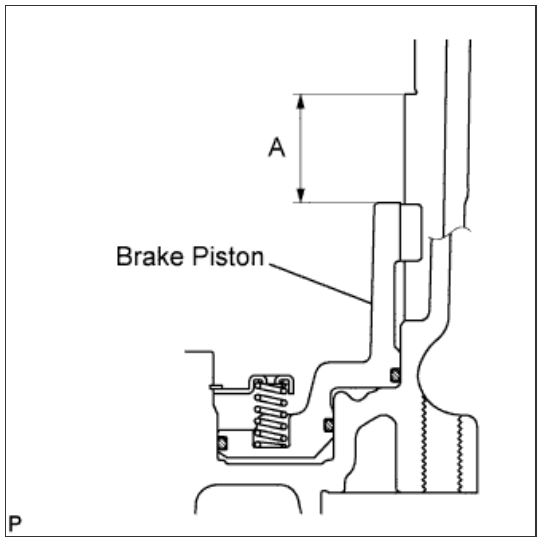


4. SELECT NO. 4 BRAKE FLANGE

a. Measure distance A (from the tip of the 1st and reverse brake piston to the step in the transmission case) in the illustration.*1

HINT:

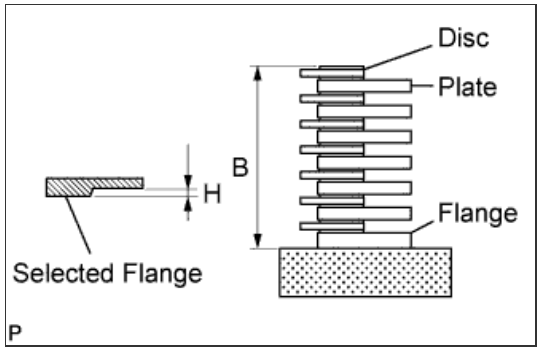
Standard distance A: 27.82 to 28.42 mm (1.09 to 1.12 in.)



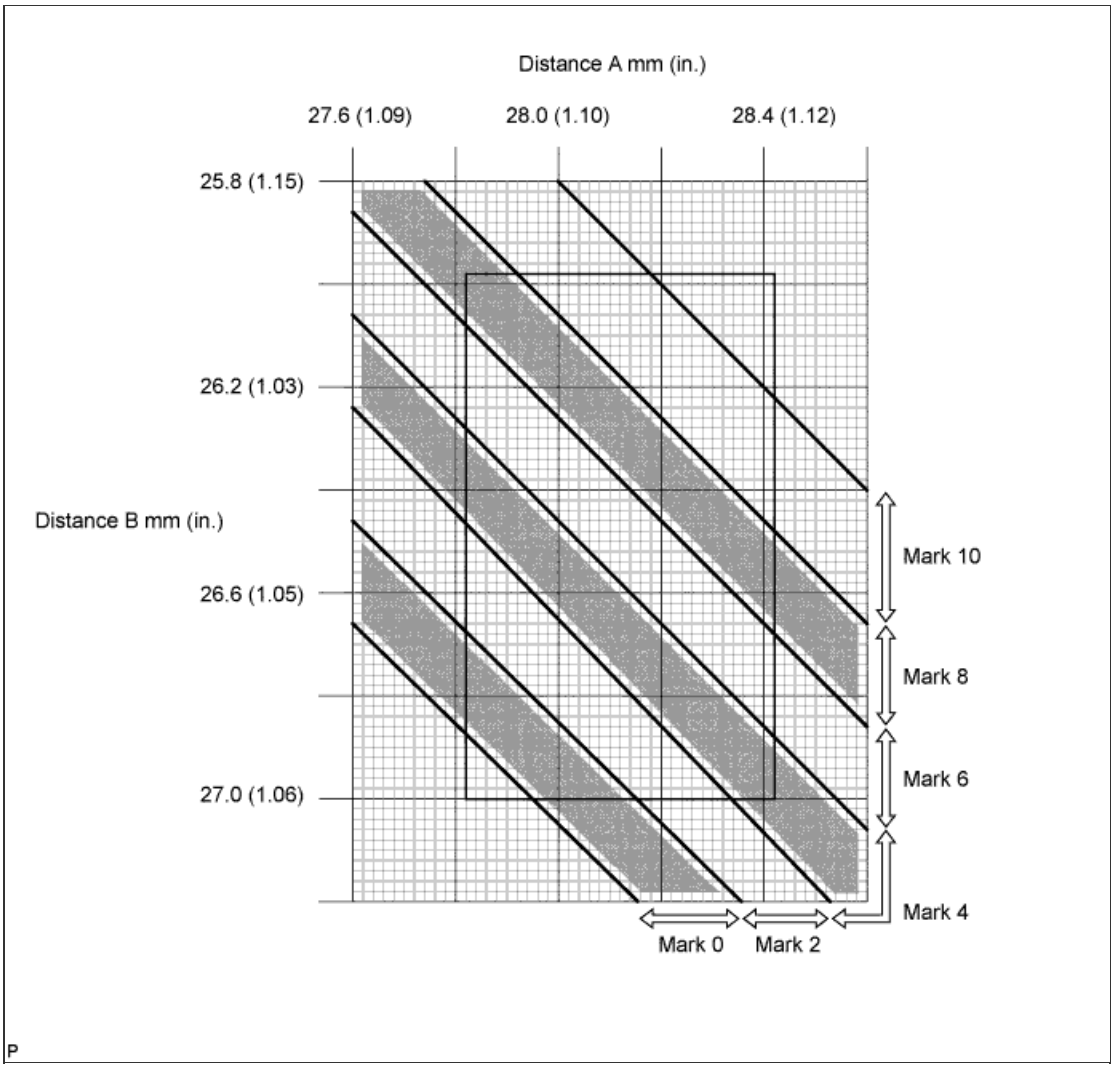
b. Assemble the No. 4 brake flange, 7 No. 4 brake discs and 6 No. 4 brake plates, and measure distance B in the illustration.*2

HINT:

Standard distance B: 25.98 to 27.01 mm (1.02 to 1.06 in.)



c. Apply the A and B measurements taken in *1 and *2 to the graph below. Use A for the X axis and B for the Y axis, and then choose the No. 4 brake selective flange indicated by the graph point.



d. Measure length H of the selected flange as shown in the illustration.

HINT:

Make sure that when the B measurement and H dimension of the selected flange are subtracted from the A measurement, the value is 0.961 to 1.261 mm (0.0378 to 0.0495 in.).

No. 4 Brake Selected Flange Length H:

Mark	Length H
0	0 mm (0 in.)
2	0.15 to 0.25 mm (0.00590 to 0.00984 in.)
4	0.35 to 0.45 mm (0.0138 to 0.0177 in.)
6	0.55 to 0.65 mm (0.0217 to 0.0256 in.)
8	0.75 to 0.85 mm (0.0295 to 0.0335 in.)
10	0.95 to 1.05 mm (0.0374 to 0.0413 in.)

5. INSTALL REAR PLANETARY GEAR ASSEMBLY

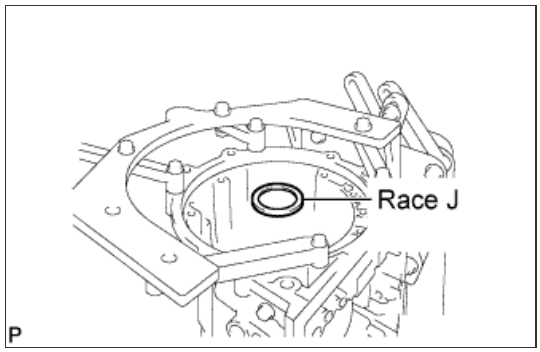
a. Install the thrust bearing race.

HINT:

Use a small amount of MP grease to make the thrust bearing race stay securely in place.

Bearing Race Diameter:

Item	Inside	Outside
Race J	47.15 to 47.4 mm (1.86 to 1.87 in.)	66.9 to 67.1 mm (2.63 to 2.64 in.)



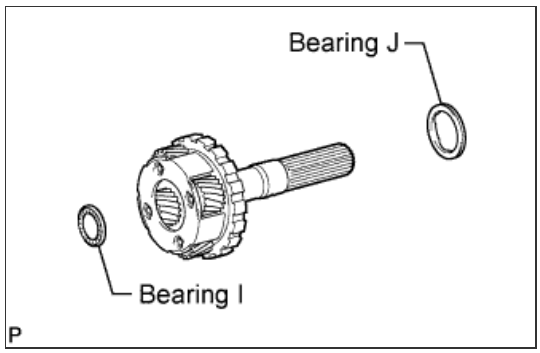
b. Install the 2 thrust needle roller bearings to the rear planetary gear.

Bearing Diameter:

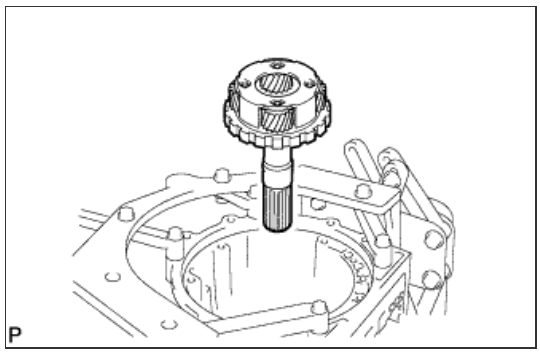
Item	Inside	Outside
Bearing I	23.2 to 23.4 mm (0.913 to 0.921 in.)	43.9 to 44.15 mm (1.73 to 1.74 in.)
Bearing J	43.6 to 43.9 mm (1.72 to 1.73 in.)	62.3 to 62.8 mm (2.45 to 2.47 in.)

HINT:

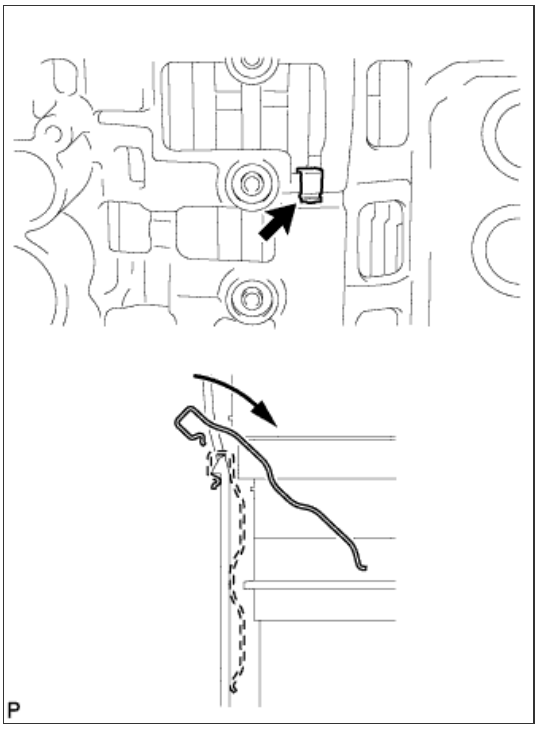
Use a small amount of MP grease to make the thrust needle roller bearings stay securely in place.



c. Install the rear planetary gear assembly.



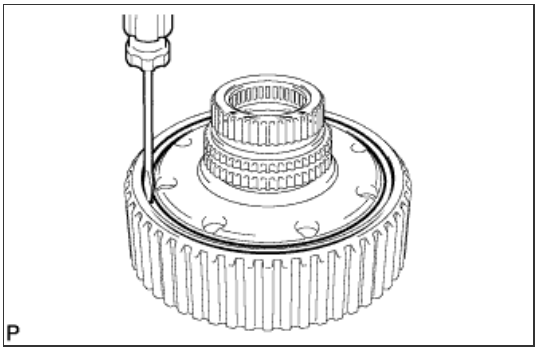
6. INSTALL BRAKE PLATE STOPPER SPRING



7. INSTALL REAR PLANETARY RING GEAR

a. Install the rear planetary ring gear flange to the rear planetary ring gear.

b. Using a screwdriver, install the snap ring.



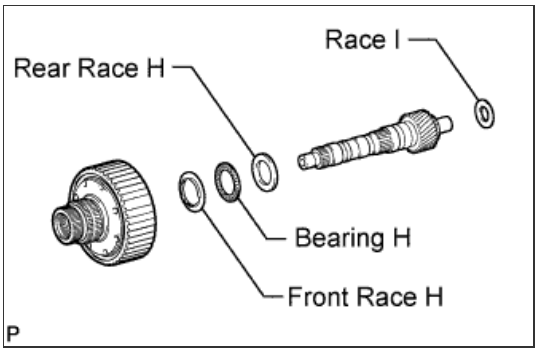
c. Install the 3 thrust bearing races, thrust needle roller bearing and planetary ring gear with the rear planetary ring gear flange to the intermediate shaft.

HINT:

Use a small amount of MP grease to make the thrust needle roller bearing and races stay securely in place.

Bearing and Race Diameter:

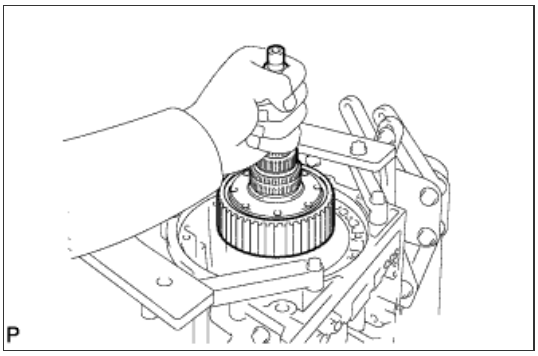
Item	Inside	Outside
Front race H	39.67 to 39.87 mm (1.56 to 1.57 in.)	56.5 to 57.0 mm (2.22 to 2.24 in.)
Bearing H	36.5 to 36.6 mm (1.437 to 1.441 in.)	56.62 to 56.92 mm (2.23 to 2.24 in.)
Rear race H	36.45 to 36.7 mm (1.435 to 1.445 in.)	56.5 to 57.0 mm (2.22 to 2.24 in.)
Race I	21.05 to 21.3 mm (0.829 to 0.839 in.)	39.5 to 39.8 mm (1.56 to 1.57 in.)



8. INSTALL INTERMEDIATE SHAFT WITH REAR PLANETARY RING GEAR FLANGE AND REAR PLANETARY RING GEAR

a. Install the intermediate shaft with the rear planetary ring gear flange and rear

planetary ring gear to the transmission case.



9. INSTALL NO. 4 BRAKE DISC SET

a. Install the flange, 7 discs, 6 plates and selected flange.

Install in order:
F - D - P - D - P - D - P - D - P - D - P - D - P - D - S/F

HINT:

F = Flange

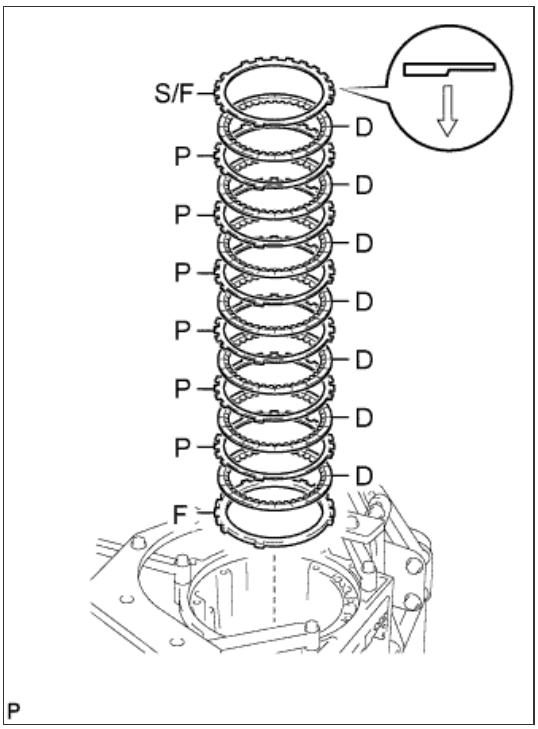
D = Disc

P = Plate

S/F = Selected flange

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

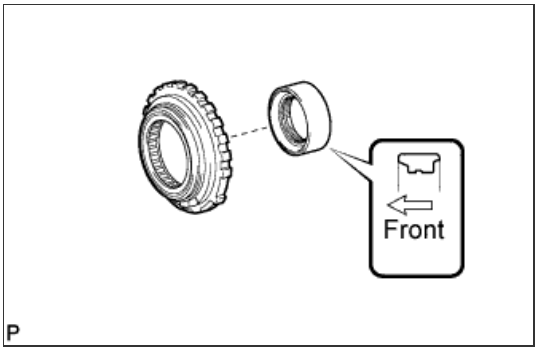


10. INSTALL NO. 3 1-WAY CLUTCH INNER RACE

a. Install the 1-way clutch inner race to the No. 3 1-way clutch assembly.

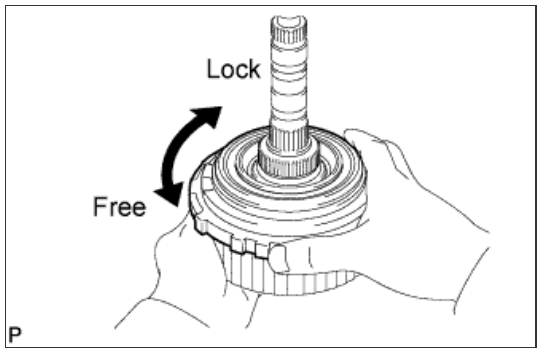
NOTICE:

Do not mistake the direction of the 1-way clutch inner race.



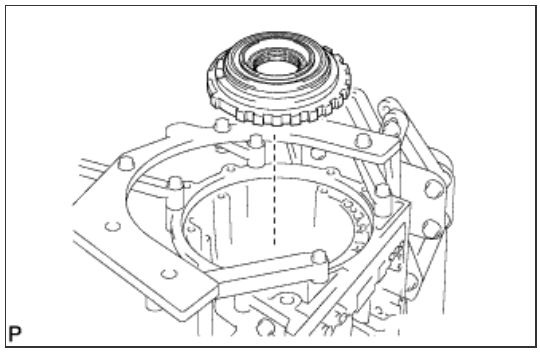
11. INSPECT NO. 3 1-WAY CLUTCH ASSEMBLY

a. Hold the rear planetary ring gear flange and turn the 1-way clutch. Check that the 1-way clutch turns freely counterclockwise and locks when turned clockwise.



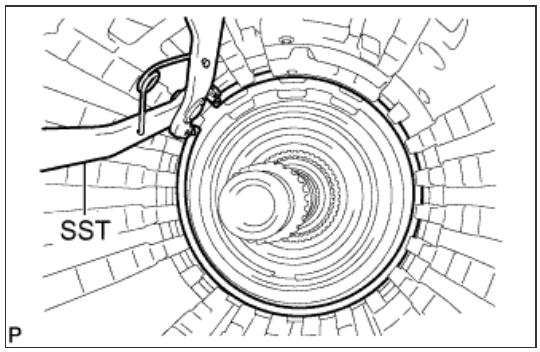
12. INSTALL NO. 3 1-WAY CLUTCH ASSEMBLY

a. Install the 1-way clutch assembly to the transmission case.



b. Using SST, install the snap ring.

SST
09350-30020 (09350-07060)



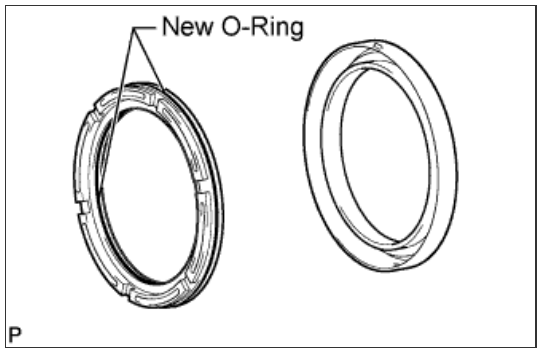
13. INSTALL NO. 2 BRAKE PISTON

a. Coat 2 new O-rings with ATF, and install them to the brake piston.

b. Press the brake piston into the brake cylinder with both hands.

NOTICE:

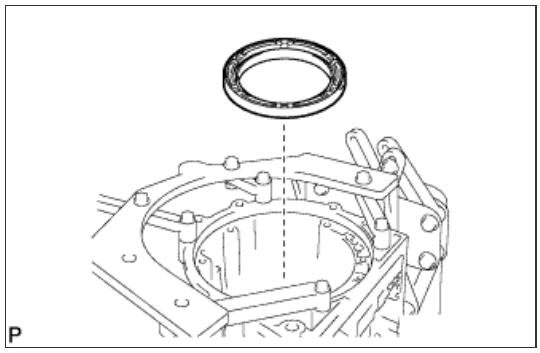
Be careful not to damage the O-rings.

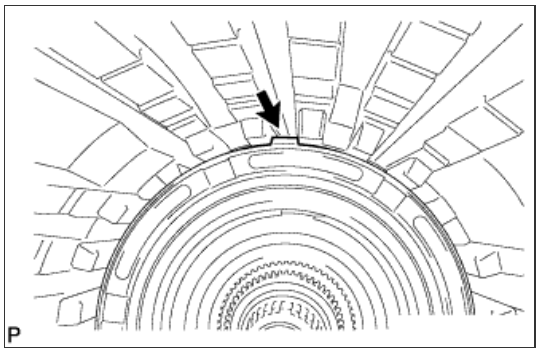


14. INSTALL NO. 2 BRAKE CYLINDER WITH NO. 2 BRAKE PISTON

a. Install the No. 2 brake cylinder with piston to the transmission case.

NOTICE:





- **When installing the No. 2 brake cylinder with piston to the transmission case, align and install the cylinder claw to the case top groove.**
- **Make sure the No. 2 brake cylinder with piston is securely inserted into the transmission case.**

15. SELECT NO. 2 BRAKE FLANGE

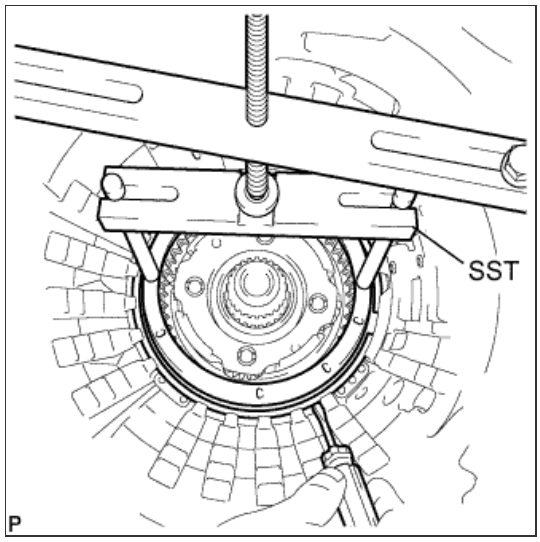
a. Install the No. 2 brake piston return spring and flange to the No. 2 brake piston.

b. Place SST on the brake flange and compress the brake return spring.

SST

09380-60010 (09381-06010, 09381-06020, 09381-06050, 09381-06070, 09381-06090, 09381-06120)

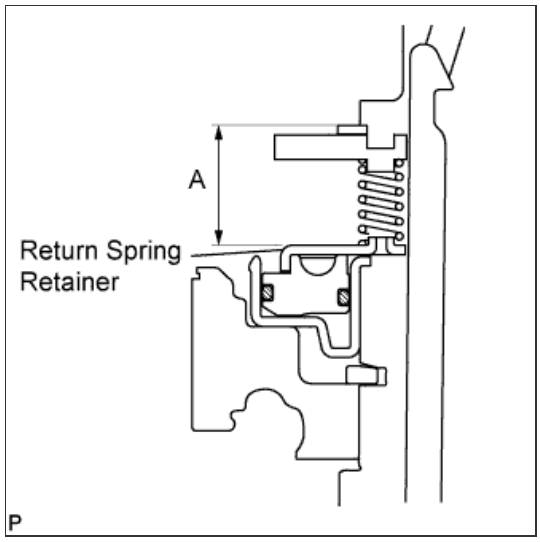
c. Using a screwdriver, install the snap ring to the transmission case.



d. Measure distance A (from the top surface of the snap ring to the top surface of the brake piston return spring retainer) in the illustration.*1

HINT:

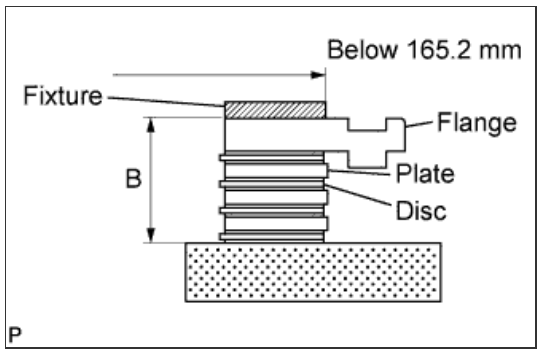
Standard distance A: 21.00 to 21.76 mm (0.834 to 0.857 in.)



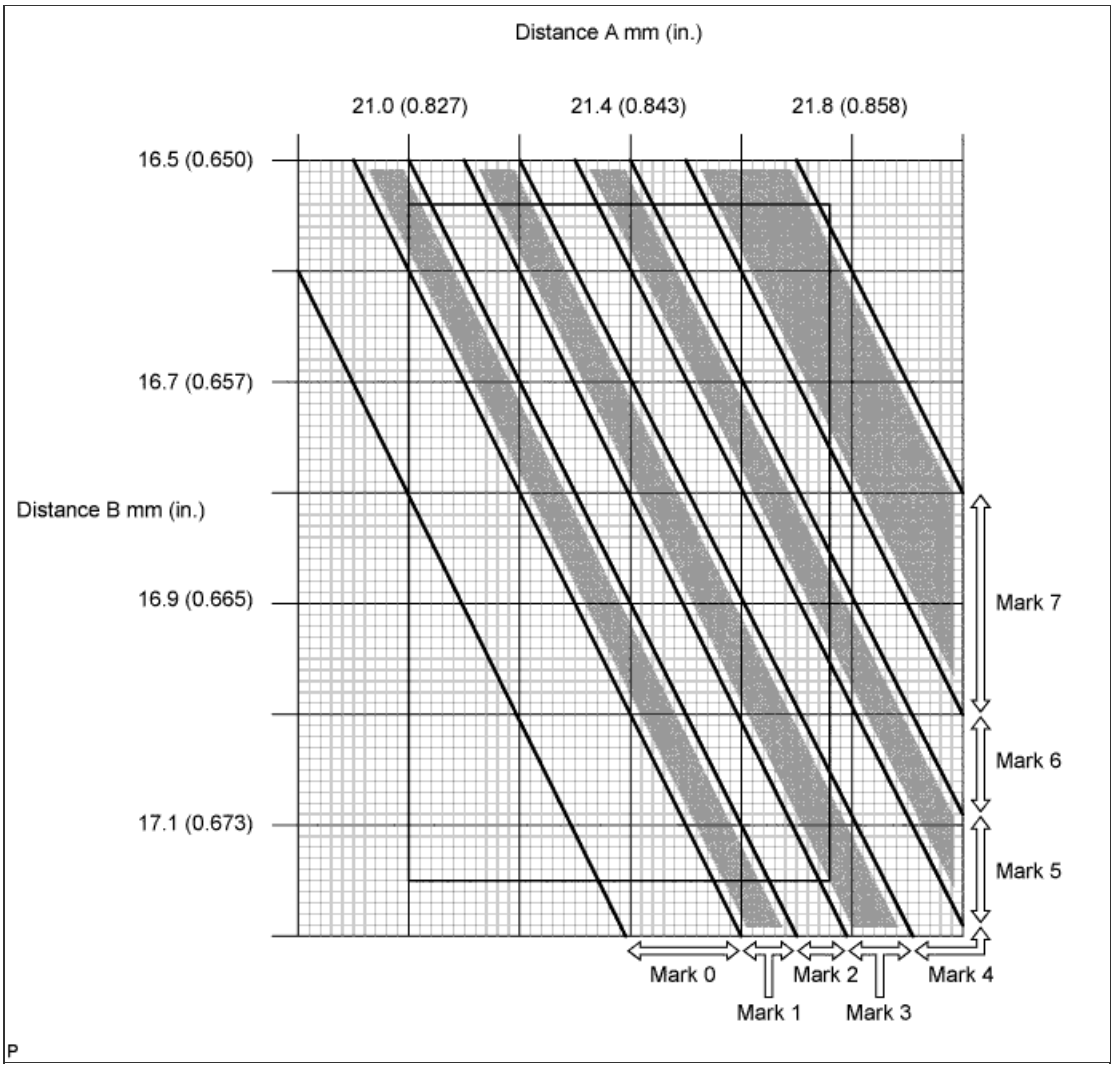
e. Assemble the 4 discs, 3 plates and flange as shown in the illustration. Then with a fixture of 165.2 mm (6.50 in.) or less placed on the flange, measure distance B.*2

HINT:

Standard distance B: 16.54 to 17.15 mm (0.651 to 0.675 in.)



f. Apply the A and B measurements taken in *1 and *2 to the graph below. Use A for the X axis and B for the Y axis, and then choose the flange indicated by the graph point.



HINT:

Make sure that when the B measurement and selected flange thickness are subtracted from the A measurement, the value is 2.20 to 2.50 mm (0.0866 to 0.0984 in.).

Flange Thickness:

Mark	Thickness
0	1.95 to 2.05 mm (0.0768 to 0.0807 in.)
1	2.05 to 2.15 mm (0.0807 to 0.0846 in.)
2	2.15 to 2.25 mm (0.0846 to 0.0886 in.)
3	2.25 to 2.35 mm (0.0886 to 0.0925 in.)
4	2.35 to 2.45 mm (0.0925 to 0.0965 in.)
5	2.45 to 2.55 mm (0.0965 to 0.100 in.)
6	2.55 to 2.65 mm (0.100 to 0.104 in.)
7	2.65 to 2.75 mm (0.104 to 0.108 in.)

g. Remove the snap ring, flange and No. 2 brake piston return spring from the transmission case.

16. INSTALL NO. 2 BRAKE DISC SET

a. Install the brake piston return spring, selected flange, 4 discs, 3 plates and flange.

Install in order:
S/F - D - P - D - P - D - P - D - F

HINT:

S/F = Selected flange

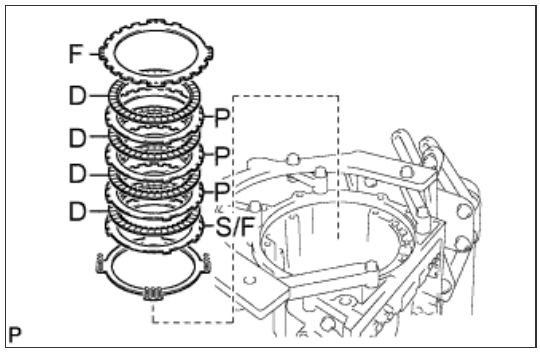
D = Disc

P = Plate

F = Flange

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

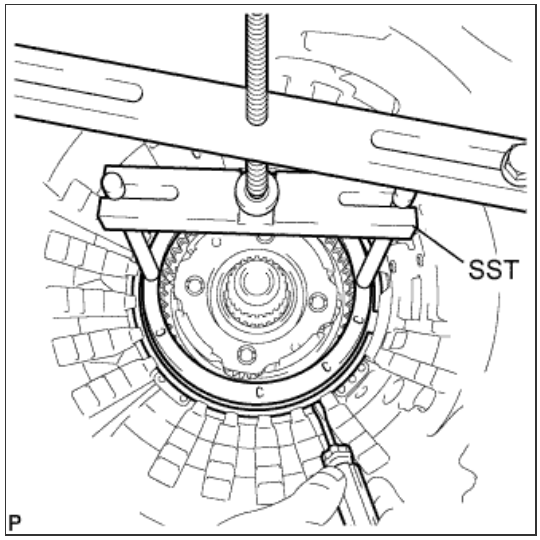


b. Place SST on the brake flange and compress the brake return spring.

SST

09380-60010 (09381-06010, 09381-06020, 09381-06050, 09381-06070, 09381-06090, 09381-06120)

c. Using a screwdriver, install the snap ring to the transmission case.

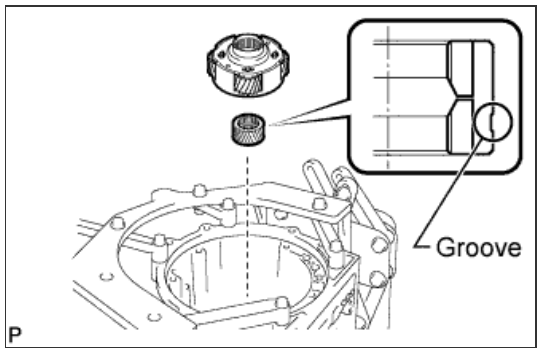


17. INSTALL CENTER PLANETARY GEAR ASSEMBLY

a. Install the center planetary sun gear and center planetary gear to the transmission case.

NOTICE:

Make sure to install the center planetary sun gear with the groove facing the transmission case.



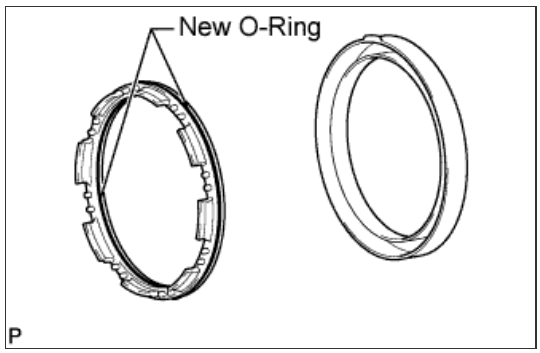
18. INSTALL NO. 1 BRAKE PISTON

a. Coat 2 new O-rings with ATF, and install them to the brake piston.

b. Press the brake piston into the brake cylinder with both hands.

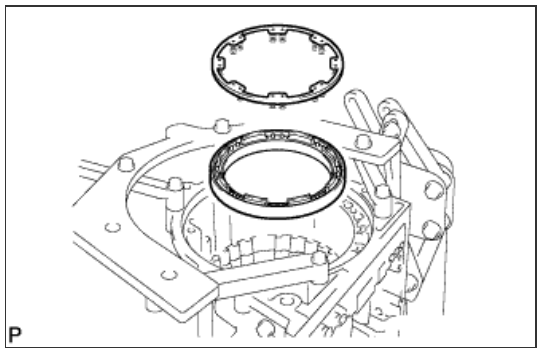
NOTICE:

Be careful not to damage the O-rings.

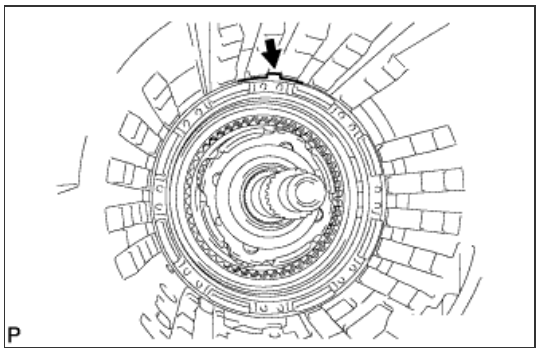


19. INSTALL NO. 1 BRAKE CYLINDER WITH NO. 1 BRAKE PISTON

a. Install the No. 1 brake cylinder with piston and brake piston return spring to the transmission case.



NOTICE:

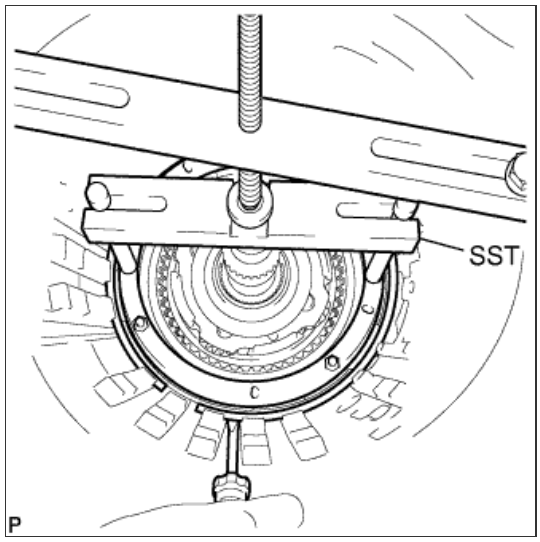


- **When installing the No. 1 brake cylinder with piston to the transmission case, align and install the cylinder claw to the case top groove.**
- **Make sure the No. 1 brake cylinder with piston is securely inserted into the transmission case.**

b. Place SST on the brake return spring and compress the brake return spring.

SST

09380-60010 (09381-06010, 09381-06020, 09381-06050, 09381-06060, 09381-06090, 09381-06100, 09381-06110, 09381-06120)



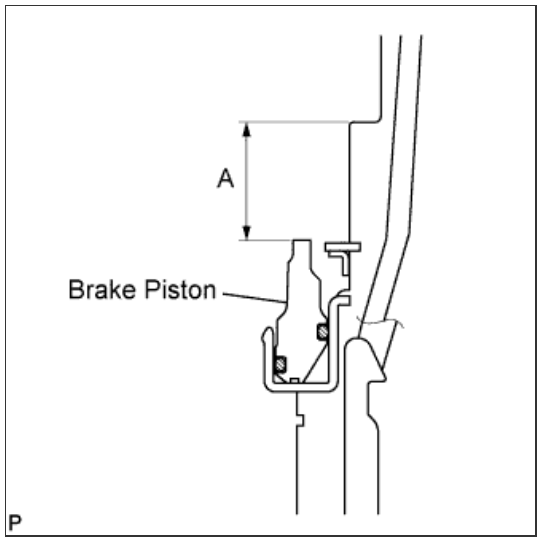
c. Using a screwdriver, install the snap ring to the transmission case.

20. SELECT NO. 1 BRAKE FLANGE

a. Measure distance A (from the step in the transmission case to the tip of the No. 1 brake piston) in the illustration.*1

HINT:

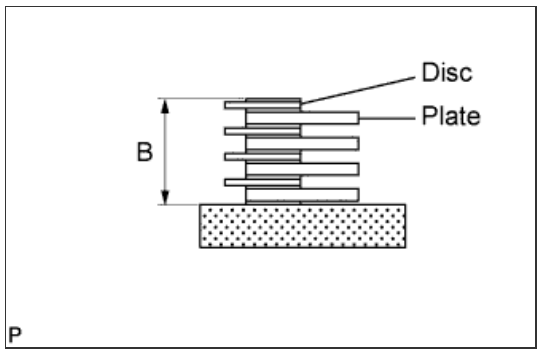
Standard distance A: 19.74 to 20.22 mm (0.777 to 0.796 in.)



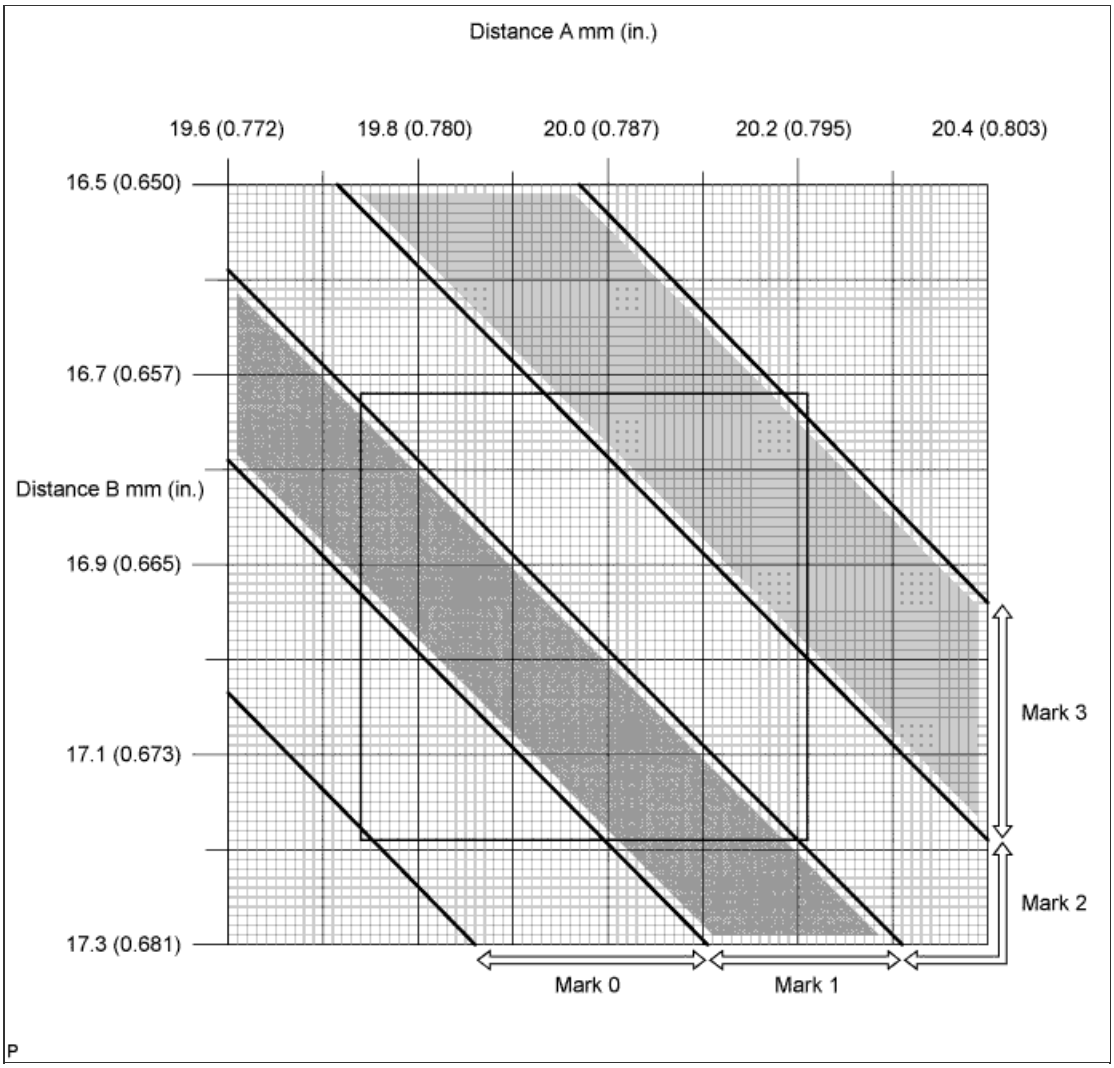
b. Assemble the 4 plates and 4 discs and measure distance B in the illustration.*2

HINT:

Standard distance B: 16.72 to 17.19 mm (0.658 to 0.677 in.)



c. Apply the A and B measurements taken in *1 and *2 to the graph below. Use A for the X axis and B for the Y axis, and then choose the flange indicated by the graph point.



HINT:

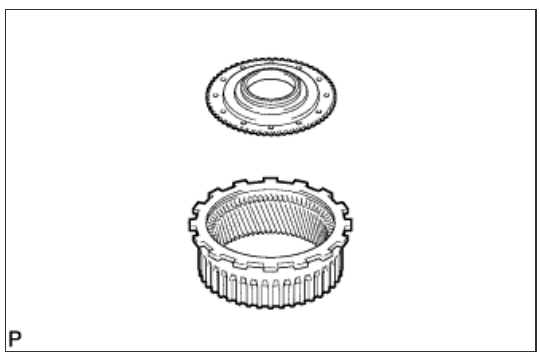
Make sure that when the B measurement and selected flange thickness are subtracted from the A measurement, the value is 0.56 to 0.86 mm (0.0220 to 0.0339 in.).

Flange Thickness:

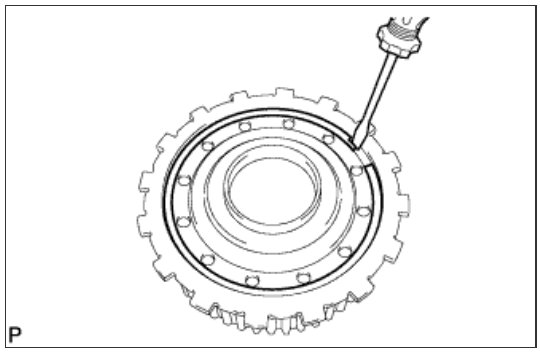
Mark	Thickness
0	1.95 to 2.05 mm (0.0768 to 0.0807 in.)
1	2.15 to 2.25 mm (0.0846 to 0.0886 in.)
2	2.35 to 2.45 mm (0.0925 to 0.0965 in.)
3	2.55 to 2.65 mm (0.100 to 0.104 in.)

21. INSTALL CENTER PLANETARY RING GEAR

a. Install the front planetary ring gear flange to the center planetary ring gear.

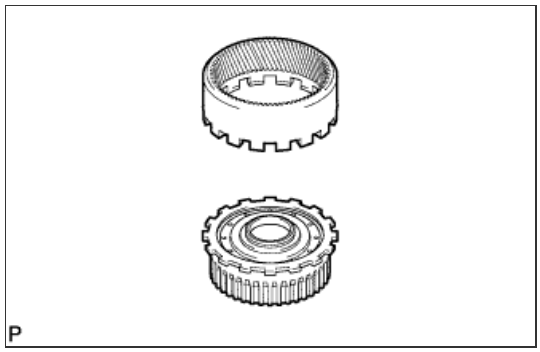


b. Using a screwdriver, install the snap ring.



22. INSTALL FRONT PLANETARY RING GEAR

a. Install the front planetary ring gear to the center planetary ring gear.



23. INSTALL FRONT PLANETARY RING GEAR WITH FRONT PLANETARY RING GEAR FLANGE SUB-ASSEMBLY AND CENTER PLANETARY RING GEAR

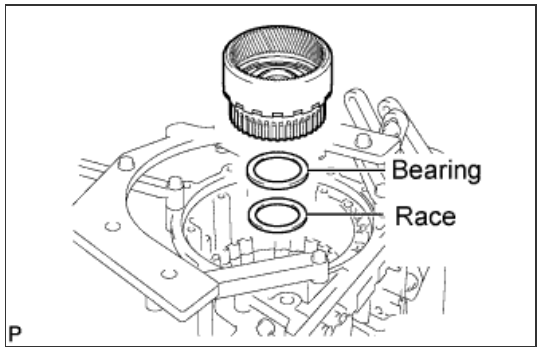
a. Install the thrust bearing race and thrust needle roller bearing.

HINT:

Use a small amount of MP grease to make the thrust needle roller bearing and race stay securely in place.

Bearing and Race Diameter:

Item	Inside	Outside
Race	62.85 to 63.1 mm (2.47 to 2.48 in.)	82.3 to 82.6 mm (3.24 to 3.25 in.)
Bearing	65.35 to 65.6 mm (2.57 to 2.58 in.)	85.6 to 85.95 mm (3.37 to 3.38 in.)



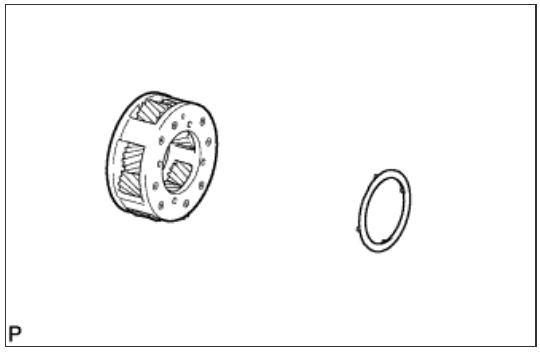
b. Install the front planetary ring gear with the front planetary ring gear flange and center planetary ring gear to the transmission case.

24. INSTALL FRONT PLANETARY GEAR ASSEMBLY

a. Install the No. 2 planetary carrier thrust washer to the front planetary gear.

HINT:

Use a small amount of MP grease to make the thrust washer stay securely in place.



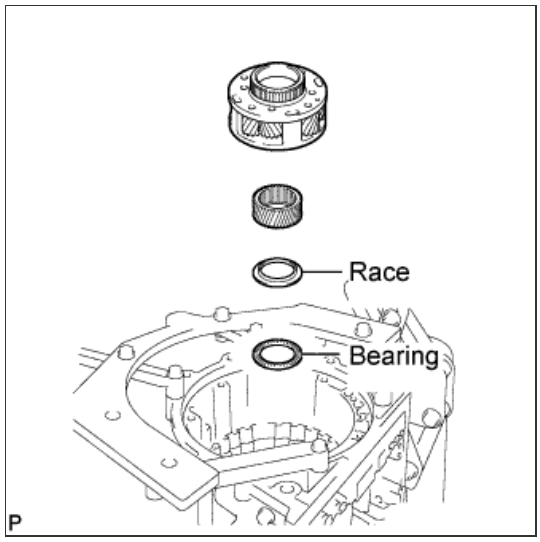
b. Install the thrust needle roller bearing, thrust bearing race, front planetary sun gear and front planetary gear.

HINT:

Use a small amount of MP grease to make the thrust needle roller bearing and race stay securely in place.

Bearing Diameter:

Item	Inside	Outside
Bearing	54.55 to 54.8 mm (2.15 to 2.16 in.)	70.0 to 70.5 mm (2.76 to 2.78 in.)
Race	55.0 to 55.2 mm (2.165 to 2.173 in.)	68.8 to 69.3 mm (2.71 to 2.73 in.)

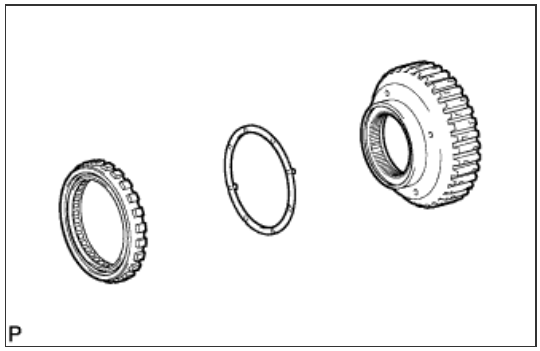


25. INSTALL 1-WAY CLUTCH INNER RACE SUB-ASSEMBLY

a. Apply the No. 1 planetary carrier thrust washer to the 1-way clutch inner race, and then install them to the 1-way clutch.

HINT:

Use a small amount of MP grease to make the thrust washer stay securely in place.

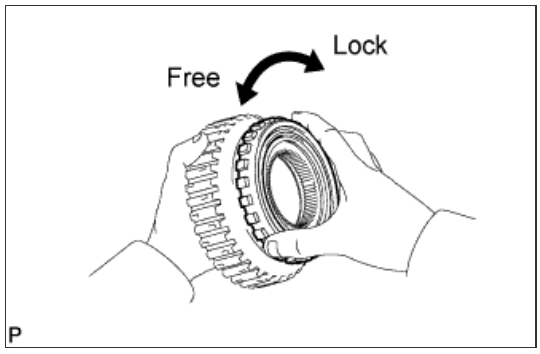


26. INSPECT 1-WAY CLUTCH ASSEMBLY

a. Install the 1-way clutch to the 1-way clutch inner race.

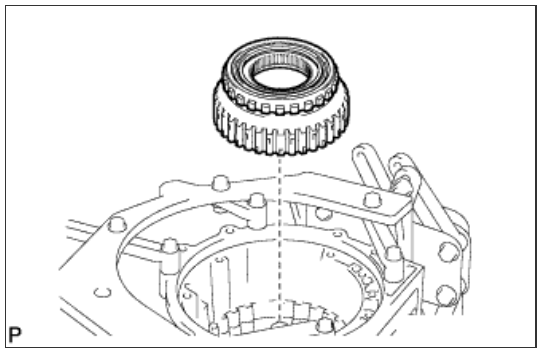
b. Hold the 1-way clutch inner race and turn the 1-way clutch. Check that the 1-way clutch turns freely counterclockwise and locks when turned clockwise.

c. Remove the 1-way clutch from the 1-way clutch inner race.



27. INSTALL 1-WAY CLUTCH ASSEMBLY WITH 1-WAY CLUTCH INNER RACE SUB-ASSEMBLY

a. Install the 1-way clutch with the 1-way clutch inner race to the transmission case.



28. INSTALL NO. 1 BRAKE DISC SET

a. Install the 4 plates, 4 discs and flange.

Install in order:
P - D - P - D - P - D - P - D - F

HINT:

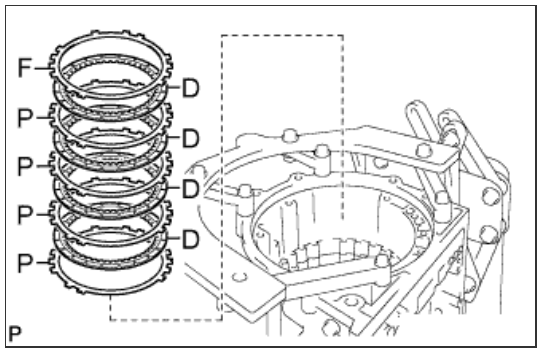
P = Plate

D = Disc

F = Flange

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.



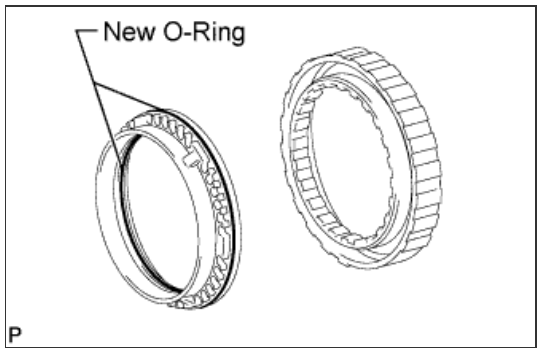
29. INSTALL NO. 3 BRAKE PISTON

a. Coat 2 new O-rings with ATF, and install them to the brake piston.

b. Press the brake piston into the brake cylinder with both hands.

NOTICE:

Be careful not to damage the O-rings.

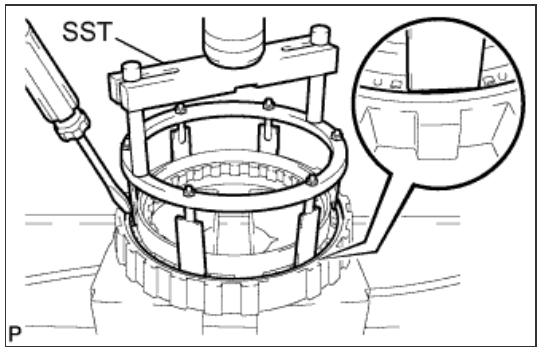


c. Using SST and a press, compress the return spring and install the snap ring with a screwdriver.

SST
09380-60010 (09381-06020, 09381-06040, 09381-06060, 09381-06100, 09381-06110)

NOTICE:

Be sure the end gap of the snap ring is not aligned with the spring retainer claw.

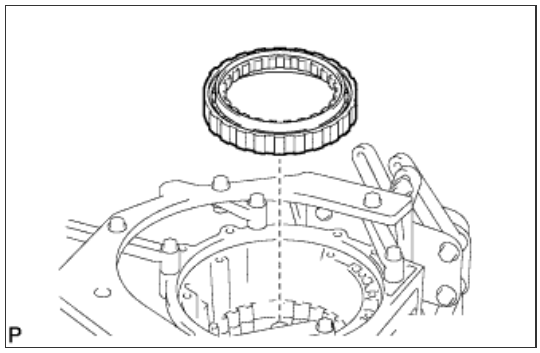


30. INSTALL NO. 3 BRAKE CYLINDER WITH NO. 3 BRAKE PISTON AND NO. 3 BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

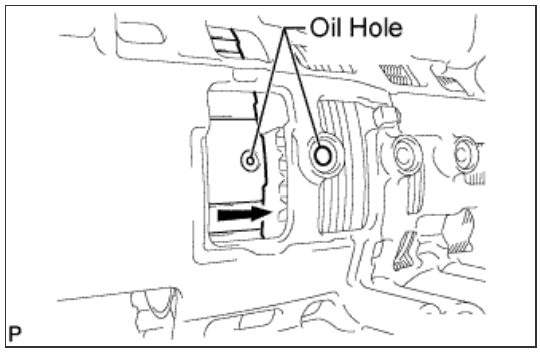
a. Install the No. 3 brake cylinder with the No. 3 brake piston and No. 3 brake

piston return spring to the transmission case.

NOTICE:



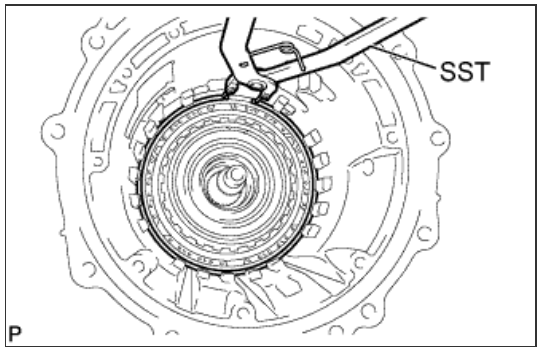
- **Align the oil holes of the No. 3 brake cylinder and transmission case as shown in the illustration.**
- **Make sure the No. 3 brake piston and cylinder are securely inserted into the transmission case.**



31. INSTALL NO. 3 BRAKE PISTON HOLE SNAP RING

a. Using SST, install the snap ring.

SST
09350-30020 (09350-07060)



32. INSTALL NO. 3 BRAKE DISC SET

a. Install the "O" mark flange, 4 discs, 3 plates and "A" mark flange to the transmission case.

Install in order:
OF - D - P - D - P - D - P - D - AF

HINT:

OF = "O" mark flange

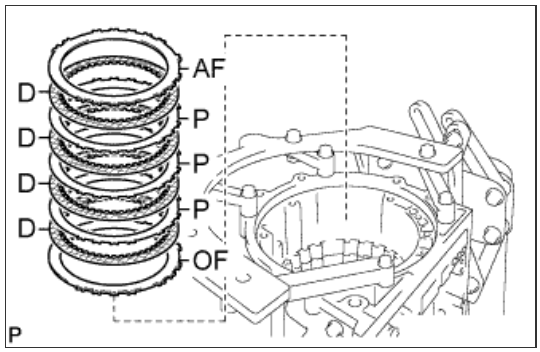
P = Plate

D = Disc

AF = "A" mark flange

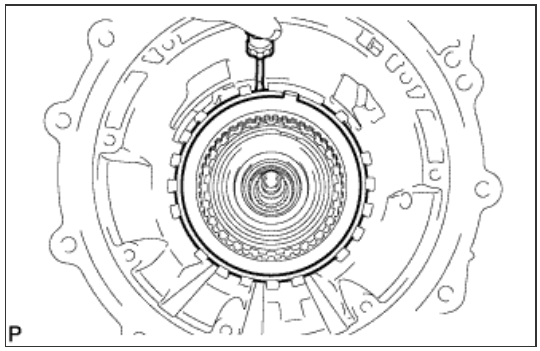
NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.



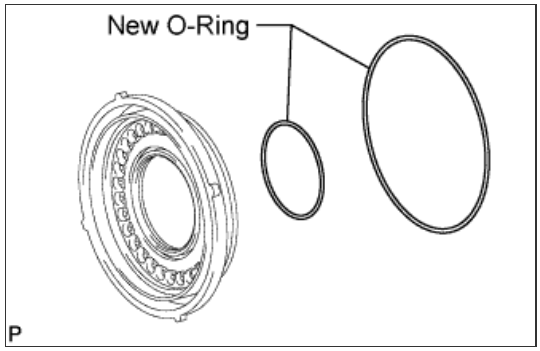
33. INSTALL NO. 3 BRAKE SNAP RING

a. Using a screwdriver, install the snap ring.

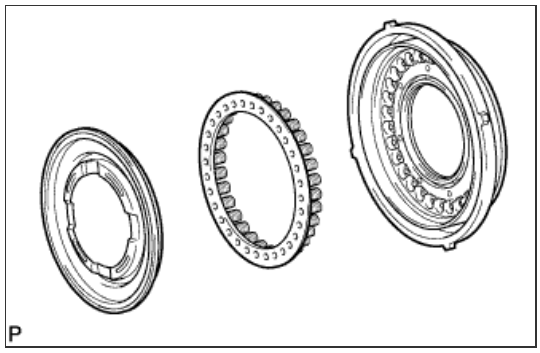


34. INSTALL DIRECT CLUTCH PISTON SUB-ASSEMBLY

a. Coat 2 new O-rings with ATF, and install them to the direct clutch piston.



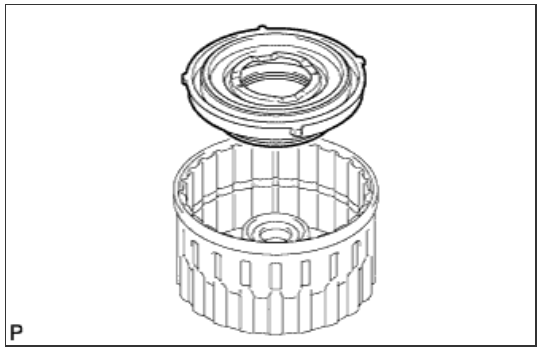
b. Install the direct clutch return spring and No. 2 clutch balancer to the direct clutch piston.



c. Press the direct clutch piston with the clutch return spring and clutch balancer into the reverse clutch piston with both hands.

NOTICE:

Be careful not to damage the O-ring.



d. Place SST on the direct clutch balancer, and compress the return spring with a press.

SST

09380-60010 (09381-06030, 09381-06040, 09381-06080)

NOTICE:

Stop pressing when the spring sheet is lowered to a position 1 to 2 mm (0.0394 to 0.0787 in.) from the snap ring groove to prevent the spring sheet from being deformed.

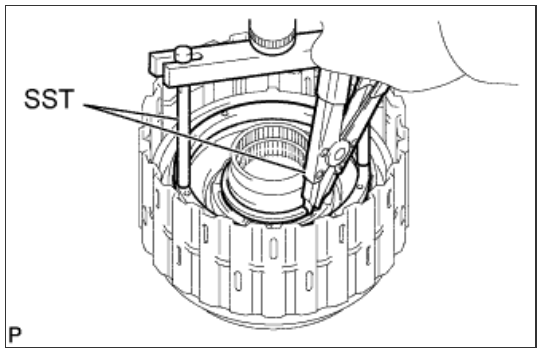
e. Using SST, install the snap ring.

SST

09350-30020 (09350-07070)

NOTICE:

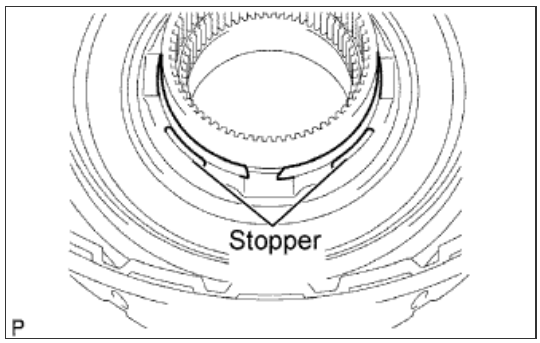
Do not expand the snap ring excessively.



f. Set the end gap of the snap ring in the balancer as shown in the illustration.

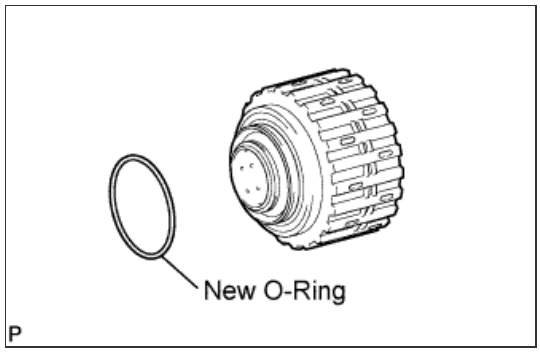
NOTICE:

Be sure the end gap of the snap ring is not aligned with the spring retainer claw.

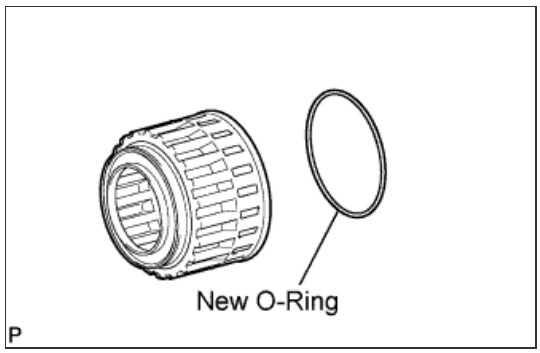


35. INSTALL REVERSE CLUTCH PISTON SUB-ASSEMBLY

a. Coat a new O-ring with ATF, and install it to the clutch drum.



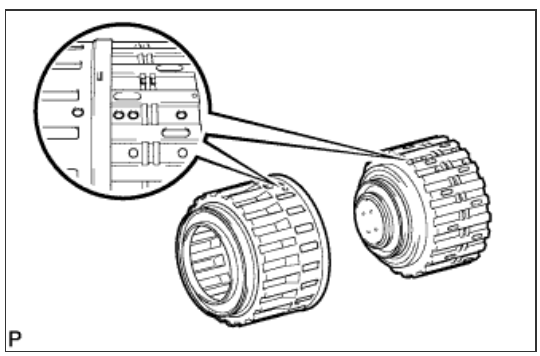
b. Coat a new O-ring with ATF, and install it to the reverse clutch piston.



c. Pass the clutch drum into the reverse clutch piston with both hands.

NOTICE:

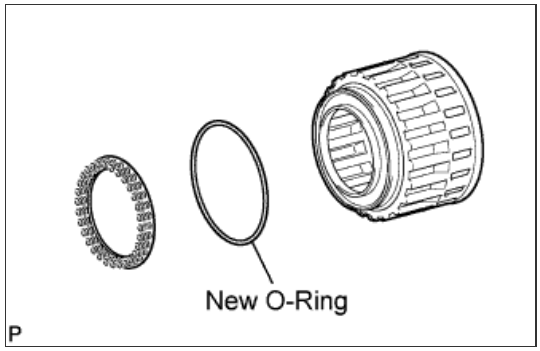
- **Be careful not to damage the O-ring.**
- **Make sure to align the holes of the reverse clutch piston and clutch drum as shown in the illustration.**
- **Make sure to align the protrusions of the reverse clutch piston and the cutout of the clutch drum.**



36. INSTALL NO. 3 CLUTCH BALANCER

a. Coat a new O-ring with ATF, and install it to the reverse clutch piston.

b. Install the reverse clutch return spring and balancer onto the reverse clutch piston.

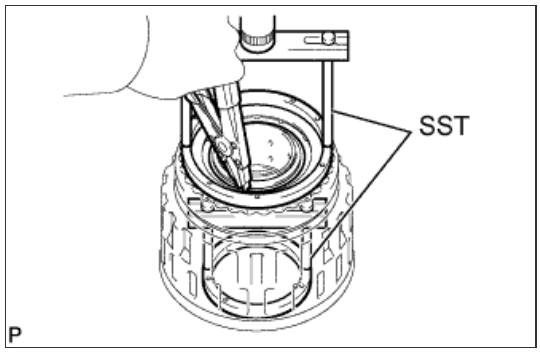


c. Place SST on the clutch balancer, and compress the clutch balancer with a press.

SST
09380-60010 (09381-06020, 09381-06030, 09381-06040, 09381-06050, 09381-06070, 09381-06080)

NOTICE:

Stop pressing when the spring sheet is lowered to a position 1 to 2 mm (0.0394 to 0.0787 in.) from the snap ring groove to prevent the spring sheet from being deformed.



d. Using SST, install the snap ring.

SST
09350-30020 (09350-07070)

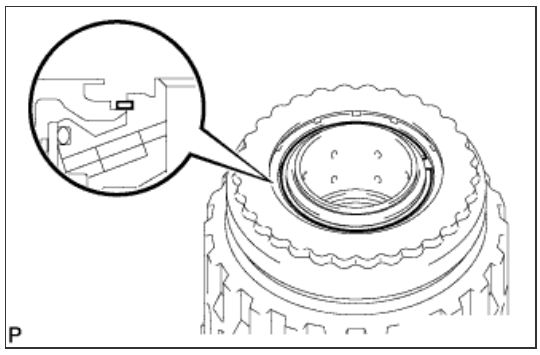
NOTICE:

Do not expand the snap ring excessively.

e. Set the end gap of the snap ring in the piston as shown in the illustration.

NOTICE:

Be sure the end gap of the snap ring is not aligned with the spring retainer claw.



37. INSTALL DIRECT CLUTCH DISC

a. Place the oil pump onto the torque converter clutch, and then place the clutch drum onto the oil pump.

b. Install the 5 plates, 5 discs and reverse clutch flange to the clutch drum.

Install in order:
P - D - P - D - P - D - P - D - P - D - F

HINT:

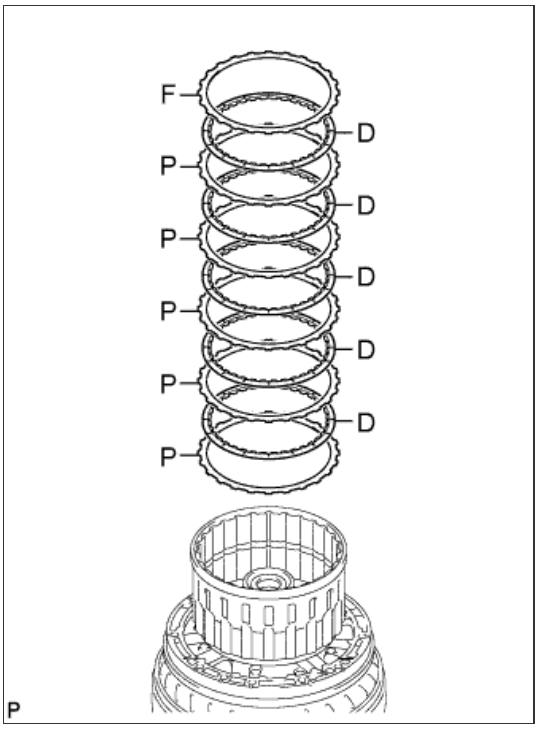
P = Plate

D = Disc

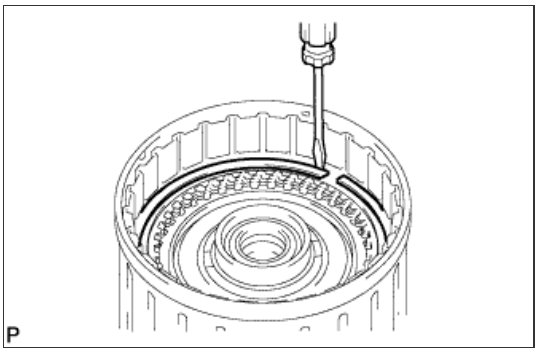
F = Flange

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.

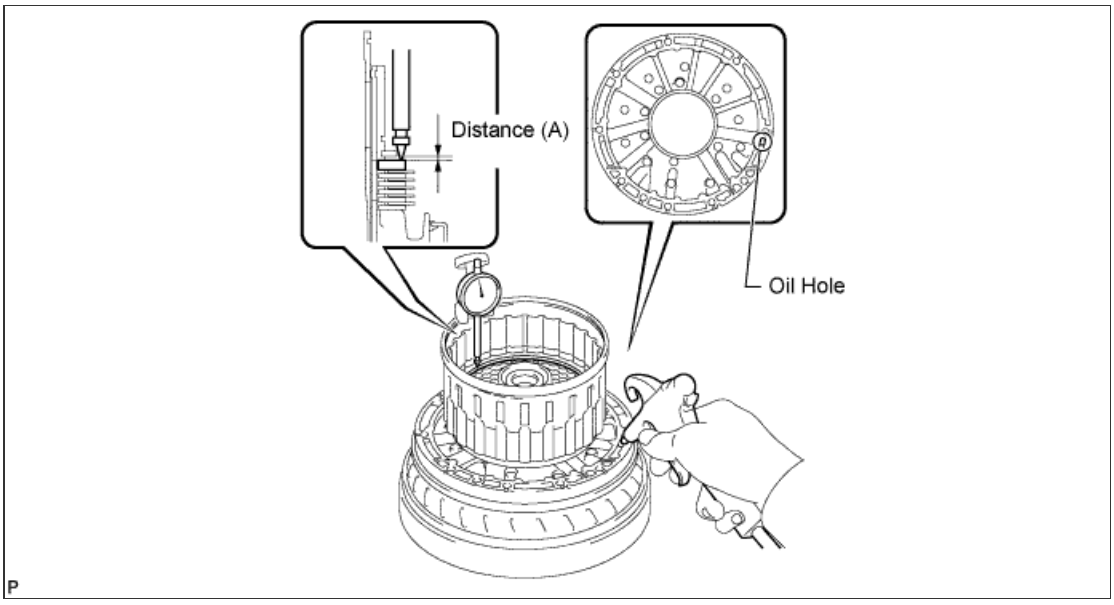


c. Using a screwdriver, install the snap ring to the clutch drum.



d. Using a dial indicator, measure the moving distance (A) of the clutch flange at both ends across the diameter while blowing compressed air (392 kPa, 2.0 kgf/cm^2, 57 psi) into the oil hole as shown in the illustration. Then choose from the 9 flange thicknesses in the table so that the measured value is within the standard value.

Standard moving distance (A):
0.72 to 1.02 mm (0.0283 to 0.0402 in.)



Flange Thickness:

Mark	Thickness
0	3.45 to 3.55 mm (0.136 to 0.140 in.)
1	3.55 to 3.65 mm (0.140 to 0.144 in.)
2	3.65 to 3.75 mm (0.144 to 0.148 in.)
3	3.75 to 3.85 mm (0.148 to 0.152 in.)
4	3.85 to 3.95 mm (0.152 to 0.156 in.)
5	3.95 to 4.05 mm (0.156 to 0.159 in.)
6	4.05 to 4.15 mm (0.159 to 0.163 in.)
7	4.15 to 4.25 mm (0.163 to 0.167 in.)
8	4.25 to 4.35 mm (0.167 to 0.171 in.)

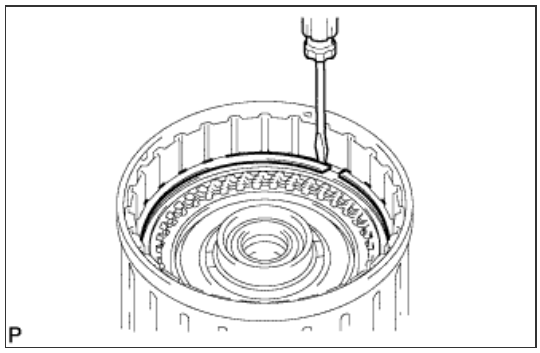
e. Temporarily remove the snap ring, install the selected flange and reinstall the snap ring.

38. SELECT REVERSE CLUTCH FLANGE

a. Using a screwdriver, install the snap ring to the clutch drum.

NOTICE:

Make sure to install the direct clutch and reverse clutch snap rings so that their openings face opposite directions.



b. Install the flange, 5 discs, 4 plates, selected flange, cushion plate and reverse clutch reaction sleeve to the clutch drum.

Install in order:
F - D - P - D - P - D - P - D - P - D - S/F - C

HINT:

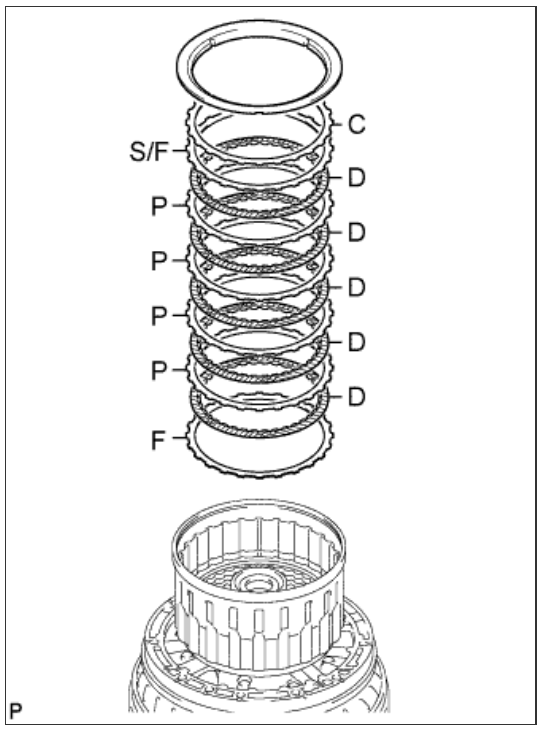
F = Flange

D = Disc

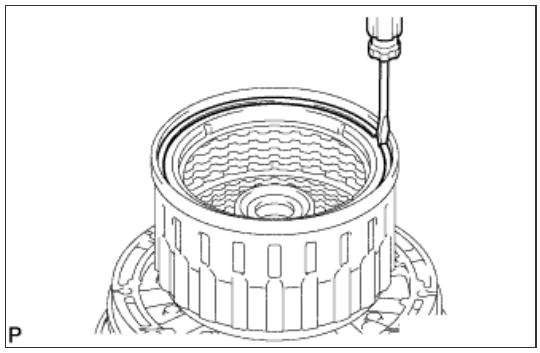
P = Plate

S/F = Selected flange

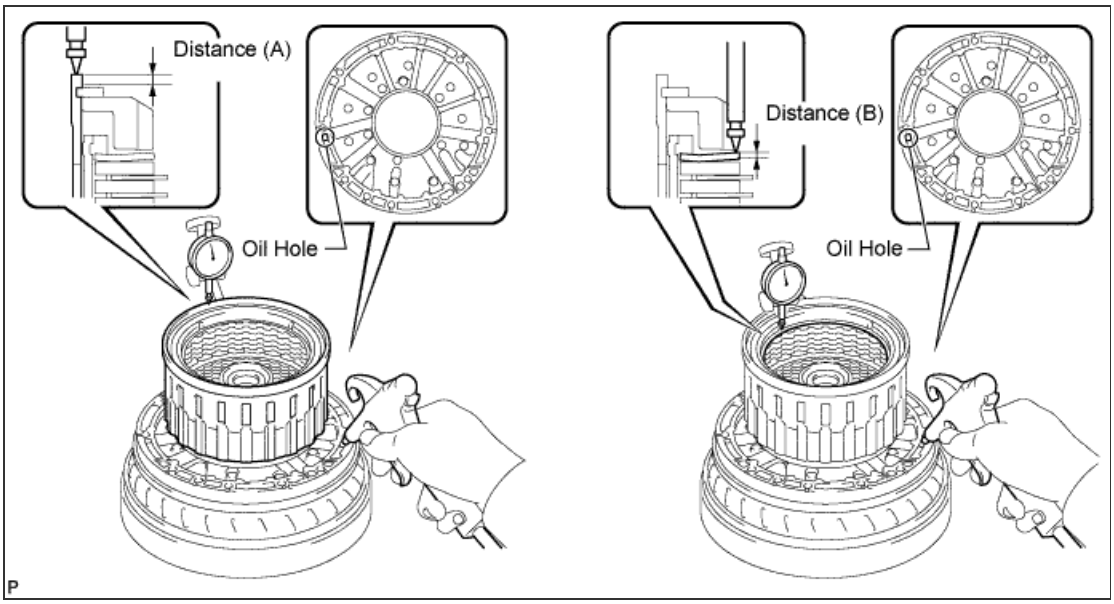
C = Cushion plate



c. Using a screwdriver, install the hole snap ring.



d. Using a dial indicator, measure the moving distance (A minus B) of the tip of the reverse clutch piston (A) and cushion plate at both ends across the diameter (B) while blowing compressed air (392 kPa, 2.0 kgf/cm^2, 57 psi) into the oil hole as shown in the illustration. Then choose from the 12 flange thicknesses in the table so that the measured value is within the standard value.

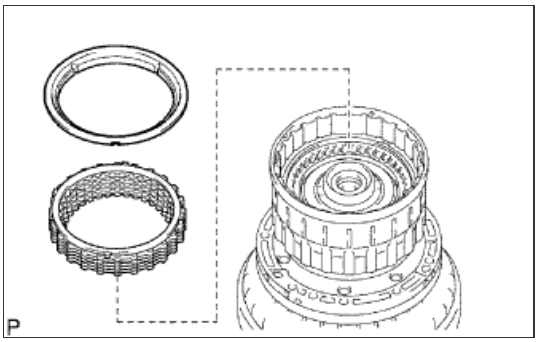


Standard moving distance (A minus B):
0.59 to 0.89 mm (0.0232 to 0.0350 in.)

Flange Thickness:

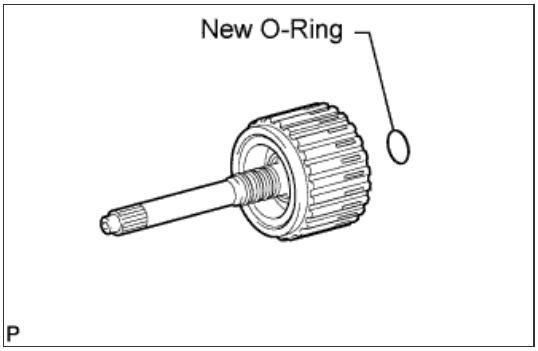
Mark	Thickness
0	2.35 to 2.45 mm (0.0925 to 0.0965 in.)
1	2.45 to 2.55 mm (0.0965 to 0.100 in.)
2	2.55 to 2.65 mm (0.100 to 0.104 in.)
3	2.65 to 2.75 mm (0.104 to 0.108 in.)
4	2.75 to 2.85 mm (0.108 to 0.112 in.)
5	2.85 to 2.95 mm (0.112 to 0.116 in.)
6	2.95 to 3.05 mm (0.116 to 0.120 in.)
7	3.05 to 3.15 mm (0.120 to 0.124 in.)
8	3.15 to 3.25 mm (0.124 to 0.128 in.)
A	3.25 to 3.35 mm (0.128 to 0.132 in.)
B	3.35 to 3.45 mm (0.132 to 0.136 in.)
C	3.45 to 3.55 mm (0.136 to 0.140 in.)

e. Remove the snap ring, reverse clutch reaction sleeve and rear clutch disc set from the clutch drum.

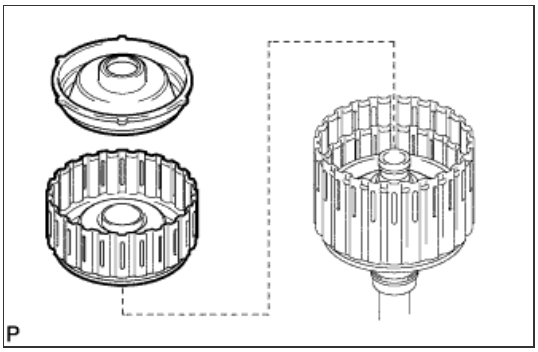


39. INSTALL FORWARD CLUTCH PISTON SUB-ASSEMBLY AND COAST CLUTCH PISTON

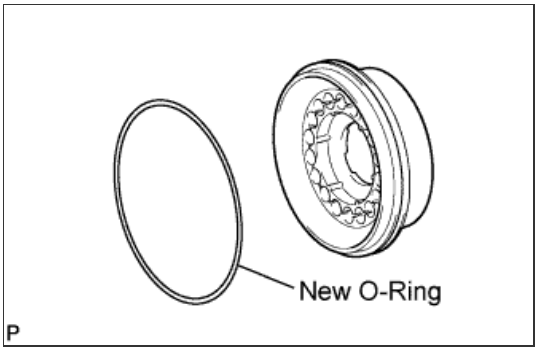
a. Coat a new O-ring with ATF, and install it to the input shaft.



b. Install the forward clutch piston and coast clutch piston to the input shaft.



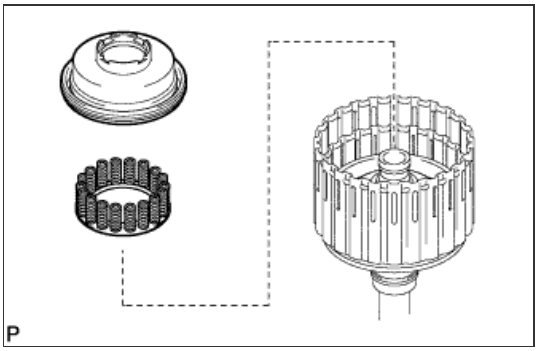
c. Coat a new O-ring with ATF, and install it to the No. 1 clutch balancer.



d. Install the forward clutch return spring and No. 1 clutch balancer to the input shaft.

NOTICE:

Be careful not to damage the O-rings.

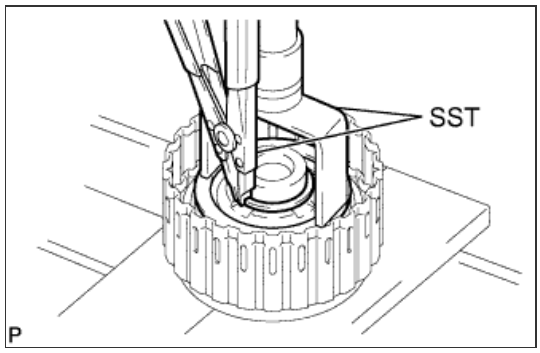


e. Place SST on the No. 1 clutch balancer, and compress the return spring with a press.

SST
09350-30020 (09350-07040)

NOTICE:

Stop pressing when the spring sheet is lowered to a position 1 to 2 mm (0.0394 to 0.0787 in.) from the snap ring groove to prevent the spring sheet from being deformed.



f. Using SST, install the snap ring.

SST
09350-30020 (09350-07070)

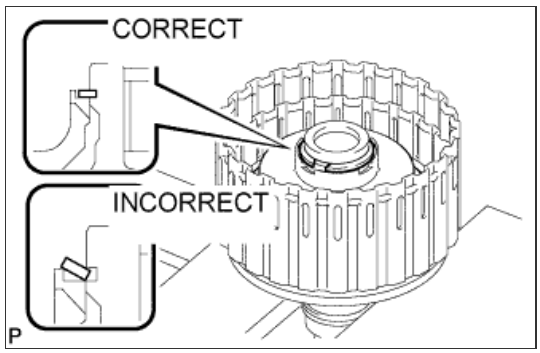
NOTICE:

Do not expand the snap ring excessively.

g. Set the end gap of the snap ring in the balancer as shown in the illustration.

NOTICE:

Be sure the end gap of the snap ring is not aligned with the spring retainer claw.



40. INSTALL COAST CLUTCH DISC SET

a. Install the 4 plates, 4 discs and flange.

Install in order:
P - D - P - D - P - D - P - D - F

HINT:

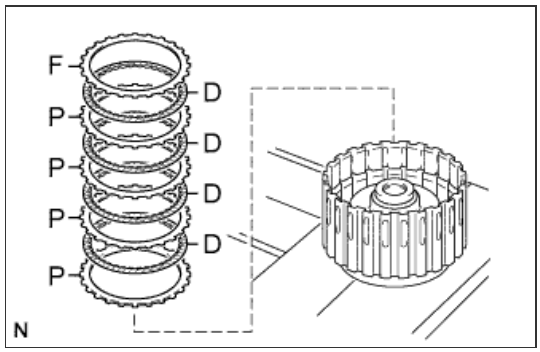
P = Plate

D = Disc

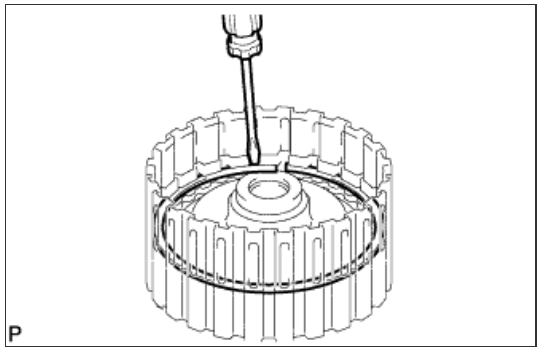
F = Flange

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.



b. Temporarily install the snap ring.

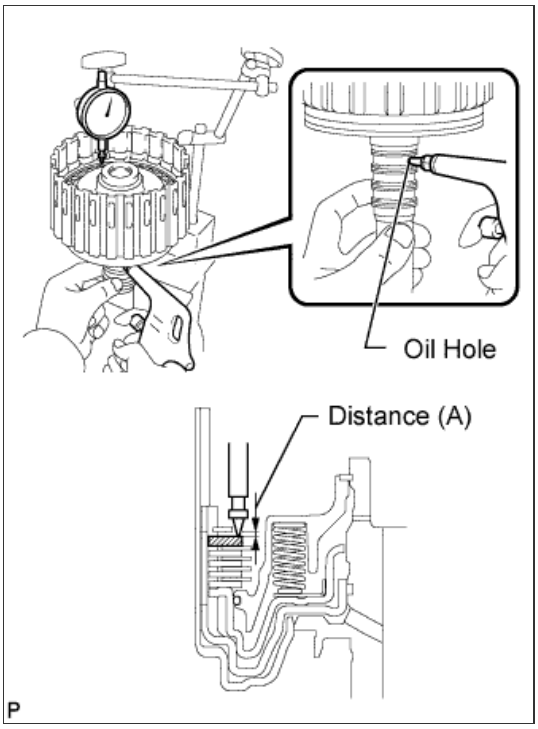


c. Using a dial indicator, measure the moving distance (A) of the clutch flange at both ends across the diameter while blowing compressed air (196 kPa, 2.0 kgf/cm^2, 28 psi) into the oil hole as shown in the illustration. Then choose from the 11 flange thicknesses in the table so that the measured value is within the standard value.

Standard moving distance (A):
0.41 to 0.71 mm (0.0161 to 0.0280 in.)

Flange Thickness:

Mark	Thickness
0	2.95 to 3.05 mm (0.116 to 0.120 in.)
1	3.05 to 3.15 mm (0.120 to 0.124 in.)
2	3.15 to 3.25 mm (0.124 to 0.128 in.)
3	3.25 to 3.35 mm (0.128 to 0.132 in.)
4	3.35 to 3.45 mm (0.132 to 0.136 in.)
5	3.45 to 3.55 mm (0.136 to 0.140 in.)
6	3.55 to 3.65 mm (0.140 to 0.144 in.)
7	3.65 to 3.75 mm (0.144 to 0.148 in.)
8	3.75 to 3.85 mm (0.148 to 0.152 in.)
A	3.85 to 3.95 mm (0.152 to 0.156 in.)
B	3.95 to 4.05 mm (0.156 to 0.159 in.)



d. Temporarily remove the snap ring, install the selected flange and reinstall the snap ring.

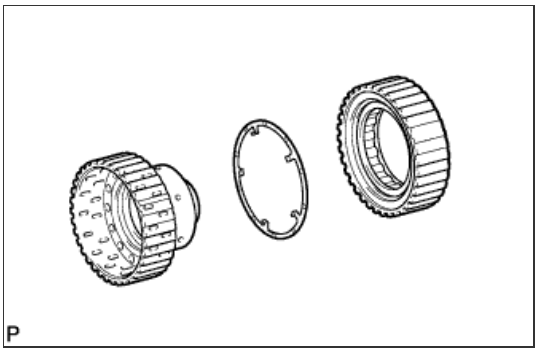
41. INSTALL NO. 4 1-WAY CLUTCH ASSEMBLY

a. Install the No. 2 clutch hub thrust washer to the coast clutch hub.

HINT:

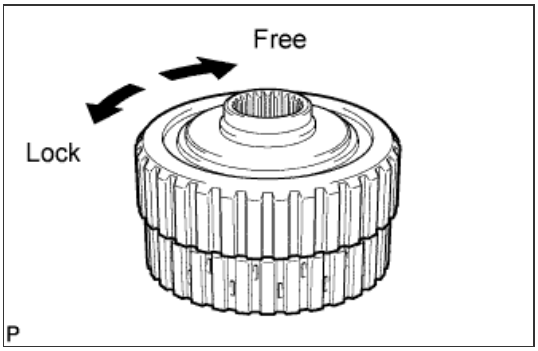
Use a small amount of MP grease to make the thrust washer stay securely in place.

b. Install the 1-way clutch to the coast clutch hub.



42. INSPECT NO. 4 1-WAY CLUTCH ASSEMBLY

a. Hold the coast clutch hub and turn the 1-way clutch assembly. Check that the 1-way clutch turns freely clockwise and locks when turned counterclockwise.



43. INSTALL COAST CLUTCH HUB SUB-ASSEMBLY WITH NO. 4 1-WAY CLUTCH ASSEMBLY

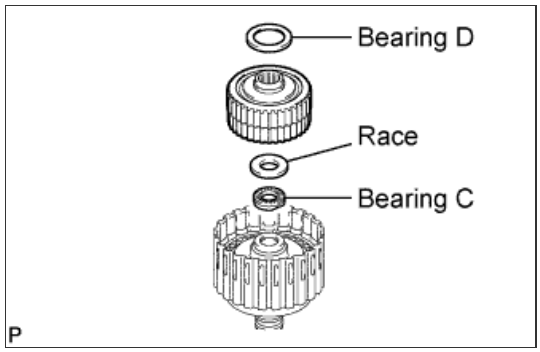
a. Install the 2 thrust needle roller bearings, thrust bearing race and coast clutch hub with the No. 4 1-way clutch to the input shaft.

HINT:

Use a small amount of MP grease to make the thrust needle roller bearings and race stay securely in place.

Bearing and Race Diameter:

Item	Inside	Outside
Bearing C	21.05 to 21.3 mm (0.829 to 0.839 in.)	39.63 to 39.88 mm (1.56 to 1.57 in.)
Race	22.8 to 23.1 mm (0.898 to 0.909 in.)	44.5 to 44.75 mm (1.75 to 1.76 in.)
Bearing D	39.45 to 39.7 mm (1.55 to 1.56 in.)	60.5 to 60.75 mm (2.38 to 2.39 in.)



44. INSTALL FORWARD MULTIPLE DISC CLUTCH DISC SET

a. Install the cushion plate, 6 plates, 6 discs and flange to the input shaft.

Install in order:
C - P - D - P - D - P - D - P - D - P - D - P - D - F

HINT:

C = Cushion plate

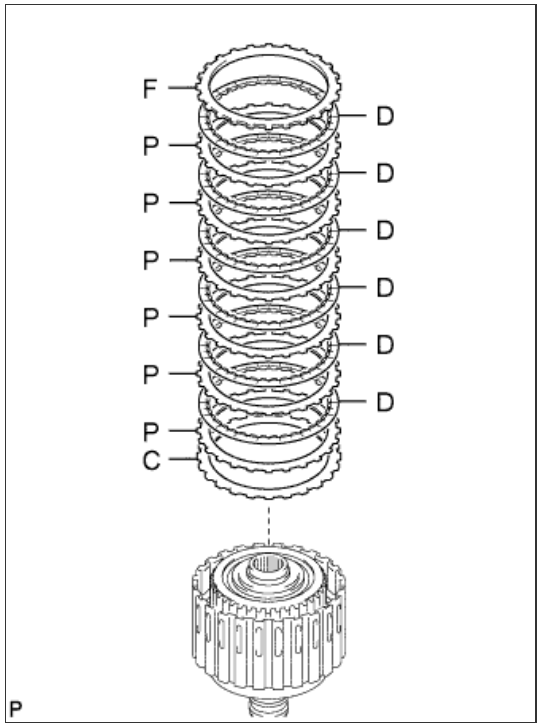
P = Plate

D = Disc

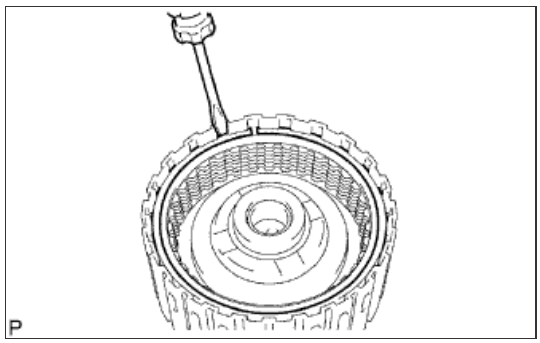
F = Flange

NOTICE:

Before assembling new discs, soak them in ATF for at least 2 hours.



b. Temporarily install the snap ring.



c. Using a dial indicator, measure the moving distance (A) of the clutch flange at both ends across the diameter while blowing compressed air (196 kPa, 2.0 kgf/cm^2, 28 psi) into the oil hole as shown in the illustration. Then choose from the 12 flange thicknesses in the table so that the measured value is within the standard value.

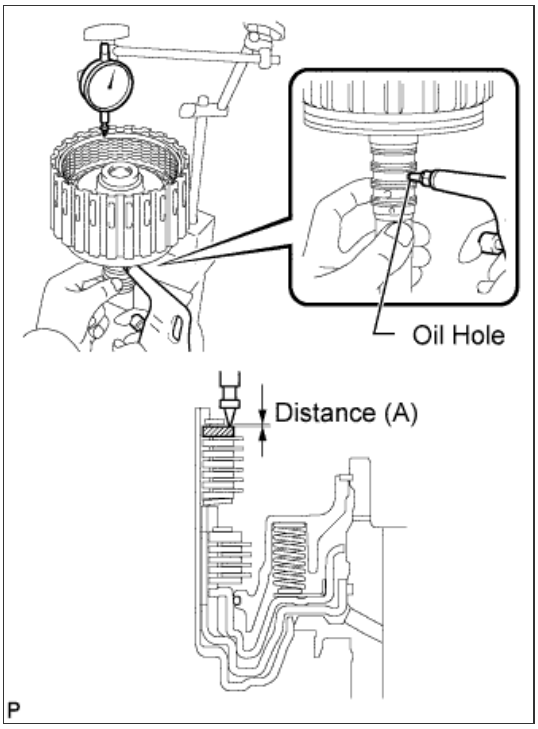
Standard moving distance (A):
0.85 to 1.15 mm (0.0335 to 0.0453 in.)

Flange Thickness:

Mark	Thickness

0	2.95 to 3.05 mm (0.116 to 0.120 in.)
1	3.05 to 3.15 mm (0.120 to 0.124 in.)
2	3.15 to 3.25 mm (0.124 to 0.128 in.)
3	3.25 to 3.35 mm (0.128 to 0.132 in.)
4	3.35 to 3.45 mm (0.132 to 0.136 in.)
5	3.45 to 3.55 mm (0.136 to 0.140 in.)
6	3.55 to 3.65 mm (0.140 to 0.144 in.)
7	3.65 to 3.75 mm (0.144 to 0.148 in.)
8	3.75 to 3.85 mm (0.148 to 0.152 in.)
A	3.85 to 3.95 mm (0.152 to 0.156 in.)
B	3.95 to 4.05 mm (0.156 to 0.159 in.)
C	4.05 to 4.15 mm (0.159 to 0.163 in.)

d. Temporarily remove the snap ring, install the selected flange and reinstall the snap ring.

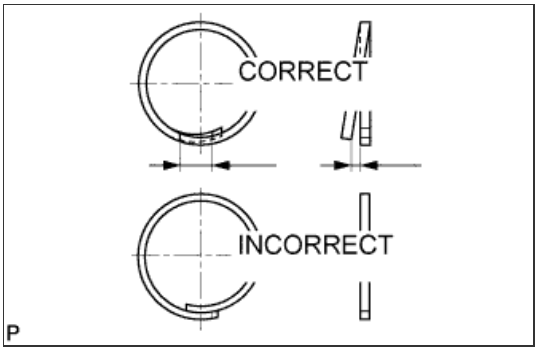


45. INSTALL INPUT SHAFT OIL SEAL RING

a. Overlap the seal ring edges in the axial direction.

NOTICE:

- **Overlapping the seal ring edges in the axial direction prevents damage to the seal ring.**
- **Do not overlap the seal ring edges in the radial direction, as this may damage the seal ring.**



b. Coat 4 new oil seal rings with ATF.

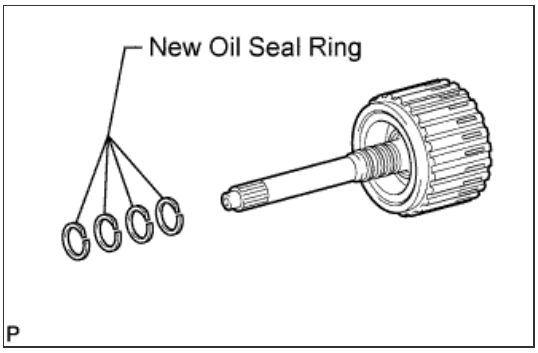
c. Squeeze the ends of the 4 oil seal rings together, and then install them to the input shaft groove.

NOTICE:

Do not excessively widen the rings.

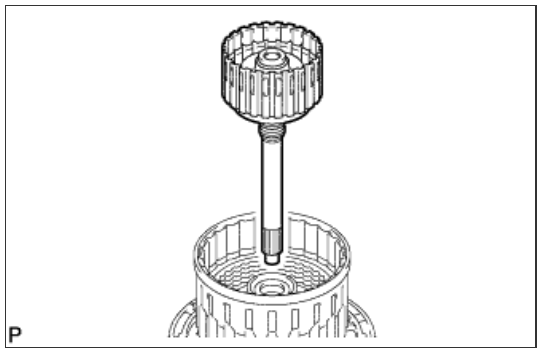
HINT:

After installing the oil seal rings, check that they rotate smoothly.



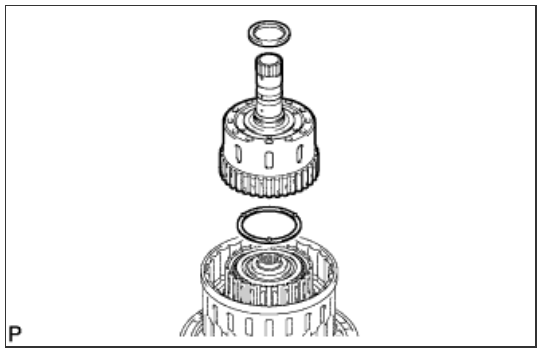
46. INSTALL INPUT SHAFT ASSEMBLY

a. Install the input shaft to the clutch drum.



47. INSTALL FORWARD CLUTCH HUB SUB-ASSEMBLY

a. Install the No. 3 clutch hub thrust washer, forward clutch hub and thrust needle roller bearing to the clutch drum.



NOTICE:

Before installing the forward clutch hub, apply ATF to the forward clutch hub bush sliding surfaces. After the installation, check that the forward clutch hub rotates smoothly.

HINT:

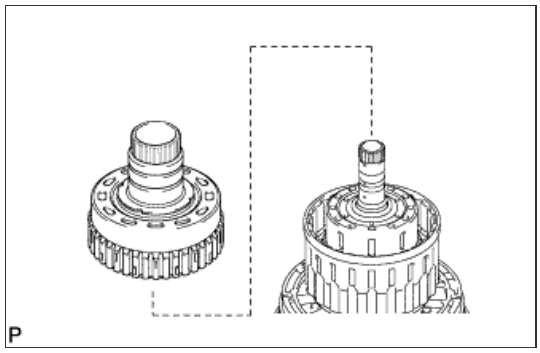
Use a small amount of MP grease to make the thrust needle roller bearing and thrust washer stay securely in place.

Bearing Diameter:

Item	Inside	Outside
Bearing	46.45 to 46.7 mm (1.83 to 1.84 in.)	64.3 to 64.55 mm (2.53 to 2.54 in.)

48. INSTALL REVERSE CLUTCH HUB SUB-ASSEMBLY

a. Install the reverse clutch hub to the clutch drum.



NOTICE:

Before installing the reverse clutch hub, apply ATF to the reverse clutch hub bush sliding surfaces. After the installation, check that the reverse clutch rotates smoothly.

49. INSTALL REAR CLUTCH DISC SET

a. Install the flange, 5 discs, 4 plates, selected flange, cushion plate and reverse clutch reaction sleeve to the clutch drum.

Install in order:
F - D - P - D - P - D - P - D - P - D - S/F - C

HINT:

F = Flange

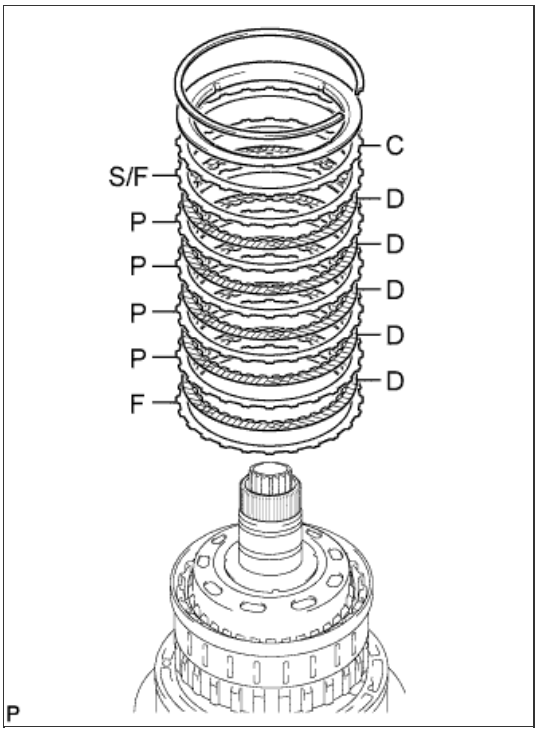
D = Disc

P = Plate

S/F = Selected flange

C = Cushion plate

b. Using a screwdriver, install the snap ring to the clutch drum.



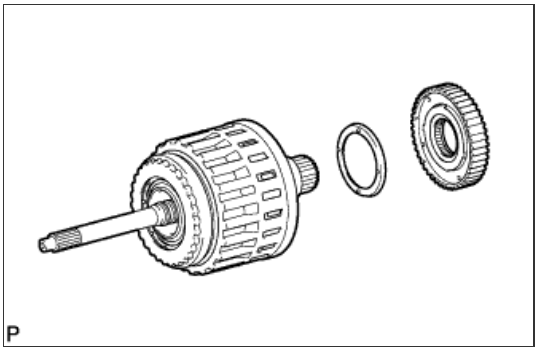
50. INSTALL NO. 2 1-WAY CLUTCH ASSEMBLY

a. Install the clutch drum thrust washer to the clutch drum.

HINT:

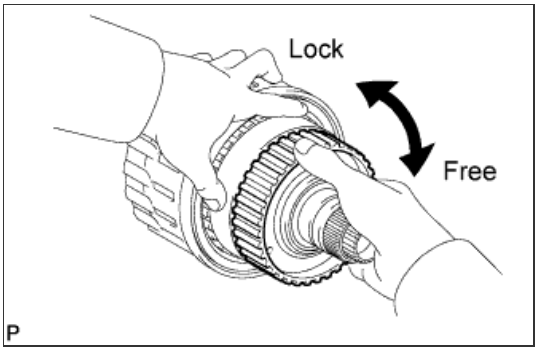
Use a small amount of MP grease to make the thrust washer stay securely in place.

b. Install the 1-way clutch to the clutch drum.



51. INSPECT NO. 2 1-WAY CLUTCH ASSEMBLY

a. Hold the reverse clutch hub and turn the 1-way clutch assembly. Check that the 1-way clutch turns freely clockwise and locks when turned counterclockwise.



52. INSTALL CLUTCH DRUM AND INPUT SHAFT ASSEMBLY

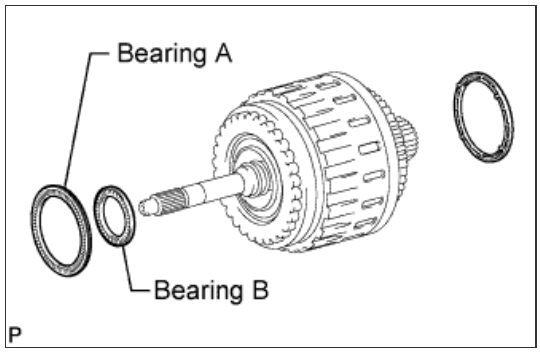
a. Install the 2 thrust needle roller bearings.

HINT:

Use a small amount of MP grease to make the thrust needle roller bearings stay securely in place.

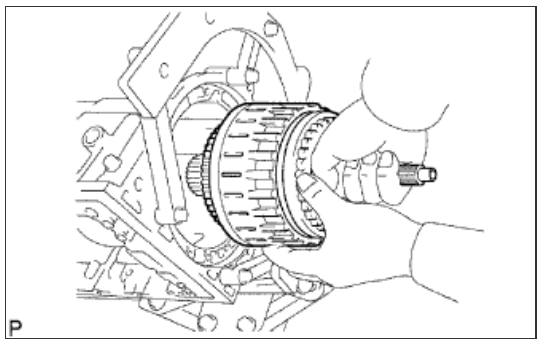
Bearing Diameter:

Item	Inside	Outside
Bearing A	71.96 to 72.26 mm (2.83 to 2.84 in.)	85.25 to 85.6 mm (3.36 to 3.37 in.)
Bearing B	36.45 to 36.7 mm (1.44 to 1.45 in.)	52.96 to 53.26 mm (2.09 to 2.10 in.)



b. Coat the clutch drum thrust washer with petroleum jelly and install it onto the clutch drum and input shaft assembly.

c. Install the clutch drum and input shaft assembly to the transmission case.



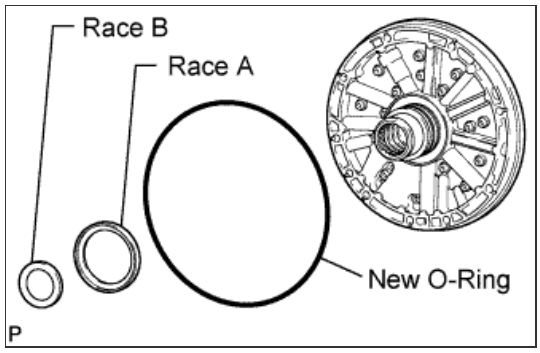
53. INSTALL OIL PUMP ASSEMBLY

a. Coat a new O-ring with ATF, and install it to the oil pump.

b. Install the 2 thrust bearing races to the front oil pump.

Thrust Bearing Race Diameter:

Item	Inside	Outside
Race A	74.26 to 74.56 mm (2.92 to 2.94 in.)	87.39 to 87.74 mm (3.44 to 3.45 in.)
Race B	38.0 to 38.3 mm (1.50 to 1.51 in.)	53.9 to 54.1 mm (2.12 to 2.13 in.)



c. Pass the input shaft through the center hole of the oil pump, and align the bolt holes of the oil pump assembly with the transmission case.

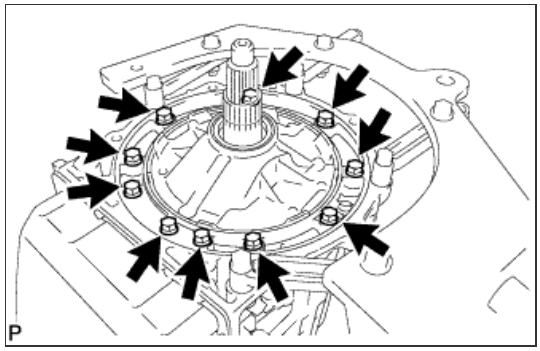
d. Hold the input shaft, and lightly press the oil pump body to slide the oil seal rings into the overdrive direct clutch drum.

e. Apply seal packing to the flanges of the bolts.

Seal packing:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent

NOTICE:

Do not allow seal packing to contact the bolt threads.



f. Install the 10 bolts.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }

NOTICE:

During installation, do not allow oil to contact the bolts or the surface of the oil pump body.

54. INSPECT INDIVIDUAL PISTON OPERATION

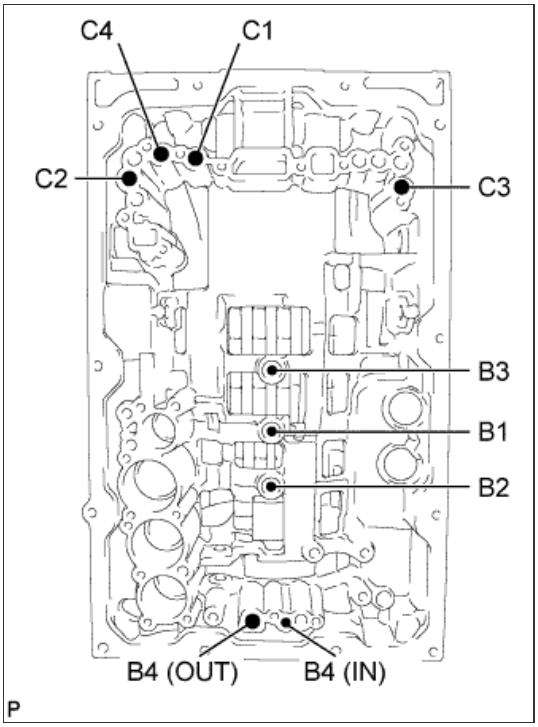
a. Check the operating sound while applying compressed air into the oil holes indicated in the illustration.

HINT:

When inspecting the direct clutch, check with the accumulator piston holes indicated in the illustration.

If there is no sound, disassemble and check the installation condition of the parts.

1. No. 2 clutch (C2)
2. No. 3 clutch (C3)
3. No. 4 clutch (C4)
4. No. 1 clutch (C1)
5. No. 3 brake (B3)
6. No. 1 brake (B1)
7. No. 2 brake (B2)
8. No. 4 brake (B4)

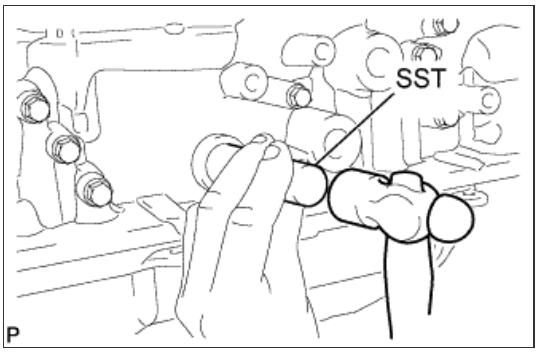


55. INSTALL MANUAL VALVE LEVER SHAFT OIL SEAL

a. Using SST, tap in 2 new oil seals.

SST
09350-30020 (09350-07110)

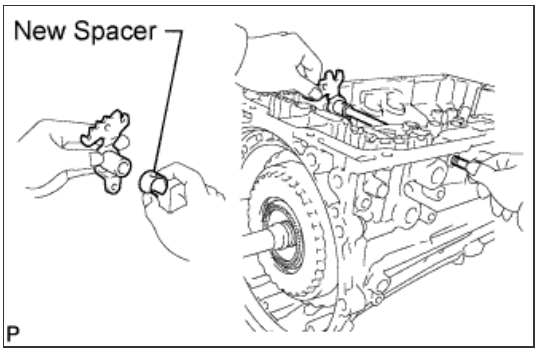
b. Coat the lips of the oil seals with MP grease.



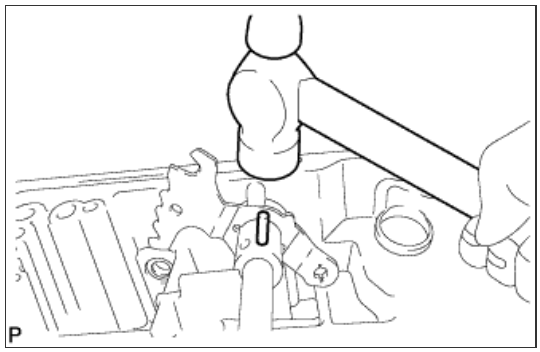
56. INSTALL MANUAL VALVE LEVER SUB-ASSEMBLY

a. Install a new spacer to the manual valve lever.

b. Push the manual valve lever shaft through the transmission case, and install the manual valve lever to the shaft.

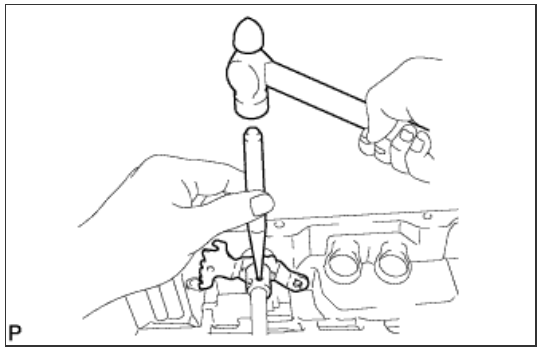


c. Using a hammer, tap in a new spring pin.



d. Align the manual valve lever indentation with the spacer hole, and stake them together with the punch.

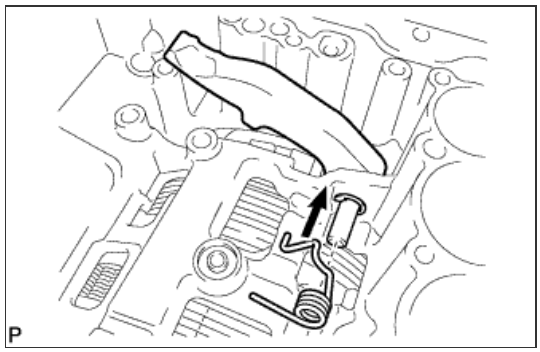
e. Check that the shaft rotates smoothly.



57. INSTALL PARKING LOCK PAWL

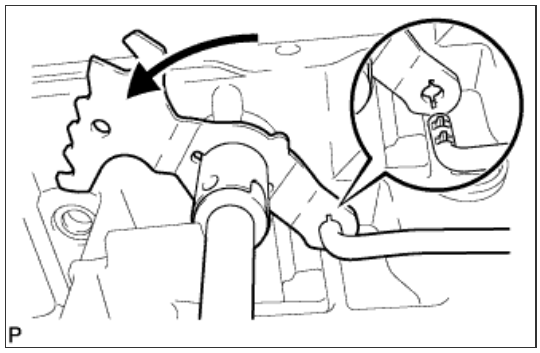
a. Install a new E-ring to the shaft.

b. Install the parking lock pawl, shaft and spring.



58. INSTALL PARKING LOCK ROD SUB-ASSEMBLY

a. Connect the parking lock rod to the manual valve lever.

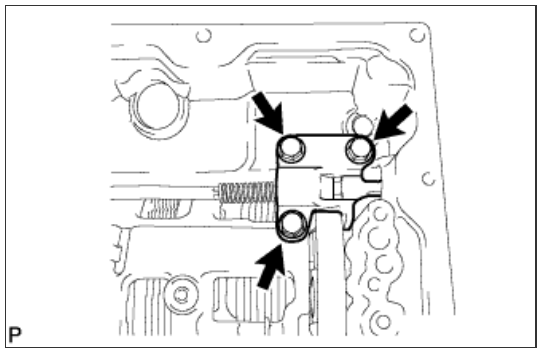


59. INSTALL PARKING LOCK PAWL BRACKET

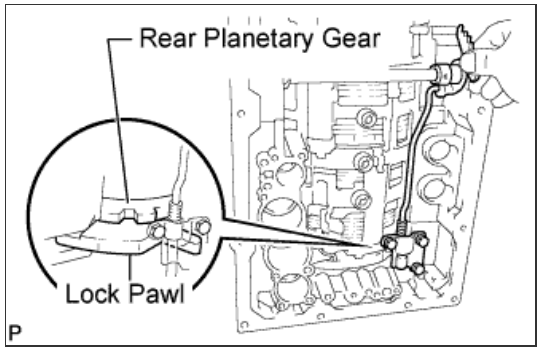
a. Place the parking lock pawl bracket onto the transmission case and install the 3 bolts.

Torque:

18 N*m{ 184 kgf*cm , 13 ft.*lbf }



b. Move the manual valve lever to the P position, and confirm that the planetary ring gear is correctly locked by the lock pawl.

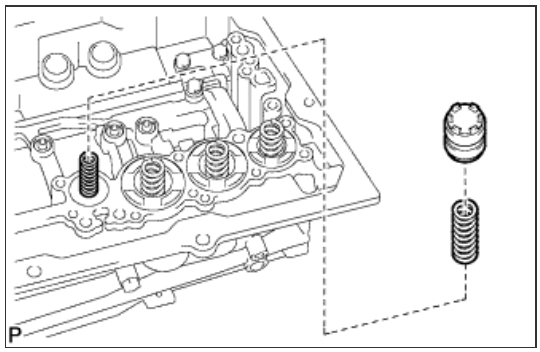


60. INSTALL B-1 ACCUMULATOR VALVE

a. Install the 2 springs and accumulator valve to the hole.

Spring Diameter:

Spring	Free Length Outer Diameter	Color
B-1 Inner	44.98 mm (1.77 in.) 11.30 mm (0.445 in.)	Natural
B-1 Outer	46.36 mm (1.83 in.) 17.10 mm (0.673 in.)	Natural



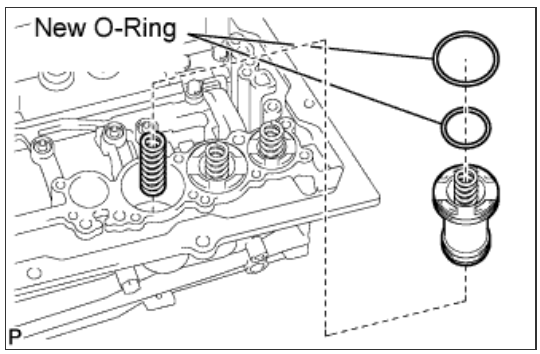
61. INSTALL C-3 ACCUMULATOR PISTON

a. Coat 2 new O-rings with ATF, and install them to the piston.

b. Install the spring and accumulator piston to the hole.

Spring Diameter:

Spring	Free Length Outer Diameter	Color
C-3	76.65 mm (3.02 in.) 20.1 mm (0.791 in.)	Natural



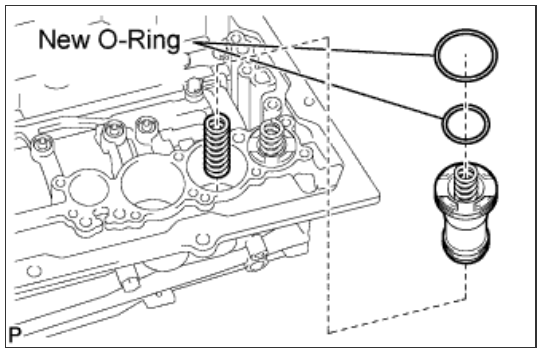
62. INSTALL B-3 ACCUMULATOR PISTON

a. Coat 2 new O-rings with ATF, and install them to the piston.

b. Install the spring and accumulator piston to the hole.

Spring Diameter:

Spring	Free Length Outer Diameter	Color
B-3	64.50 mm (2.54 in.) 19.5 mm (0.768 in.)	Orange



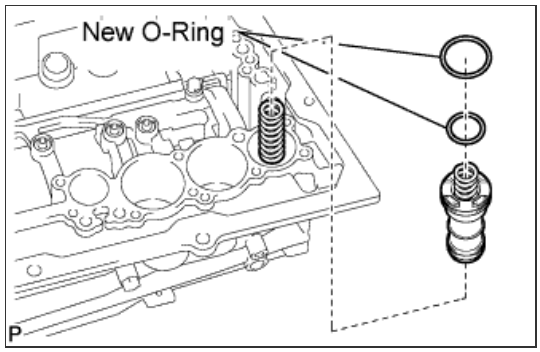
63. INSTALL C-2 ACCUMULATOR PISTON

a. Coat 2 new O-rings with ATF, and install them to the piston.

b. Install the spring and accumulator piston to the hole.

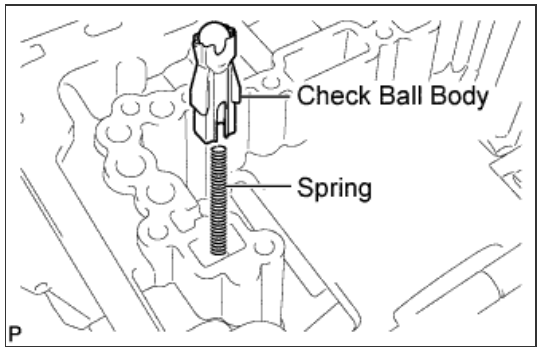
Spring Diameter:

Spring	Free Length Outer Diameter	Color
C-2	68.0 mm (2.68 in.) 16.1 mm (0.634 in.)	Light green



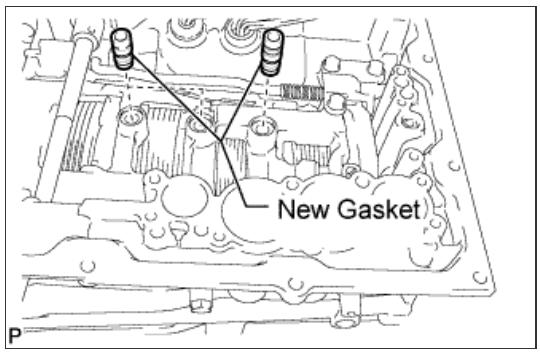
64. INSTALL CHECK BALL BODY

a. Install the spring and check ball body.



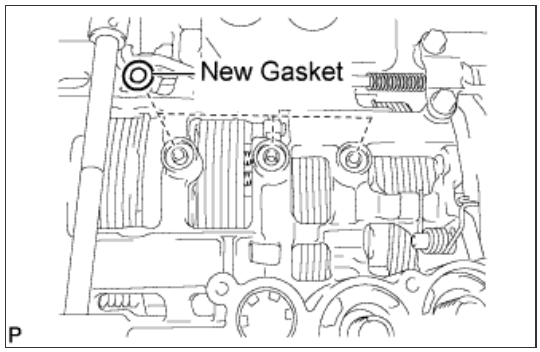
65. INSTALL BRAKE DRUM GASKET

a. Install 3 new brake drum gaskets.



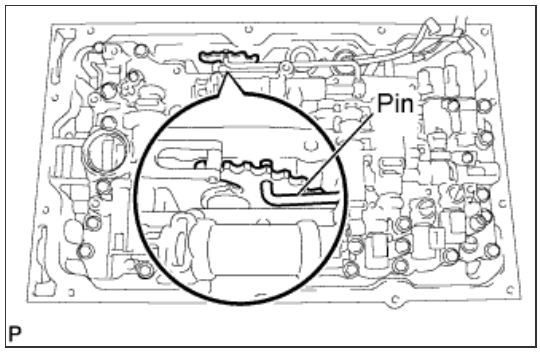
66. INSTALL TRANSMISSION CASE GASKET

a. Install 3 new transmission case gaskets.



67. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

a. Align the hole of the manual valve with the pin of the lever.



b. Install the 19 bolts.

Torque:
11 N*m{ 112 kgf*cm , 8 ft.*lbf }

HINT:

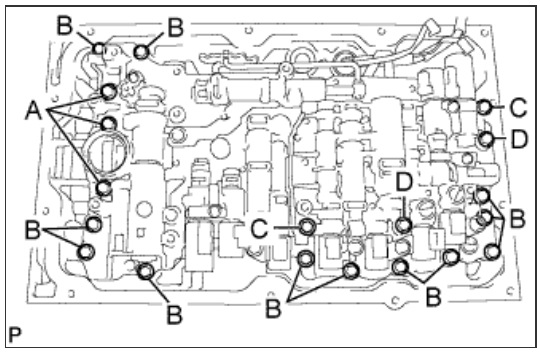
Each bolt length is indicated below.

36 mm (1.42 in.) for bolt A

25 mm (0.984 in.) for bolt B

45 mm (1.77 in.) for bolt C

50 mm (1.97 in.) for bolt D

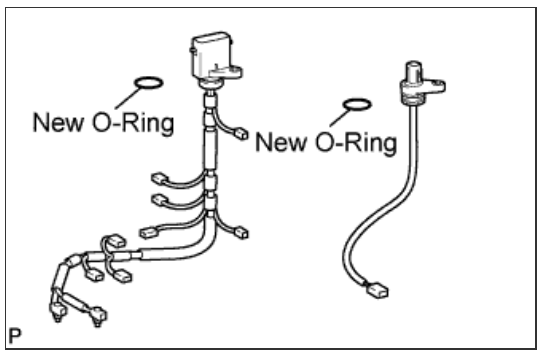


c. Install the detent spring and detent spring cover with the bolt.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }

68. INSTALL TRANSMISSION WIRE

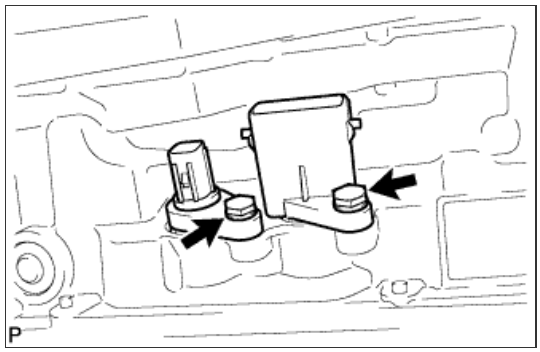
a. Install 2 new O-rings to the transmission wires.



b. Install the transmission wire harnesses.

c. Install the bolts.

Torque:
5.4 N*m{ 55 kgf*cm , 48 in.*lbf }



d. Connect the 9 connectors to the solenoid valves.

e. Connect the 2 ATF temperature sensors with the 2 clamps and 2 bolts.

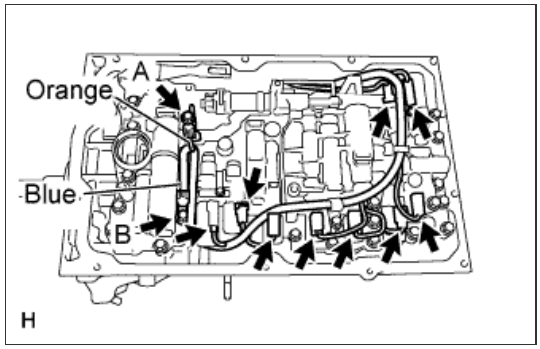
Torque:
for bolt A:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }
for bolt B:
11 N*m{ 112 kgf*cm , 8 ft.*lbf }

HINT:

Each bolt length is indicated below.

12 mm (0.472 in.) for bolt A

36 mm (1.42 in.) for bolt B

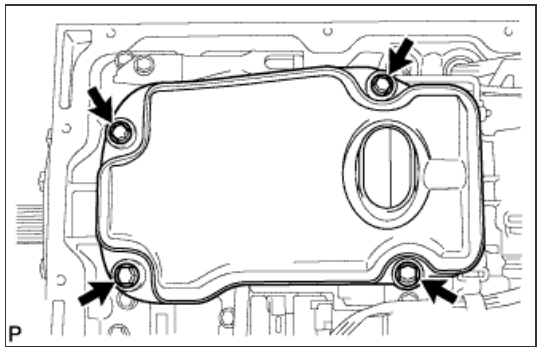


69. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

a. Coat a new O-ring with ATF, and install it to the oil strainer.

b. Install the oil strainer with the 4 bolts.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



70. INSTALL AUTOMATIC TRANSMISSION OIL PAN SUB-ASSEMBLY

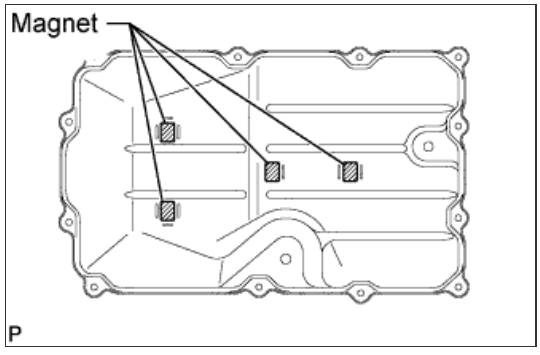
a. Install the 4 magnets.

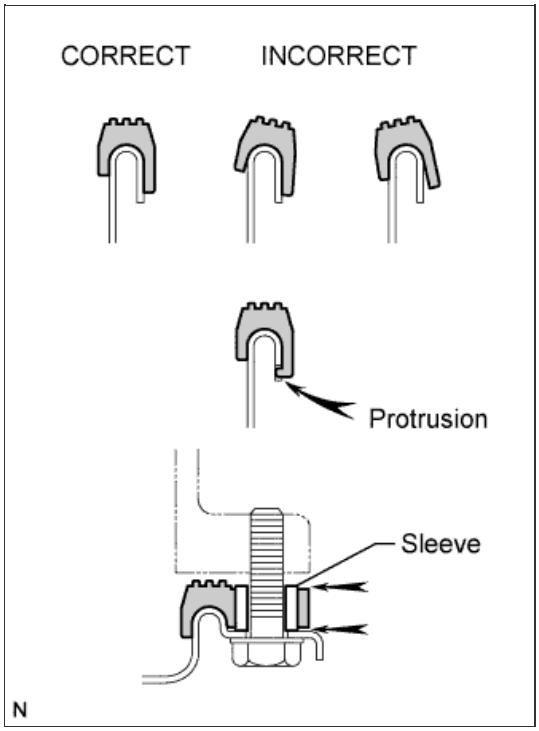
b. Install a new gasket to the oil pan.

c. Install the oil pan with the 12 bolts.

Torque:
7.4 N*m{ 75 kgf*cm , 65 in.*lbf }

NOTICE:





- **Make sure that there is no oil or foreign matter on the gasket seal surface and oil pan contact surface.**
- **Install the gasket so that there is no slack in the gasket, and make sure the entire circumference of the seal surface is level.**
- **Make sure that the 9 gasket drop prevention protrusions are set on the oil pan.**
- **When tightening the bolts of the oil pan, make sure that the gasket is not pinched between the gasket tightening area sleeve and the transmission seal surface.**

d. Install the drain plug.

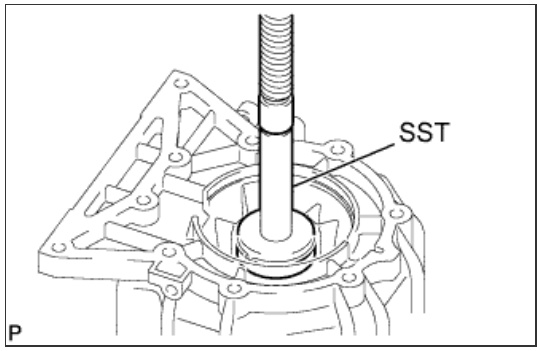
Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }

71. INSTALL TRANSFER CASE ADAPTER RADIAL BALL BEARING

a. Using SST and a press, press in the bearing until it stops.

SST
09950-60010 (09951-00650)
09950-70010 (09951-07150)

b. Using a screwdriver, install the snap ring.



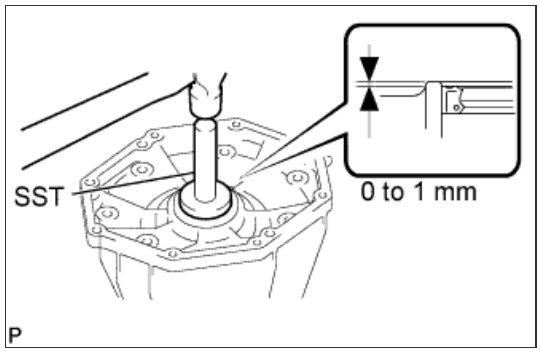
72. INSTALL TRANSMISSION CASE ADAPTER OIL SEAL

a. Coat the lip of a new oil seal with ATF.

b. Using SST and a hammer, tap in the oil seal.

Standard depth:
0 to 1 mm (0 to 0.0394 in.)

SST
09950-60010 (09951-00650)
09950-70010 (09951-07150)



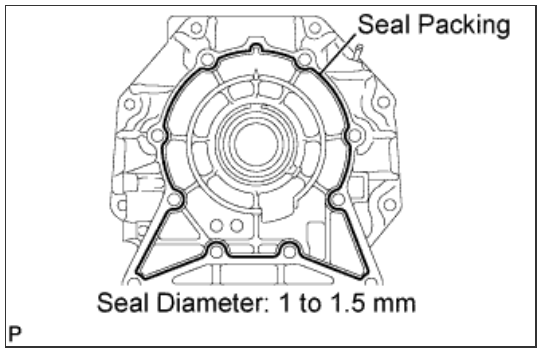
73. INSTALL TRANSFER ADAPTER REAR

a. Clean the threads of the bolts and case with non-residue solvent.

b. Apply seal packing to the rear adaptor transfer.

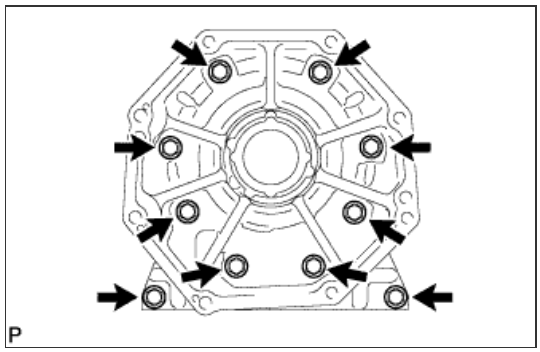
Seal packing:
Toyota Genuine Seal Packing 1281,
Three Bond 1281 or equivalent

Seal diameter:
1.0 to 1.5 mm (0.0394 to 0.0591 in.)



c. Install the rear adaptor transfer with the 10 bolts.

Torque:
34 N*m{ 345 kgf*cm , 25 ft.*lbf }

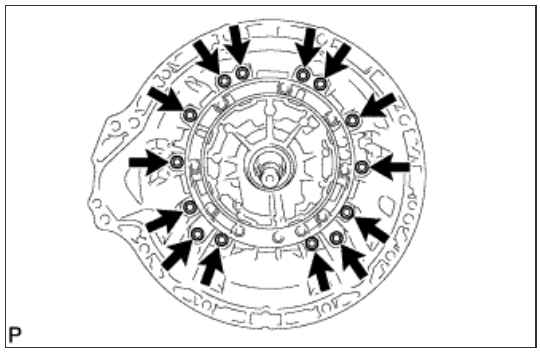


74. INSTALL AUTOMATIC TRANSMISSION HOUSING

a. Clean the threads of the bolts and case with non-residue solvent.

b. Install the transmission housing with the 14 bolts.

Torque:
34 N*m{ 345 kgf*cm , 25 ft.*lbf }

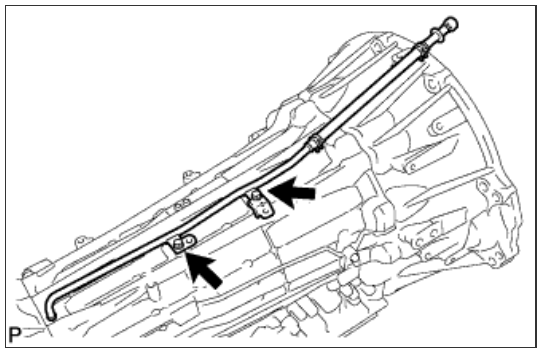


75. INSTALL AUTOMATIC TRANSMISSION BREATHER TUBE

a. Coat a new O-ring with ATF and install it to the breather tube.

b. Install the breather tube with the 2 bolts.

Torque:
5.4 N*m{ 55 kgf*cm , 48 in.*lbf }



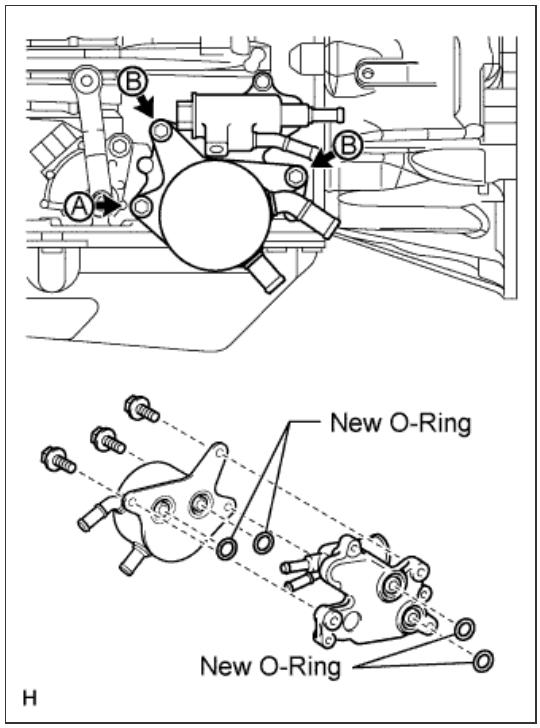
76. INSTALL TRANSMISSION OIL COOLER ASSEMBLY (w/o Air Cooled Transmission Oil Cooler)

a. Coat 4 new O-rings with ATF.

b. Install the 4 O-rings, transmission oil thermostat and transmission oil cooler to the automatic transmission.

c. Temporarily install bolt A. Install the bolts labeled B and tighten them to the specified torque. Then tighten bolt A to the specified torque.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }



77. INSTALL OIL COOLER TUBE UNION (w/ Air Cooled Transmission Oil Cooler)

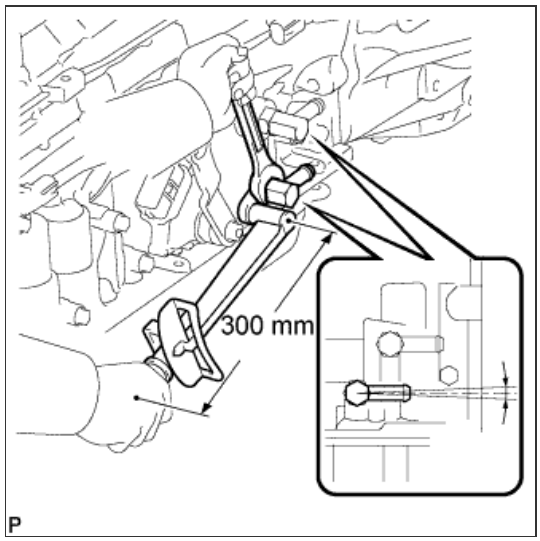
a. Coat 2 new O-rings with ATF, and install them to the 2 oil cooler tube unions.

b. Using a union nut wrench, install the 2 oil cooler tube unions.

Torque:
without union nut wrench:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }
with union nut wrench:
26 N*m{ 265 kgf*cm , 19 ft.*lbf }

HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.8 in.).



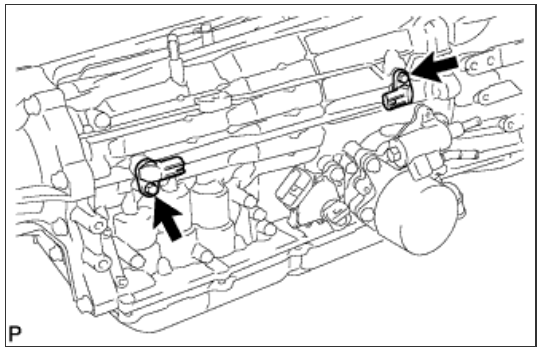
78. INSTALL SPEED SENSOR

a. Coat 2 new O-rings with ATF, and install them to the speed sensors.

b. Install the 2 speed sensors.

c. Install the 2 bolts.

Torque:
5.4 N*m{ 55 kgf*cm , 48 in.*lbf }



79. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

HINT:

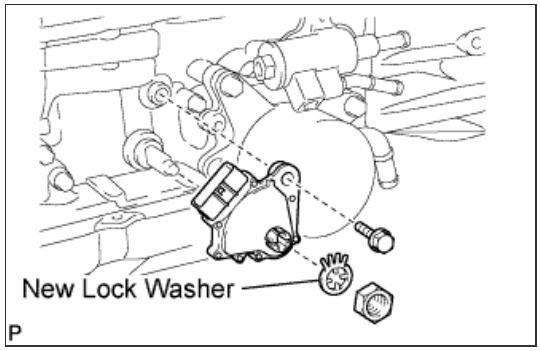
Make sure that the manual valve lever shaft has not been rotated prior to installing the park/neutral position switch as the detent spring may become detached from the manual valve lever shaft.

a. Install the park/neutral position switch to the manual valve lever shaft, and temporarily install the adjusting bolt.

b. Install a new lock washer and the nut.

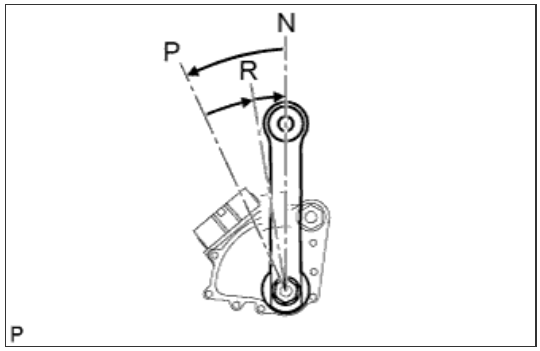
Torque:
6.9 N*m{ 70 kgf*cm , 61 in.*lbf }

c. Temporarily install the control shaft lever RH.



d. Turn the control shaft lever RH counterclockwise until it stops, and then turn it clockwise 2 notches to set it to the N position.

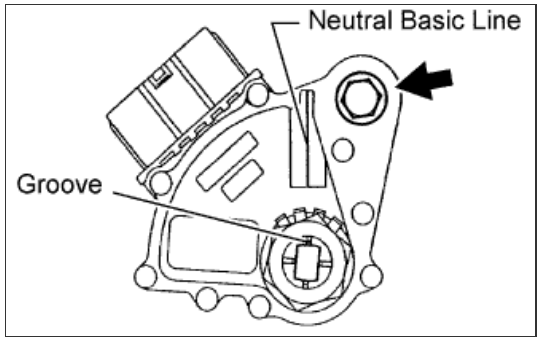
e. Remove the control shaft lever RH.



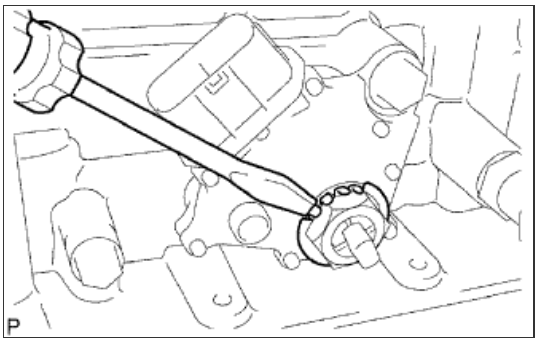
f. Align the groove with the neutral basic line.

g. Hold the switch in position and tighten the bolt.

Torque:
13 N*m{ 133 kgf*cm , 10 ft.*lbf }



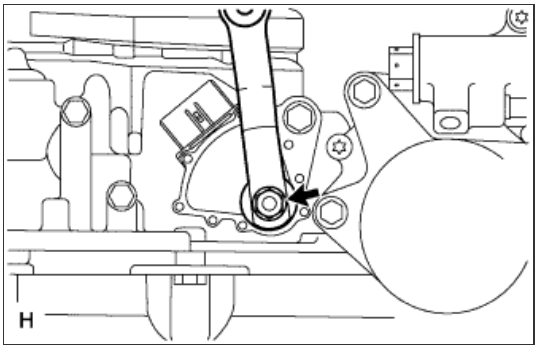
h. Using a screwdriver, bend the tabs of the lock washer.



80. INSTALL TRANSMISSION CONTROL SHAFT LEVER RH

a. Install the control shaft lever RH with the washer and nut.

Torque:
16 N*m{ 163 kgf*cm , 12 ft.*lbf }

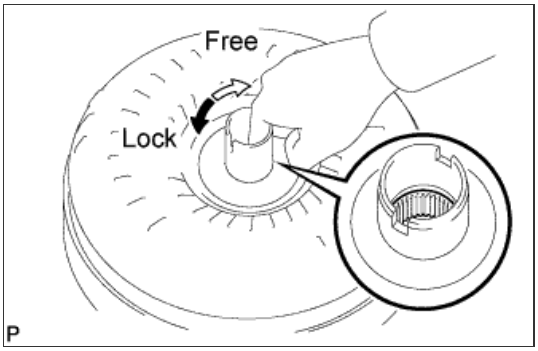


for Preparation Click here

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Inspect the 1-way clutch.

i. Press on the serrations of the starter with a finger and rotate it. Check that it rotates smoothly when turned clockwise and locks when turned counterclockwise.
If necessary, clean the converter and recheck the 1-way clutch.
Replace the converter if the 1-way clutch still fails the check.



b. Determine the condition of the torque converter clutch.

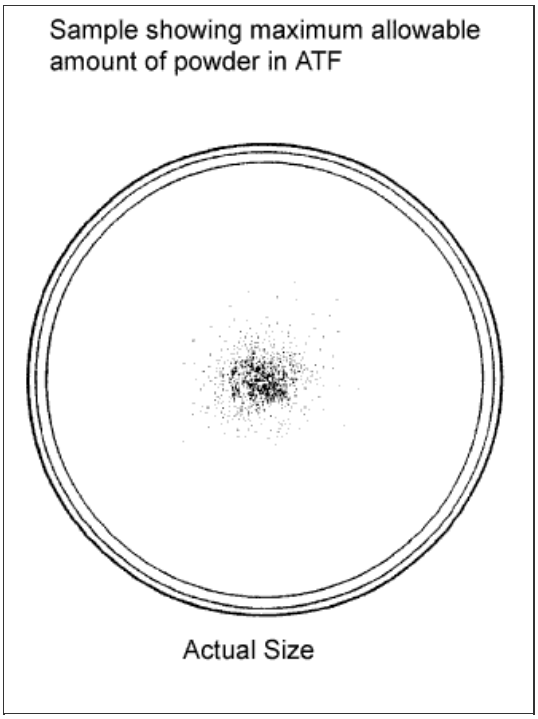
i. Check that the following conditions are met:

- During the stall test or when the shift lever is in N, metallic sounds are not emitted from the torque converter clutch.
- The 1-way clutch turns in one direction and locks in the other direction.
- The amount of powder in the ATF is not more than the sample shown in the illustration.

If the results are not as specified, replace the torque converter clutch assembly.

HINT:

The sample illustration shows approximately 0.25 liters (0.26 US qts., 0.22 Imp. qts.) of ATF taken from a removed torque converter clutch.



c. Replace the ATF in the torque converter clutch.

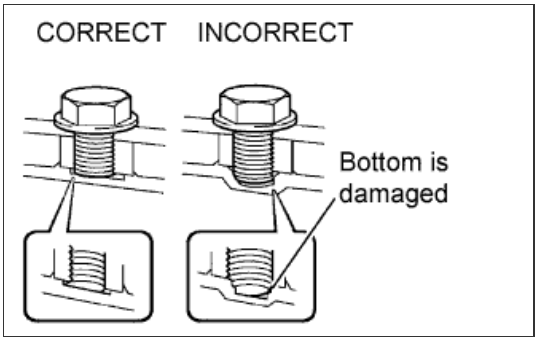
i. If the ATF is discolored and/or has a foul odor, stir the ATF in the torque converter clutch thoroughly and drain the ATF with the torque converter facing upward.

d. Prevent deformation of the torque converter clutch and damage to the oil pump gear.

i. When any marks due to interference are found on the end of the bolt for the torque converter clutch and on the bottom of the bolt hole, replace the bolt and torque converter clutch.

ii. All of the bolts should be the same length.

iii. Make sure no spring washers are missing.

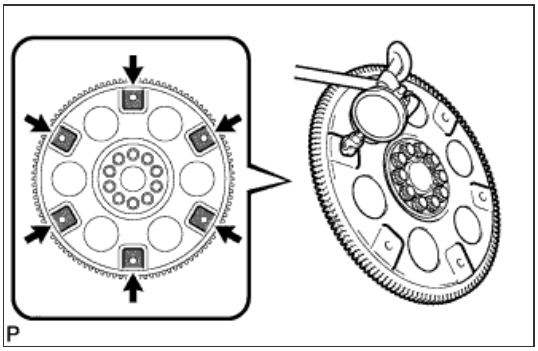


2. INSPECT RUNOUT OF DRIVE PLATE AND RING GEAR

a. Set up a dial indicator and measure runout at 6 portions around the torque converter fitting surface.

Maximum runout:
0.30 mm (0.00118 in.)

b. Check the drive plate damage.
If the runout is more than the maximum or if the drive plate is damaged, replace the drive plate (Click here).



3. INSPECT RUNOUT OF TORQUE CONVERTER CLUTCH ASSEMBLY

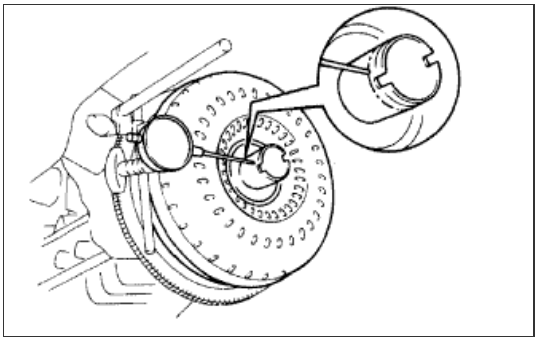
a. Temporarily mount the torque converter clutch to the drive plate. Set up a dial indicator and measure the torque converter clutch runout.

Maximum runout:
0.30 mm (0.0118 in.)

If the runout is more than the maximum, try to correct it by changing the installation direction of the torque converter clutch. If the runout cannot be corrected, replace the torque converter clutch.

HINT:

Mark the position of the torque converter clutch so that it can be installed correctly later.



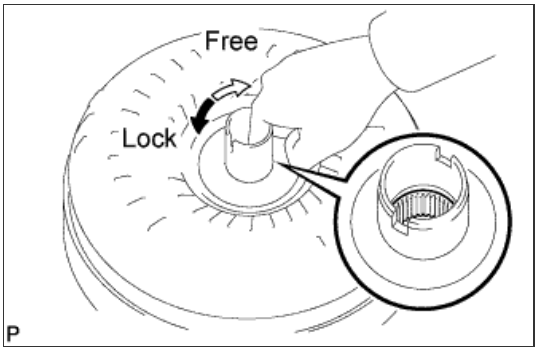
b. Remove the torque converter clutch.

for Preparation Click here

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

a. Inspect the 1-way clutch.

i. Press on the serrations of the starter with a finger and rotate it. Check that it rotates smoothly when turned clockwise and locks when turned counterclockwise.
If necessary, clean the converter and recheck the 1-way clutch.
Replace the converter if the 1-way clutch still fails the check.



b. Determine the condition of the torque converter clutch.

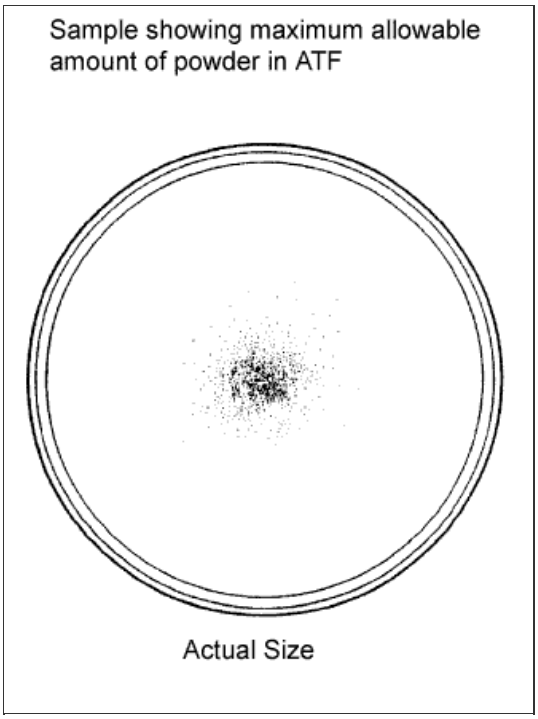
i. Check that the following conditions are met:

- During the stall test or when the shift lever is in N, metallic sounds are not emitted from the torque converter clutch.
- The 1-way clutch turns in one direction and locks in the other direction.
- The amount of powder in the ATF is not more than the sample shown in the illustration.

If the results are not as specified, replace the torque converter clutch assembly.

HINT:

The sample illustration shows approximately 0.25 liters (0.26 US qts., 0.22 Imp. qts.) of ATF taken from a removed torque converter clutch.



c. Replace the ATF in the torque converter clutch.

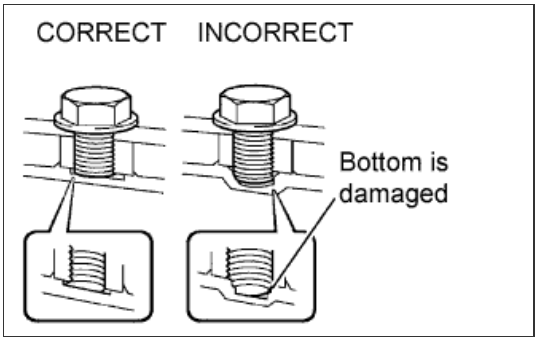
i. If the ATF is discolored and/or has a foul odor, stir the ATF in the torque converter clutch thoroughly and drain the ATF with the torque converter facing upward.

d. Prevent deformation of the torque converter clutch and damage to the oil pump gear.

i. When any marks due to interference are found on the end of the bolt for the torque converter clutch and on the bottom of the bolt hole, replace the bolt and torque converter clutch.

ii. All of the bolts should be the same length.

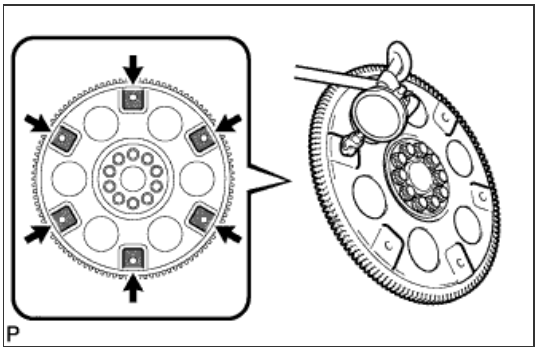
iii. Make sure no spring washers are missing.



2. INSPECT RUNOUT OF DRIVE PLATE AND RING GEAR

a. Set up a dial indicator and measure runout at 6 portions around the torque converter fitting surface.

Maximum runout:
0.30 mm (0.00118 in.)



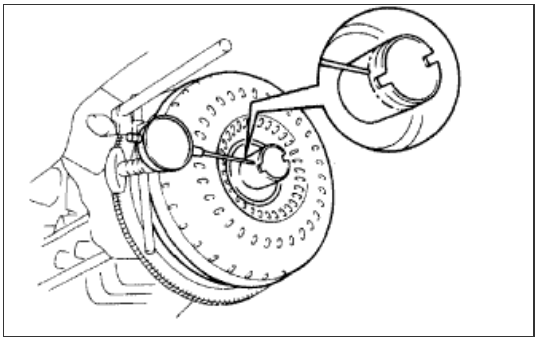
b. Check the drive plate damage.
If the runout is more than the maximum or if the drive plate is damaged, replace the drive plate.
for 1UR-FE (Click here)
for 3UR-FE (Click here)

3. INSPECT RUNOUT OF TORQUE CONVERTER CLUTCH ASSEMBLY

a. Temporarily mount the torque converter clutch to the drive plate. Set up a dial indicator and measure the torque converter clutch runout.

Maximum runout:
0.30 mm (0.0118 in.)

If the runout is more than the maximum, try to correct it by changing the installation direction of the torque converter clutch. If the runout cannot be corrected, replace the torque converter clutch.

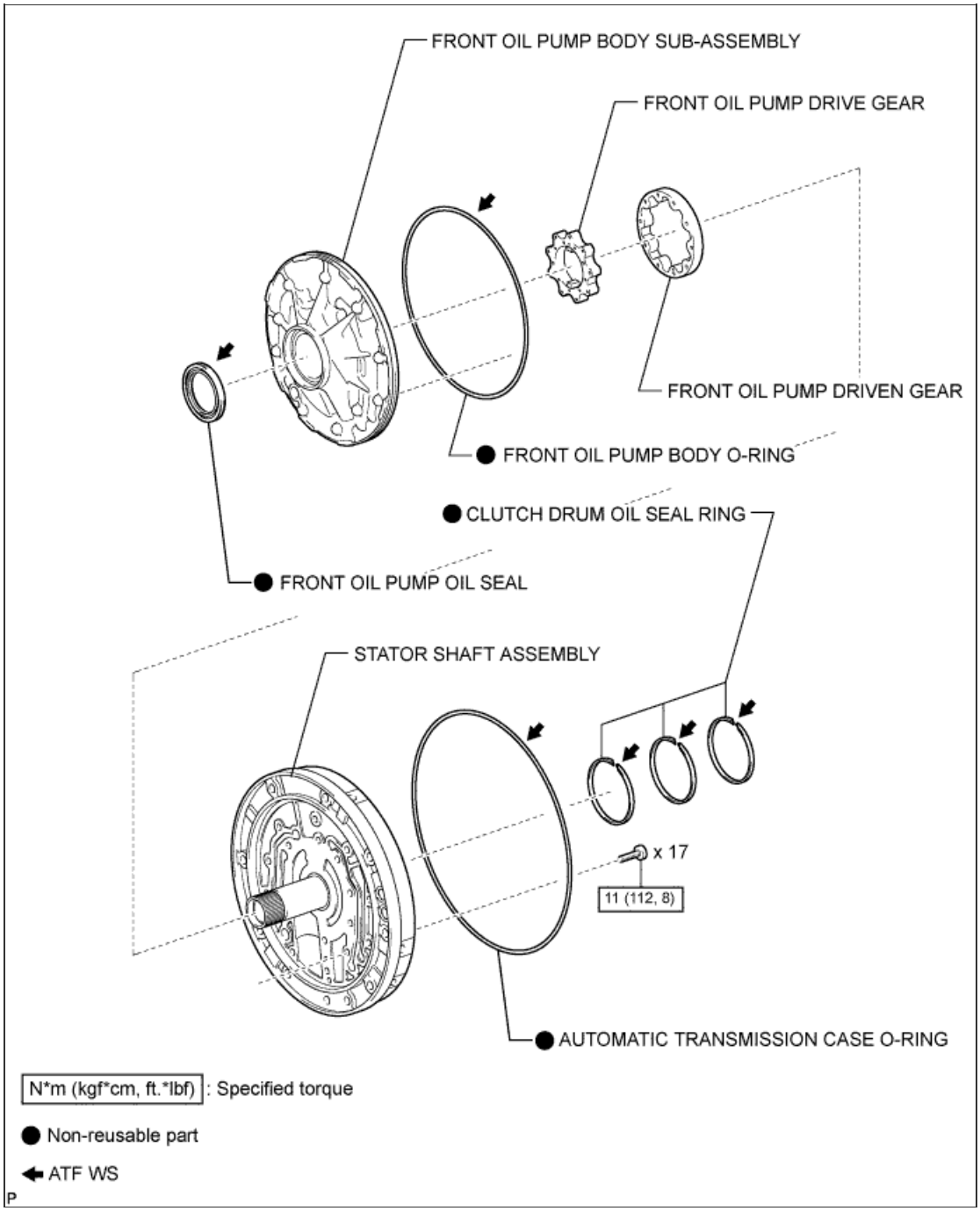


HINT:

Mark the position of the torque converter clutch so that it can be installed correctly later.

b. Remove the torque converter clutch.

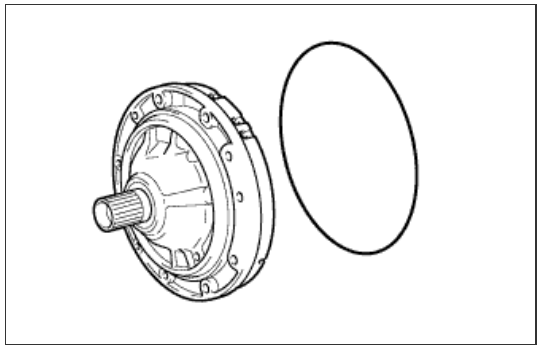
for Preparation Click here



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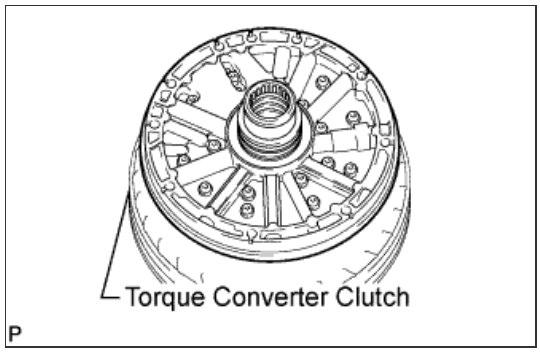
1. REMOVE AUTOMATIC TRANSMISSION CASE O-RING

a. Remove the O-ring from the oil pump.



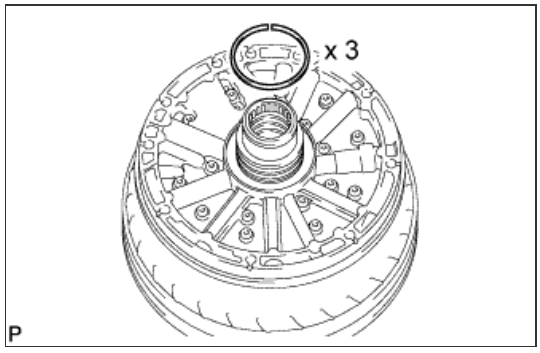
2. FIX OIL PUMP ASSEMBLY

a. Place the oil pump body on the torque converter.



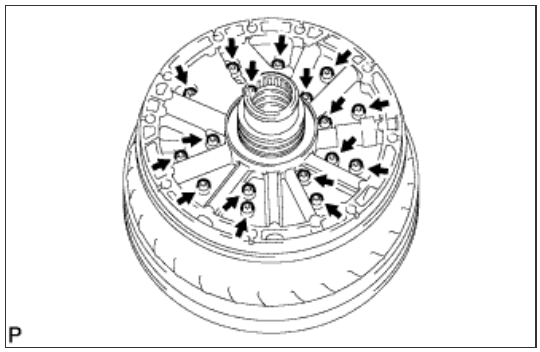
3. REMOVE CLUTCH DRUM OIL SEAL RING

a. Remove the 3 oil seal rings.



4. REMOVE STATOR SHAFT ASSEMBLY

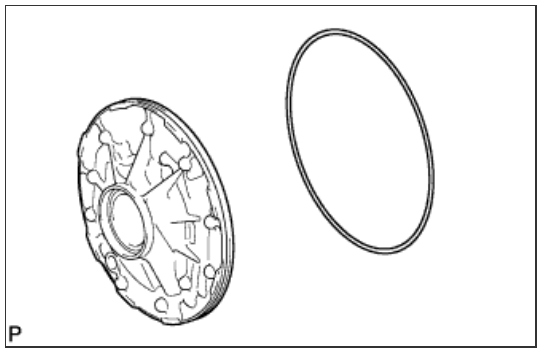
a. Remove the 17 bolts, and then remove the stator shaft from the oil pump body.



5. REMOVE FRONT OIL PUMP BODY O-RING

a. Remove the O-ring from the oil pump body.

b. Remove the oil pump body from the torque converter clutch.

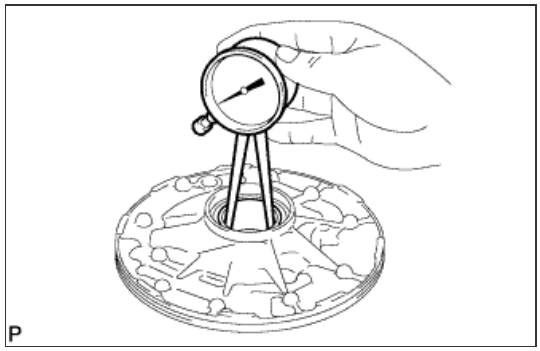


6. INSPECT FRONT OIL PUMP BODY SUB-ASSEMBLY

a. Using a dial indicator, measure the inside diameter of the oil pump body bush.

Standard inside diameter:
45.064 to 45.078 mm (1.774 to 1.775 in.)

If the inside diameter is more than the standard, replace the oil pump body sub-assembly.

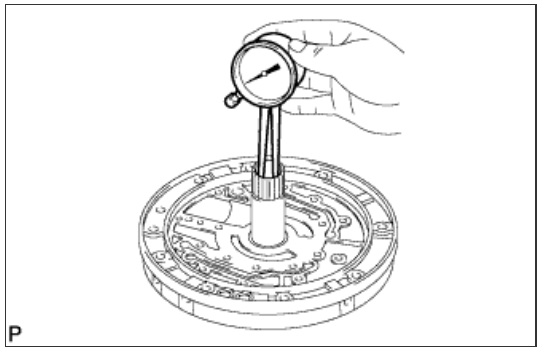


7. INSPECT STATOR SHAFT ASSEMBLY

a. Using a dial indicator, measure the inside diameter of the stator shaft bush.

Standard inside diameter:
25.900 to 25.921 mm (1.020 to 1.021 in.)

If the inside diameter is more than the standard, replace the stator shaft assembly.



8. INSPECT CLEARANCE OF OIL PUMP ASSEMBLY

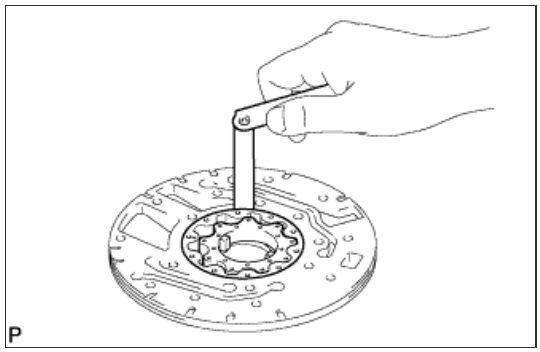
a. Push the driven gear to one side of the body.

b. Using a feeler gauge, measure the body clearance.

Standard body clearance:
0.10 to 0.17 mm (0.00394 to 0.00669 in.)

Maximum body clearance:
0.17 mm (0.00669 in.)

If the body clearance is more than the maximum, replace the drive gear, driven gear or pump body assembly.

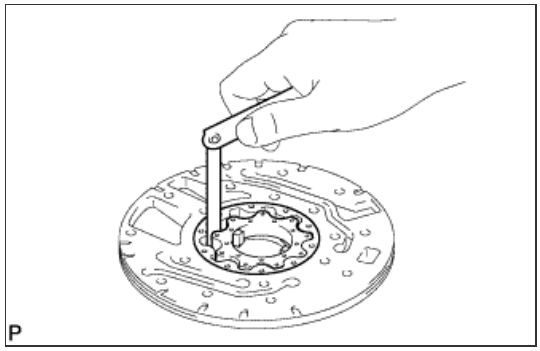


c. Using a feeler gauge, measure the tip clearance between the driven gear teeth and drive gear teeth.

Standard tip clearance:
0.070 to 0.150 mm (0.00276 to 0.00591 in.)

Maximum tip clearance:
0.150 mm (0.00591 in.)

If the tip clearance is more than the maximum, replace the drive gear, driven gear or pump body assembly.



d. Using a steel straightedge and feeler gauge, measure the side clearance of both gears.

Standard side clearance:
0.03 to 0.05 mm (0.00118 to 0.00197 in.)

Maximum side clearance:
0.05 mm (0.00197 in.)

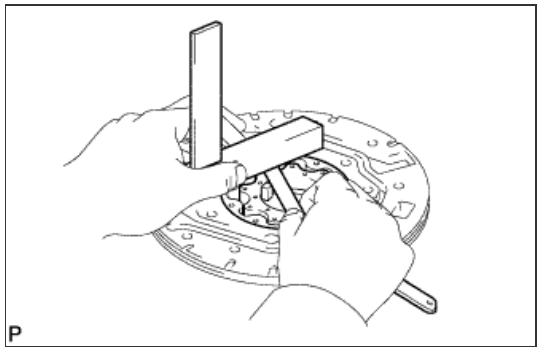
If the side clearance is more than the maximum, replace the drive gear, driven gear or pump body assembly.

HINT:

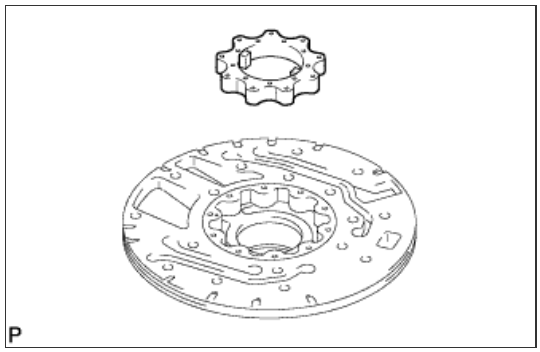
There are 7 different thicknesses for the drive and driven gears.

Drive and Driven Gears Thickness:

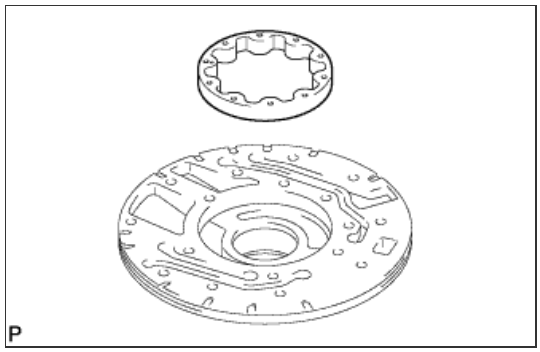
Mark	Thickness
0	11.636 to 11.642 mm (0.4581 to 0.4583 in.)
1	11.643 to 11.649 mm (0.4584 to 0.4586 in.)
2	11.650 to 11.656 mm (0.4587 to 0.4589 in.)
3	11.657 to 11.663 mm (0.4589 to 0.4592 in.)
4	11.664 to 11.670 mm (0.4592 to 0.4594 in.)
5	11.671 to 11.677 mm (0.4595 to 0.4597 in.)
6	11.678 to 11.684 mm (0.4598 to 0.4600 in.)



9. REMOVE FRONT OIL PUMP DRIVE GEAR



10. REMOVE FRONT OIL PUMP DRIVEN GEAR



11. REMOVE FRONT OIL PUMP OIL SEAL

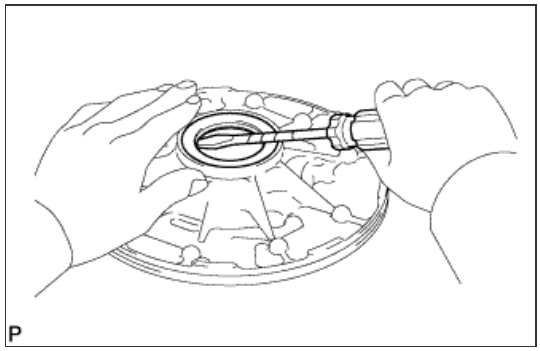
a. Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the oil pump body.

HINT:

Wrap the tip of the screwdriver with tape.



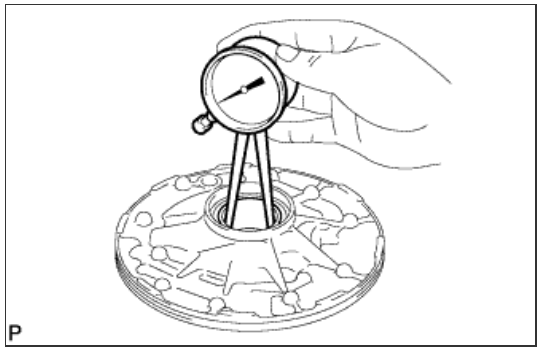
for Preparation Click here

1. INSPECT FRONT OIL PUMP BODY SUB-ASSEMBLY

a. Using a dial indicator, measure the inside diameter of the oil pump body bush.

Standard inside diameter:
45.064 to 45.078 mm (1.774 to 1.775 in.)

If the inside diameter is more than the standard, replace the oil pump body sub-assembly.

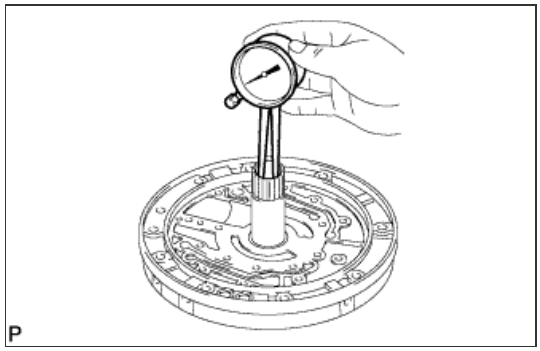


2. INSPECT STATOR SHAFT ASSEMBLY

a. Using a dial indicator, measure the inside diameter of the stator shaft bush.

Standard inside diameter:
25.900 to 25.921 mm (1.020 to 1.021 in.)

If the inside diameter is more than the standard, replace the stator shaft assembly.



3. INSPECT CLEARANCE OF OIL PUMP ASSEMBLY

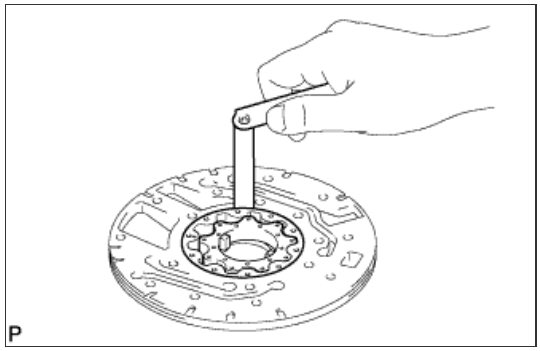
a. Push the driven gear to one side of the body.

b. Using a feeler gauge, measure the body clearance.

Standard body clearance:
0.10 to 0.17 mm (0.00394 to 0.00669 in.)

Maximum body clearance:
0.17 mm (0.00669 in.)

If the body clearance is more than the maximum, replace the drive gear, driven gear or pump body assembly.

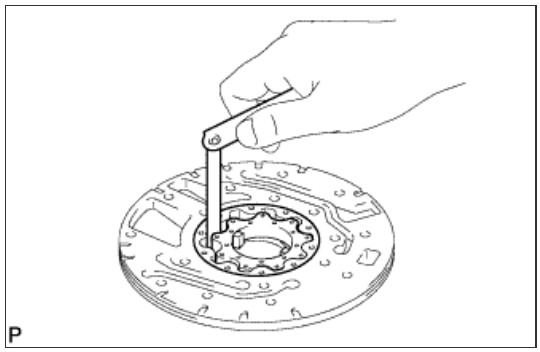


c. Using a feeler gauge, measure the tip clearance between the driven gear teeth and drive gear teeth.

Standard tip clearance:
0.070 to 0.150 mm (0.00276 to 0.00591 in.)

Maximum tip clearance:
0.150 mm (0.00591 in.)

If the tip clearance is more than the maximum, replace the drive gear, driven gear or pump body assembly.

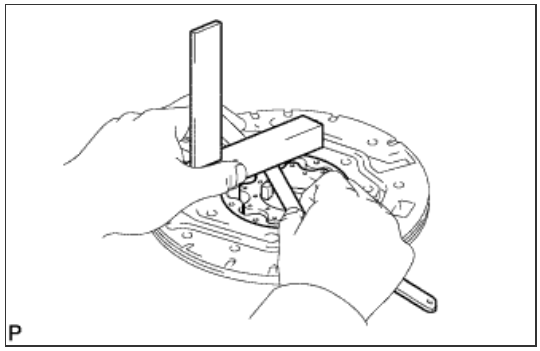


d. Using a steel straightedge and feeler gauge, measure the side clearance of both gears.

Standard side clearance:
0.03 to 0.05 mm (0.00118 to 0.00197 in.)

Maximum side clearance:
0.05 mm (0.00197 in.)

If the side clearance is more than the maximum, replace the drive gear, driven gear or pump body assembly.



HINT:

There are 7 different thicknesses for the drive and driven gears.

Drive and Driven Gears Thickness:

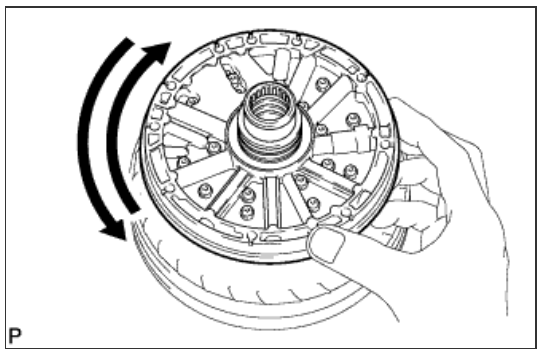
Mark	Thickness
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6	11.678 to 11.684 mm (0.4598 to 0.4600 in.)

4. INSPECT FRONT OIL PUMP DRIVE GEAR ROTATION

a. Place the oil pump assembly on the torque converter clutch.

b. Check that the drive gear rotates smoothly.

c. Remove the oil pump assembly from the torque converter.



for Preparation Click here

1. INSTALL FRONT OIL PUMP OIL SEAL

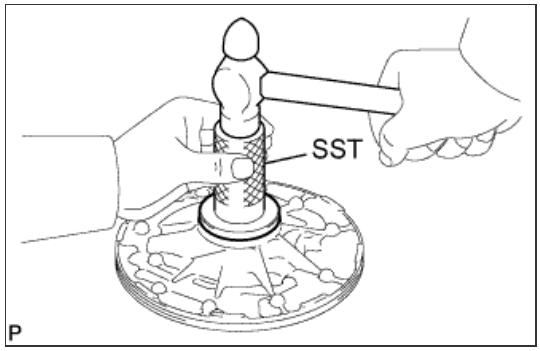
a. Using SST and a hammer, tap in a new oil seal.

SST
09950-60010 (09951-00650)
09950-70010 (09951-07100)

HINT:

The oil seal end should be flush with the outer edge of the pump body.

b. Coat the lip of the oil seal with MP grease.



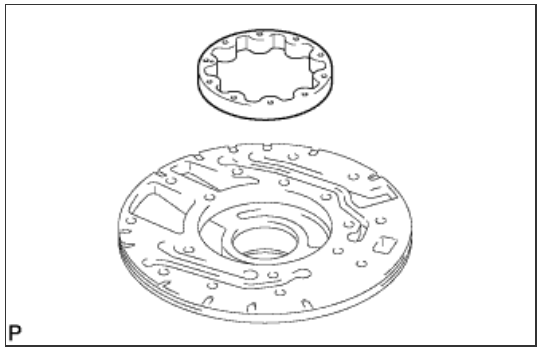
2. FIX FRONT OIL PUMP BODY SUB-ASSEMBLY

a. Place the oil pump body on the torque converter clutch.

3. INSTALL FRONT OIL PUMP DRIVEN GEAR

a. Coat the driven gear with ATF.

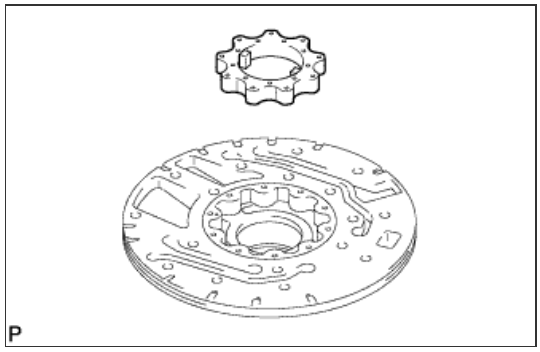
b. Install the driven gear to the oil pump body.



4. INSTALL FRONT OIL PUMP DRIVE GEAR

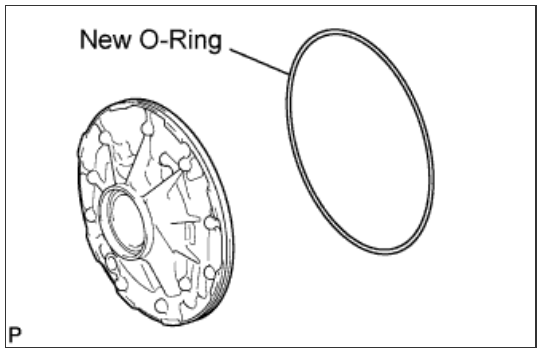
a. Coat the drive gear with ATF.

b. Install the drive gear to the oil pump body.



5. INSTALL FRONT OIL PUMP BODY O-RING

a. Coat a new O-ring with ATF and install it to the oil pump body.

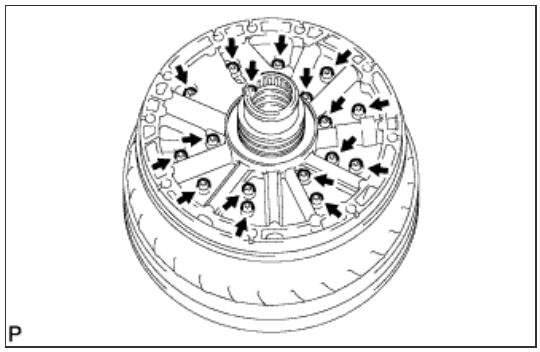


6. INSTALL STATOR SHAFT ASSEMBLY

a. Align the stator shaft with the bolt holes.

b. Install the 17 bolts.

Torque:
11 N*m{ 112 kgf*cm , 8 ft.*lbf }



7. INSTALL CLUTCH DRUM OIL SEAL RING

a. Coat 3 new oil seal rings with ATF.

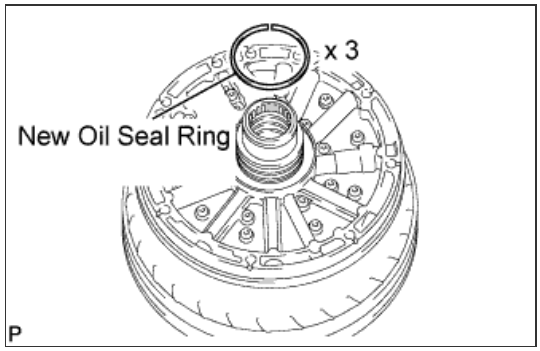
b. Squeeze the ends of the 3 oil seal rings together so that the overlap distance is 8 mm (0.314 in.) or less, and then install them to the starter shaft groove.

NOTICE:

Do not excessively widen the rings.

HINT:

After installing the oil seal rings, check that they rotate smoothly.

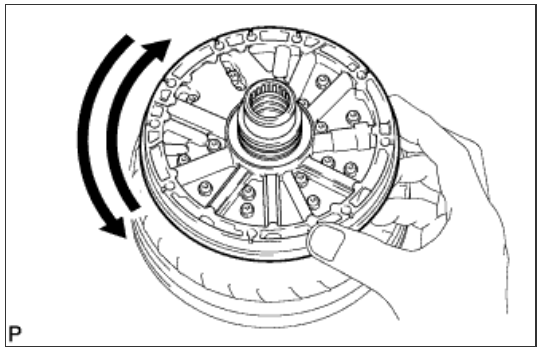


8. INSPECT OIL PUMP DRIVE GEAR ROTATION

a. Place the oil pump assembly on the torque converter clutch.

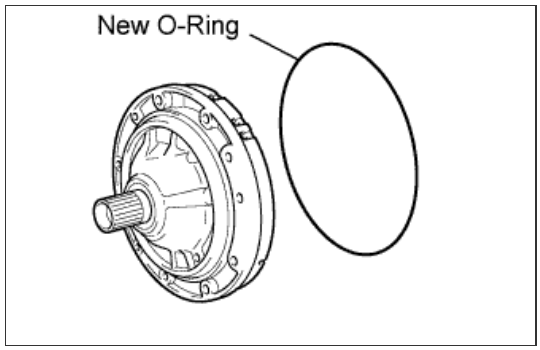
b. Check that the drive gear rotates smoothly.

c. Remove the oil pump assembly from the torque converter.



9. INSTALL AUTOMATIC TRANSMISSION CASE O-RING

a. Coat a new O-ring with ATF and install it to the oil pump.



for Preparation Click here

1.Before disassembling the transfer assembly, thoroughly clean it by removing any foreign matter. This will help prevent contamination during disassembly and reassembly.

2.When removing the transfer cover or any other light alloy parts, do not pry them off with a screwdriver or other tool that may cause damage. Instead, tap off the parts with a plastic-faced hammer.

3.Always arrange removed parts in the order they were removed and protect them from foreign matter.

4.Before installation of each part, thoroughly clean and dry it. Then apply hypoid gear oil to it. Do not use alkaline chemicals to clean aluminum parts, rubber parts or ring gear set bolts. Also, do not use non-residue solvent or other cleaning oils to clean O-rings, oil seals or rubber parts.

5.Coat any sliding surface or rotating part with hypoid gear oil.

6.Do not directly fix a part in a vise. Place aluminum plates between the part and vise.

7.Replace any damaged or deformed snap rings with new ones.

8.Do not allow the mating surface of the case to be scratched. Scratches may lead to oil leakage.

9.Using a razor blade and gasket scraper, remove any old seal packing black from the seal surface.

10.Clean all parts to remove excess seal packing black completely.

11.Clean the sealing surface with solvent so that no residue remains on the seal surface.

12.Apply seal packing black in a continuous line of approximately 1.2 mm (0.0472 in.) in diameter along the sealing surface.

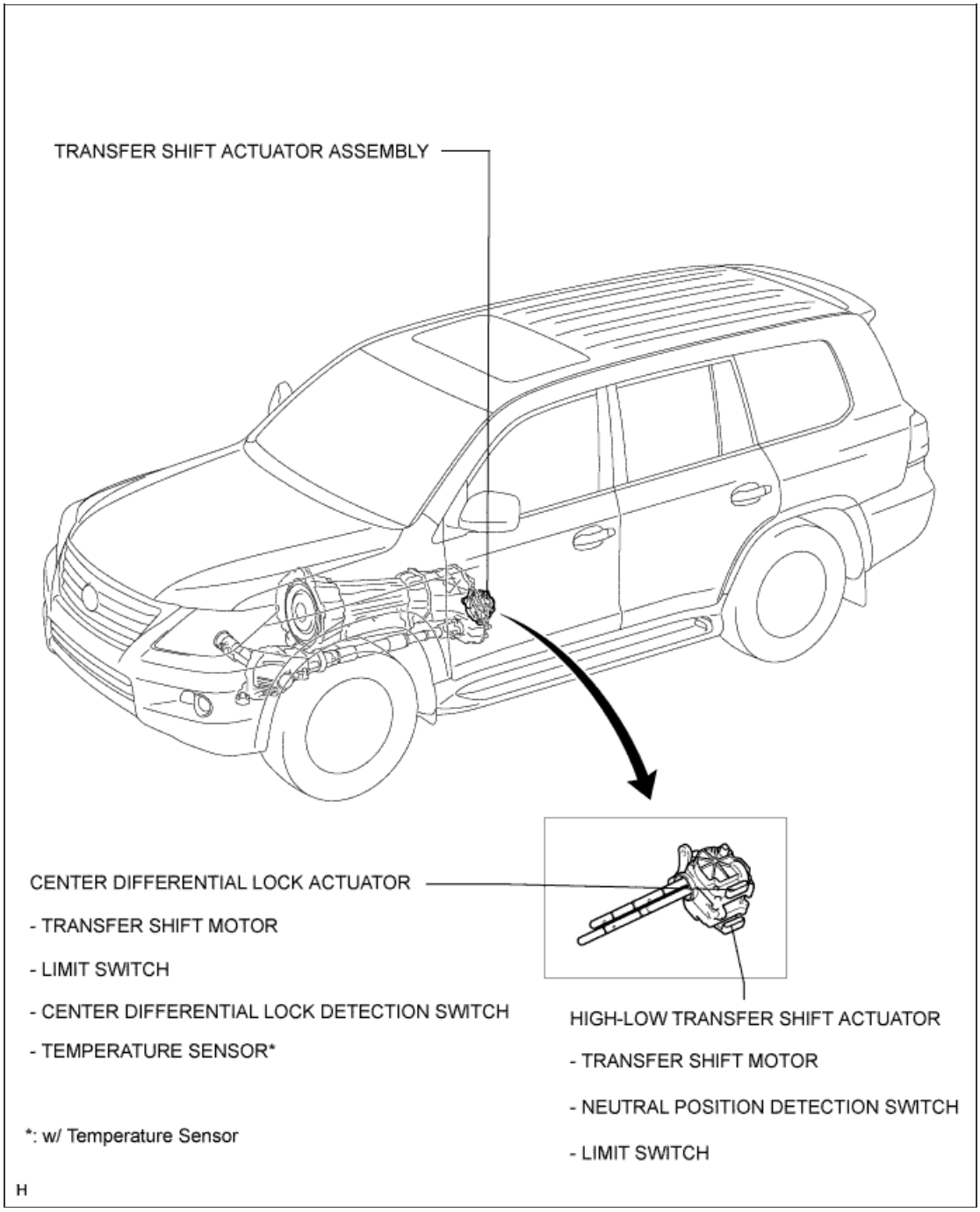
13.Be sure to assemble parts within 10 minutes of seal packing application. Otherwise, the FIPG must be removed and reapplied.

14.After sealing parts, do not allow oil to contact the seal for at least 1 hour.

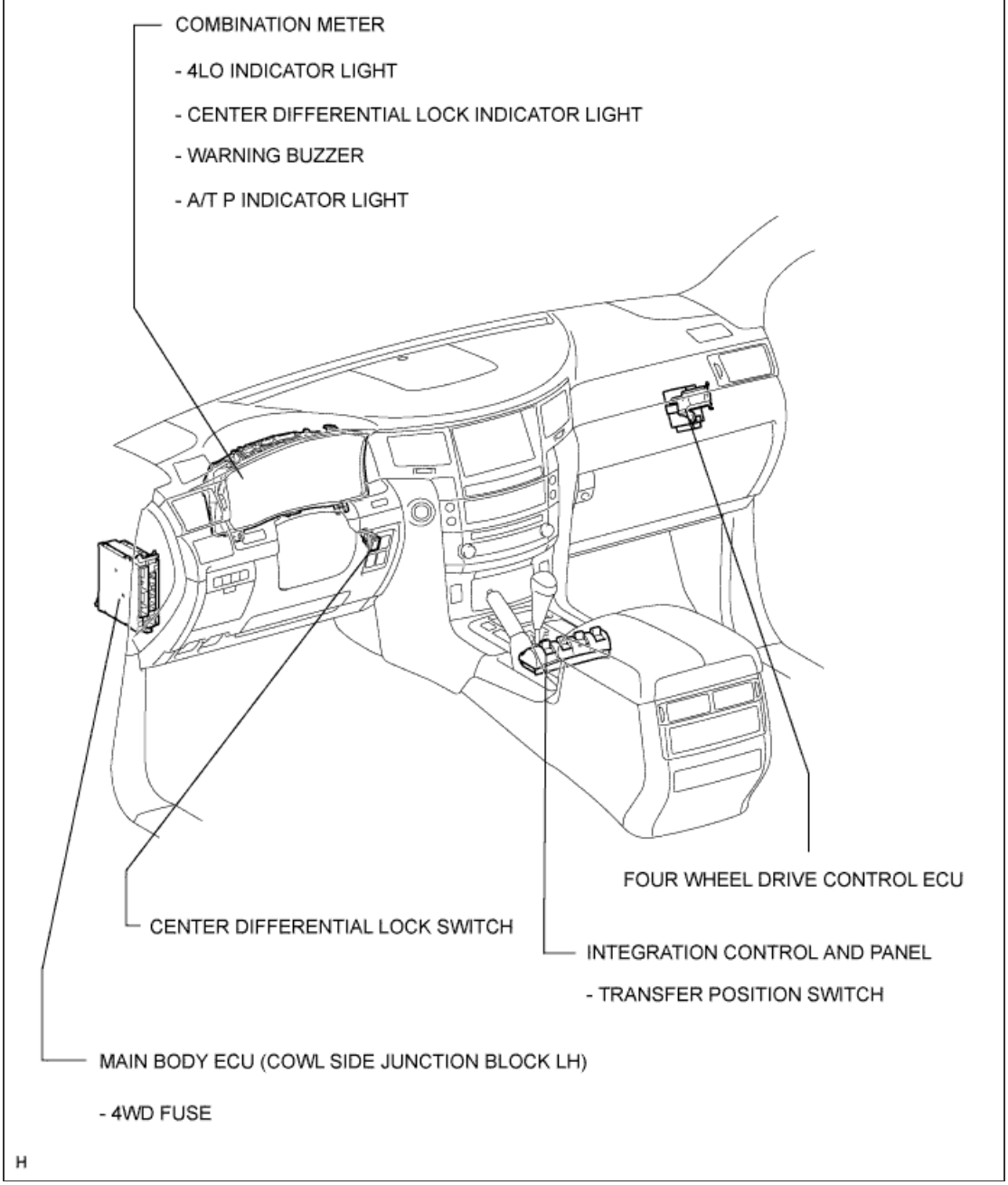
15.Do not allow scratches where a part contacts an oil seal or gasket. Scratches may lead to oil leakage.

16.When press-fitting an oil seal, be careful not to damage the lip of the oil seal and its periphery.

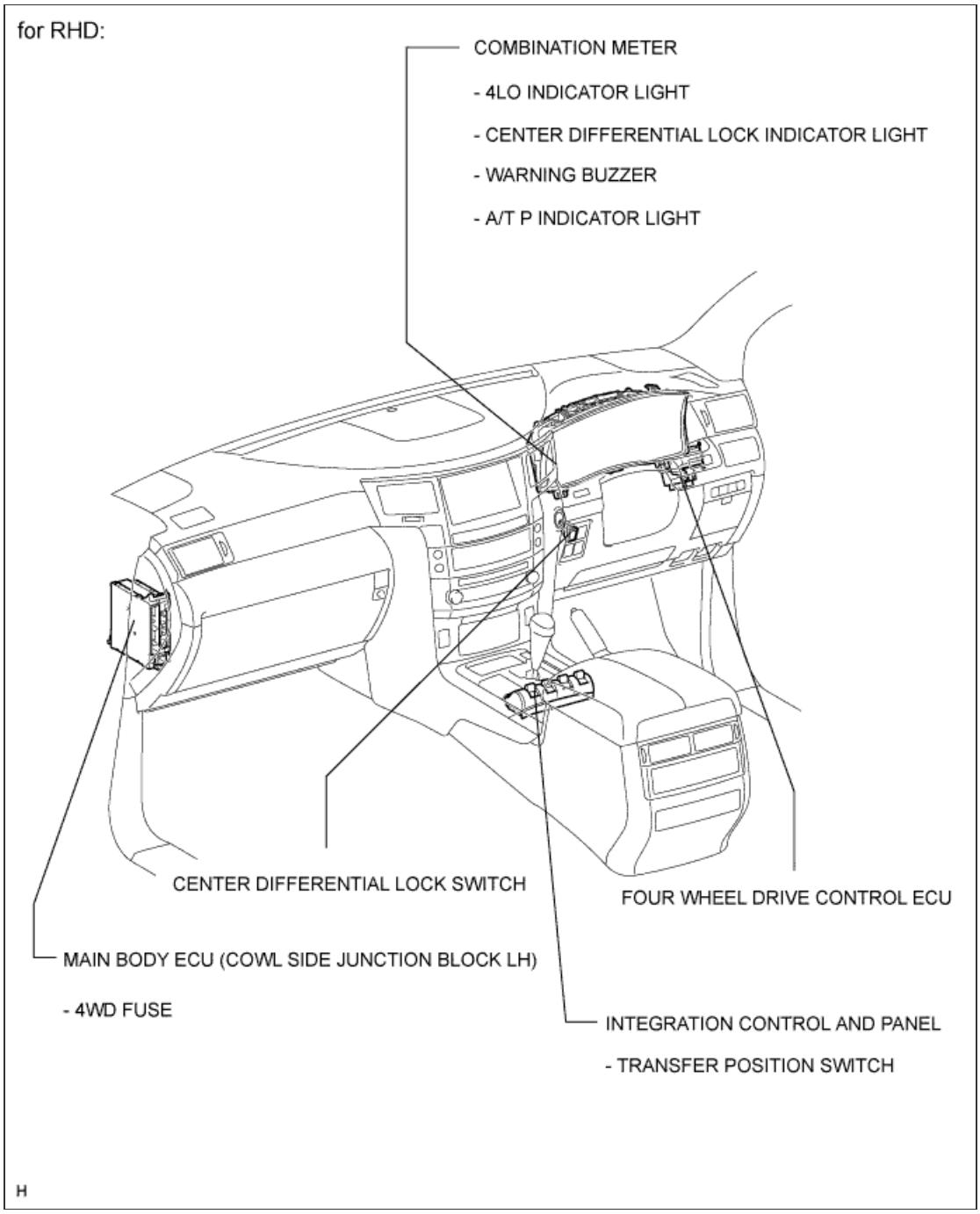
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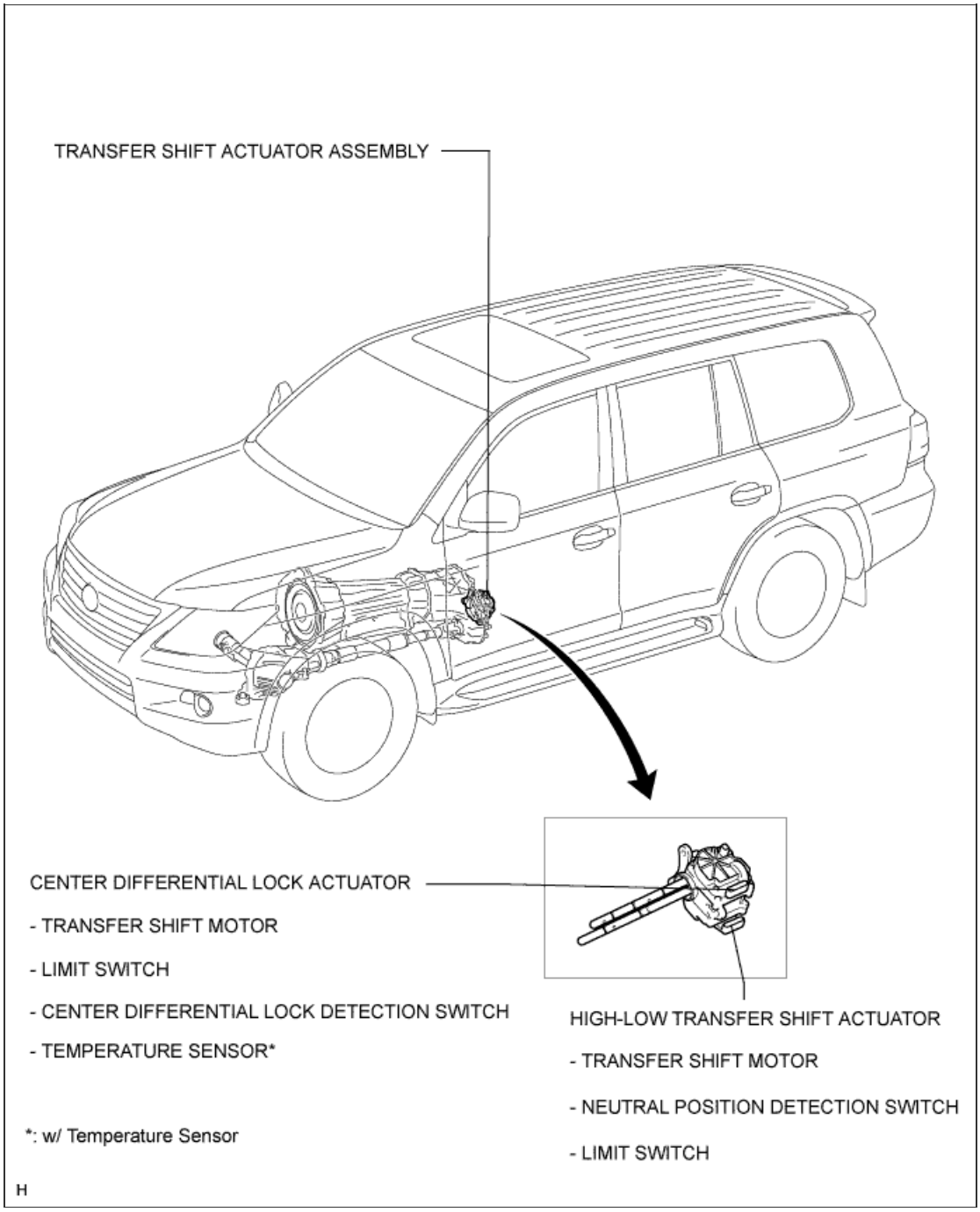
for LHD:


COMBINATION METER
- 4LO INDICATOR LIGHT
- CENTER DIFFERENTIAL LOCK INDICATOR LIGHT
- WARNING BUZZER
- A/T P INDICATOR LIGHT
FOUR WHEEL DRIVE CONTROL ECU
CENTER DIFFERENTIAL LOCK SWITCH
INTEGRATION CONTROL AND PANEL
- TRANSFER POSITION SWITCH
MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)
- 4WD FUSE

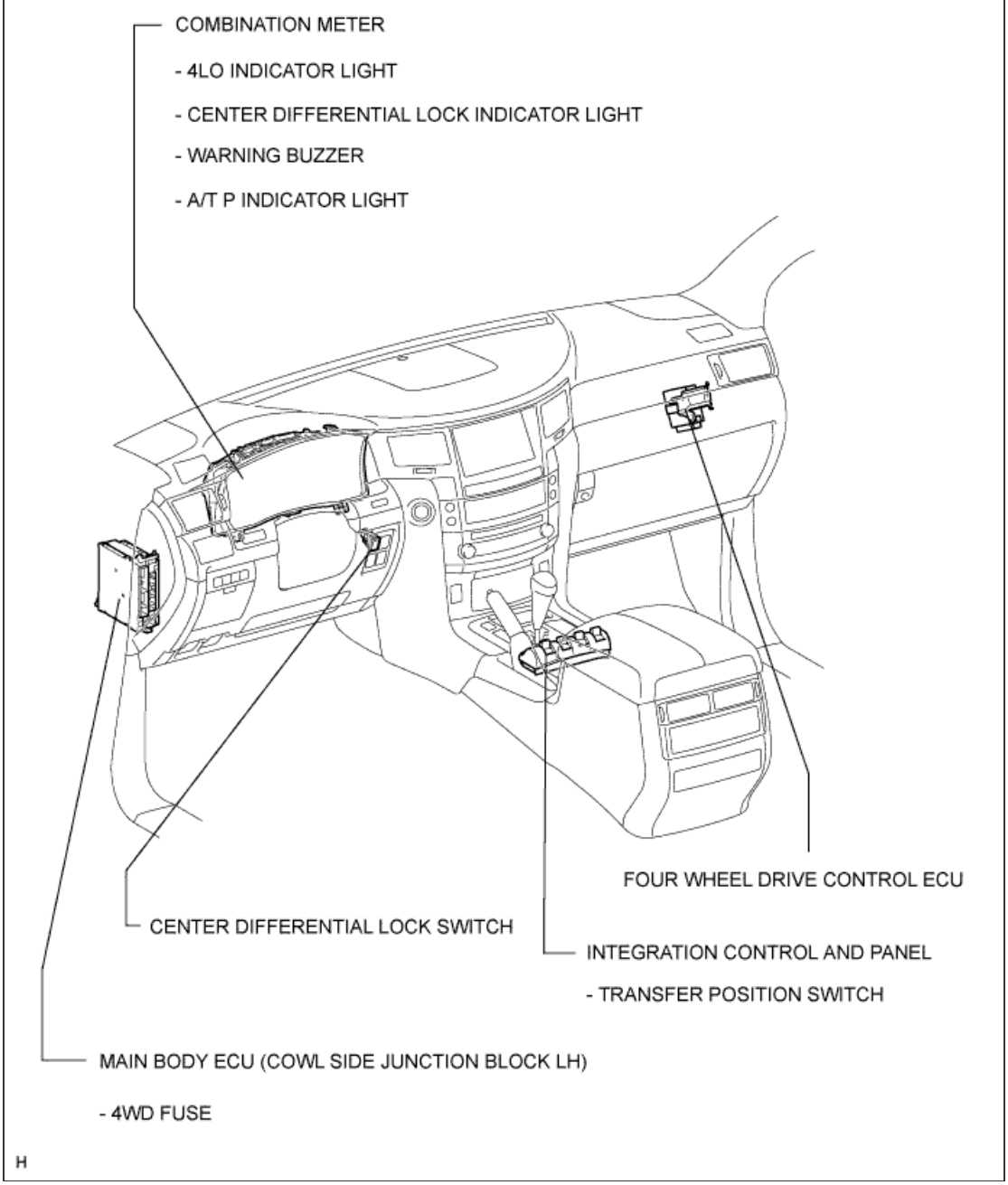
H


for RHD:
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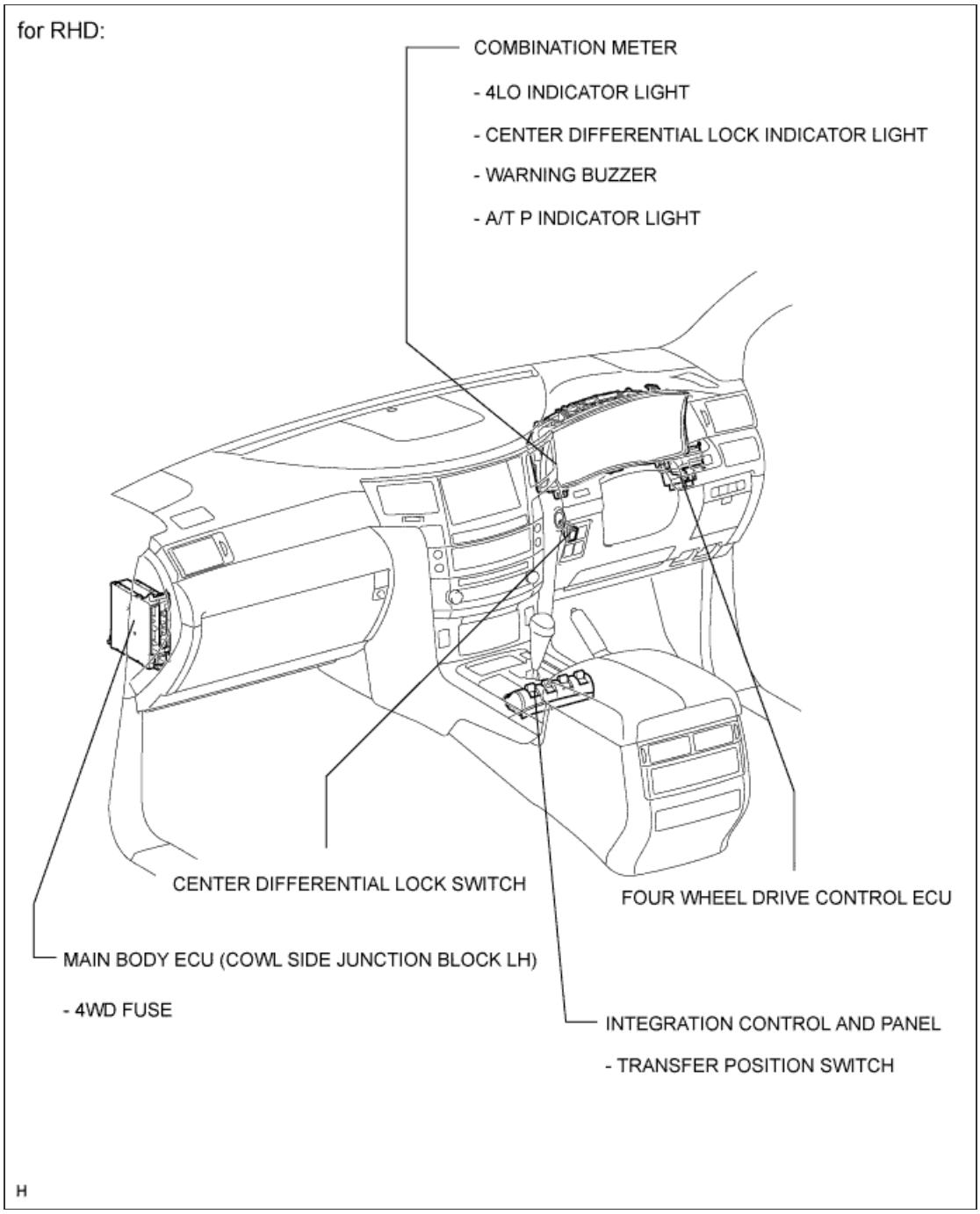
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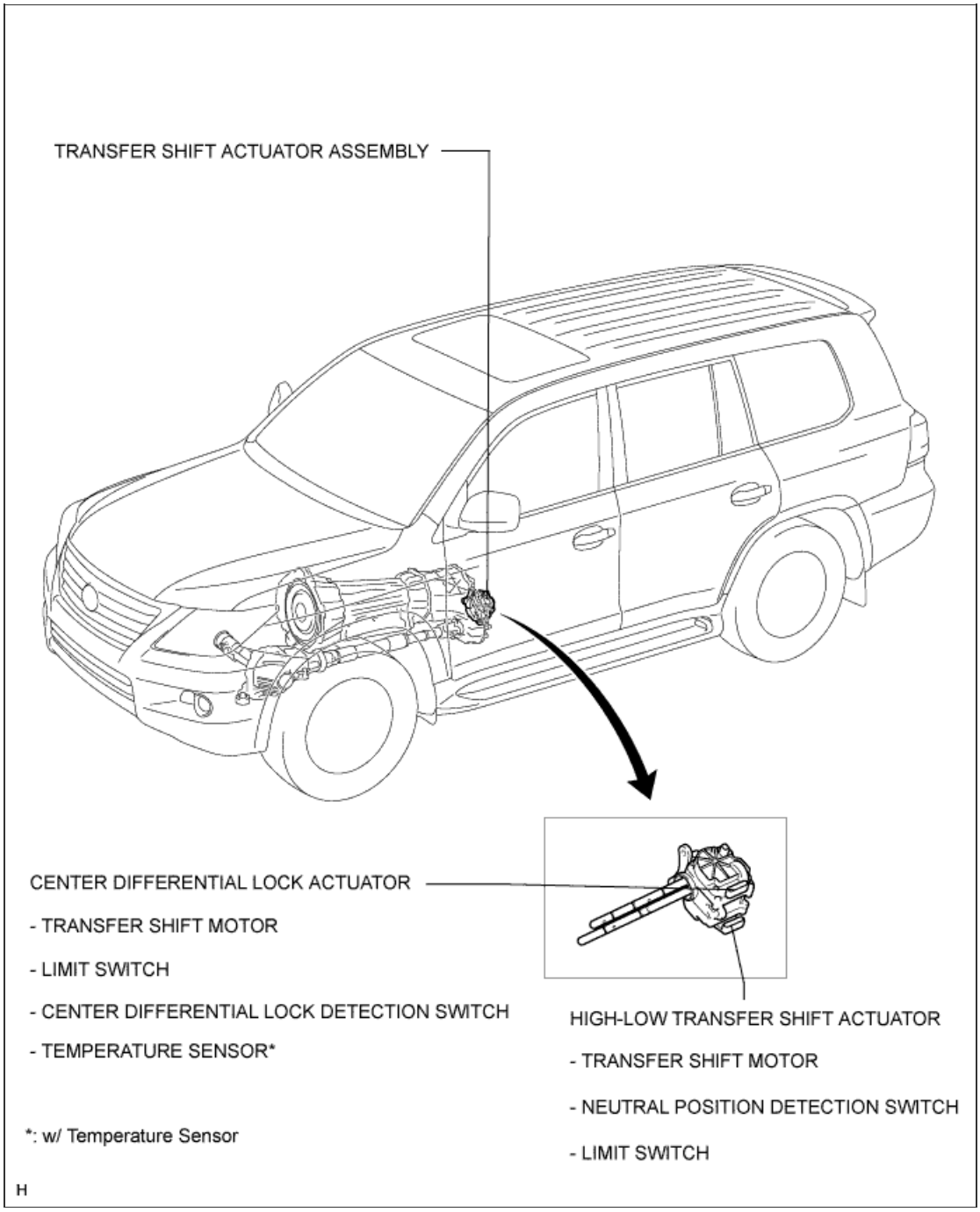
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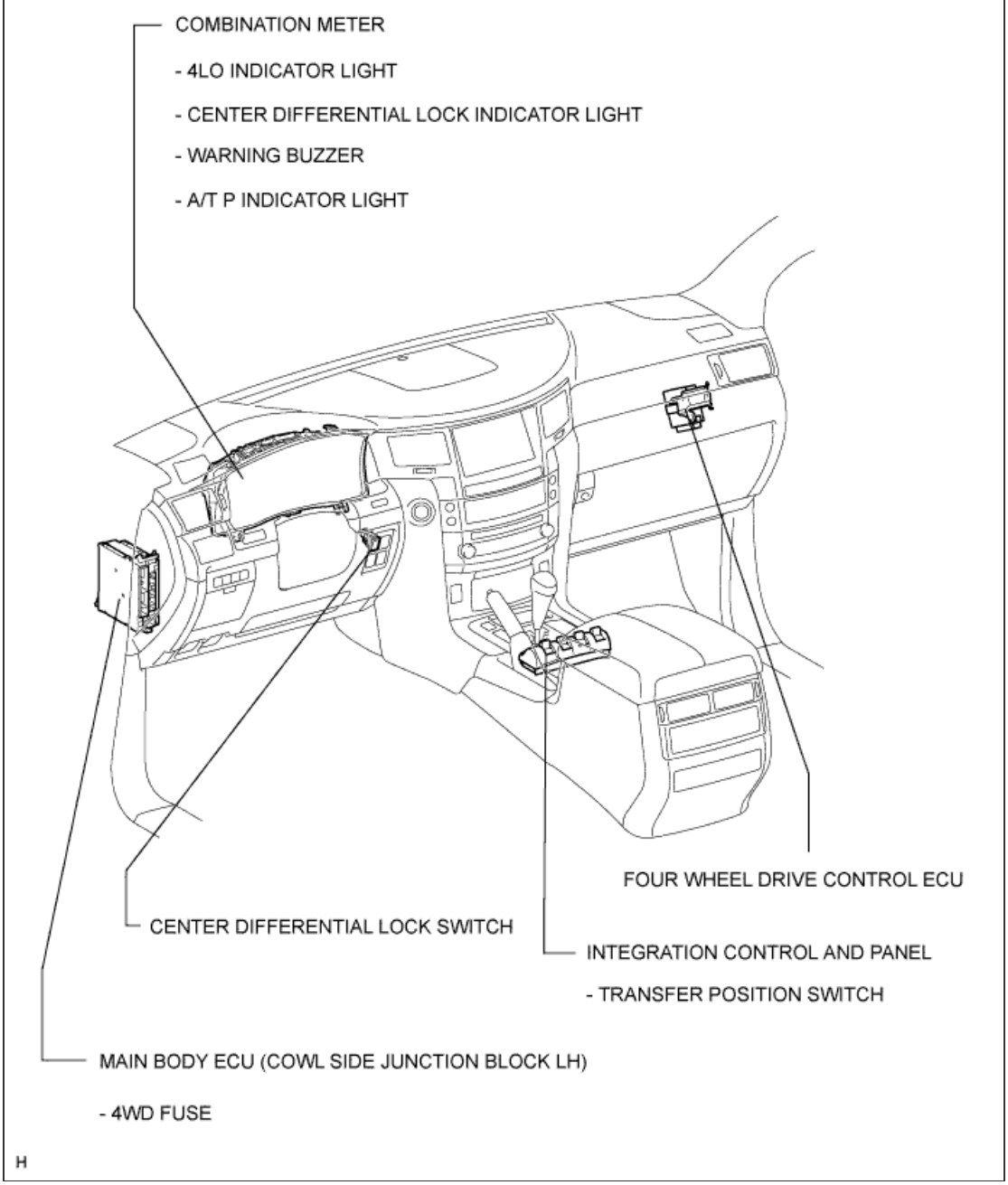
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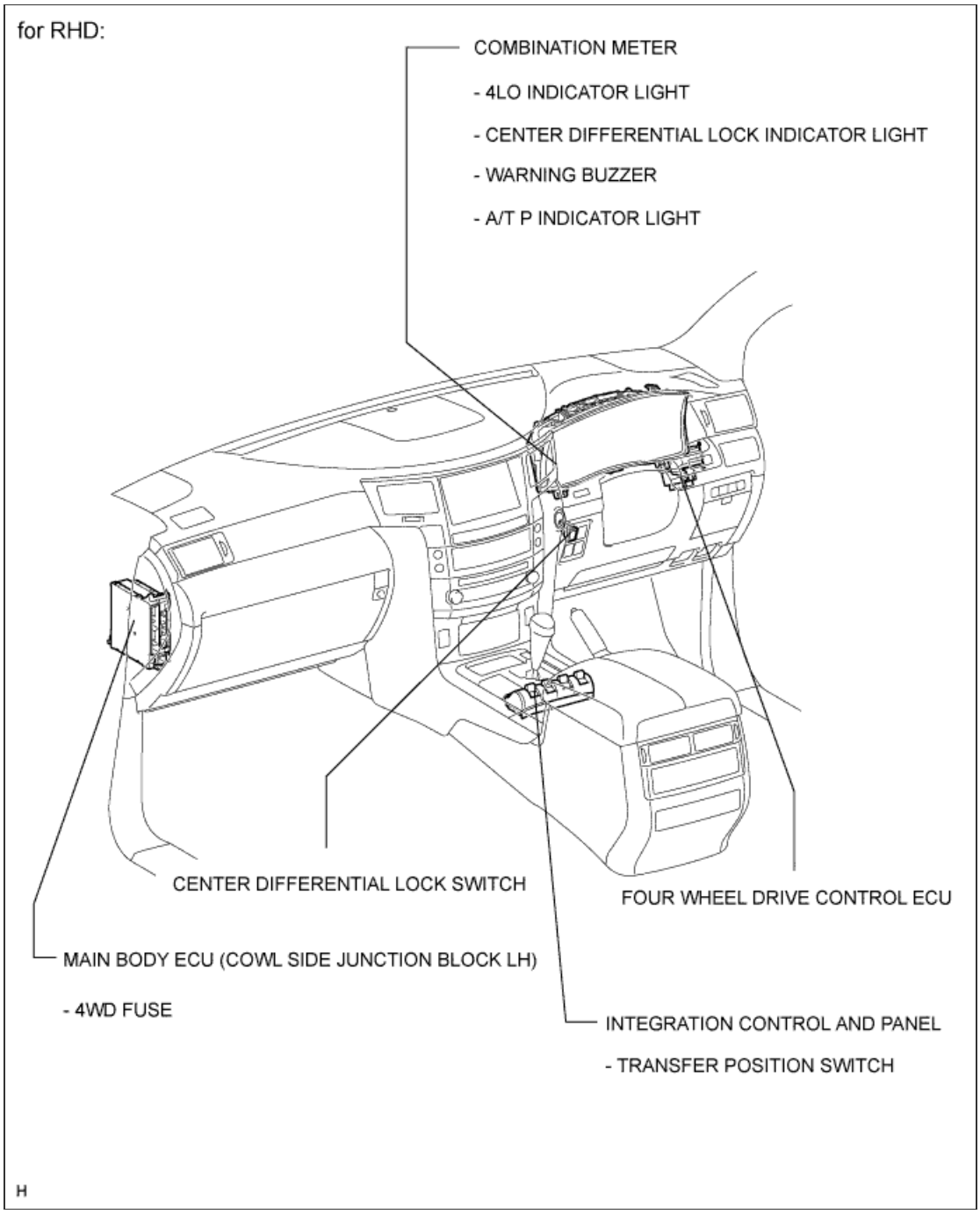
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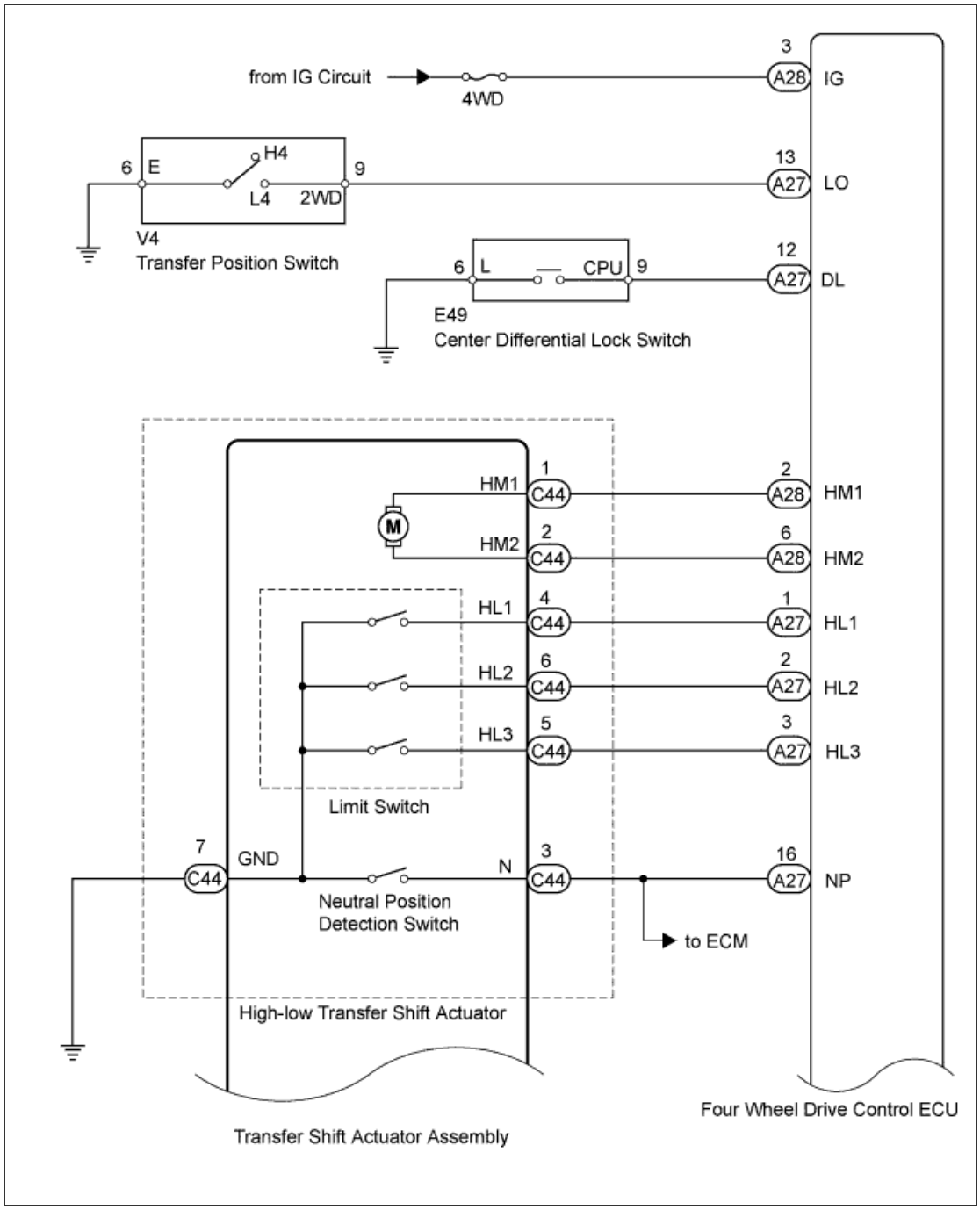
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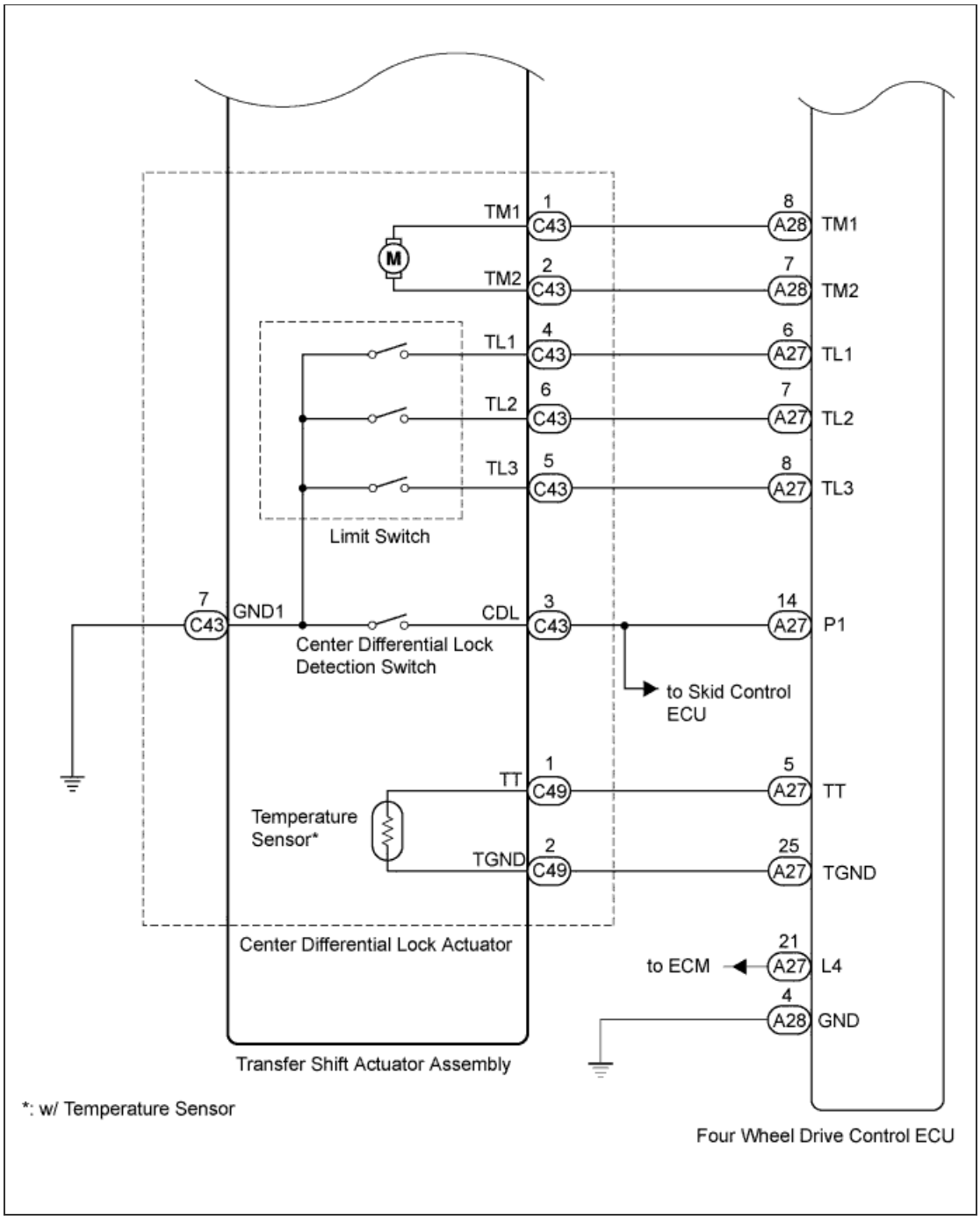

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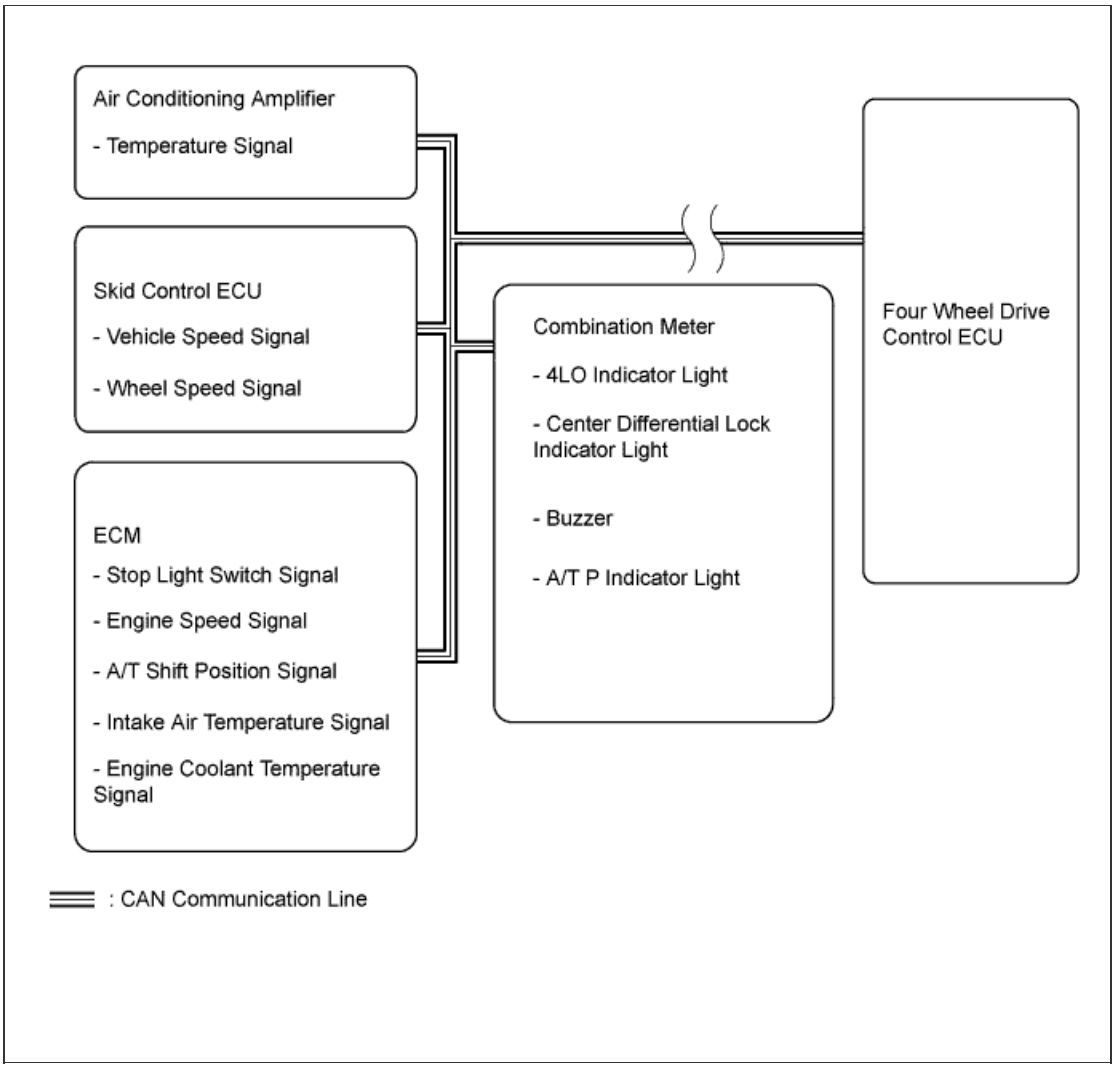
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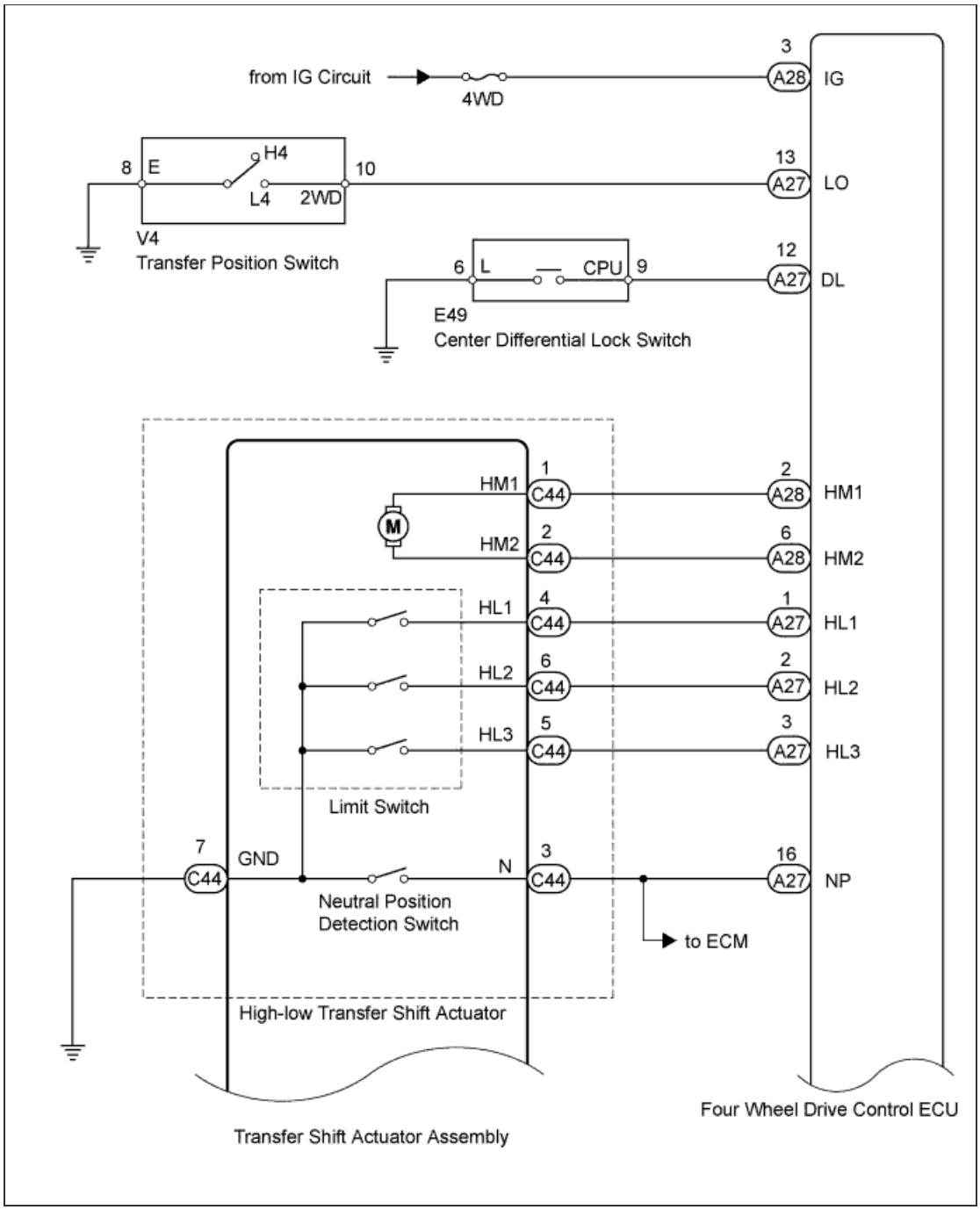
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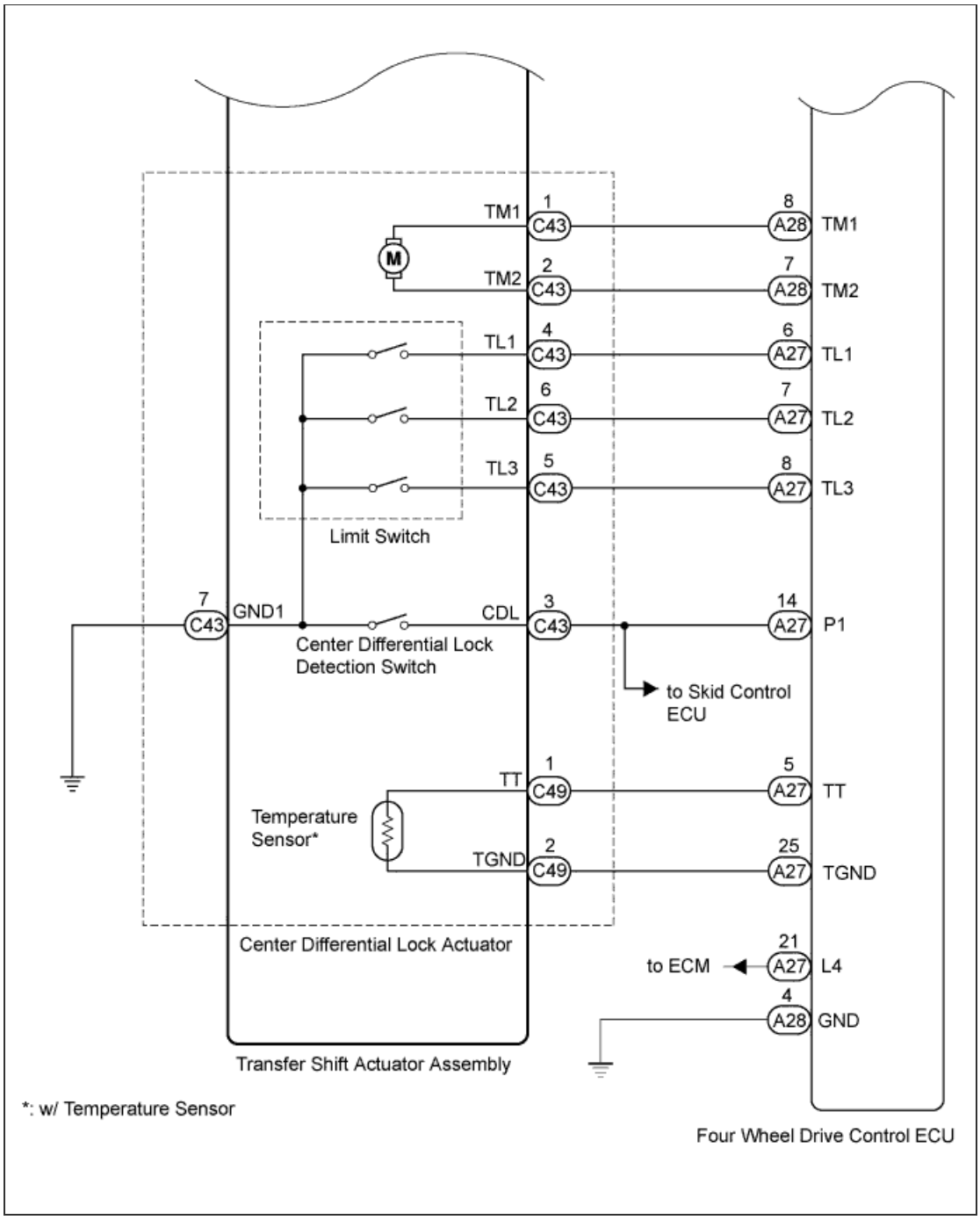


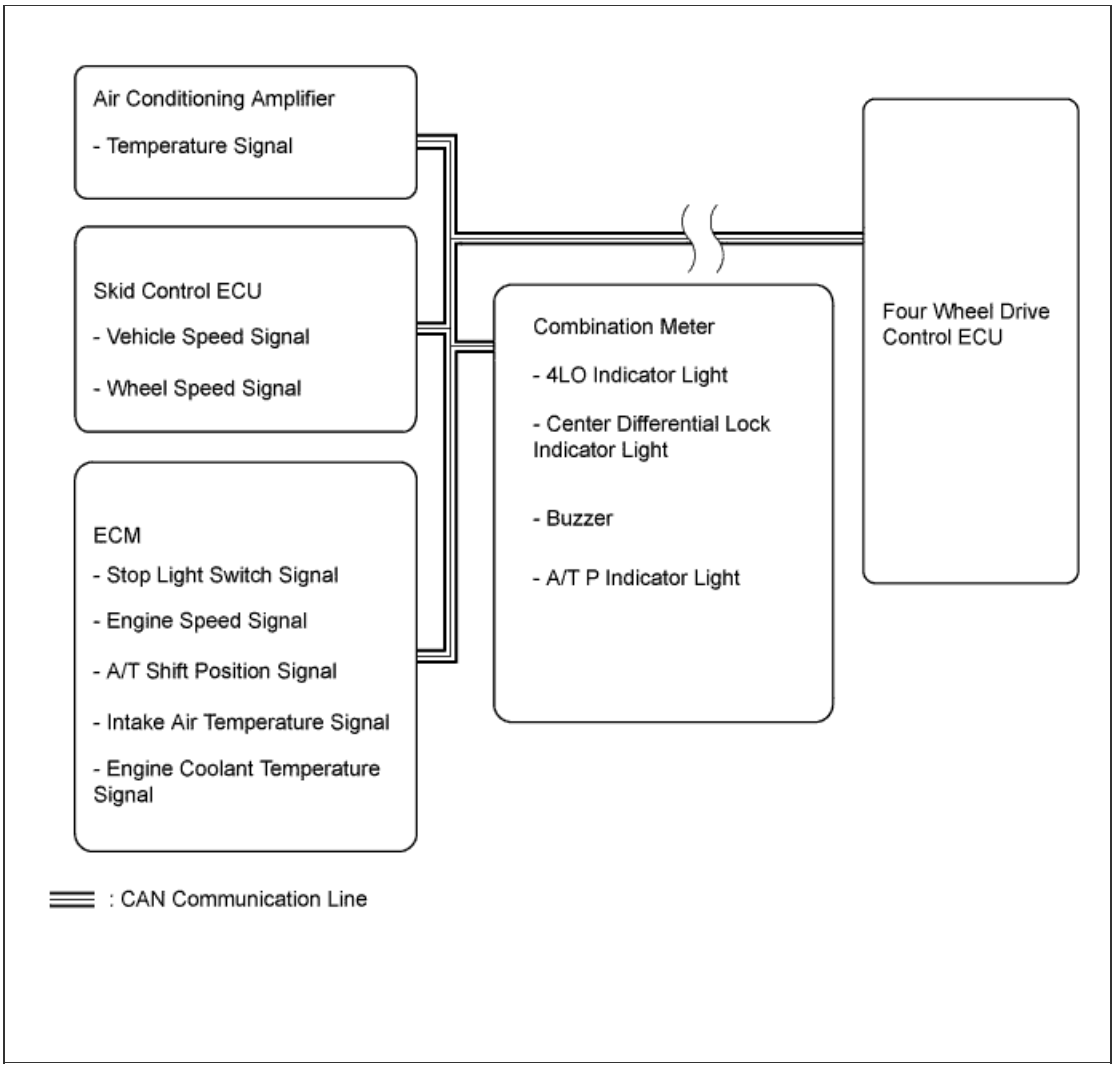

TM1
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A28
TM1
M
TM2
2
C43
7
A28
TM2
TL1
4
C43
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A27
TL1
TL2
6
C43
7
A27
TL2
TL3
5
C43
8
A27
TL3
Limit Switch
7
C43
GND1
CDL
3
C43
14
A27
P1
Center Differential Lock
Detection Switch
to Skid Control
ECU
TT
1
C49
5
A27
TT
Temperature
Sensor*
TGND
2
C49
25
A27
TGND
Center Differential Lock Actuator
21
A27
to ECM
L4
4
A28
GND
Transfer Shift Actuator Assembly
*: w/ Temperature Sensor
Four Wheel Drive Control ECU


Air Conditioning Amplifier
- Temperature Signal
Skid Control ECU
- Vehicle Speed Signal
- Wheel Speed Signal
ECM
- Stop Light Switch Signal
- Engine Speed Signal
- A/T Shift Position Signal
- Intake Air Temperature Signal
- Engine Coolant Temperature Signal
Combination Meter
- 4LO Indicator Light
- Center Differential Lock Indicator Light
- Buzzer
- A/T P Indicator Light
Four Wheel Drive Control ECU
: CAN Communication Line

for Preparation Click here




TM1
1
C43
8
A28
TM1
M
TM2
2
C43
7
A28
TM2
TL1
4
C43
6
A27
TL1
TL2
6
C43
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A27
TL2
TL3
5
C43
8
A27
TL3
Limit Switch
7
C43
GND1
CDL
3
C43
14
A27
P1
Center Differential Lock
Detection Switch
to Skid Control
ECU
TT
1
C49
5
A27
TT
Temperature
Sensor*
TGND
2
C49
25
A27
TGND
Center Differential Lock Actuator
21
A27
to ECM
L4
4
A28
GND
Transfer Shift Actuator Assembly
*: w/ Temperature Sensor
Four Wheel Drive Control ECU


Air Conditioning Amplifier
- Temperature Signal
Skid Control ECU
- Vehicle Speed Signal
- Wheel Speed Signal
ECM
- Stop Light Switch Signal
- Engine Speed Signal
- A/T Shift Position Signal
- Intake Air Temperature Signal
- Engine Coolant Temperature Signal
Combination Meter
- 4LO Indicator Light
- Center Differential Lock Indicator Light
- Buzzer
- A/T P Indicator Light
Four Wheel Drive Control ECU
: CAN Communication Line

for Preparation Click here

HINT:

- **Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.**
- **Inspect the fuses and relays related to this system before inspecting the suspected areas below.**

Transfer System

Symptom	Suspected Area	See page
Noise	Oil (Level low)	Click here
	Oil (Wrong)	Click here
	Transfer faulty	Click here
Oil leakage	Oil (Level too high)	Click here
	Gasket (Damaged)	Click here
	Oil seal (Worn or damaged)	Click here
	O-ring (Worn or damaged)	Click here
Switch from High to Low impossible	Harness or connector	Click here
	Transfer shift actuator	Click here
	CAN communication system (for LHD)	Click here
	CAN communication system (for RHD)	Click here
	Transfer position switch (built into integration control and panel)	Click here
	Four wheel drive control ECU	Click here
	Transfer faulty	Click here
Switch from Free to Lock impossible	Harness or connector	Click here
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for Preparation Click here

1. INSPECT INDICATOR LIGHT

a. Check the 4LO indicator light.

i. Start the engine.

ii. Stop the vehicle.

iii. Move the shift lever to N.

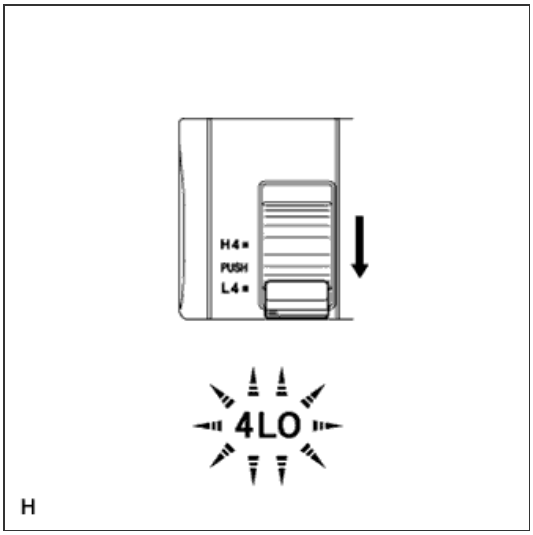
iv. Turn the transfer position switch from H4 to L4.

v. Check the 4LO indicator light.

OK:

Switch Condition	Specified Condition
Turned from H4 to L4	4LO indicator light comes on immediately or comes on after blinking

If there is a malfunction, inspect the switch, four wheel drive control ECU and transfer shift actuator. If the system is normal, there may be a malfunction in the CAN communication system or combination meter. In that case, first check the CAN communication system for LHD (Click here), for RHD (Click here). Then check the combination meter (Click here).



b. Check the center differential lock indicator light.

i. Start the engine.

ii. Push the center differential lock switch.

NOTICE:

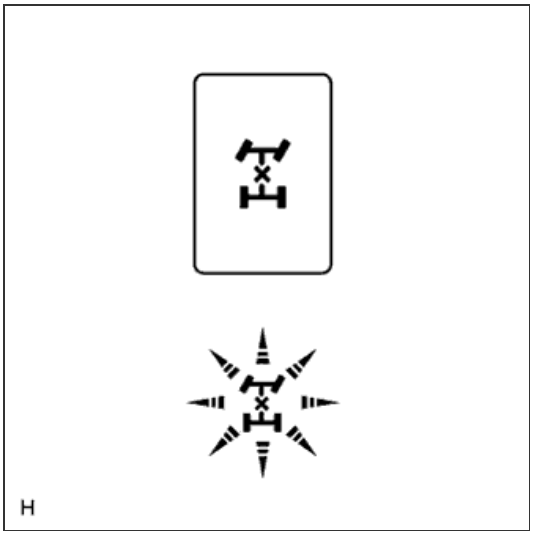
- **Do not push the switch while the vehicle is turning.**
- **Push the switch at a vehicle speed less than 100 km/h (62 mph).**

iii. Check the center differential lock indicator light.

OK:

Switch Condition	Specified Condition
Pushed	Center differential lock indicator light comes on immediately or comes on after blinking

If there is a malfunction, inspect the switch, four wheel drive control ECU and transfer shift actuator. If the system is normal, there may be a malfunction in the CAN communication system or combination meter. In that case, first check the CAN communication system for LHD (Click here), for RHD (Click here). Then check the combination meter (Click here).



2. INSPECT FUSE

a. Remove the 4WD fuse from the main body ECU (cowl side junction block LH).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
4WD fuse	Always	Below 1 Ω

If the fuse is blown, inspect the harness connected to the fuse for a short circuit, and repair or replace the harness or replace the fuse.

3. INSPECT TRANSFER POSITION SWITCH (BUILT INTO INTEGRATION CONTROL AND PANEL)

a. Remove the integration control and panel (Click here).

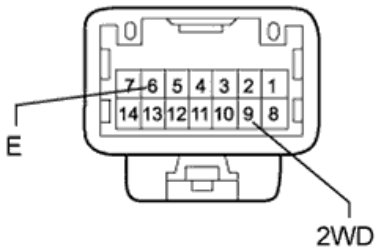
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
9 (2WD) - 6 (E)	H4 position	100 kΩ or higher
	L4 position	Below 1 Ω

If there is a malfunction, replace the suspension control switch.

Component without harness connected:
(Integration Control and Panel)



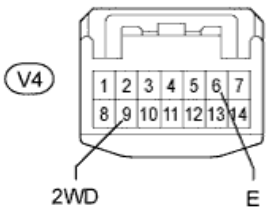
c. Check the harness and connector (ECU - transfer position switch and body ground).

i. Disconnect the A27 ECU connector.

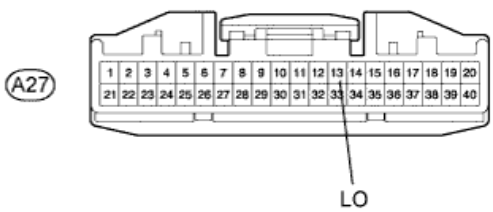
ii. Disconnect the V4 suspension control switch connector.

iii. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to Integration Control and Panel)



Front view of wire harness connector:
(to Four Wheel Drive Control ECU)



Standard Resistance:

Tester Connection	Condition	Specified Condition
V4-9 (2WD) - A27-13 (LO)	Always	Below 1 Ω
V4-9 (2WD) - Body ground	Always	100 kΩ or higher
V4-6 (E) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

4. INSPECT CENTER DIFFERENTIAL LOCK SWITCH

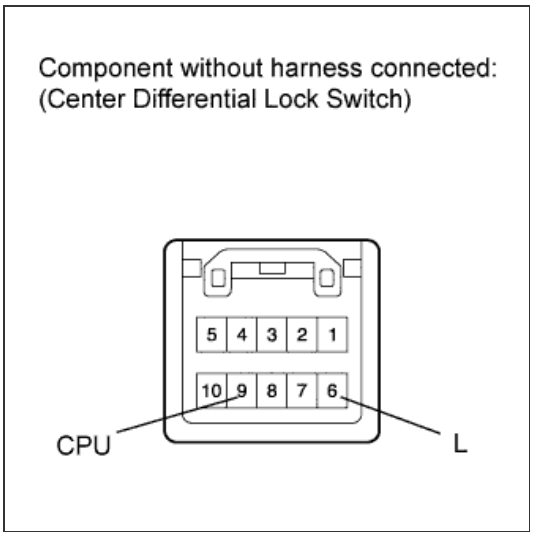
a. Remove the center differential lock switch (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
6 (L) - 9 (CPU)	Switch is pressed and held	Below 1 Ω
	Switch is not pressed	100 kΩ or higher

If there is a malfunction, replace the center differential lock switch.

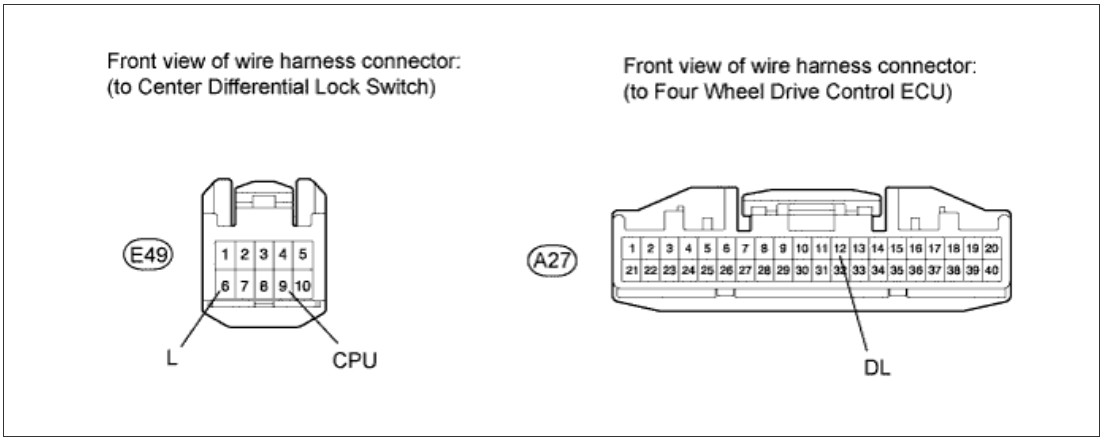


c. Check the harness and connector (ECU - center differential lock switch and body ground).

i. Disconnect the A27 ECU connector.

ii. Disconnect the E49 center differential lock switch connector.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition

A27-12 (DL) - E49-9 (CPU)	Always	Below 1 Ω
A27-12 (DL) - Body ground	Always	100 kΩ or higher
E49-6 (L) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

5. INSPECT TRANSFER SHIFT ACTUATOR ASSEMBLY (HIGH-LOW TRANSFER SHIFT ACTUATOR)

HINT:

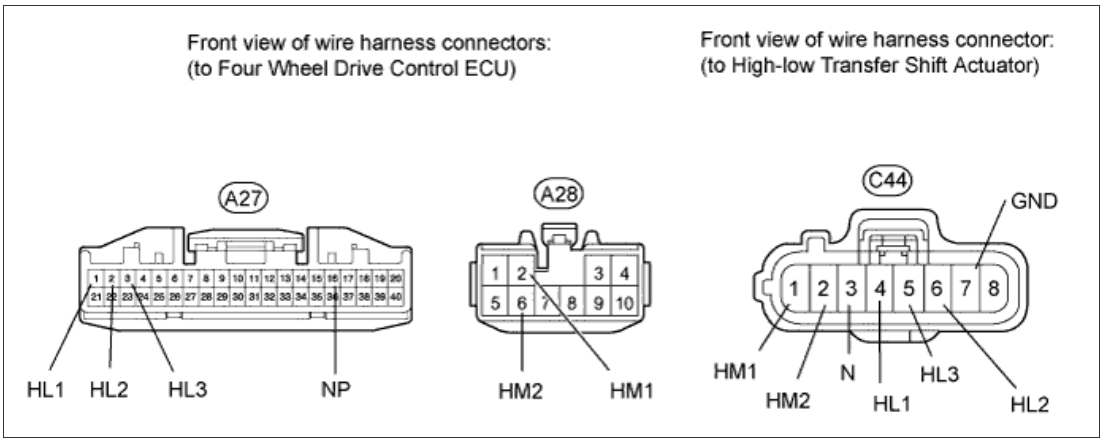
After inspecting the ECU power supply or transfer position switch, check the high-low transfer shift actuator.

a. Check the harness and connector (ECU - high-low transfer shift actuator).

i. Disconnect the C44 actuator connector.

ii. Disconnect the A27 and A28 ECU connectors.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-1 (HL1) - C44-4 (HL1)	Always	Below 1 Ω
A27-1 (HL1) - Body ground	Always	100 kΩ or higher
A27-2 (HL2) - C44-6 (HL2)	Always	Below 1 Ω
A27-2 (HL2) - Body ground	Always	100 kΩ or higher
A27-3 (HL3) - C44-5 (HL3)	Always	Below 1 Ω
A27-3 (HL3) - Body ground	Always	100 kΩ or higher
A27-16 (NP) - C44-3 (N)	Always	Below 1 Ω
A27-16 (NP) - Body ground	Always	100 kΩ or higher
A28-2 (HM1) - C44-1 (HM1)	Always	Below 1 Ω
A28-2 (HM1) - Body		100 kΩ or

ground	Always	higher
A28-6 (HM2) - C44-2 (HM2)	Always	Below 1 Ω
A28-6 (HM2) - Body ground	Always	100 kΩ or higher
C44-7 (GND) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

b. Check the high-low transfer shift actuator.

i. Turn the engine switch on (IG).

ii. Stop the vehicle.

iii. Move the shift lever to N.

iv. Check that there is an operating noise from the transfer shift actuator when the transfer position switch is turned from H4 to L4, or L4 to H4.

OK:
There is an operating noise.

HINT:

- **If the actuator fork cannot move from high to low, or low to high even though there is an operating noise, there may be a mechanical malfunction in the transfer.**
- **If there is no operating noise, there may be a malfunction in the high-low transfer shift actuator. However, it may also be a result of a mechanical malfunction in the transfer, so inspect each part.**

v. Remove the transfer shift actuator assembly (Click here).

vi. Check the high to low switch.

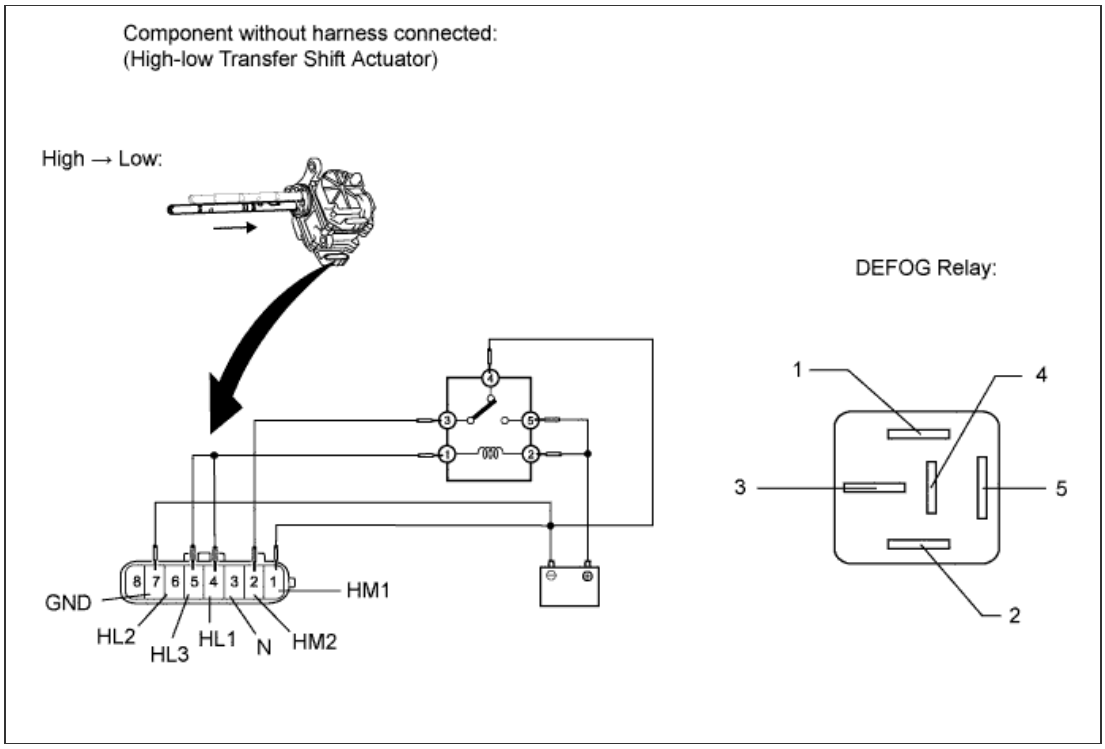
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the high to low position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the high to low switch is complete, check the neutral position detection switch and limit switch.
    1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (N) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
4 (HL1) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
5 (HL3) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
6 (HL2) - 7 (GND)	After high to low switch is complete	Below 1 Ω

If there is a malfunction, replace the transfer shift actuator assembly.

vii. Check the low to high switch.

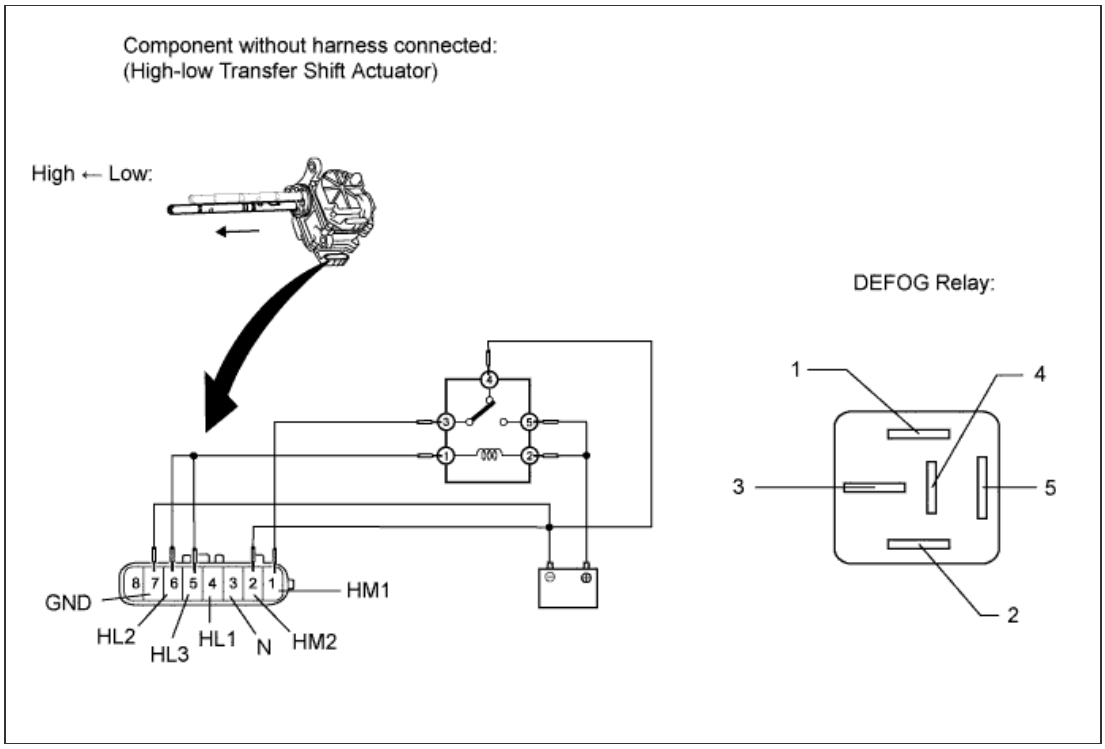
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the low to high position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the low to high switch is complete, check the neutral position detection switch and limit switch.
   1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (N) - 7 (GND)	After low to high switch is complete	100 kΩ or higher
4 (HL1) - 7 (GND)	After low to high switch is complete	Below 1 Ω
5 (HL3) - 7 (GND)	After low to high switch is complete	100 kΩ or higher
6 (HL2) - 7 (GND)	After low to high switch is complete	100 kΩ or higher

If there is a malfunction, replace the transfer shift actuator assembly.

6. INSPECT TRANSFER SHIFT ACTUATOR ASSEMBLY (CENTER DIFFERENTIAL LOCK ACTUATOR)

HINT:

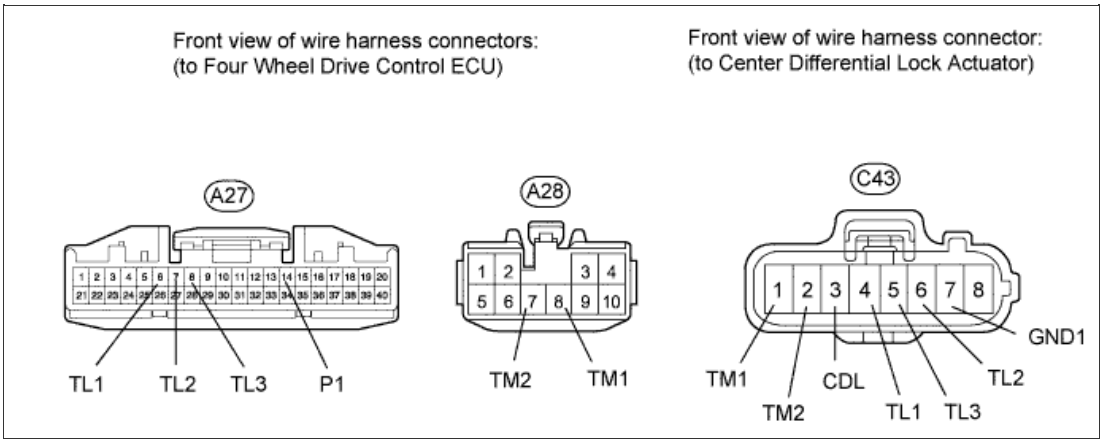
After inspecting the ECU power supply or center differential lock switch, check the center differential lock actuator.

a. Check the harness and connector (ECU - center differential lock actuator).

i. Disconnect the C43 actuator connector.

ii. Disconnect the A27 and A28 ECU connectors.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-6 (TL1) - C43-4 (TL1)	Always	Below 1 Ω
A27-6 (TL1) - Body ground	Always	100 kΩ or higher
A27-7 (TL2) - C43-6 (TL2)	Always	Below 1 Ω
A27-7 (TL2) - Body ground	Always	100 kΩ or higher
A27-8 (TL3) - C43-5 (TL3)	Always	Below 1 Ω
A27-8 (TL3) - Body ground	Always	100 kΩ or higher
A27-14 (P1) - C43-3 (CDL)	Always	Below 1 Ω
A27-14 (P1) - Body ground	Always	100 kΩ or higher
A28-7 (TM2) - C43-2 (TM2)	Always	Below 1 Ω
A28-7 (TM2) - Body ground	Always	100 kΩ or higher
A28-8 (TM1) - C43-1 (TM1)	Always	Below 1 Ω
A28-8 (TM1) - Body ground	Always	100 kΩ or higher
C43-7 (GND1) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

b. Check the center differential lock actuator.

i. Turn the engine switch on (IG).

ii. Check that there is an operating noise from the transfer shift actuator when the center differential lock switch is pressed to switch from Free to Lock, or lock to free.

OK:
There is an operating noise.

HINT:

- **If the actuator fork cannot move from free to lock, or lock to free even though there is an operating noise, there may be a mechanical malfunction in the transfer.**
- **If there is no operating noise, there may be a malfunction in the center differential lock actuator. However, it may also be a result of a mechanical malfunction in the transfer, so inspect each part.**

iii. Remove the transfer shift actuator assembly (Click here).

iv. Check the free to lock switch.

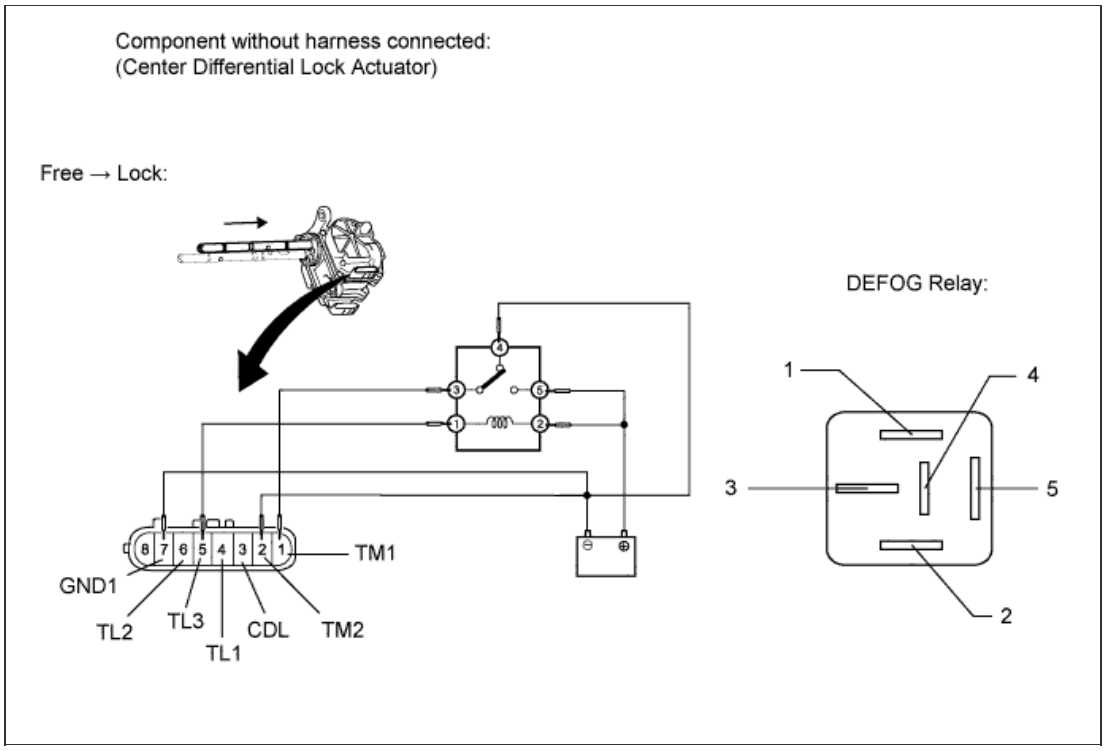
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the free to lock position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the free to lock switch is complete, check the center differential lock detection switch and limit switch.
    1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (CDL) - 7 (GND1)	After free to lock switch is complete	Below 1 Ω
4 (TL1) - 7 (GND1)	After free to lock switch is complete	100 kΩ or higher
5 (TL3) - 7 (GND1)	After free to lock switch is complete	100 kΩ or higher
6 (TL2) - 7 (GND1)	After free to lock switch is complete	Below 1 Ω

If there is a malfunction, replace the transfer shift actuator assembly.

v. Check the lock to free switch.

1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the lock to free position.

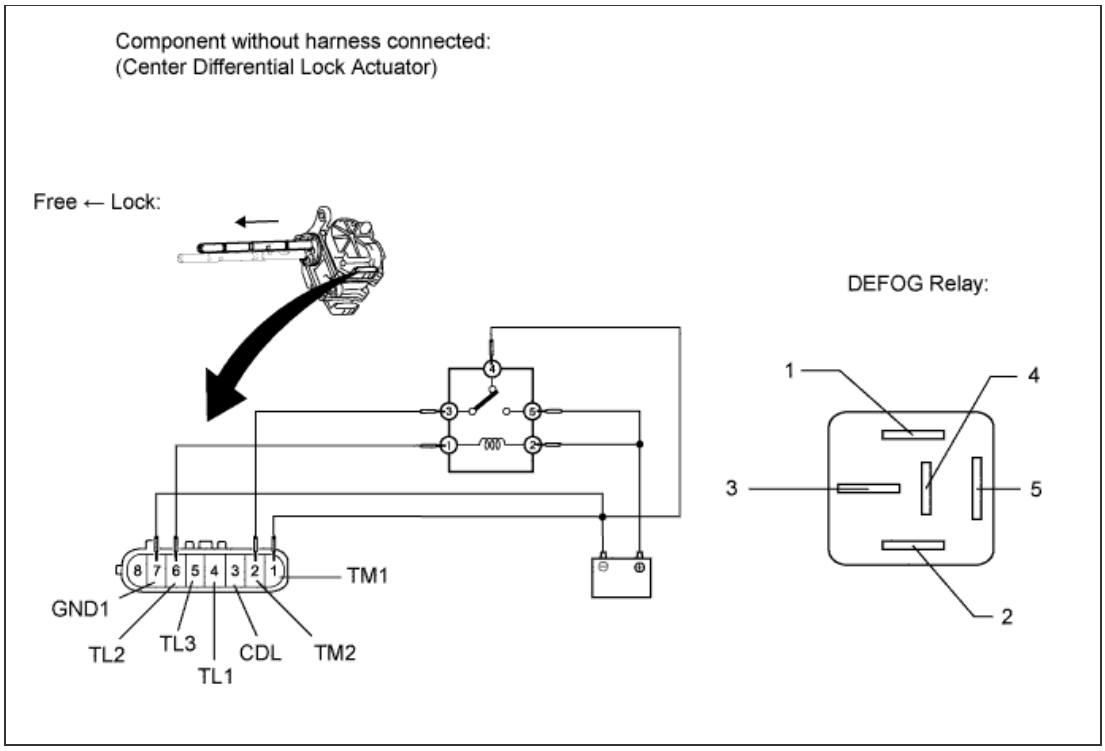
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HINT:

When performing the operation described above, use the DEFOG relay.



2. After the lock to free switch is complete, check the center differential lock detection switch and limit switch.
   1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (CDL) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher
4 (TL1) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher
5 (TL3) - 7 (GND1)	After lock to free switch is complete	Below 1 Ω
6 (TL2) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher

If there is a malfunction, replace the transfer shift actuator assembly.

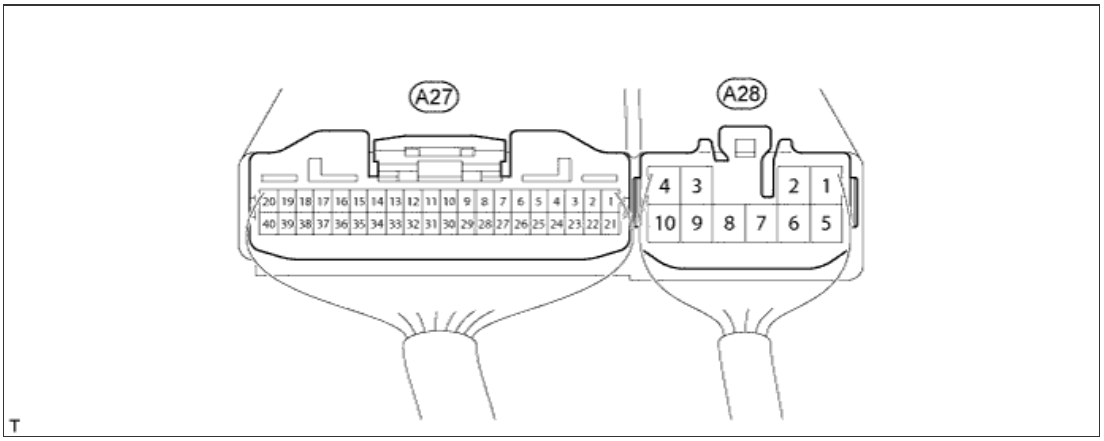
7. INSPECT 4 WHEEL DRIVE CONTROL ECU

HINT:

Inspect the connectors from the back side while the connectors are connected.

a. Check the four wheel drive control ECU.

i. Measure the resistance and voltage according to the value(s) in the table below.



Tester Connection	Terminal Description	Condition	Specified Condition
A27-1 (HL1) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	Below 1.5 V
		Engine switch on (IG) Transfer in low position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-2 (HL2) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	Below 1.5 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-3 (HL3) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	Below 1.5 V
A27-5 (TT) - A27-25 (TGND)*	Temperature sensor	Engine switch on (IG)	0 to 5 V
A27-6 (TL1) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	Below 1.5 V
A27-7 (TL2) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	Below 1.5 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-8 (TL3) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	Below 1.5 V
		Engine switch on (IG) Center differential in lock position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
		Engine switch on (IG)	

A27-12 (DL) - A28-4 (GND)	Center differential lock switch	Center differential lock switch is pressed and held	Below 1.5 V
		Engine switch on (IG) Center differential lock switch is not pressed	11 to 14 V
A27-13 (LO) - A28-4 (GND)	Transfer position switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	Below 1.5 V
A27-14 (P1) - A28-4 (GND)	Center differential lock detection switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	Below 1.5 V
A27-16 (NP) - A28-4 (GND)	Transfer shift actuator neutral position detection switch	Engine switch on (IG) Transfer in neutral position	Below 1.5 V
		Engine switch on (IG) Transfer in high or low position	11 to 14 V
A27-19 (CAN+) - A27-20 (CAN-)	CAN communication line	Engine switch off	54 to 69 Ω
A27-21 (L4) - A28-4 (GND)	Transfer shift actuator Low detection switch	Engine switch on (IG) Transfer position switch in H4 position	11 to 14 V
		Engine switch on (IG) Transfer position switch in L4 position	Below 1.5 V
A28-2 (HM1) - A28-4 (GND)	High-low transfer shift actuator motor	Engine switch on (IG) Transfer position switch H4 → L4 (During operation of high-low transfer shift actuator motor from high to low)	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
		Engine switch on (IG) Transfer position switch L4 → H4 (During operation of high-low transfer shift actuator motor from low to high)	11 to 14 V
A28-3 (IG) - A28-4 (GND)	IG power	Engine switch on (IG)	11 to 14 V
A28-4 (GND) - Body ground	Ground	Always	Below 1 Ω
A28-6 (HM2) - A28-4 (GND)	High-low transfer shift actuator motor	Engine switch on (IG) Transfer position switch H4 → L4 (During operation of high-low transfer shift actuator motor from high to low)	11 to 14 V
		Engine switch on (IG) Transfer position switch L4 → H4 (During operation of high-low transfer shift actuator motor from low to high)	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
A28-7 (TM2) - A28-4 (GND)	Center differential lock actuator motor	Engine switch on (IG) Center differential position free → lock	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
		Engine switch on (IG) Center differential position lock → free	11 to 14 V
A28-8 (TM1) - A28-4 (GND)	Center differential lock actuator motor	Engine switch on (IG) Center differential position free → lock	11 to 14 V
		Engine switch on (IG) Center differential position lock → free	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V

*: w/ Temperature Sensor

If there is a malfunction, inspect the harnesses, connectors, transfer position switch, center differential lock switch, and transfer shift actuator assembly. If these are normal, replace the four wheel drive control ECU (Click here).

for Preparation Click here

1. INSPECT INDICATOR LIGHT

a. Check the 4LO indicator light.

i. Start the engine.

ii. Stop the vehicle.

iii. Move the shift lever to N.

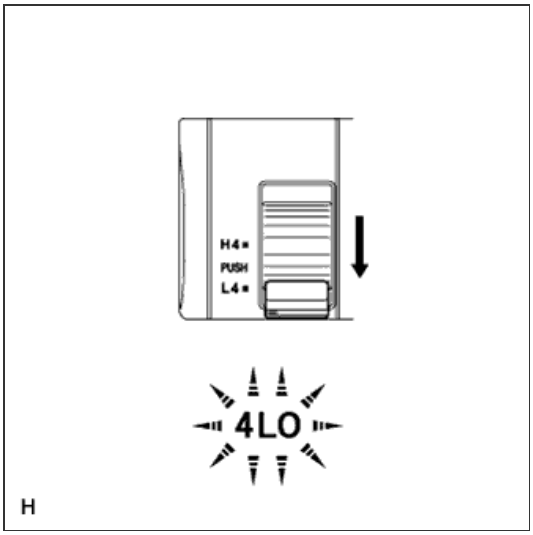
iv. Turn the transfer position switch from H4 to L4.

v. Check the 4LO indicator light.

OK:

Switch Condition	Specified Condition
Turned from H4 to L4	4LO indicator light comes on immediately or comes on after blinking

If there is a malfunction, inspect the switch, four wheel drive control ECU and transfer shift actuator. If the system is normal, there may be a malfunction in the CAN communication system or combination meter. In that case, first check the CAN communication system for LHD (Click here), for RHD (Click here). Then check the combination meter (Click here).



b. Check the center differential lock indicator light.

i. Start the engine.

ii. Push the center differential lock switch.

NOTICE:

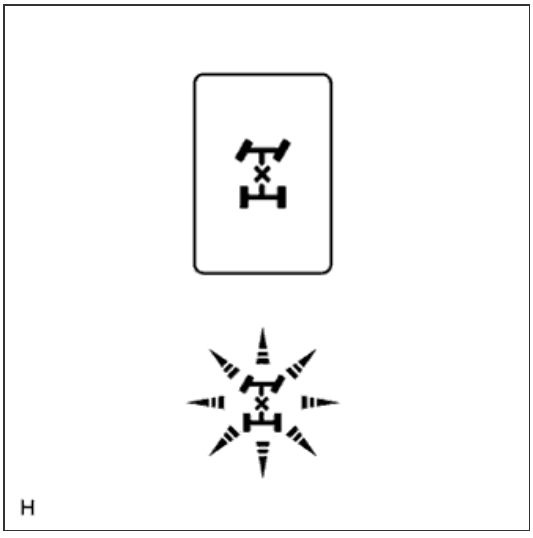
- **Do not push the switch while the vehicle is turning.**
- **Push the switch at a vehicle speed less than 100 km/h (62 mph).**

iii. Check the center differential lock indicator light.

OK:

Switch Condition	Specified Condition
Pushed	Center differential lock indicator light comes on immediately or comes on after blinking

If there is a malfunction, inspect the switch, four wheel drive control ECU and transfer shift actuator. If the system is normal, there may be a malfunction in the CAN communication system or combination meter. In that case, first check the CAN communication system for LHD (Click here), for RHD (Click here). Then check the combination meter (Click here).



2. INSPECT FUSE

a. Remove the 4WD fuse from the main body ECU (cowl side junction block LH).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
4WD fuse	Always	Below 1 Ω

If the fuse is blown, inspect the harness connected to the fuse for a short circuit, and repair or replace the harness or replace the fuse.

3. INSPECT TRANSFER POSITION SWITCH (BUILT INTO INTEGRATION CONTROL AND PANEL)

a. Remove the integration control and panel (Click here).

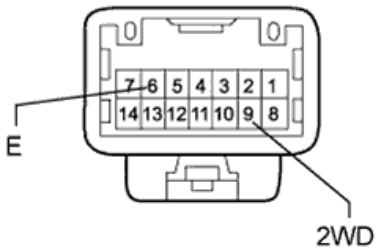
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
9 (2WD) - 6 (E)	H4 position	100 kΩ or higher
	L4 position	Below 1 Ω

If there is a malfunction, replace the suspension control switch.

Component without harness connected:
(Integration Control and Panel)



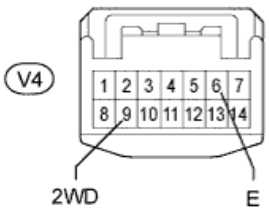
c. Check the harness and connector (ECU - transfer position switch and body ground).

i. Disconnect the A27 ECU connector.

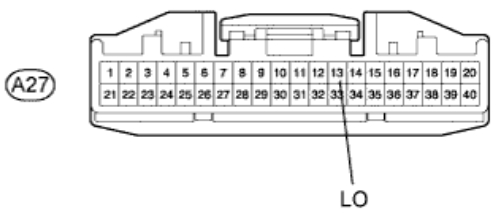
ii. Disconnect the V4 suspension control switch connector.

iii. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to Integration Control and Panel)



Front view of wire harness connector:
(to Four Wheel Drive Control ECU)



Standard Resistance:

Tester Connection	Condition	Specified Condition
V4-9 (2WD) - A27-13 (LO)	Always	Below 1 Ω
V4-9 (2WD) - Body ground	Always	100 kΩ or higher
V4-6 (E) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

4. INSPECT CENTER DIFFERENTIAL LOCK SWITCH

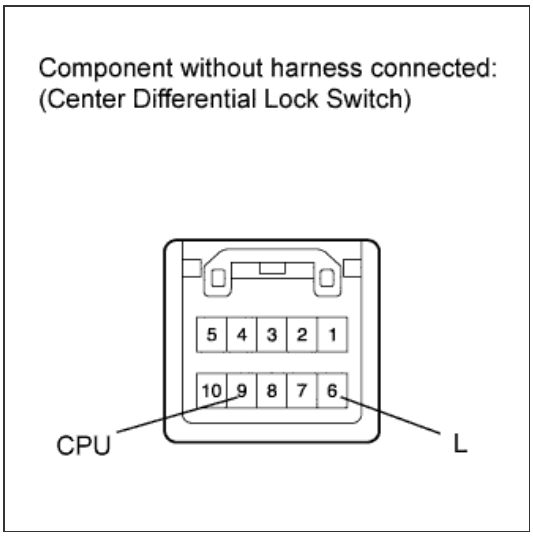
a. Remove the center differential lock switch (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
6 (L) - 9 (CPU)	Switch is pressed and held	Below 1 Ω
	Switch is not pressed	100 kΩ or higher

If there is a malfunction, replace the center differential lock switch.

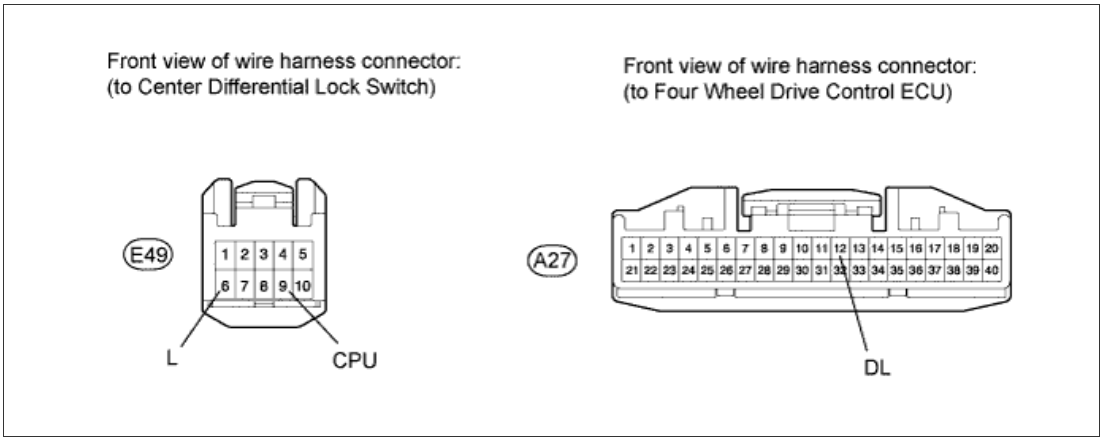


c. Check the harness and connector (ECU - center differential lock switch and body ground).

i. Disconnect the A27 ECU connector.

ii. Disconnect the E49 center differential lock switch connector.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition

A27-12 (DL) - E49-9 (CPU)	Always	Below 1 Ω
A27-12 (DL) - Body ground	Always	100 kΩ or higher
E49-6 (L) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

5. INSPECT TRANSFER SHIFT ACTUATOR ASSEMBLY (HIGH-LOW TRANSFER SHIFT ACTUATOR)

HINT:

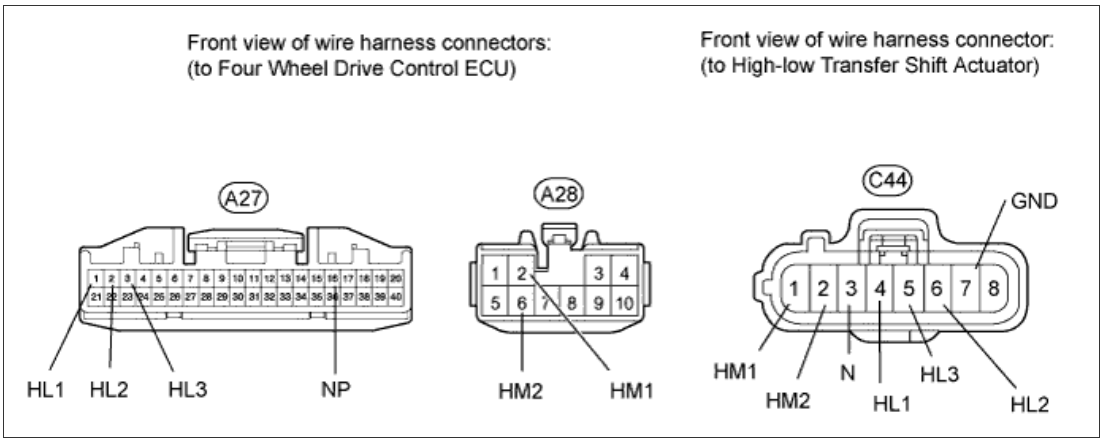
After inspecting the ECU power supply or transfer position switch, check the high-low transfer shift actuator.

a. Check the harness and connector (ECU - high-low transfer shift actuator).

i. Disconnect the C44 actuator connector.

ii. Disconnect the A27 and A28 ECU connectors.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-1 (HL1) - C44-4 (HL1)	Always	Below 1 Ω
A27-1 (HL1) - Body ground	Always	100 kΩ or higher
A27-2 (HL2) - C44-6 (HL2)	Always	Below 1 Ω
A27-2 (HL2) - Body ground	Always	100 kΩ or higher
A27-3 (HL3) - C44-5 (HL3)	Always	Below 1 Ω
A27-3 (HL3) - Body ground	Always	100 kΩ or higher
A27-16 (NP) - C44-3 (N)	Always	Below 1 Ω
A27-16 (NP) - Body ground	Always	100 kΩ or higher
A28-2 (HM1) - C44-1 (HM1)	Always	Below 1 Ω
A28-2 (HM1) - Body		100 kΩ or

ground	Always	higher
A28-6 (HM2) - C44-2 (HM2)	Always	Below 1 Ω
A28-6 (HM2) - Body ground	Always	100 kΩ or higher
C44-7 (GND) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

b. Check the high-low transfer shift actuator.

i. Turn the engine switch on (IG).

ii. Stop the vehicle.

iii. Move the shift lever to N.

iv. Check that there is an operating noise from the transfer shift actuator when the transfer position switch is turned from H4 to L4, or L4 to H4.

OK:
There is an operating noise.

HINT:

- **If the actuator fork cannot move from high to low, or low to high even though there is an operating noise, there may be a mechanical malfunction in the transfer.**
- **If there is no operating noise, there may be a malfunction in the high-low transfer shift actuator. However, it may also be a result of a mechanical malfunction in the transfer, so inspect each part.**

v. Remove the transfer shift actuator assembly (Click here).

vi. Check the high to low switch.

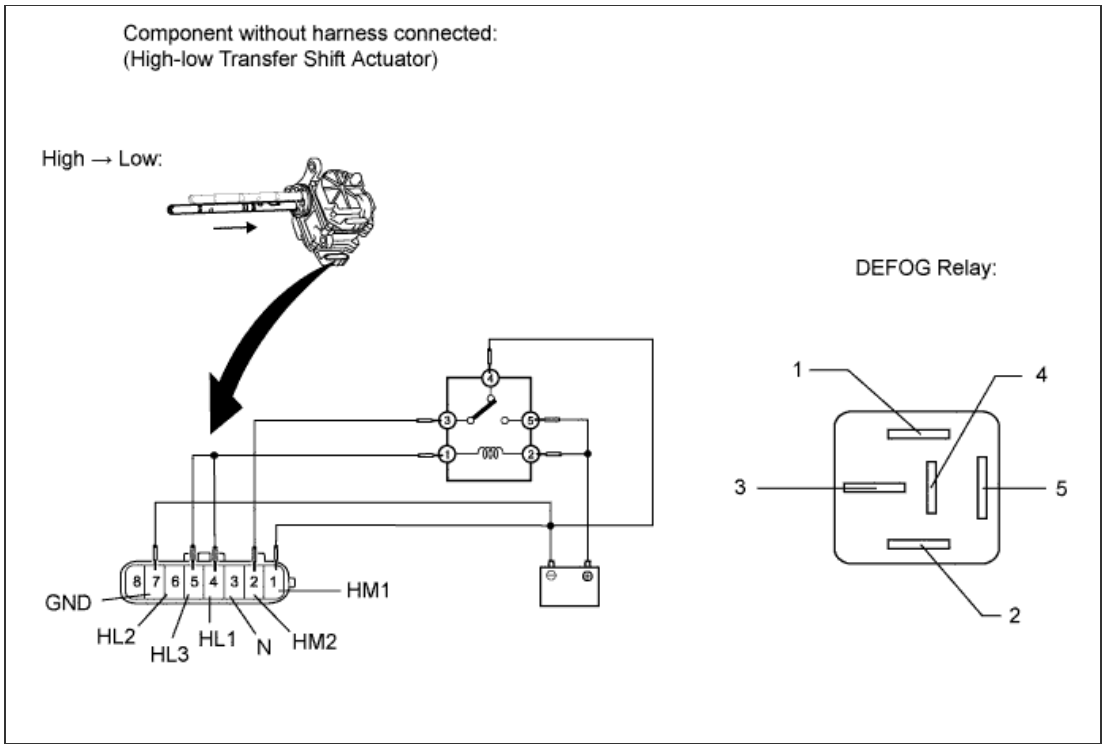
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the high to low position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the high to low switch is complete, check the neutral position detection switch and limit switch.
    1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (N) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
4 (HL1) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
5 (HL3) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
6 (HL2) - 7 (GND)	After high to low switch is complete	Below 1 Ω

If there is a malfunction, replace the transfer shift actuator assembly.

vii. Check the low to high switch.

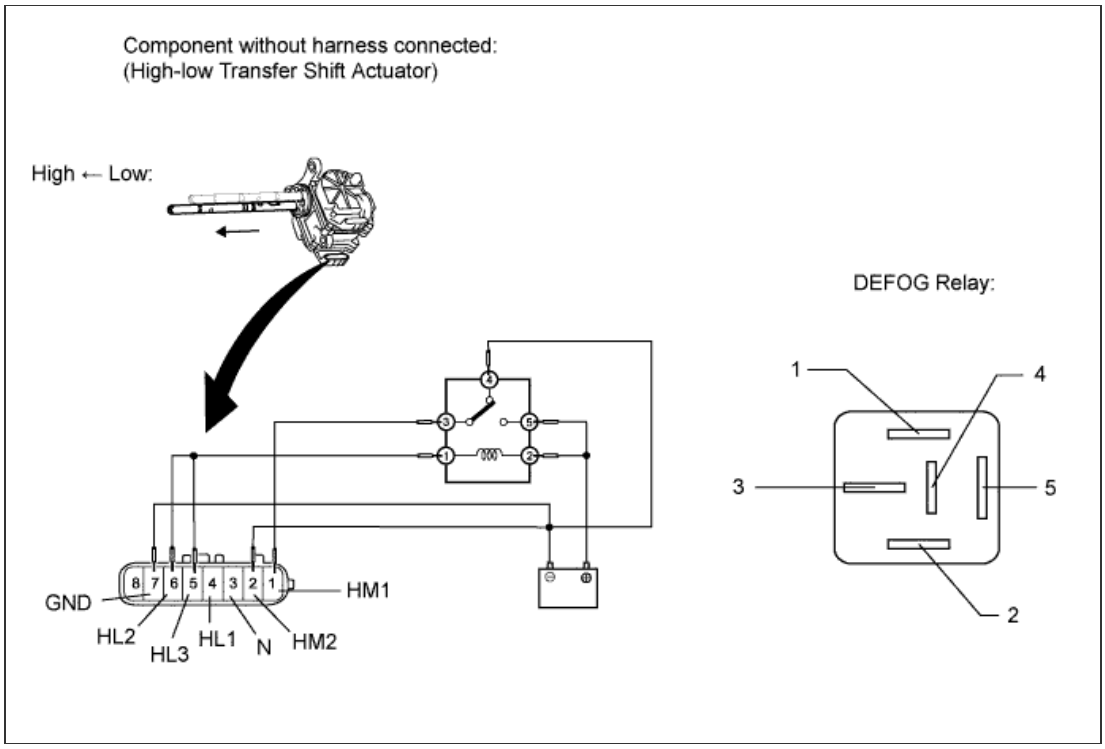
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the low to high position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the low to high switch is complete, check the neutral position detection switch and limit switch.
   1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (N) - 7 (GND)	After low to high switch is complete	100 kΩ or higher
4 (HL1) - 7 (GND)	After low to high switch is complete	Below 1 Ω
5 (HL3) - 7 (GND)	After low to high switch is complete	100 kΩ or higher
6 (HL2) - 7 (GND)	After low to high switch is complete	100 kΩ or higher

If there is a malfunction, replace the transfer shift actuator assembly.

6. INSPECT TRANSFER SHIFT ACTUATOR ASSEMBLY (CENTER DIFFERENTIAL LOCK ACTUATOR)

HINT:

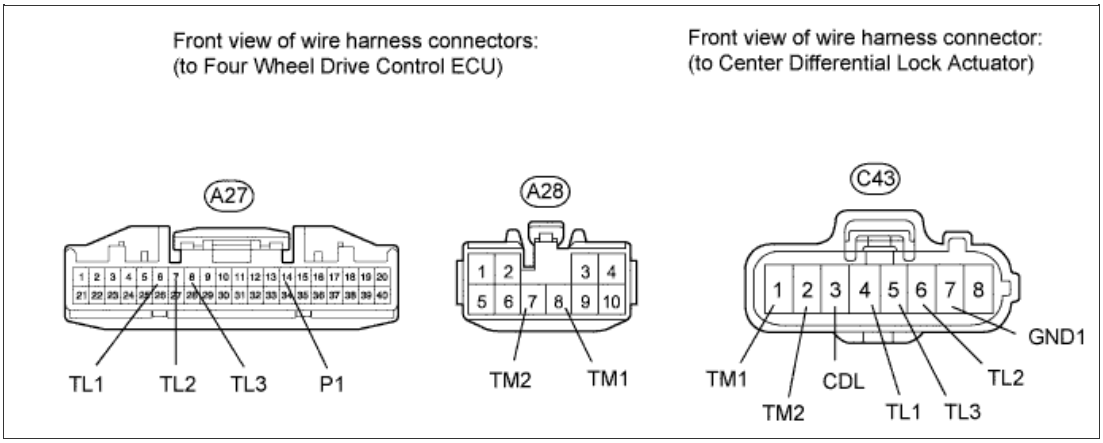
After inspecting the ECU power supply or center differential lock switch, check the center differential lock actuator.

a. Check the harness and connector (ECU - center differential lock actuator).

i. Disconnect the C43 actuator connector.

ii. Disconnect the A27 and A28 ECU connectors.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-6 (TL1) - C43-4 (TL1)	Always	Below 1 Ω
A27-6 (TL1) - Body ground	Always	100 kΩ or higher
A27-7 (TL2) - C43-6 (TL2)	Always	Below 1 Ω
A27-7 (TL2) - Body ground	Always	100 kΩ or higher
A27-8 (TL3) - C43-5 (TL3)	Always	Below 1 Ω
A27-8 (TL3) - Body ground	Always	100 kΩ or higher
A27-14 (P1) - C43-3 (CDL)	Always	Below 1 Ω
A27-14 (P1) - Body ground	Always	100 kΩ or higher
A28-7 (TM2) - C43-2 (TM2)	Always	Below 1 Ω
A28-7 (TM2) - Body ground	Always	100 kΩ or higher
A28-8 (TM1) - C43-1 (TM1)	Always	Below 1 Ω
A28-8 (TM1) - Body ground	Always	100 kΩ or higher
C43-7 (GND1) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

b. Check the center differential lock actuator.

i. Turn the engine switch on (IG).

ii. Check that there is an operating noise from the transfer shift actuator when the center differential lock switch is pressed to switch from Free to Lock, or lock to free.

OK:
There is an operating noise.

HINT:

- **If the actuator fork cannot move from free to lock, or lock to free even though there is an operating noise, there may be a mechanical malfunction in the transfer.**
- **If there is no operating noise, there may be a malfunction in the center differential lock actuator. However, it may also be a result of a mechanical malfunction in the transfer, so inspect each part.**

iii. Remove the transfer shift actuator assembly (Click here).

iv. Check the free to lock switch.

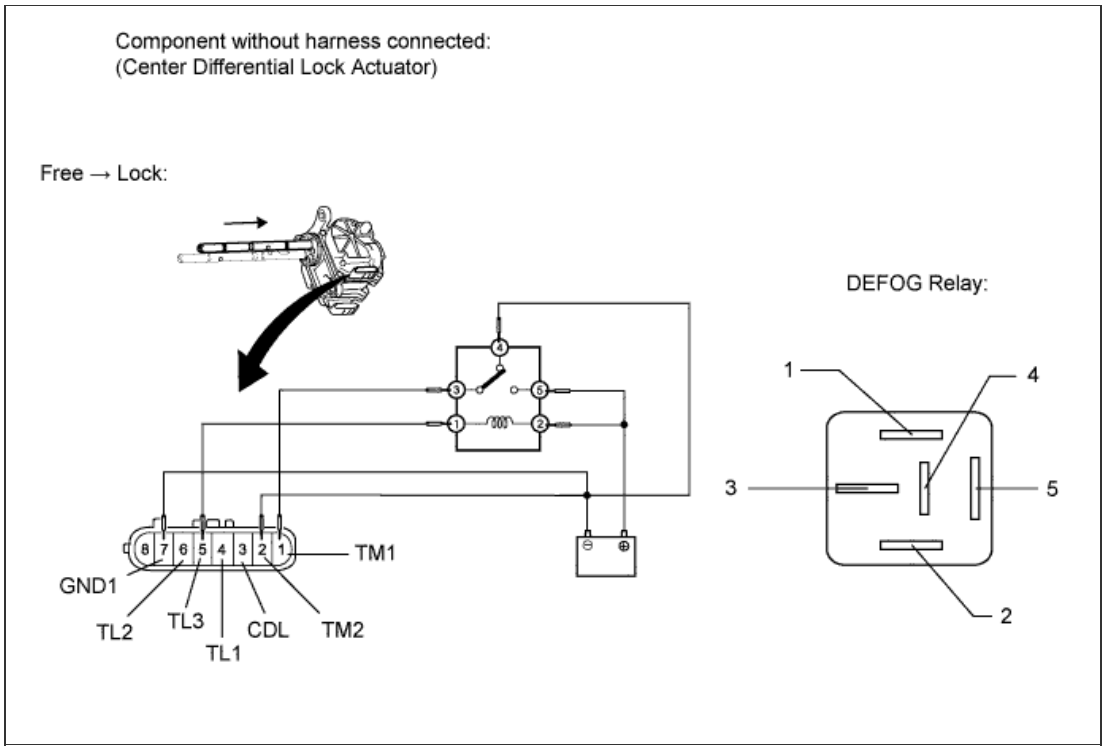
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the free to lock position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the free to lock switch is complete, check the center differential lock detection switch and limit switch.
    1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (CDL) - 7 (GND1)	After free to lock switch is complete	Below 1 Ω
4 (TL1) - 7 (GND1)	After free to lock switch is complete	100 kΩ or higher
5 (TL3) - 7 (GND1)	After free to lock switch is complete	100 kΩ or higher
6 (TL2) - 7 (GND1)	After free to lock switch is complete	Below 1 Ω

If there is a malfunction, replace the transfer shift actuator assembly.

v. Check the lock to free switch.

1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the lock to free position.

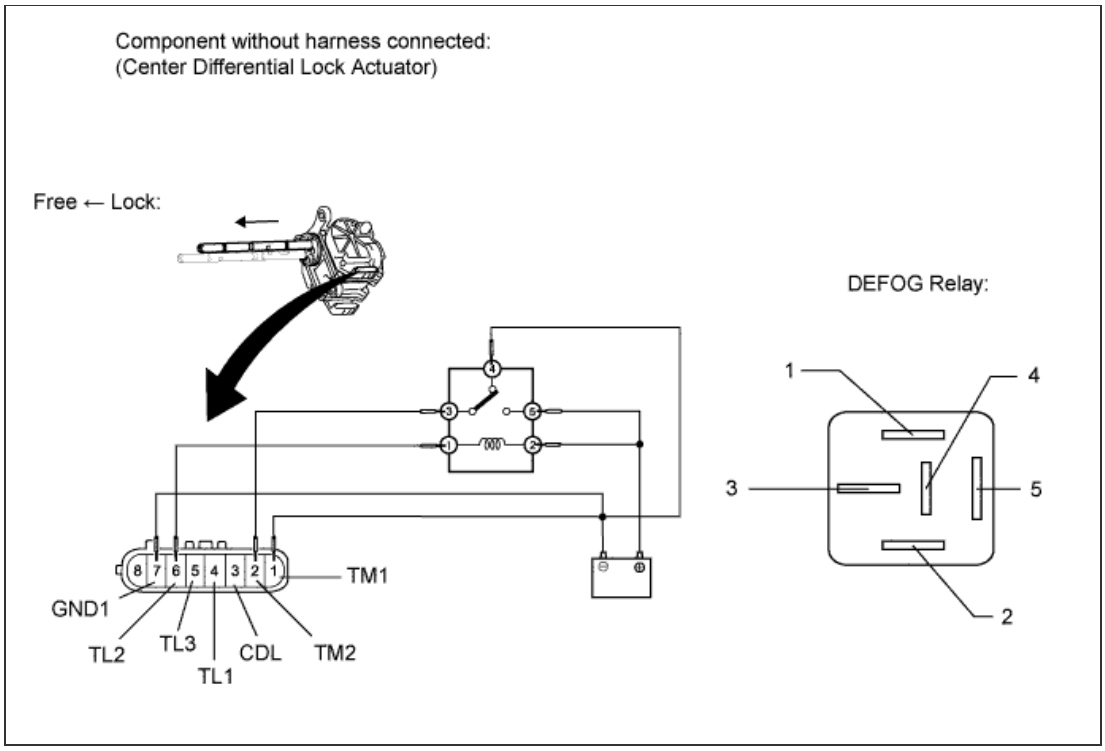
NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the**

actuator will be damaged.

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the lock to free switch is complete, check the center differential lock detection switch and limit switch.
   1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (CDL) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher
4 (TL1) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher
5 (TL3) - 7 (GND1)	After lock to free switch is complete	Below 1 Ω
6 (TL2) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher

If there is a malfunction, replace the transfer shift actuator assembly.

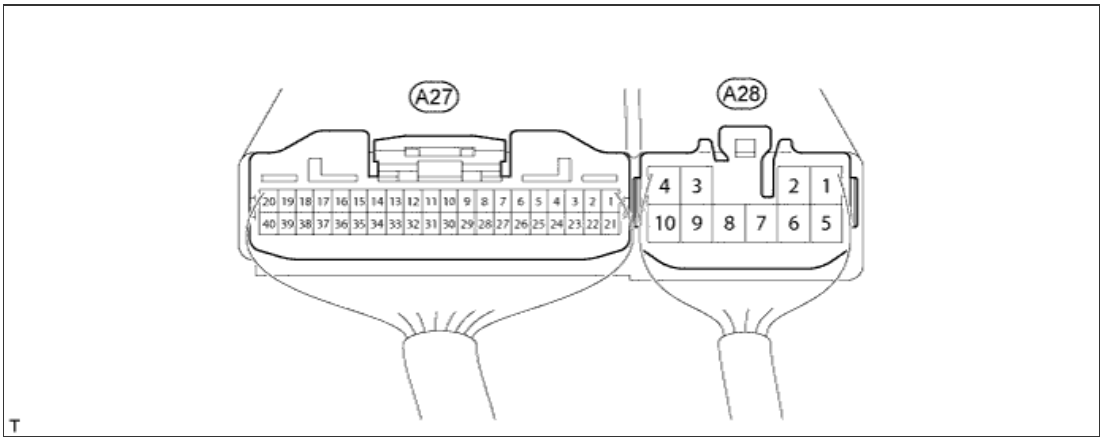
7. INSPECT 4 WHEEL DRIVE CONTROL ECU

HINT:

Inspect the connectors from the back side while the connectors are connected.

a. Check the four wheel drive control ECU.

i. Measure the resistance and voltage according to the value(s) in the table below.



Tester Connection	Terminal Description	Condition	Specified Condition
A27-1 (HL1) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	Below 1.5 V
		Engine switch on (IG) Transfer in low position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-2 (HL2) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	Below 1.5 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-3 (HL3) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	Below 1.5 V
A27-5 (TT) - A27-25 (TGND)*	Temperature sensor	Engine switch on (IG)	0 to 5 V
A27-6 (TL1) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	Below 1.5 V
A27-7 (TL2) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	Below 1.5 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-8 (TL3) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	Below 1.5 V
		Engine switch on (IG) Center differential in lock position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
		Engine switch on (IG)	

A27-12 (DL) - A28-4 (GND)	Center differential lock switch	Center differential lock switch is pressed and held	Below 1.5 V
		Engine switch on (IG) Center differential lock switch is not pressed	11 to 14 V
A27-13 (LO) - A28-4 (GND)	Transfer position switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	Below 1.5 V
A27-14 (P1) - A28-4 (GND)	Center differential lock detection switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	Below 1.5 V
A27-16 (NP) - A28-4 (GND)	Transfer shift actuator neutral position detection switch	Engine switch on (IG) Transfer in neutral position	Below 1.5 V
		Engine switch on (IG) Transfer in high or low position	11 to 14 V
A27-19 (CAN+) - A27-20 (CAN-)	CAN communication line	Engine switch off	54 to 69 Ω
A27-21 (L4) - A28-4 (GND)	Transfer shift actuator Low detection switch	Engine switch on (IG) Transfer position switch in H4 position	11 to 14 V
		Engine switch on (IG) Transfer position switch in L4 position	Below 1.5 V
A28-2 (HM1) - A28-4 (GND)	High-low transfer shift actuator motor	Engine switch on (IG) Transfer position switch H4 → L4 (During operation of high-low transfer shift actuator motor from high to low)	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
		Engine switch on (IG) Transfer position switch L4 → H4 (During operation of high-low transfer shift actuator motor from low to high)	11 to 14 V
A28-3 (IG) - A28-4 (GND)	IG power	Engine switch on (IG)	11 to 14 V
A28-4 (GND) - Body ground	Ground	Always	Below 1 Ω
A28-6 (HM2) - A28-4 (GND)	High-low transfer shift actuator motor	Engine switch on (IG) Transfer position switch H4 → L4 (During operation of high-low transfer shift actuator motor from high to low)	11 to 14 V
		Engine switch on (IG) Transfer position switch L4 → H4 (During operation of high-low transfer shift actuator motor from low to high)	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
A28-7 (TM2) - A28-4 (GND)	Center differential lock actuator motor	Engine switch on (IG) Center differential position free → lock	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
		Engine switch on (IG) Center differential position lock → free	11 to 14 V
A28-8 (TM1) - A28-4 (GND)	Center differential lock actuator motor	Engine switch on (IG) Center differential position free → lock	11 to 14 V
		Engine switch on (IG) Center differential position lock → free	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V

*: w/ Temperature Sensor

If there is a malfunction, inspect the harnesses, connectors, transfer position switch, center differential lock switch, and transfer shift actuator assembly. If these are normal, replace the four wheel drive control ECU (Click here).

for Preparation Click here

1. INSPECT INDICATOR LIGHT

a. Check the 4LO indicator light.

i. Start the engine.

ii. Stop the vehicle.

iii. Move the shift lever to N.

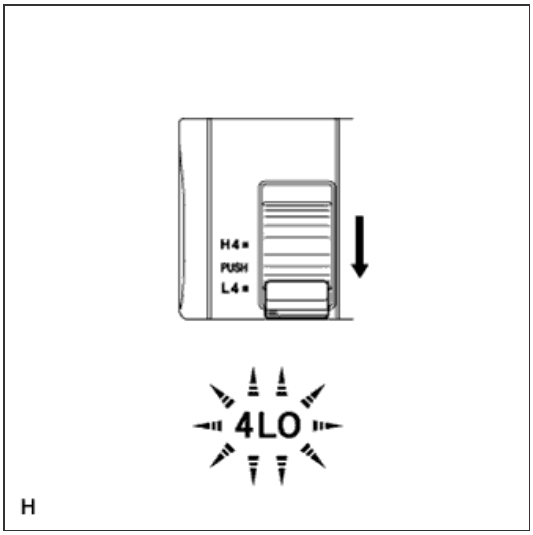
iv. Turn the transfer position switch from H4 to L4.

v. Check the 4LO indicator light.

OK:

Switch Condition	Specified Condition
Turned from H4 to L4	4LO indicator light comes on immediately or comes on after blinking

If there is a malfunction, inspect the switch, four wheel drive control ECU and transfer shift actuator. If the system is normal, there may be a malfunction in the CAN communication system or combination meter. In that case, first check the CAN communication system for LHD (Click here), for RHD (Click here). Then check the combination meter (Click here).



b. Check the center differential lock indicator light.

i. Start the engine.

ii. Push the center differential lock switch.

NOTICE:

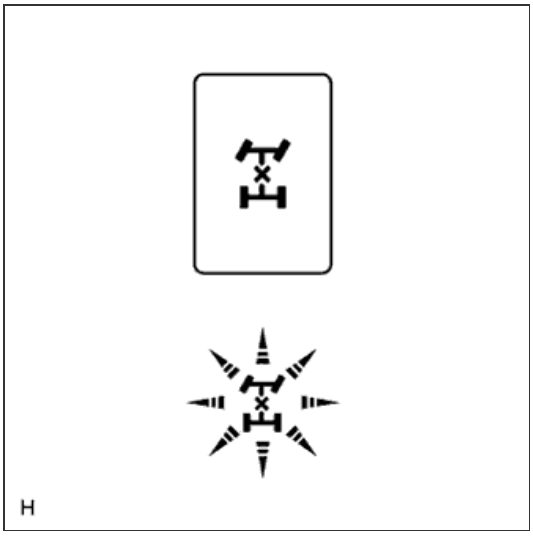
- **Do not push the switch while the vehicle is turning.**
- **Push the switch at a vehicle speed less than 100 km/h (62 mph).**

iii. Check the center differential lock indicator light.

OK:

Switch Condition	Specified Condition
Pushed	Center differential lock indicator light comes on immediately or comes on after blinking

If there is a malfunction, inspect the switch, four wheel drive control ECU and transfer shift actuator. If the system is normal, there may be a malfunction in the CAN communication system or combination meter. In that case, first check the CAN communication system for LHD (Click here), for RHD (Click here). Then check the combination meter (Click here).



2. INSPECT FUSE

a. Remove the 4WD fuse from the main body ECU (cowl side junction block LH).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
4WD fuse	Always	Below 1 Ω

If the fuse is blown, inspect the harness connected to the fuse for a short circuit, and repair or replace the harness or replace the fuse.

3. INSPECT TRANSFER POSITION SWITCH (BUILT INTO INTEGRATION CONTROL AND PANEL)

a. Remove the integration control and panel (Click here).

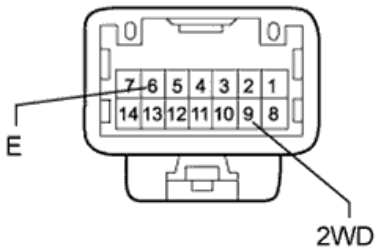
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
9 (2WD) - 6 (E)	H4 position	100 kΩ or higher
	L4 position	Below 1 Ω

If there is a malfunction, replace the suspension control switch.

Component without harness connected:
(Integration Control and Panel)



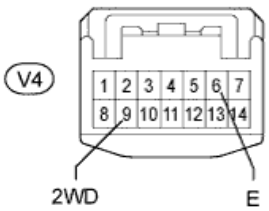
c. Check the harness and connector (ECU - transfer position switch and body ground).

i. Disconnect the A27 ECU connector.

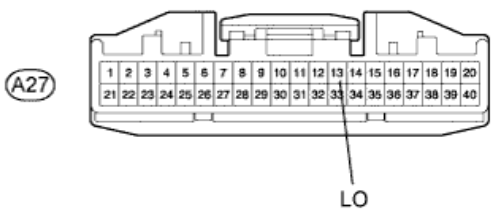
ii. Disconnect the V4 suspension control switch connector.

iii. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to Integration Control and Panel)



Front view of wire harness connector:
(to Four Wheel Drive Control ECU)



Standard Resistance:

Tester Connection	Condition	Specified Condition
V4-9 (2WD) - A27-13 (LO)	Always	Below 1 Ω
V4-9 (2WD) - Body ground	Always	100 kΩ or higher
V4-6 (E) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

4. INSPECT CENTER DIFFERENTIAL LOCK SWITCH

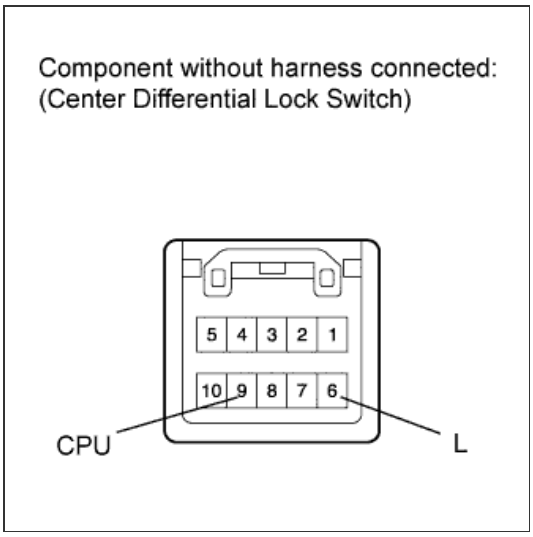
a. Remove the center differential lock switch (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
6 (L) - 9 (CPU)	Switch is pressed and held	Below 1 Ω
	Switch is not pressed	100 kΩ or higher

If there is a malfunction, replace the center differential lock switch.

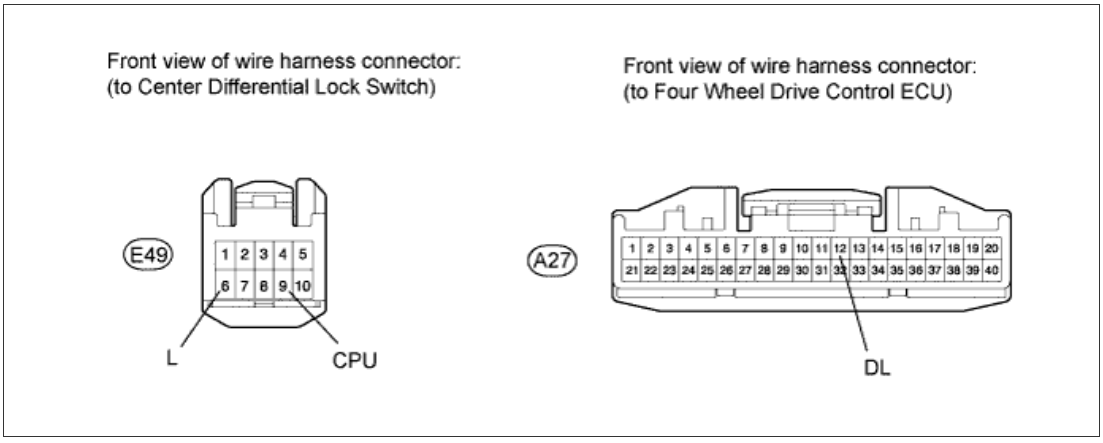


c. Check the harness and connector (ECU - center differential lock switch and body ground).

i. Disconnect the A27 ECU connector.

ii. Disconnect the E49 center differential lock switch connector.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition

A27-12 (DL) - E49-9 (CPU)	Always	Below 1 Ω
A27-12 (DL) - Body ground	Always	100 kΩ or higher
E49-6 (L) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

5. INSPECT TRANSFER SHIFT ACTUATOR ASSEMBLY (HIGH-LOW TRANSFER SHIFT ACTUATOR)

HINT:

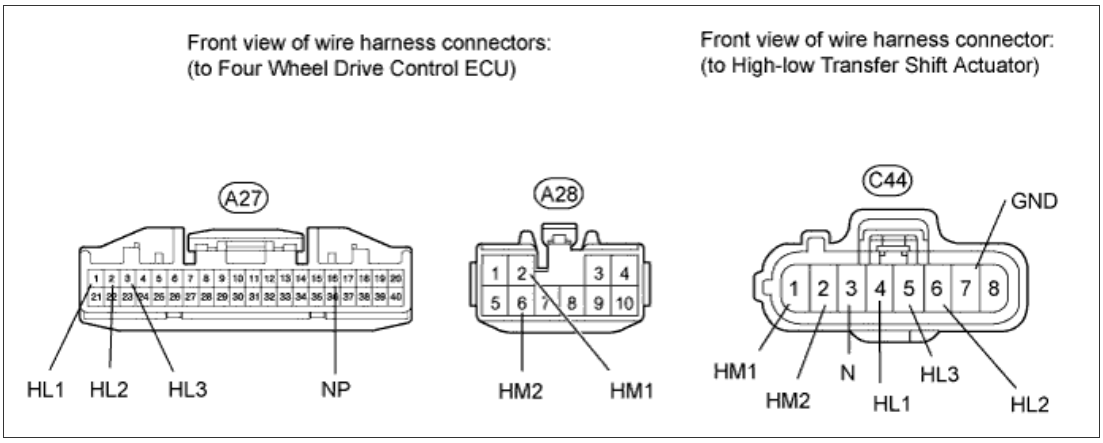
After inspecting the ECU power supply or transfer position switch, check the high-low transfer shift actuator.

a. Check the harness and connector (ECU - high-low transfer shift actuator).

i. Disconnect the C44 actuator connector.

ii. Disconnect the A27 and A28 ECU connectors.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-1 (HL1) - C44-4 (HL1)	Always	Below 1 Ω
A27-1 (HL1) - Body ground	Always	100 kΩ or higher
A27-2 (HL2) - C44-6 (HL2)	Always	Below 1 Ω
A27-2 (HL2) - Body ground	Always	100 kΩ or higher
A27-3 (HL3) - C44-5 (HL3)	Always	Below 1 Ω
A27-3 (HL3) - Body ground	Always	100 kΩ or higher
A27-16 (NP) - C44-3 (N)	Always	Below 1 Ω
A27-16 (NP) - Body ground	Always	100 kΩ or higher
A28-2 (HM1) - C44-1 (HM1)	Always	Below 1 Ω
A28-2 (HM1) - Body		100 kΩ or

ground	Always	higher
A28-6 (HM2) - C44-2 (HM2)	Always	Below 1 Ω
A28-6 (HM2) - Body ground	Always	100 kΩ or higher
C44-7 (GND) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

b. Check the high-low transfer shift actuator.

i. Turn the engine switch on (IG).

ii. Stop the vehicle.

iii. Move the shift lever to N.

iv. Check that there is an operating noise from the transfer shift actuator when the transfer position switch is turned from H4 to L4, or L4 to H4.

OK:
There is an operating noise.

HINT:

- **If the actuator fork cannot move from high to low, or low to high even though there is an operating noise, there may be a mechanical malfunction in the transfer.**
- **If there is no operating noise, there may be a malfunction in the high-low transfer shift actuator. However, it may also be a result of a mechanical malfunction in the transfer, so inspect each part.**

v. Remove the transfer shift actuator assembly (Click here).

vi. Check the high to low switch.

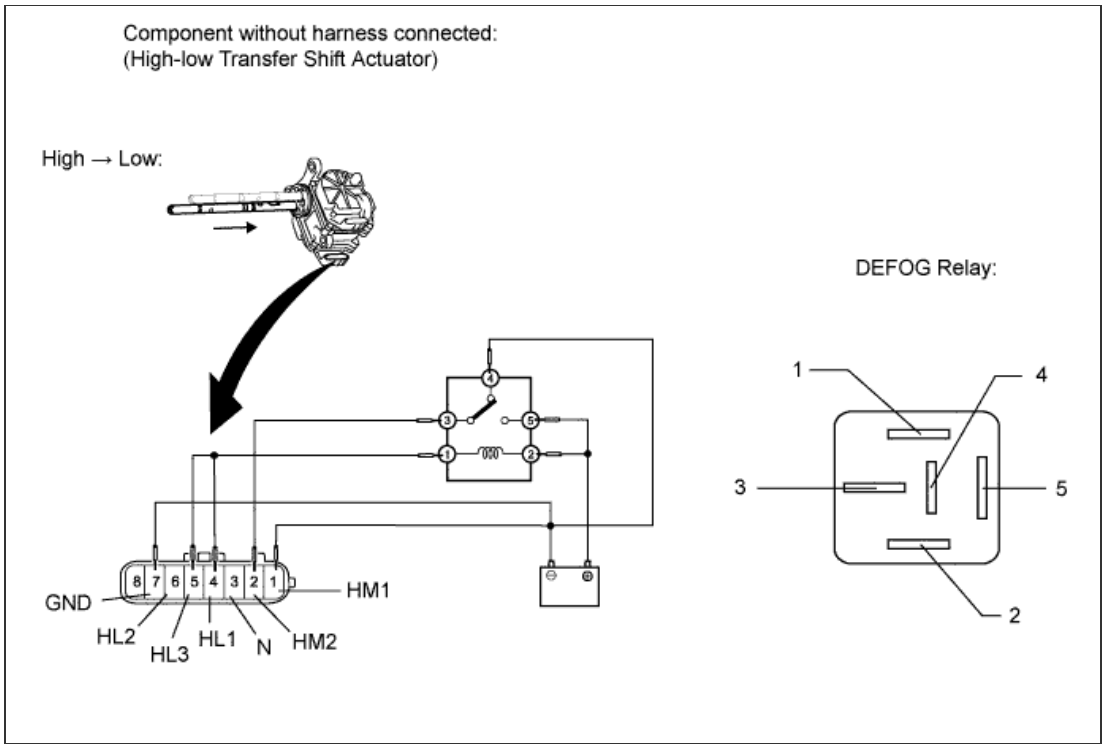
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the high to low position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the high to low switch is complete, check the neutral position detection switch and limit switch.
    1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (N) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
4 (HL1) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
5 (HL3) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
6 (HL2) - 7 (GND)	After high to low switch is complete	Below 1 Ω

If there is a malfunction, replace the transfer shift actuator assembly.

vii. Check the low to high switch.

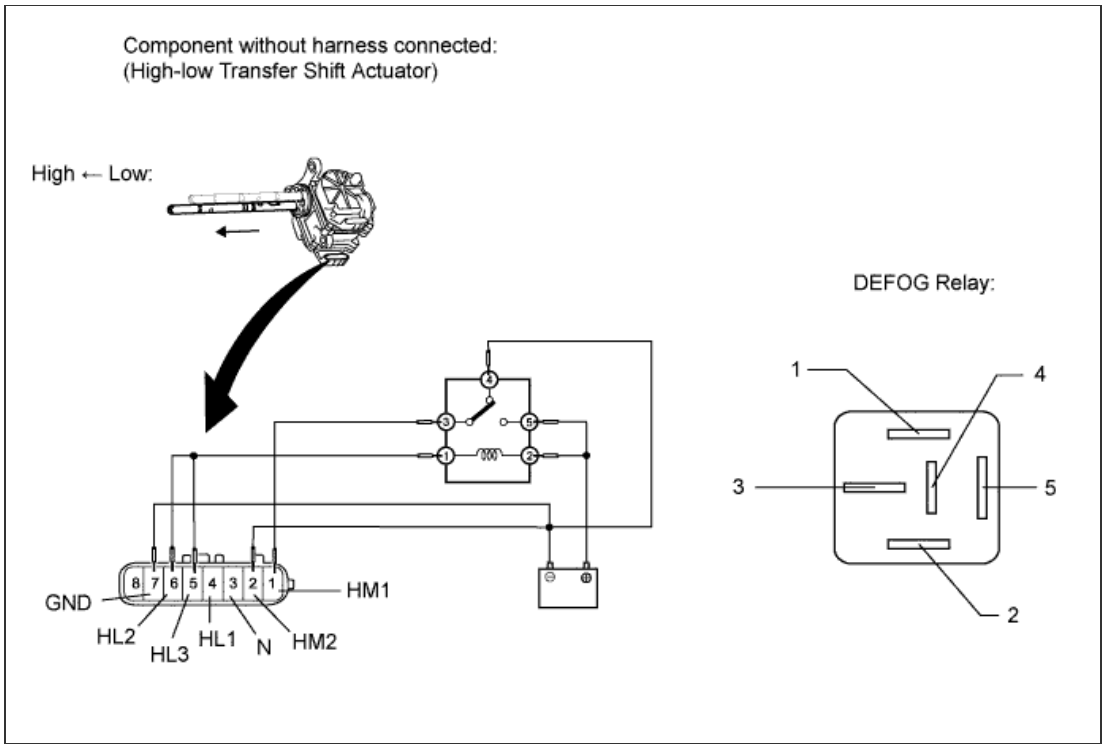
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the low to high position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the low to high switch is complete, check the neutral position detection switch and limit switch.
   1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (N) - 7 (GND)	After low to high switch is complete	100 kΩ or higher
4 (HL1) - 7 (GND)	After low to high switch is complete	Below 1 Ω
5 (HL3) - 7 (GND)	After low to high switch is complete	100 kΩ or higher
6 (HL2) - 7 (GND)	After low to high switch is complete	100 kΩ or higher

If there is a malfunction, replace the transfer shift actuator assembly.

6. INSPECT TRANSFER SHIFT ACTUATOR ASSEMBLY (CENTER DIFFERENTIAL LOCK ACTUATOR)

HINT:

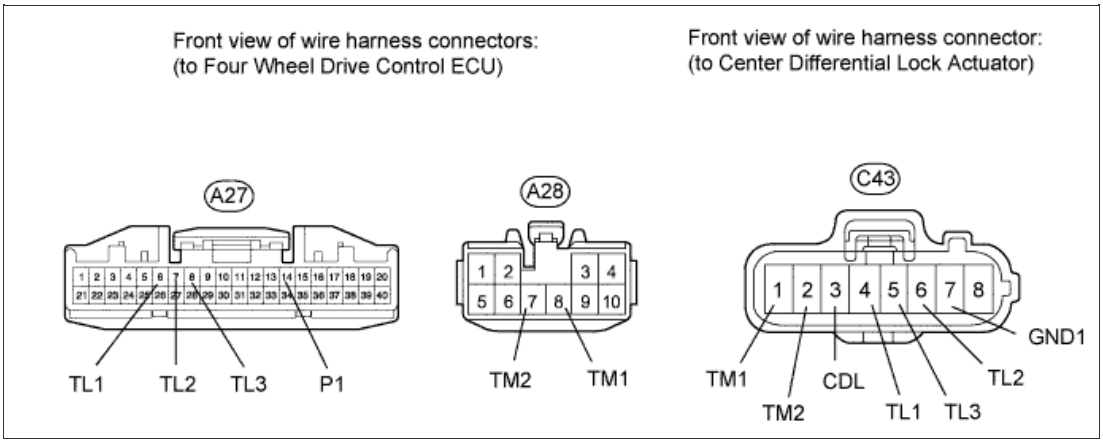
After inspecting the ECU power supply or center differential lock switch, check the center differential lock actuator.

a. Check the harness and connector (ECU - center differential lock actuator).

i. Disconnect the C43 actuator connector.

ii. Disconnect the A27 and A28 ECU connectors.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-6 (TL1) - C43-4 (TL1)	Always	Below 1 Ω
A27-6 (TL1) - Body ground	Always	100 kΩ or higher
A27-7 (TL2) - C43-6 (TL2)	Always	Below 1 Ω
A27-7 (TL2) - Body ground	Always	100 kΩ or higher
A27-8 (TL3) - C43-5 (TL3)	Always	Below 1 Ω
A27-8 (TL3) - Body ground	Always	100 kΩ or higher
A27-14 (P1) - C43-3 (CDL)	Always	Below 1 Ω
A27-14 (P1) - Body ground	Always	100 kΩ or higher
A28-7 (TM2) - C43-2 (TM2)	Always	Below 1 Ω
A28-7 (TM2) - Body ground	Always	100 kΩ or higher
A28-8 (TM1) - C43-1 (TM1)	Always	Below 1 Ω
A28-8 (TM1) - Body ground	Always	100 kΩ or higher
C43-7 (GND1) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

b. Check the center differential lock actuator.

i. Turn the engine switch on (IG).

ii. Check that there is an operating noise from the transfer shift actuator when the center differential lock switch is pressed to switch from Free to Lock, or lock to free.

OK:
There is an operating noise.

HINT:

- **If the actuator fork cannot move from free to lock, or lock to free even though there is an operating noise, there may be a mechanical malfunction in the transfer.**
- **If there is no operating noise, there may be a malfunction in the center differential lock actuator. However, it may also be a result of a mechanical malfunction in the transfer, so inspect each part.**

iii. Remove the transfer shift actuator assembly (Click here).

iv. Check the free to lock switch.

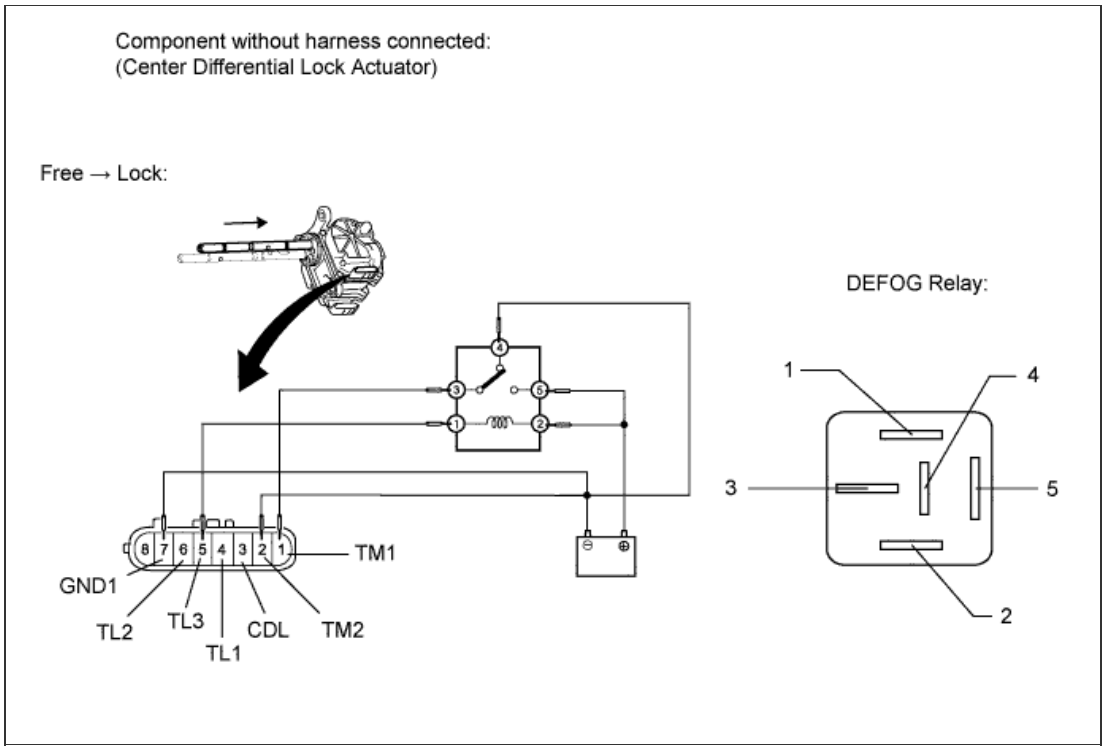
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the free to lock position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the free to lock switch is complete, check the center differential lock detection switch and limit switch.
    1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (CDL) - 7 (GND1)	After free to lock switch is complete	Below 1 Ω
4 (TL1) - 7 (GND1)	After free to lock switch is complete	100 kΩ or higher
5 (TL3) - 7 (GND1)	After free to lock switch is complete	100 kΩ or higher
6 (TL2) - 7 (GND1)	After free to lock switch is complete	Below 1 Ω

If there is a malfunction, replace the transfer shift actuator assembly.

v. Check the lock to free switch.

1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the lock to free position.

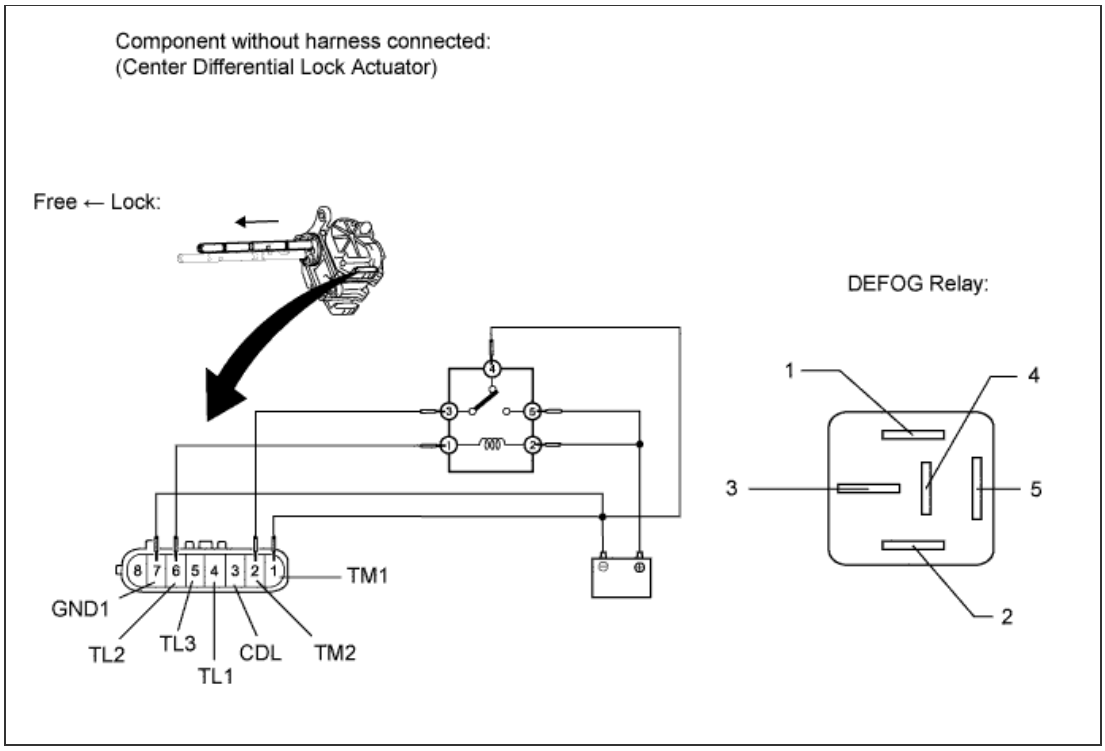
NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the**

actuator will be damaged.

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the lock to free switch is complete, check the center differential lock detection switch and limit switch.
   1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (CDL) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher
4 (TL1) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher
5 (TL3) - 7 (GND1)	After lock to free switch is complete	Below 1 Ω
6 (TL2) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher

If there is a malfunction, replace the transfer shift actuator assembly.

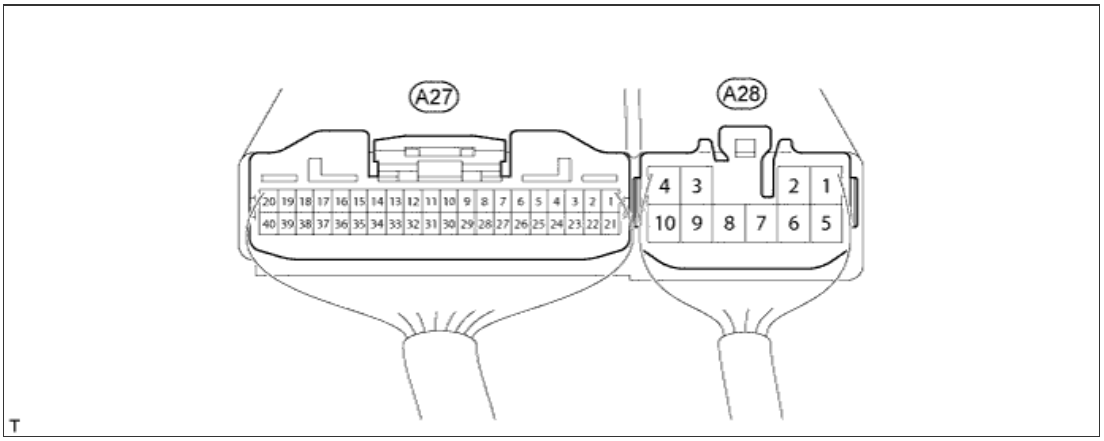
7. INSPECT 4 WHEEL DRIVE CONTROL ECU

HINT:

Inspect the connectors from the back side while the connectors are connected.

a. Check the four wheel drive control ECU.

i. Measure the resistance and voltage according to the value(s) in the table below.



Tester Connection	Terminal Description	Condition	Specified Condition
A27-1 (HL1) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	Below 1.5 V
		Engine switch on (IG) Transfer in low position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-2 (HL2) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	Below 1.5 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-3 (HL3) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	Below 1.5 V
A27-5 (TT) - A27-25 (TGND)*	Temperature sensor	Engine switch on (IG)	0 to 5 V
A27-6 (TL1) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	Below 1.5 V
A27-7 (TL2) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	Below 1.5 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-8 (TL3) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	Below 1.5 V
		Engine switch on (IG) Center differential in lock position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
		Engine switch on (IG)	

A27-12 (DL) - A28-4 (GND)	Center differential lock switch	Center differential lock switch is pressed and held	Below 1.5 V
		Engine switch on (IG) Center differential lock switch is not pressed	11 to 14 V
A27-13 (LO) - A28-4 (GND)	Transfer position switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	Below 1.5 V
A27-14 (P1) - A28-4 (GND)	Center differential lock detection switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	Below 1.5 V
A27-16 (NP) - A28-4 (GND)	Transfer shift actuator neutral position detection switch	Engine switch on (IG) Transfer in neutral position	Below 1.5 V
		Engine switch on (IG) Transfer in high or low position	11 to 14 V
A27-19 (CAN+) - A27-20 (CAN-)	CAN communication line	Engine switch off	54 to 69 Ω
A27-21 (L4) - A28-4 (GND)	Transfer shift actuator Low detection switch	Engine switch on (IG) Transfer position switch in H4 position	11 to 14 V
		Engine switch on (IG) Transfer position switch in L4 position	Below 1.5 V
A28-2 (HM1) - A28-4 (GND)	High-low transfer shift actuator motor	Engine switch on (IG) Transfer position switch H4 → L4 (During operation of high-low transfer shift actuator motor from high to low)	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
		Engine switch on (IG) Transfer position switch L4 → H4 (During operation of high-low transfer shift actuator motor from low to high)	11 to 14 V
A28-3 (IG) - A28-4 (GND)	IG power	Engine switch on (IG)	11 to 14 V
A28-4 (GND) - Body ground	Ground	Always	Below 1 Ω
A28-6 (HM2) - A28-4 (GND)	High-low transfer shift actuator motor	Engine switch on (IG) Transfer position switch H4 → L4 (During operation of high-low transfer shift actuator motor from high to low)	11 to 14 V
		Engine switch on (IG) Transfer position switch L4 → H4 (During operation of high-low transfer shift actuator motor from low to high)	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
A28-7 (TM2) - A28-4 (GND)	Center differential lock actuator motor	Engine switch on (IG) Center differential position free → lock	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
		Engine switch on (IG) Center differential position lock → free	11 to 14 V
A28-8 (TM1) - A28-4 (GND)	Center differential lock actuator motor	Engine switch on (IG) Center differential position free → lock	11 to 14 V
		Engine switch on (IG) Center differential position lock → free	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V

*: w/ Temperature Sensor

If there is a malfunction, inspect the harnesses, connectors, transfer position switch, center differential lock switch, and transfer shift actuator assembly. If these are normal, replace the four wheel drive control ECU (Click here).

for Preparation Click here

1. INSPECT INDICATOR LIGHT

a. Check the 4LO indicator light.

i. Start the engine.

ii. Stop the vehicle.

iii. Move the shift lever to N.

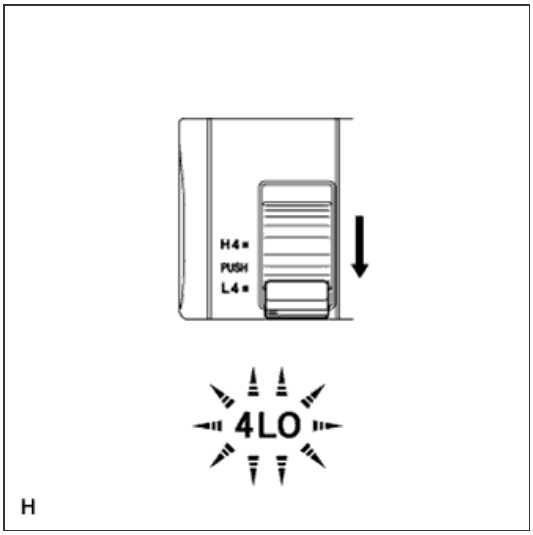
iv. Turn the transfer position switch from H4 to L4.

v. Check the 4LO indicator light.

OK:

Switch Condition	Specified Condition
Turned from H4 to L4	4LO indicator light comes on immediately or comes on after blinking

If there is a malfunction, inspect the switch, four wheel drive control ECU and transfer shift actuator. If the system is normal, there may be a malfunction in the CAN communication system or combination meter. In that case, first check the CAN communication system for LHD (Click here), for RHD (Click here). Then check the combination meter (Click here).



b. Check the center differential lock indicator light.

i. Start the engine.

ii. Push the center differential lock switch.

NOTICE:

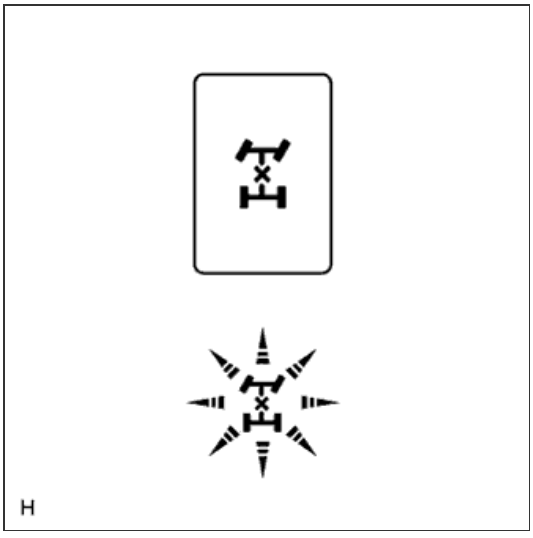
- **Do not push the switch while the vehicle is turning.**
- **Push the switch at a vehicle speed less than 100 km/h (62 mph).**

iii. Check the center differential lock indicator light.

OK:

Switch Condition	Specified Condition
Pushed	Center differential lock indicator light comes on immediately or comes on after blinking

If there is a malfunction, inspect the switch, four wheel drive control ECU and transfer shift actuator. If the system is normal, there may be a malfunction in the CAN communication system or combination meter. In that case, first check the CAN communication system for LHD (Click here), for RHD (Click here). Then check the combination meter (Click here).



2. INSPECT FUSE

a. Remove the 4WD fuse from the main body ECU (cowl side junction block LH).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
4WD fuse	Always	Below 1 Ω

If the fuse is blown, inspect the harness connected to the fuse for a short circuit, and repair or replace the harness or replace the fuse.

3. INSPECT TRANSFER POSITION SWITCH (BUILT INTO INTEGRATION CONTROL AND PANEL)

a. Remove the integration control and panel (Click here).

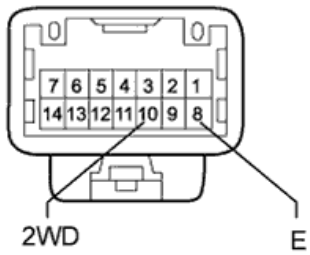
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
10 (2WD) - 8 (E)	H4 position	100 kΩ or higher
	L4 position	Below 1 Ω

If there is a malfunction, replace the suspension control switch.

Component without harness connected:
(Integration Control and Panel)



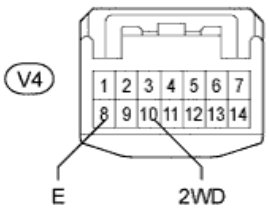
c. Check the harness and connector (ECU - transfer position switch and body ground).

i. Disconnect the A27 ECU connector.

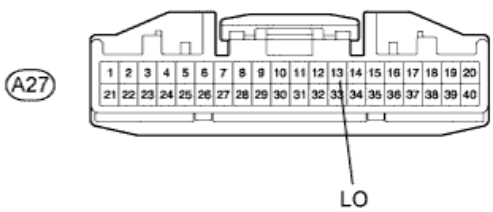
ii. Disconnect the V4 suspension control switch connector.

iii. Measure the resistance according to the value(s) in the table below.

Front view of wire harness connector:
(to Integration Control and Panel)



Front view of wire harness connector:
(to Four Wheel Drive Control ECU)



Standard Resistance:

Tester Connection	Condition	Specified Condition
V4-10 (2WD) - A27-13 (LO)	Always	Below 1 Ω
V4-10 (2WD) - Body ground	Always	100 kΩ or higher
V4-8 (E) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

4. INSPECT CENTER DIFFERENTIAL LOCK SWITCH

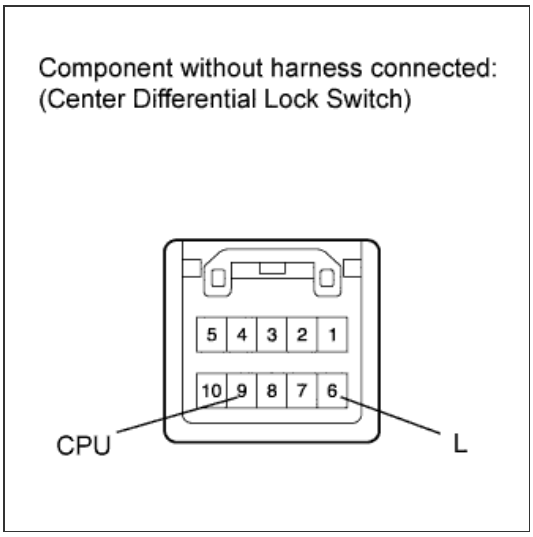
a. Remove the center differential lock switch (Click here).

b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
6 (L) - 9 (CPU)	Switch is pressed and held	Below 1 Ω
	Switch is not pressed	100 kΩ or higher

If there is a malfunction, replace the center differential lock switch.

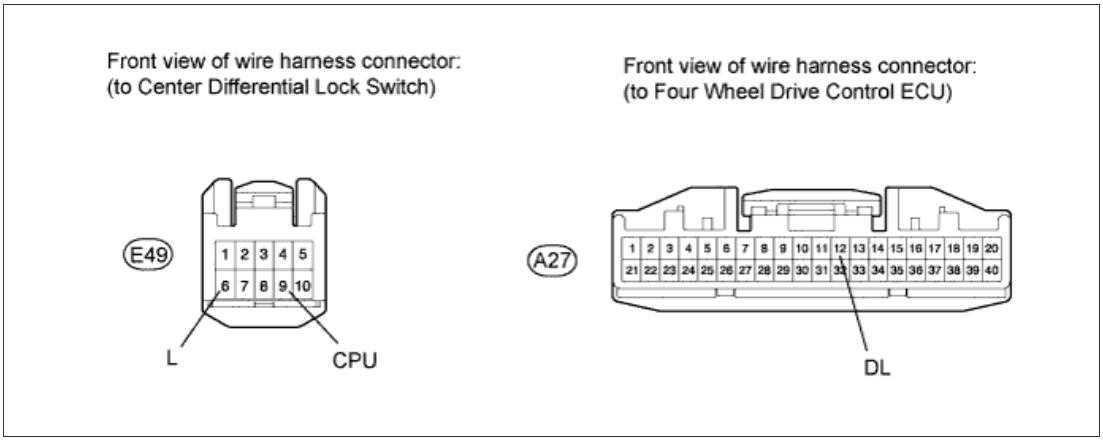


c. Check the harness and connector (ECU - center differential lock switch and body ground).

i. Disconnect the A27 ECU connector.

ii. Disconnect the E49 center differential lock switch connector.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition

A27-12 (DL) - E49-9 (CPU)	Always	Below 1 Ω
A27-12 (DL) - Body ground	Always	100 kΩ or higher
E49-6 (L) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

5. INSPECT TRANSFER SHIFT ACTUATOR ASSEMBLY (HIGH-LOW TRANSFER SHIFT ACTUATOR)

HINT:

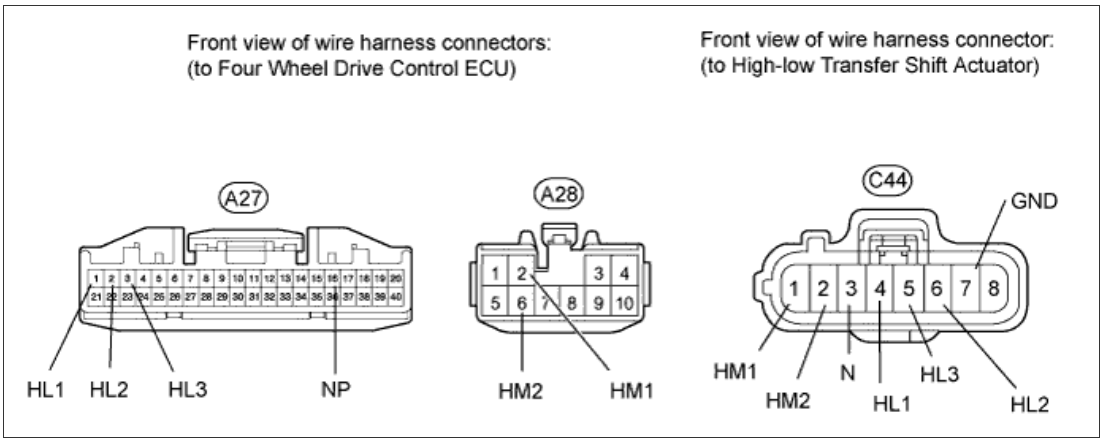
After inspecting the ECU power supply or transfer position switch, check the high-low transfer shift actuator.

a. Check the harness and connector (ECU - high-low transfer shift actuator).

i. Disconnect the C44 actuator connector.

ii. Disconnect the A27 and A28 ECU connectors.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-1 (HL1) - C44-4 (HL1)	Always	Below 1 Ω
A27-1 (HL1) - Body ground	Always	100 kΩ or higher
A27-2 (HL2) - C44-6 (HL2)	Always	Below 1 Ω
A27-2 (HL2) - Body ground	Always	100 kΩ or higher
A27-3 (HL3) - C44-5 (HL3)	Always	Below 1 Ω
A27-3 (HL3) - Body ground	Always	100 kΩ or higher
A27-16 (NP) - C44-3 (N)	Always	Below 1 Ω
A27-16 (NP) - Body ground	Always	100 kΩ or higher
A28-2 (HM1) - C44-1 (HM1)	Always	Below 1 Ω
A28-2 (HM1) - Body		100 kΩ or

ground	Always	higher
A28-6 (HM2) - C44-2 (HM2)	Always	Below 1 Ω
A28-6 (HM2) - Body ground	Always	100 kΩ or higher
C44-7 (GND) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

b. Check the high-low transfer shift actuator.

i. Turn the engine switch on (IG).

ii. Stop the vehicle.

iii. Move the shift lever to N.

iv. Check that there is an operating noise from the transfer shift actuator when the transfer position switch is turned from H4 to L4, or L4 to H4.

OK:
There is an operating noise.

HINT:

- **If the actuator fork cannot move from high to low, or low to high even though there is an operating noise, there may be a mechanical malfunction in the transfer.**
- **If there is no operating noise, there may be a malfunction in the high-low transfer shift actuator. However, it may also be a result of a mechanical malfunction in the transfer, so inspect each part.**

v. Remove the transfer shift actuator assembly (Click here).

vi. Check the high to low switch.

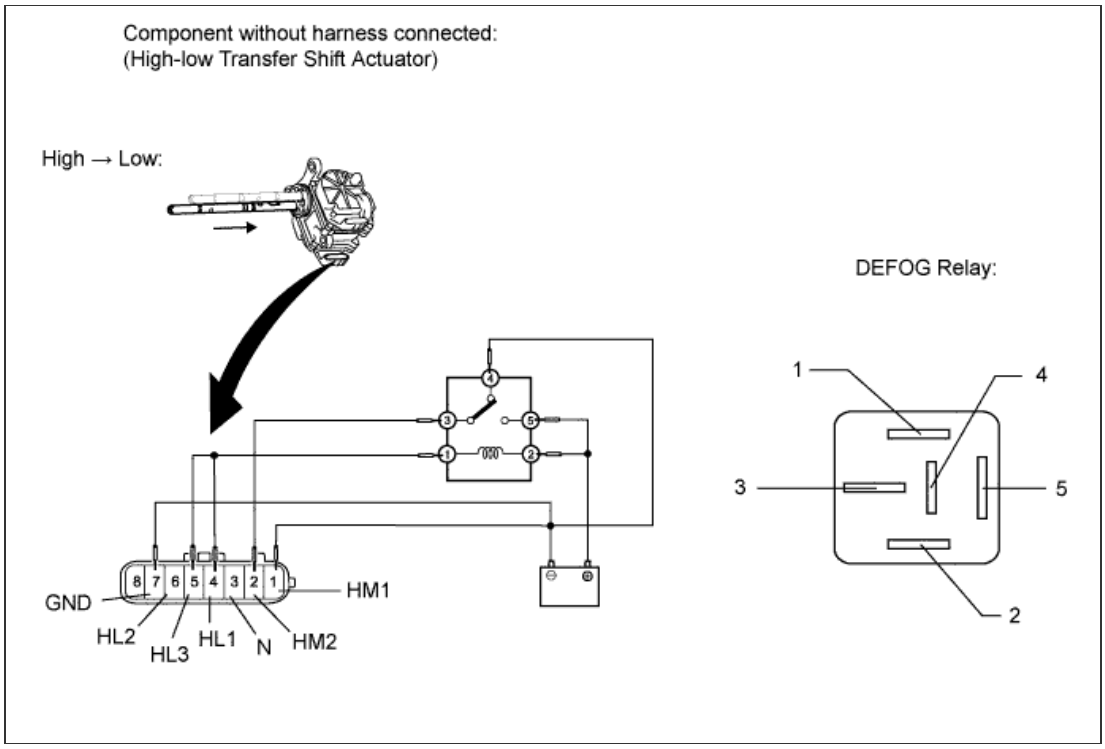
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the high to low position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the high to low switch is complete, check the neutral position detection switch and limit switch.
    1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (N) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
4 (HL1) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
5 (HL3) - 7 (GND)	After high to low switch is complete	100 kΩ or higher
6 (HL2) - 7 (GND)	After high to low switch is complete	Below 1 Ω

If there is a malfunction, replace the transfer shift actuator assembly.

vii. Check the low to high switch.

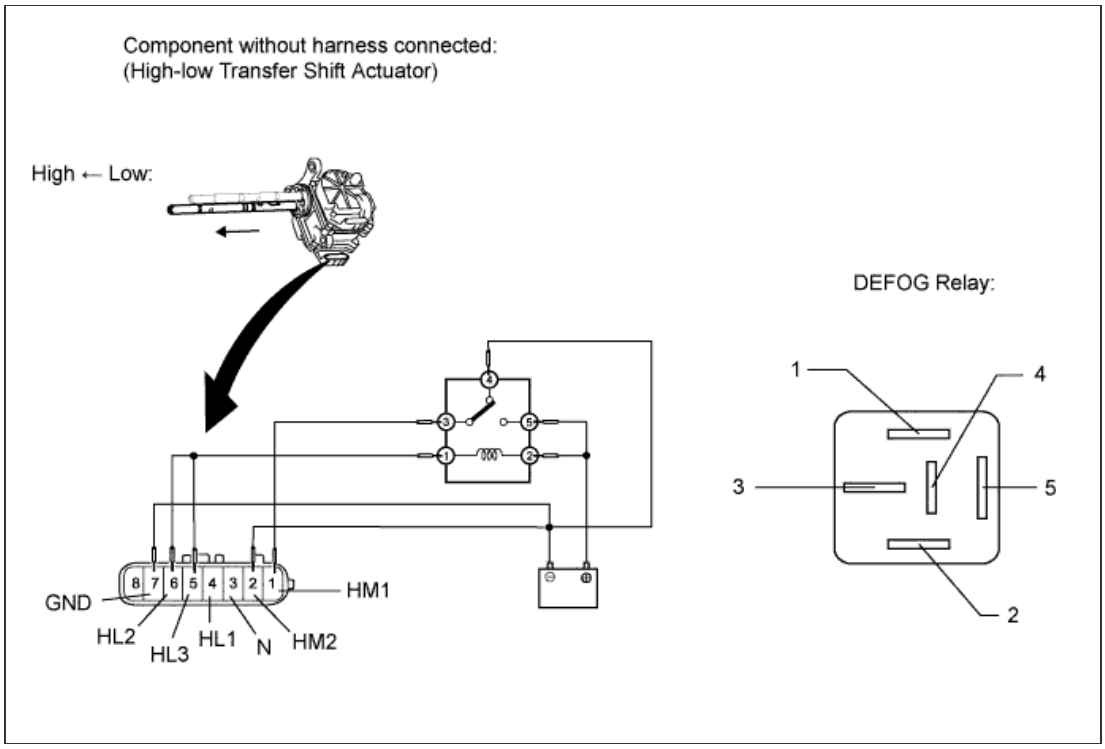
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the low to high position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the low to high switch is complete, check the neutral position detection switch and limit switch.
   1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (N) - 7 (GND)	After low to high switch is complete	100 kΩ or higher
4 (HL1) - 7 (GND)	After low to high switch is complete	Below 1 Ω
5 (HL3) - 7 (GND)	After low to high switch is complete	100 kΩ or higher
6 (HL2) - 7 (GND)	After low to high switch is complete	100 kΩ or higher

If there is a malfunction, replace the transfer shift actuator assembly.

6. INSPECT TRANSFER SHIFT ACTUATOR ASSEMBLY (CENTER DIFFERENTIAL LOCK ACTUATOR)

HINT:

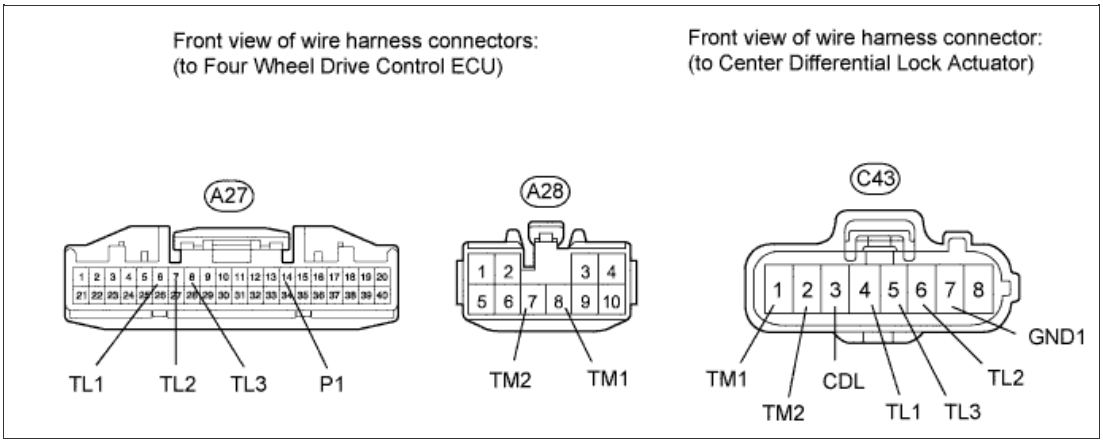
After inspecting the ECU power supply or center differential lock switch, check the center differential lock actuator.

a. Check the harness and connector (ECU - center differential lock actuator).

i. Disconnect the C43 actuator connector.

ii. Disconnect the A27 and A28 ECU connectors.

iii. Measure the resistance according to the value(s) in the table below.



Standard Resistance:

Tester Connection	Condition	Specified Condition
A27-6 (TL1) - C43-4 (TL1)	Always	Below 1 Ω
A27-6 (TL1) - Body ground	Always	100 kΩ or higher
A27-7 (TL2) - C43-6 (TL2)	Always	Below 1 Ω
A27-7 (TL2) - Body ground	Always	100 kΩ or higher
A27-8 (TL3) - C43-5 (TL3)	Always	Below 1 Ω
A27-8 (TL3) - Body ground	Always	100 kΩ or higher
A27-14 (P1) - C43-3 (CDL)	Always	Below 1 Ω
A27-14 (P1) - Body ground	Always	100 kΩ or higher
A28-7 (TM2) - C43-2 (TM2)	Always	Below 1 Ω
A28-7 (TM2) - Body ground	Always	100 kΩ or higher
A28-8 (TM1) - C43-1 (TM1)	Always	Below 1 Ω
A28-8 (TM1) - Body ground	Always	100 kΩ or higher
C43-7 (GND1) - Body ground	Always	Below 1 Ω

If there is a malfunction, repair or replace the harness or connector.

b. Check the center differential lock actuator.

i. Turn the engine switch on (IG).

ii. Check that there is an operating noise from the transfer shift actuator when the center differential lock switch is pressed to switch from Free to Lock, or lock to free.

OK:
There is an operating noise.

HINT:

- **If the actuator fork cannot move from free to lock, or lock to free even though there is an operating noise, there may be a mechanical malfunction in the transfer.**
- **If there is no operating noise, there may be a malfunction in the center differential lock actuator. However, it may also be a result of a mechanical malfunction in the transfer, so inspect each part.**

iii. Remove the transfer shift actuator assembly (Click here).

iv. Check the free to lock switch.

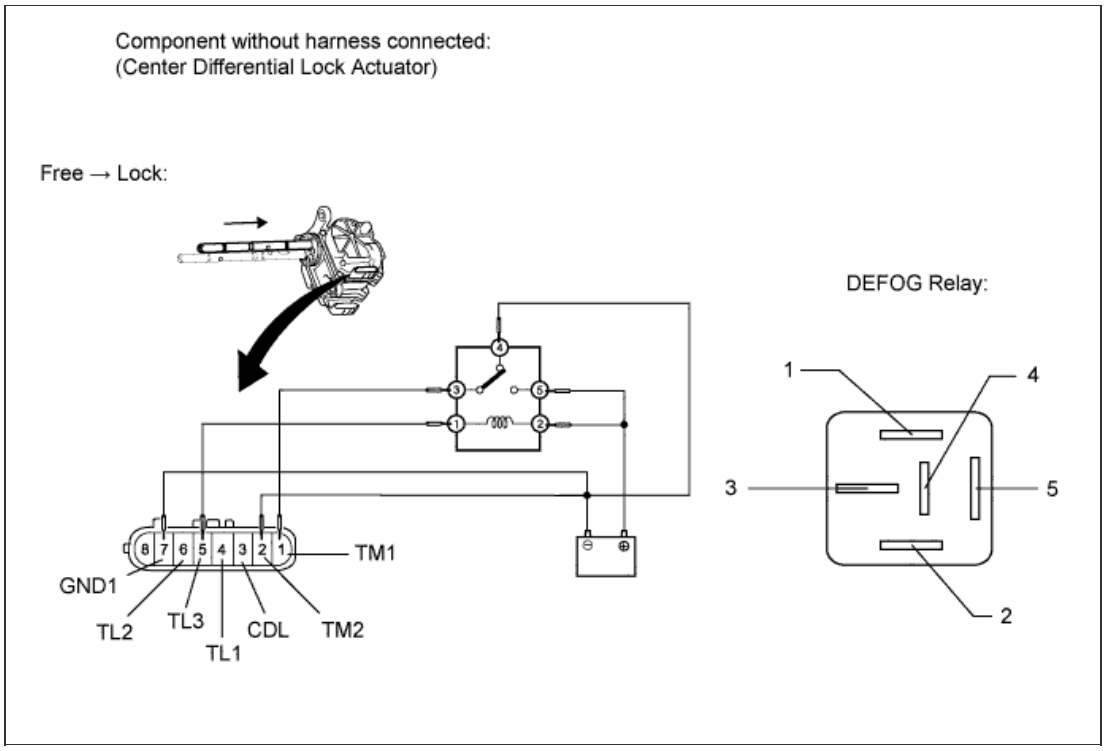
1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the free to lock position.

NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the actuator will be damaged.**

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the free to lock switch is complete, check the center differential lock detection switch and limit switch.
    1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (CDL) - 7 (GND1)	After free to lock switch is complete	Below 1 Ω
4 (TL1) - 7 (GND1)	After free to lock switch is complete	100 kΩ or higher
5 (TL3) - 7 (GND1)	After free to lock switch is complete	100 kΩ or higher
6 (TL2) - 7 (GND1)	After free to lock switch is complete	Below 1 Ω

If there is a malfunction, replace the transfer shift actuator assembly.

v. Check the lock to free switch.

1. Connect lines via a relay as shown in the illustration, and check that the actuator fork moves from the lock to free position.

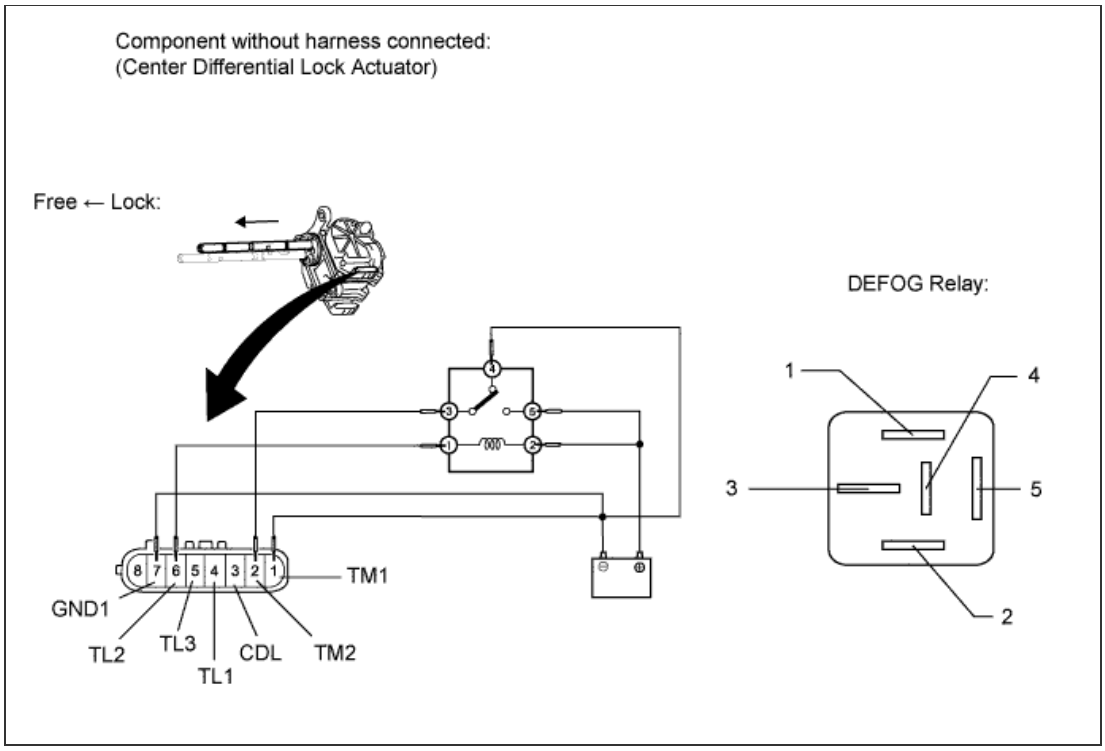
NOTICE:

- **Make sure to perform this inspection with the actuator removed from the vehicle. If this inspection is performed with the actuator installed to the vehicle, the actuator will be damaged.**
- **When inspecting the actuator, make sure to operate it with the lines connected via a relay. If the lines are not connected via a relay and battery voltage is directly applied to the actuator, the**

actuator will be damaged.

HINT:

When performing the operation described above, use the DEFOG relay.



2. After the lock to free switch is complete, check the center differential lock detection switch and limit switch.
   1. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (CDL) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher
4 (TL1) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher
5 (TL3) - 7 (GND1)	After lock to free switch is complete	Below 1 Ω
6 (TL2) - 7 (GND1)	After lock to free switch is complete	100 kΩ or higher

If there is a malfunction, replace the transfer shift actuator assembly.

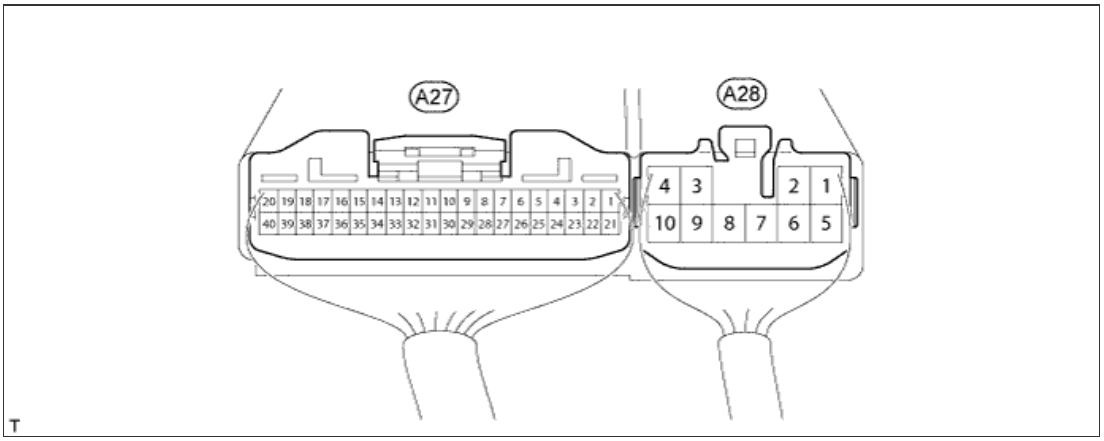
7. INSPECT 4 WHEEL DRIVE CONTROL ECU

HINT:

Inspect the connectors from the back side while the connectors are connected.

a. Check the four wheel drive control ECU.

i. Measure the resistance and voltage according to the value(s) in the table below.



Tester Connection	Terminal Description	Condition	Specified Condition
A27-1 (HL1) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	Below 1.5 V
		Engine switch on (IG) Transfer in low position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-2 (HL2) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	Below 1.5 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-3 (HL3) - A28-4 (GND)	High-low transfer shift actuator limit switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	Below 1.5 V
A27-5 (TT) - A27-25 (TGND)*	Temperature sensor	Engine switch on (IG)	0 to 5 V
A27-6 (TL1) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	Below 1.5 V
A27-7 (TL2) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	Below 1.5 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
A27-8 (TL3) - A28-4 (GND)	Center differential lock actuator limit switch	Engine switch on (IG) Center differential in free position	Below 1.5 V
		Engine switch on (IG) Center differential in lock position	11 to 14 V
		Engine switch on (IG) Transfer in neutral position	11 to 14 V
		Engine switch on (IG)	

A27-12 (DL) - A28-4 (GND)	Center differential lock switch	Center differential lock switch is pressed and held	Below 1.5 V
		Engine switch on (IG) Center differential lock switch is not pressed	11 to 14 V
A27-13 (LO) - A28-4 (GND)	Transfer position switch	Engine switch on (IG) Transfer in high position	11 to 14 V
		Engine switch on (IG) Transfer in low position	Below 1.5 V
A27-14 (P1) - A28-4 (GND)	Center differential lock detection switch	Engine switch on (IG) Center differential in free position	11 to 14 V
		Engine switch on (IG) Center differential in lock position	Below 1.5 V
A27-16 (NP) - A28-4 (GND)	Transfer shift actuator neutral position detection switch	Engine switch on (IG) Transfer in neutral position	Below 1.5 V
		Engine switch on (IG) Transfer in high or low position	11 to 14 V
A27-19 (CAN+) - A27-20 (CAN-)	CAN communication line	Engine switch off	54 to 69 Ω
A27-21 (L4) - A28-4 (GND)	Transfer shift actuator Low detection switch	Engine switch on (IG) Transfer position switch in H4 position	11 to 14 V
		Engine switch on (IG) Transfer position switch in L4 position	Below 1.5 V
A28-2 (HM1) - A28-4 (GND)	High-low transfer shift actuator motor	Engine switch on (IG) Transfer position switch H4 → L4 (During operation of high-low transfer shift actuator motor from high to low)	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
		Engine switch on (IG) Transfer position switch L4 → H4 (During operation of high-low transfer shift actuator motor from low to high)	11 to 14 V
A28-3 (IG) - A28-4 (GND)	IG power	Engine switch on (IG)	11 to 14 V
A28-4 (GND) - Body ground	Ground	Always	Below 1 Ω
A28-6 (HM2) - A28-4 (GND)	High-low transfer shift actuator motor	Engine switch on (IG) Transfer position switch H4 → L4 (During operation of high-low transfer shift actuator motor from high to low)	11 to 14 V
		Engine switch on (IG) Transfer position switch L4 → H4 (During operation of high-low transfer shift actuator motor from low to high)	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
A28-7 (TM2) - A28-4 (GND)	Center differential lock actuator motor	Engine switch on (IG) Center differential position free → lock	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V
		Engine switch on (IG) Center differential position lock → free	11 to 14 V
A28-8 (TM1) - A28-4 (GND)	Center differential lock actuator motor	Engine switch on (IG) Center differential position free → lock	11 to 14 V
		Engine switch on (IG) Center differential position lock → free	Below 1.5 V or alternating between below 1.5 V and 11 to 14 V

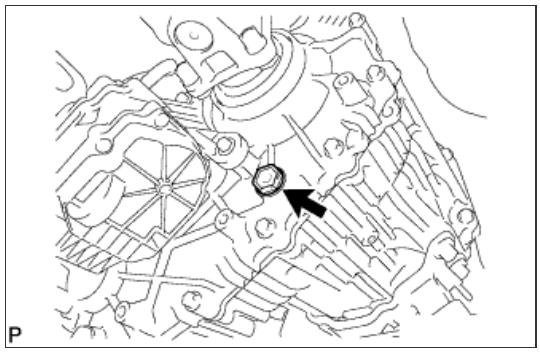
*: w/ Temperature Sensor

If there is a malfunction, inspect the harnesses, connectors, transfer position switch, center differential lock switch, and transfer shift actuator assembly. If these are normal, replace the four wheel drive control ECU (Click here).

for Preparation Click here

1. CHECK TRANSFER OIL LEVEL

a. Remove the filler plug and gasket.



b. Check that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.
If the result is not as specified, add transfer oil.

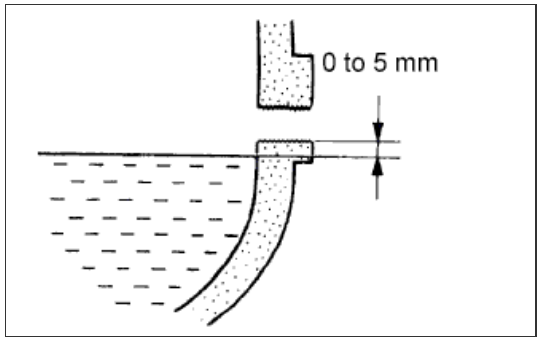
Oil Grade:
GL-5

Viscosity:
SAE 75W-90

Standard Capacity:
1.4 to 1.5 liters (1.47 to 1.59 US qts., 1.23 to 1.32 Imp. qts.)

NOTICE:

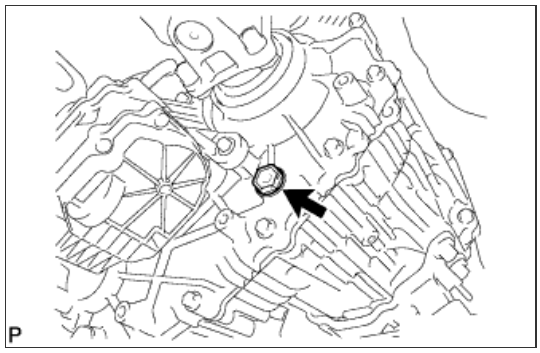
Too much or too little oil will lead to transfer problems.



c. When the oil level is too low, check for oil leaks.

d. Install a new gasket to the filler plug and then install the plug.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



2. ADD TRANSFER OIL

a. Remove the filler plug and gasket.

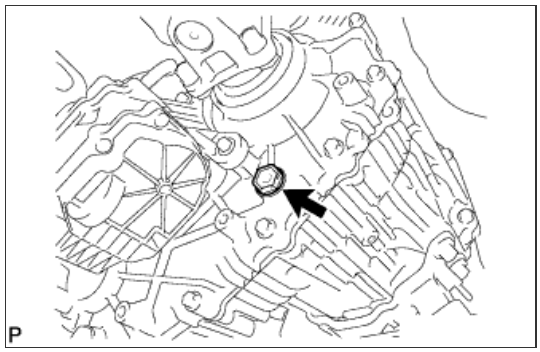
b. Add oil so that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.

NOTICE:

- **Add oil slowly.**
- **Add oil a little at a time, waiting several minutes between each**

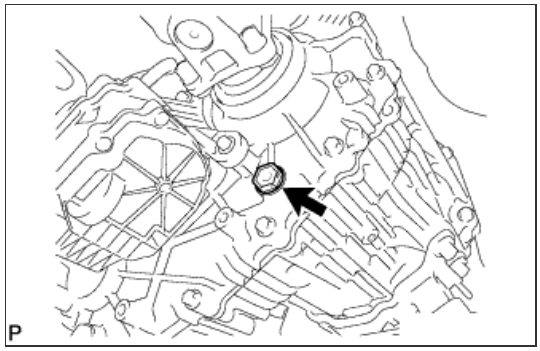
addition of oil.

c. Wait approximately 5 minutes and check that the oil level has not changed.



d. Install a new gasket to the filler plug and then install the plug.

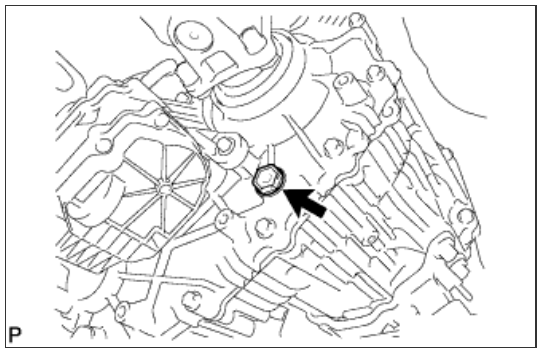
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



for Preparation Click here

1. CHECK TRANSFER OIL LEVEL

a. Remove the filler plug and gasket.



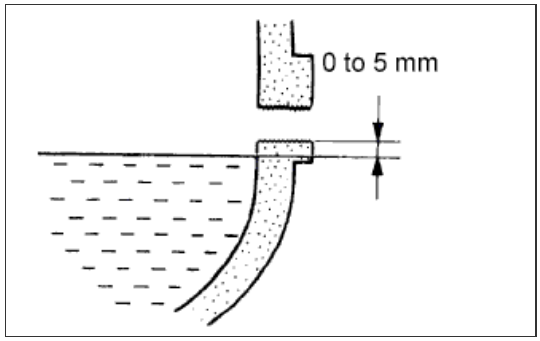
b. Check that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.
If the result is not as specified, add transfer gear oil LF.

Viscosity:
SAE 75W

Standard Capacity:
1.4 to 1.5 liters (1.5 to 1.6 US qts., 1.2 to 1.3 Imp. qts.)

NOTICE:

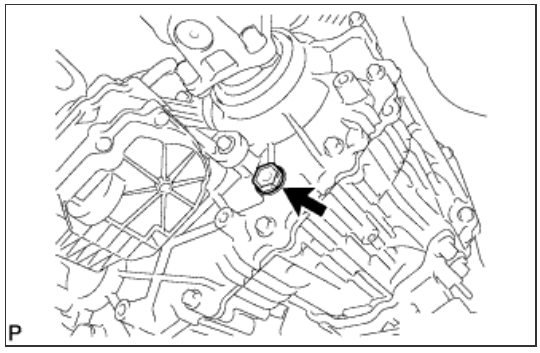
Too much or too little oil will lead to transfer problems.



c. When the oil level is too low, check for oil leaks.

d. Install a new gasket to the filler plug and then install the plug.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



2. ADD TRANSFER OIL

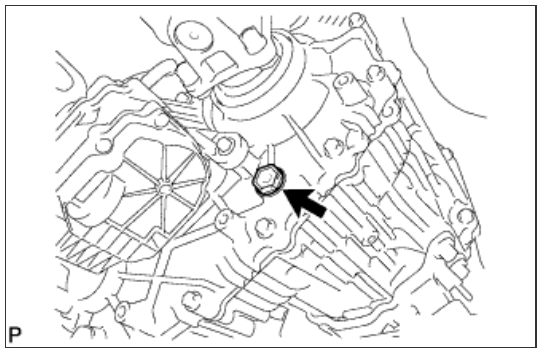
a. Remove the filler plug and gasket.

b. Add oil so that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.

NOTICE:

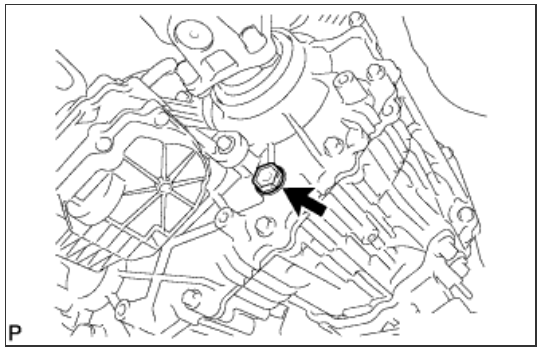
- **Add oil slowly.**
- **Add oil a little at a time, waiting several minutes between each addition of oil.**

c. Wait approximately 5 minutes and check that the oil level has not changed.



d. Install a new gasket to the filler plug and then install the plug.

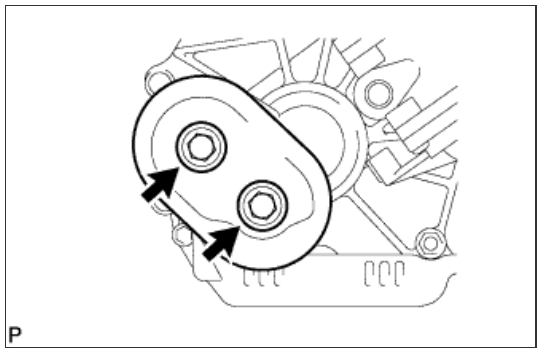
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



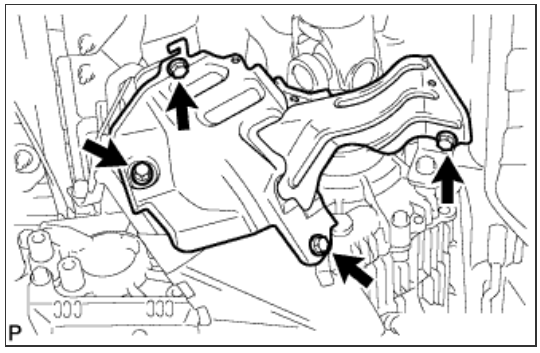
for Preparation Click here

1. DRAIN TRANSFER OIL

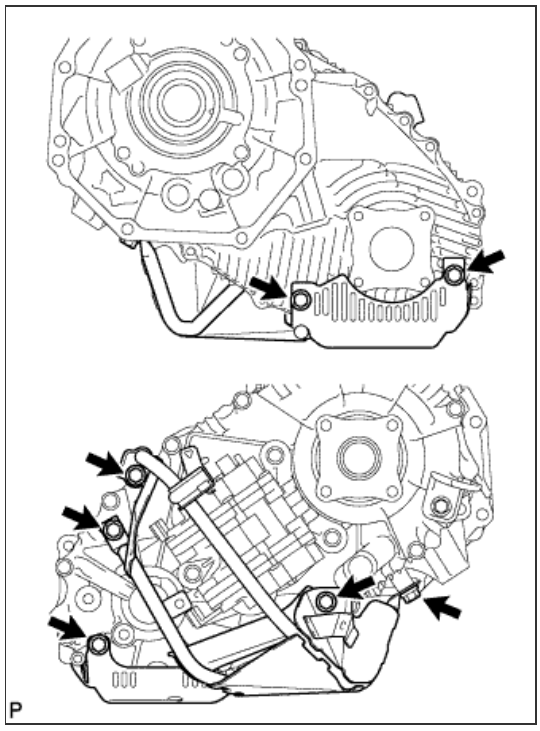
a. Remove the 2 bolts and transfer dynamic damper.



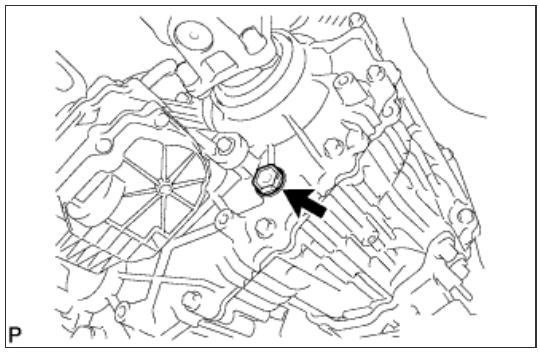
b. Remove the 4 bolts and transfer heat insulator.



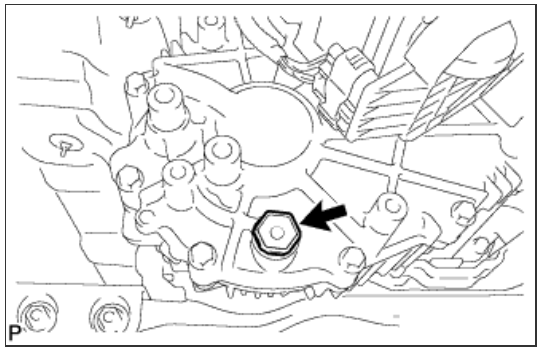
c. Remove the 7 bolts and lower transfer case protector.



d. Remove the filler plug and gasket.



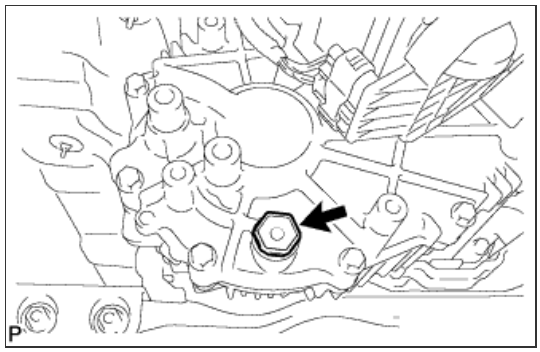
e. Remove the drain plug and gasket, and drain the transfer oil.



2. ADD TRANSFER OIL

a. Install a new gasket to the drain plug and then install the plug.

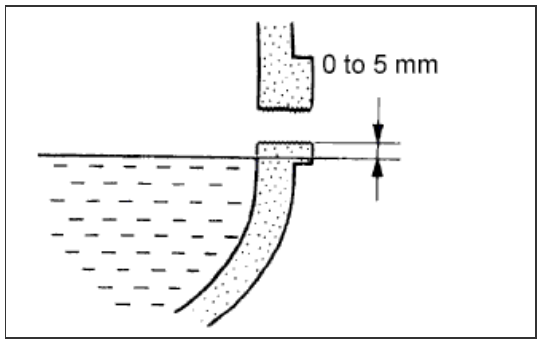
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



b. Add oil so that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.

NOTICE:

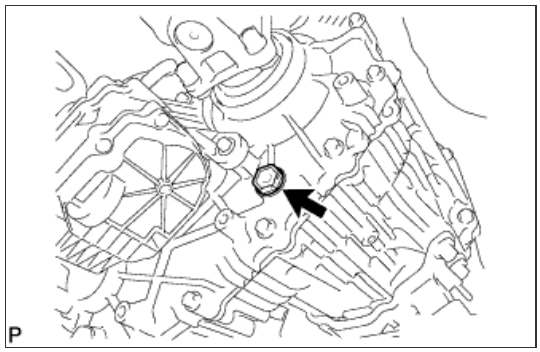
- **Add oil slowly.**
- **Add oil a little at a time, waiting several minutes between each addition of oil.**



c. Wait approximately 5 minutes and check that the oil level has not changed.

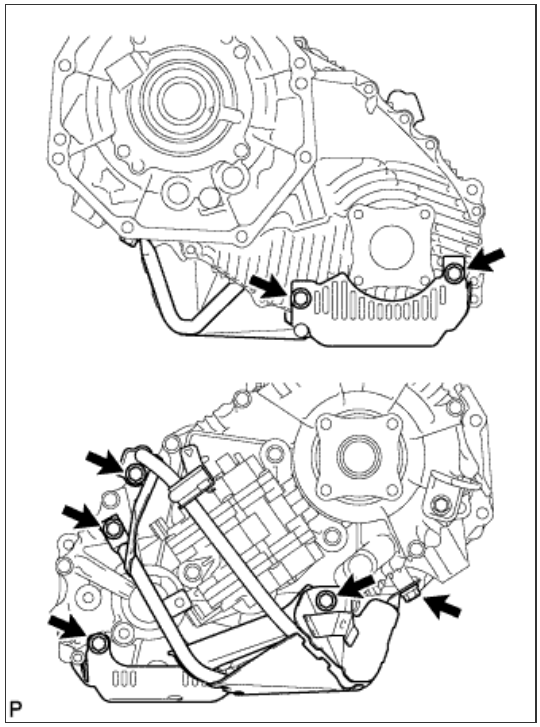
d. Install a new gasket to the filler plug and then install the plug.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



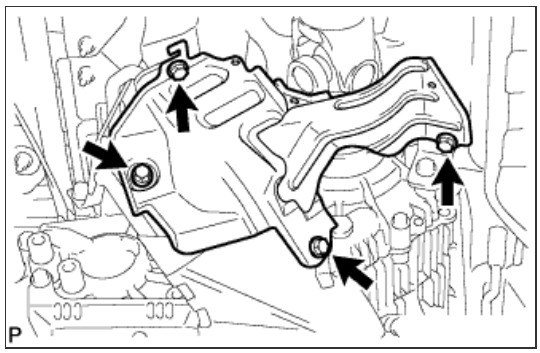
e. Install the lower transfer case protector with the 7 bolts.

Torque:
14 N*m{ 139 kgf*cm , 10 ft.*lbf }



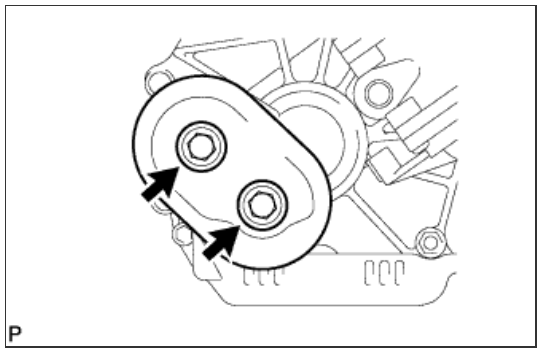
f. Install the transfer heat insulator with the 4 bolts.

Torque:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }

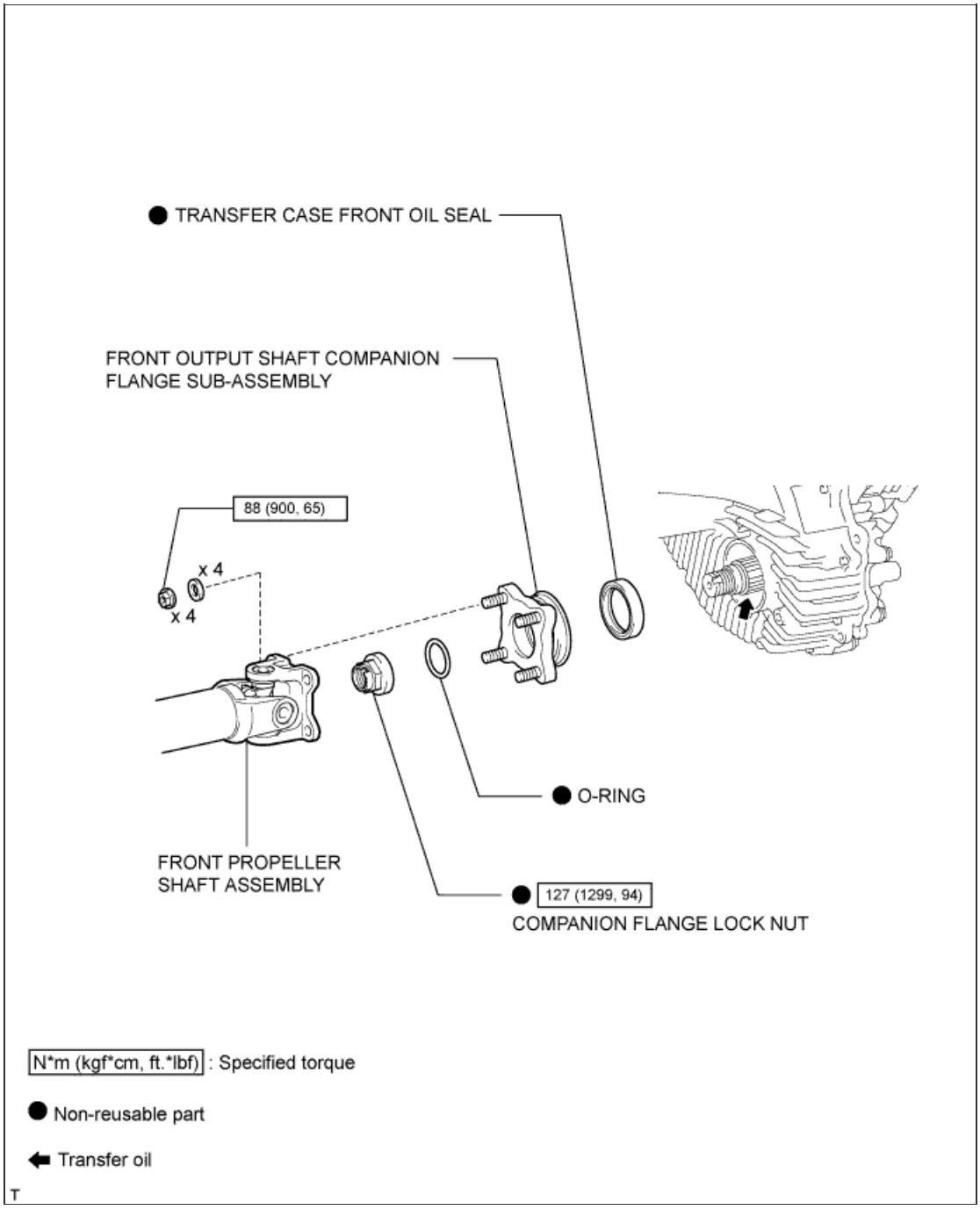


g. Install the transfer dynamic damper with the 2 bolts.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



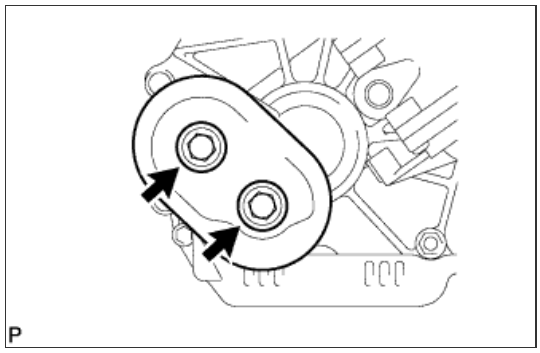
for Preparation Click here



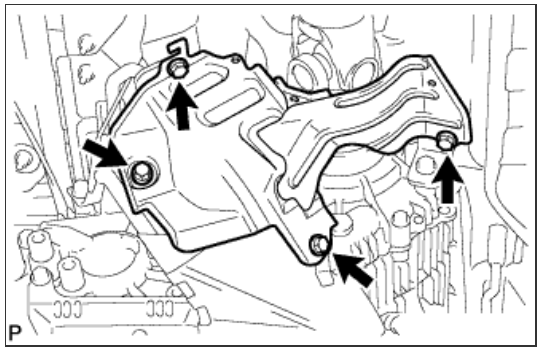
for Preparation Click here

1. DRAIN TRANSFER OIL

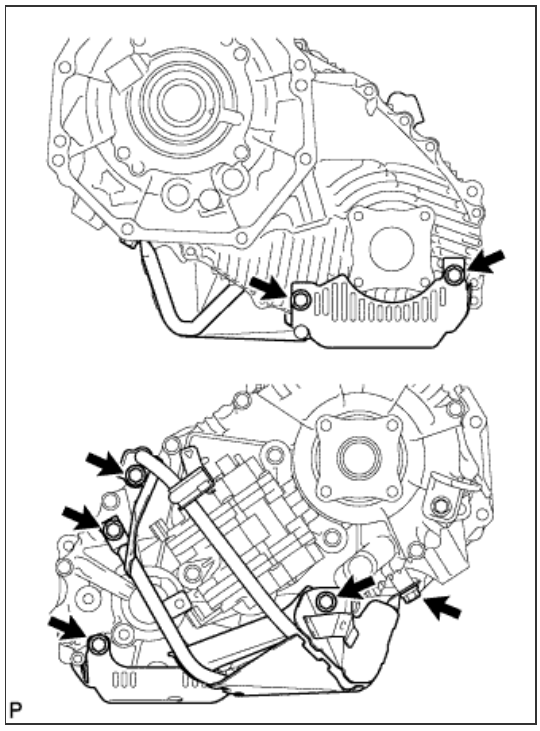
a. Remove the 2 bolts and transfer dynamic damper.



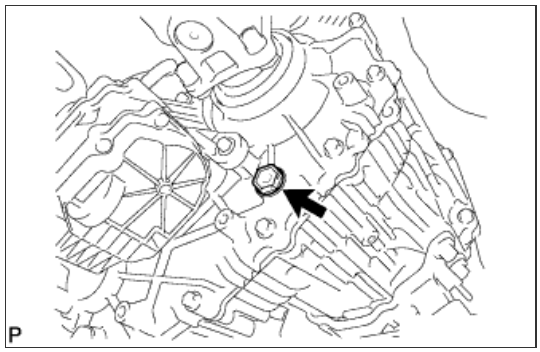
b. Remove the 4 bolts and transfer heat insulator.



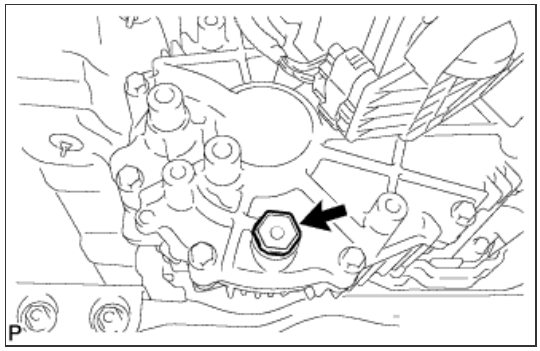
c. Remove the 7 bolts and lower transfer case protector.



d. Remove the filler plug and gasket.



e. Remove the drain plug and gasket, and drain the transfer oil.



2. REMOVE FRONT PROPELLER SHAFT ASSEMBLY

a. Remove the front propeller shaft (Click here).

3. REMOVE FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

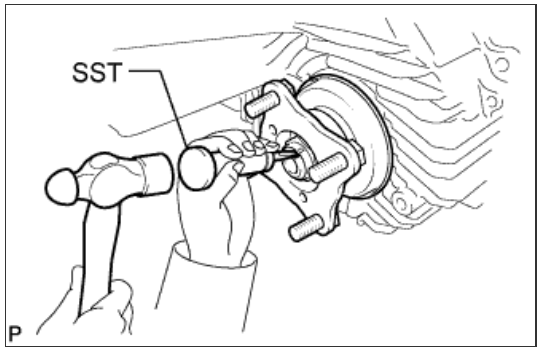
a. Using SST and a hammer, release the staked part of the nut.

SST

09930-00010 (09931-00010, 09931-00020)

NOTICE:

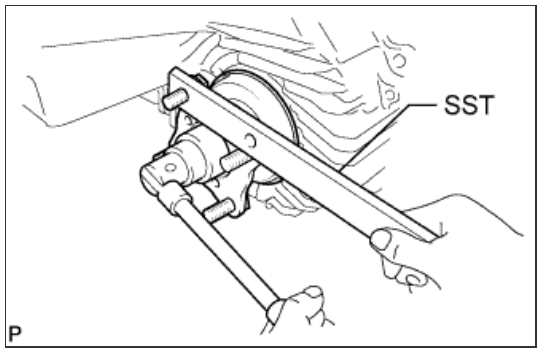
- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the transfer driven sprocket.**



b. Using SST to hold the companion flange, remove the lock nut.

SST

09330-00021

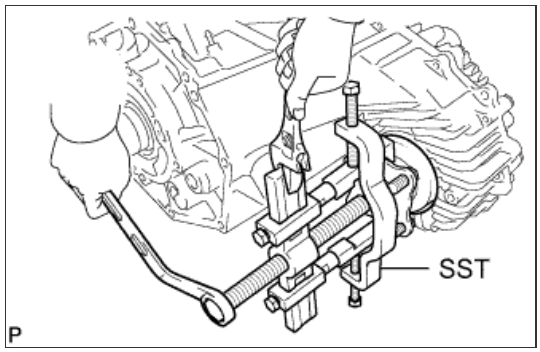


c. Using SST, remove the companion flange.

SST

09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



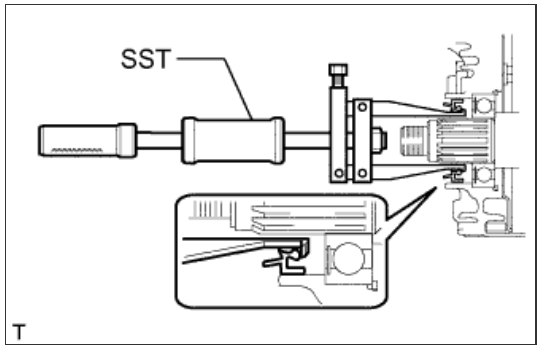
4. REMOVE TRANSFER CASE FRONT OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

NOTICE:

Be careful not to damage the oil seal and front transfer case contact surface.

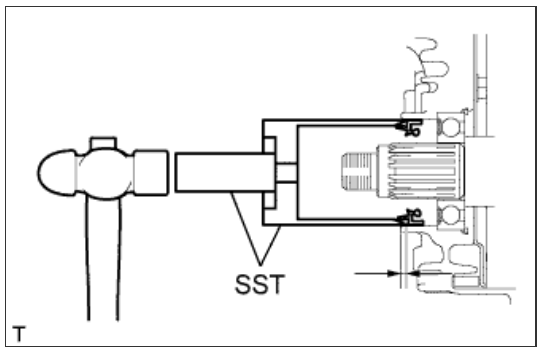


5. INSTALL TRANSFER CASE FRONT OIL SEAL

a. Apply transfer oil to the spline of the driven sprocket.

b. Using SST and a hammer, tap in a new oil seal until its surface is 1 to 1.5 mm (0.0394 to 0.0590 in.) from the case upper surface.

SST
09649-17010
09950-70010 (09951-07150)



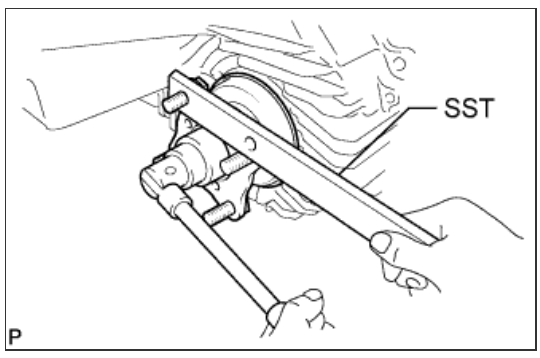
6. INSTALL FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the drive sprocket.

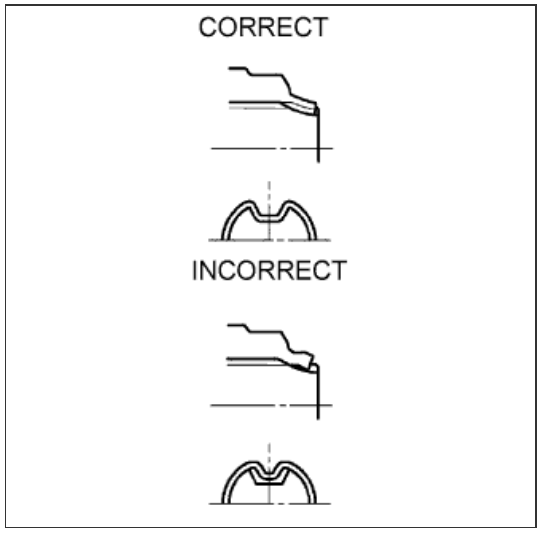
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.



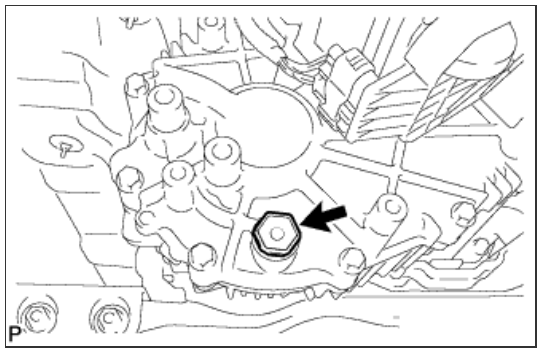
7. INSTALL FRONT PROPELLER SHAFT ASSEMBLY

a. Install the front propeller shaft (Click here).

8. ADD TRANSFER OIL

a. Install a new gasket to the drain plug and then install the plug.

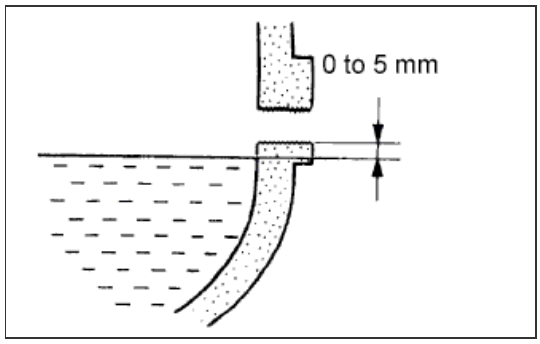
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



b. Add oil so that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.

NOTICE:

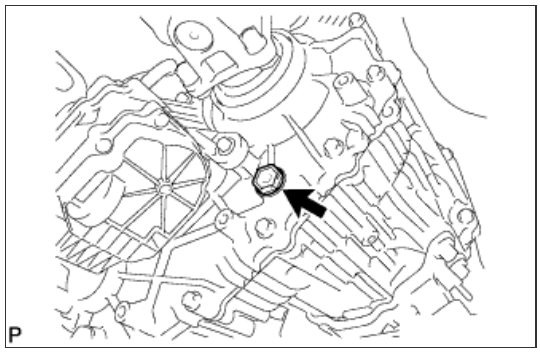
- **Add oil slowly.**
- **Add oil a little at a time, waiting several minutes between each addition of oil.**



c. Wait approximately 5 minutes and check that the oil level has not changed.

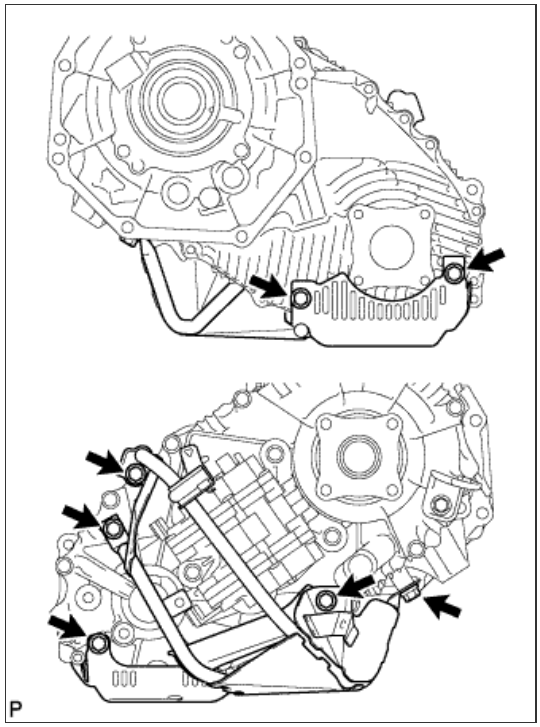
d. Install a new gasket to the filler plug and then install the plug.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



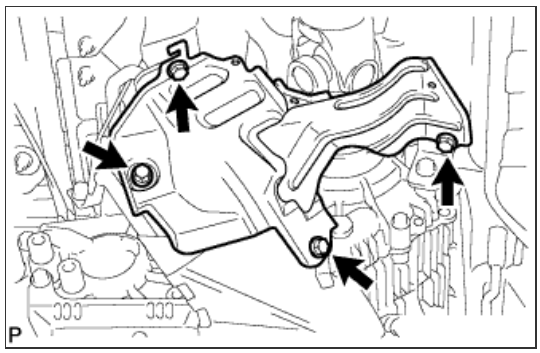
e. Install the lower transfer case protector with the 7 bolts.

Torque:
14 N*m{ 139 kgf*cm , 10 ft.*lbf }



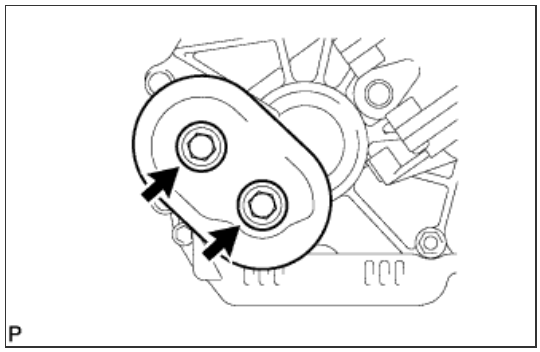
f. Install the transfer heat insulator with the 4 bolts.

Torque:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }



g. Install the transfer dynamic damper with the 2 bolts.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }

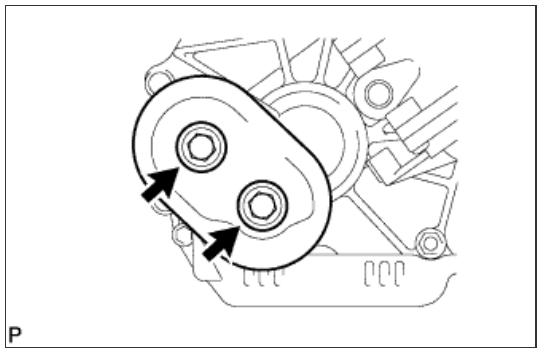


9. CHECK FOR TRANSFER OIL LEAK

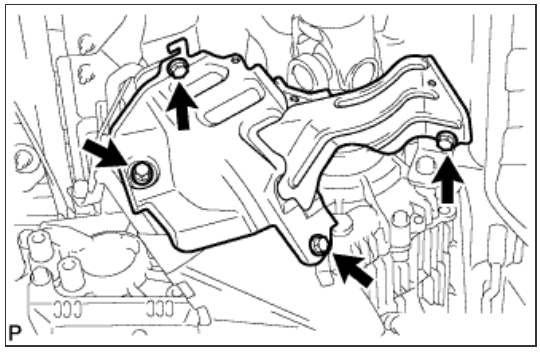
for Preparation Click here

1. DRAIN TRANSFER OIL

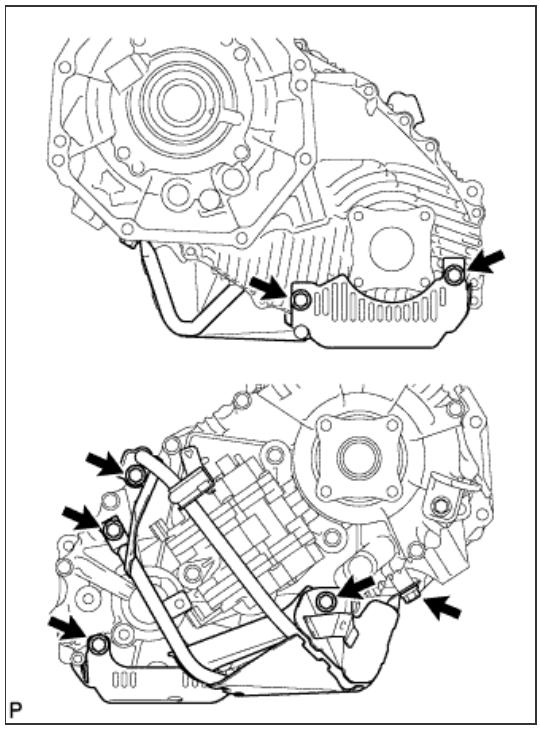
a. Remove the 2 bolts and transfer dynamic damper.



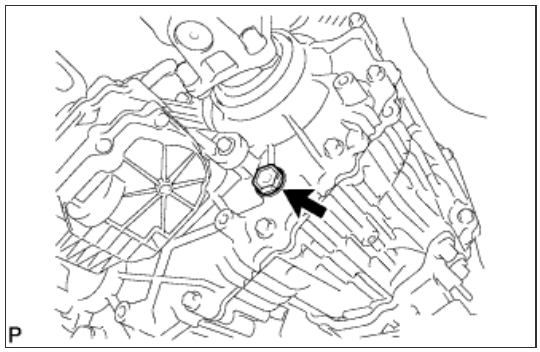
b. Remove the 4 bolts and transfer heat insulator.



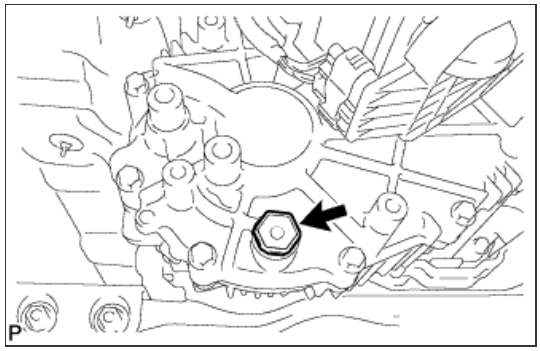
c. Remove the 7 bolts and lower transfer case protector.



d. Remove the filler plug and gasket.



e. Remove the drain plug and gasket, and drain the transfer oil.



2. REMOVE FRONT PROPELLER SHAFT ASSEMBLY

a. Remove the front propeller shaft (Click here).

3. REMOVE FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

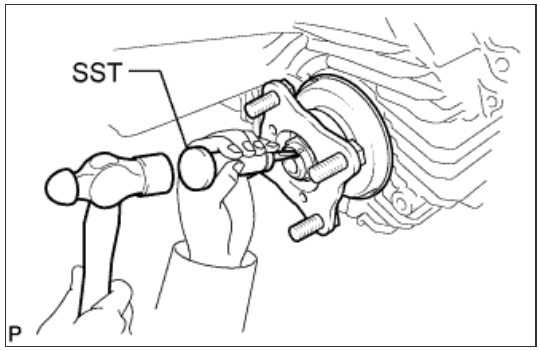
a. Using SST and a hammer, release the staked part of the nut.

SST

09930-00010 (09931-00010, 09931-00020)

NOTICE:

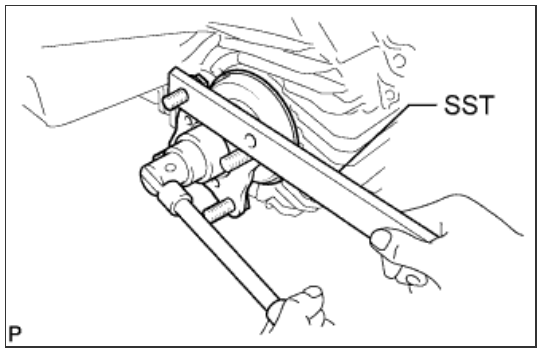
- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the transfer driven sprocket.**



b. Using SST to hold the companion flange, remove the lock nut.

SST

09330-00021

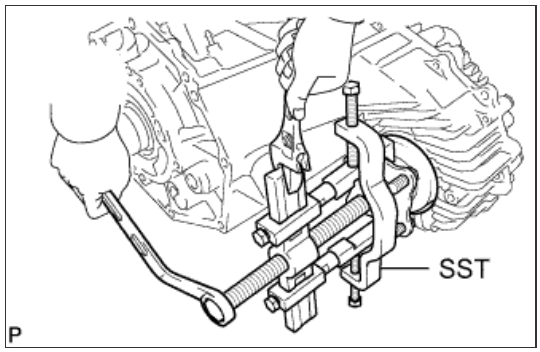


c. Using SST, remove the companion flange.

SST

09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



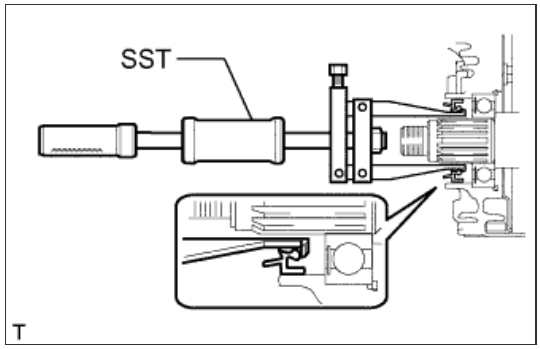
4. REMOVE TRANSFER CASE FRONT OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

NOTICE:

Be careful not to damage the oil seal and front transfer case contact surface.

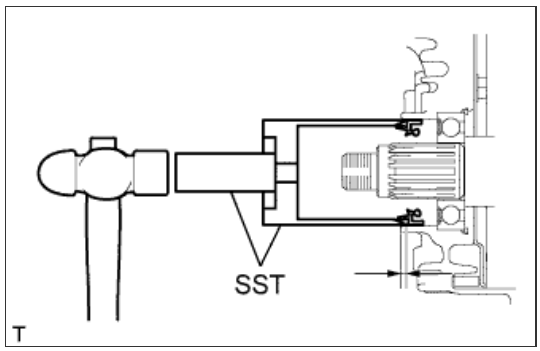


5. INSTALL TRANSFER CASE FRONT OIL SEAL

a. Apply transfer oil to the spline of the driven sprocket.

b. Using SST and a hammer, tap in a new oil seal until its surface is 1 to 1.5 mm (0.0394 to 0.0590 in.) from the case upper surface.

SST
09649-17010
09950-70010 (09951-07150)



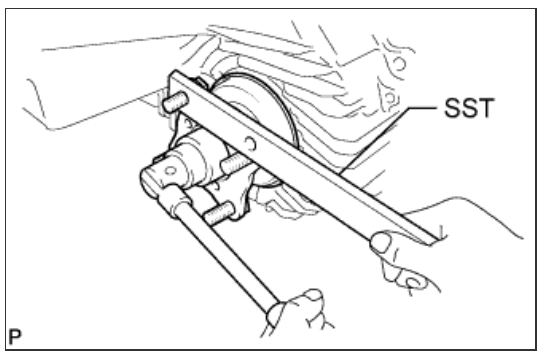
6. INSTALL FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the drive sprocket.

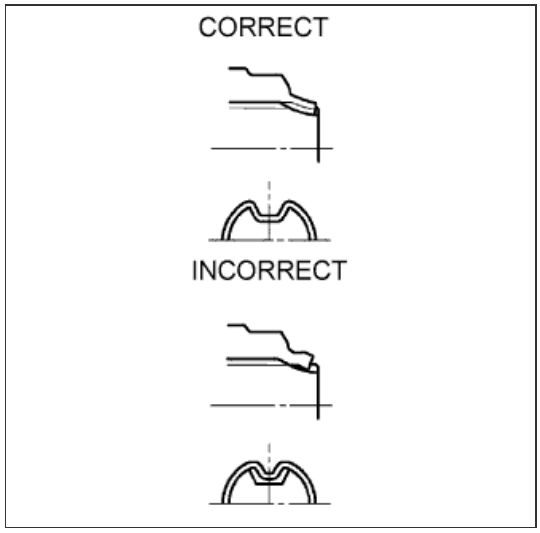
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.



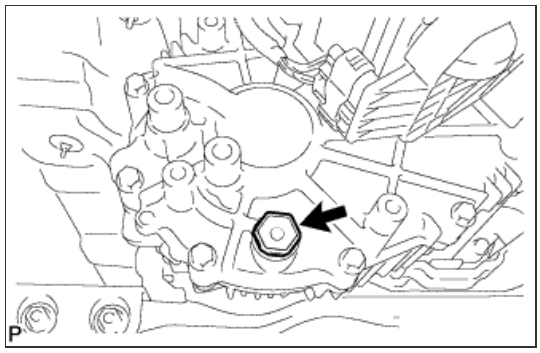
7. INSTALL FRONT PROPELLER SHAFT ASSEMBLY

a. Install the front propeller shaft (Click here).

8. ADD TRANSFER OIL

a. Install a new gasket to the drain plug and then install the plug.

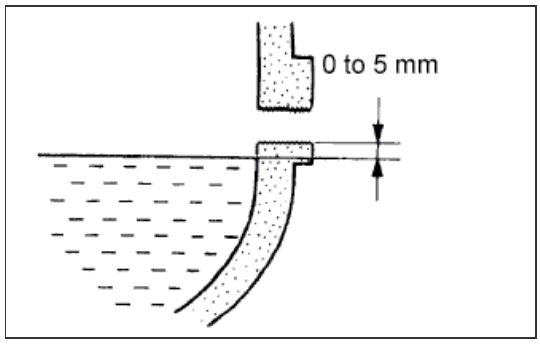
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



b. Add oil so that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.

NOTICE:

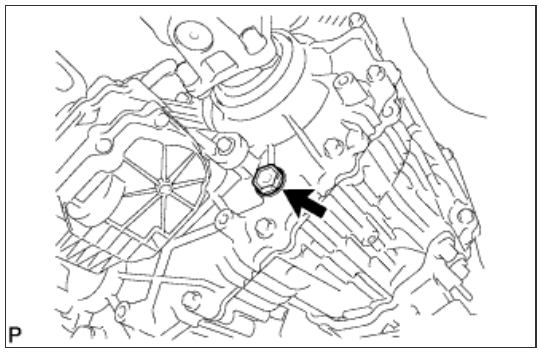
- **Add oil slowly.**
- **Add oil a little at a time, waiting several minutes between each addition of oil.**



c. Wait approximately 5 minutes and check that the oil level has not changed.

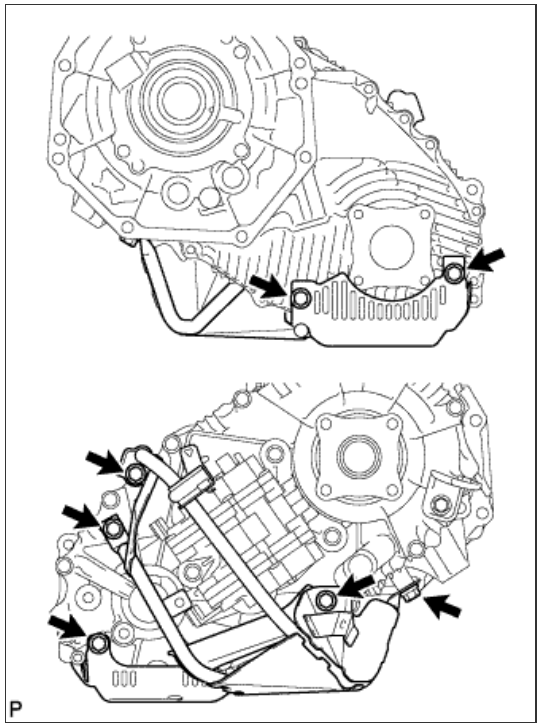
d. Install a new gasket to the filler plug and then install the plug.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



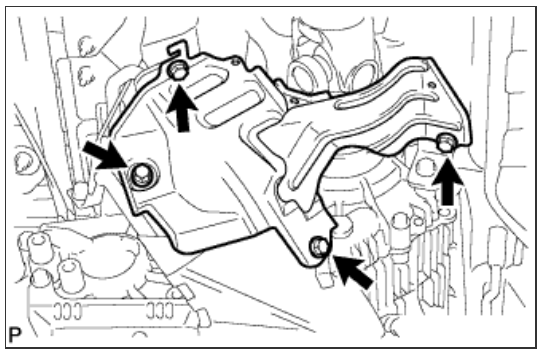
e. Install the lower transfer case protector with the 7 bolts.

Torque:
14 N*m{ 139 kgf*cm , 10 ft.*lbf }



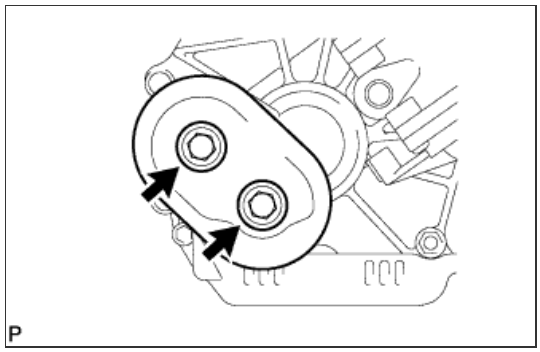
f. Install the transfer heat insulator with the 4 bolts.

Torque:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }



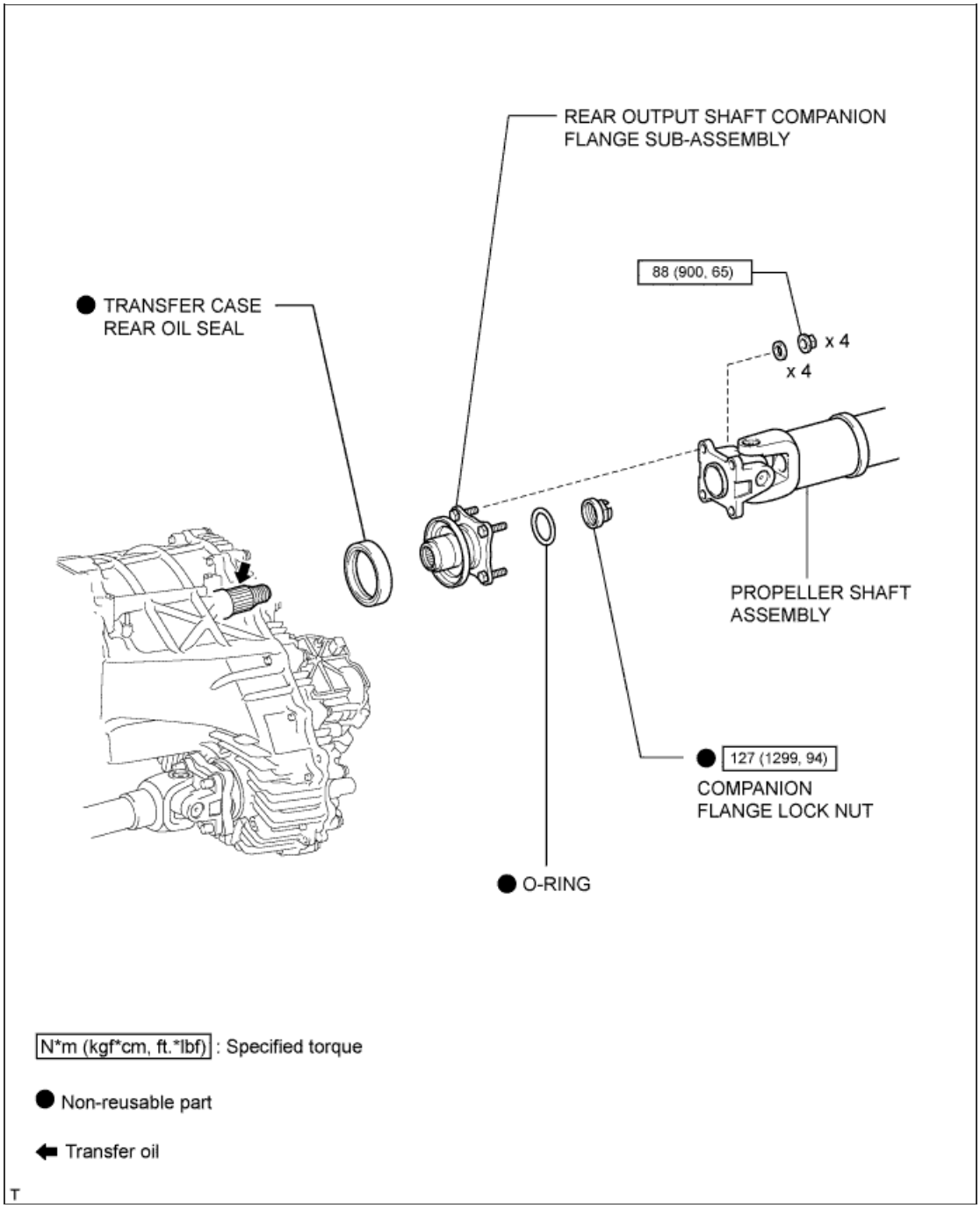
g. Install the transfer dynamic damper with the 2 bolts.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



9. CHECK FOR TRANSFER OIL LEAK

for Preparation Click here



for Preparation Click here

1. REMOVE PROPELLER SHAFT ASSEMBLY

a. Remove the propeller shaft assembly (Click here).

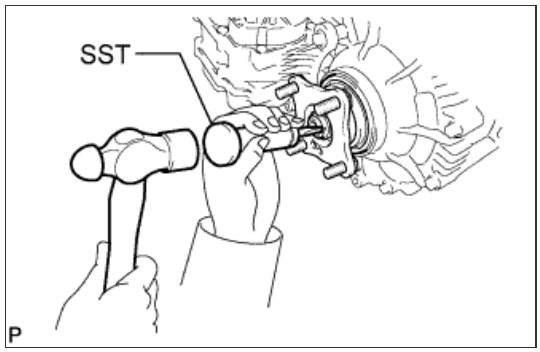
2. REMOVE REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Using SST and a hammer, release the staked part of the nut.

SST
09930-00010 (09931-00010, 09931-00020)

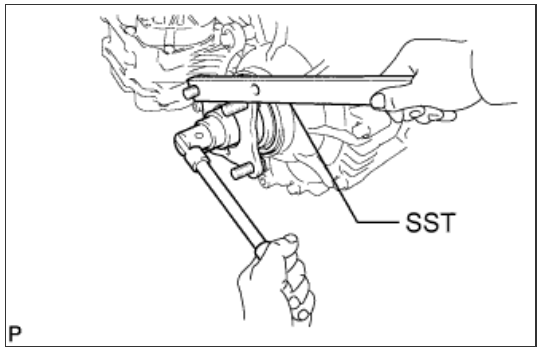
NOTICE:

- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the rear transfer output shaft.**



b. Using SST to hold the companion flange, remove the lock nut.

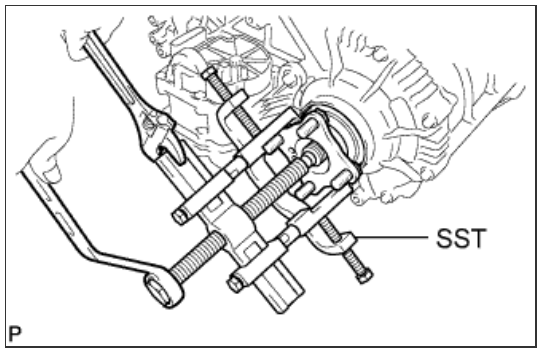
SST
09330-00021



c. Using SST, remove the companion flange.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



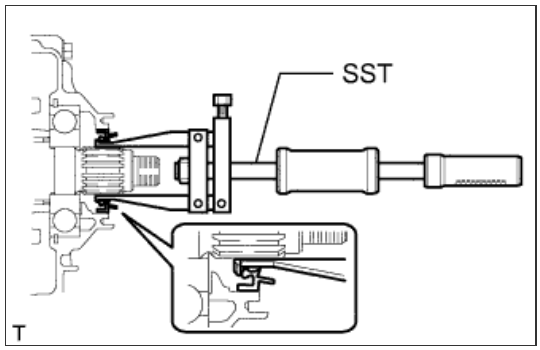
3. REMOVE TRANSFER CASE REAR OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

NOTICE:

Be careful not to damage the oil seal and rear transfer case contact surface.

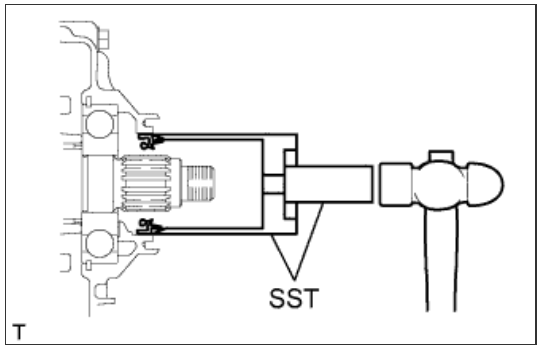


4. INSTALL TRANSFER CASE REAR OIL SEAL

a. Apply transfer oil to the spline of the output shaft.

b. Using SST and a hammer, tap in a new oil seal until its surface is flush with the housing upper surface.

SST
09649-17010
09950-70010 (09951-07150)



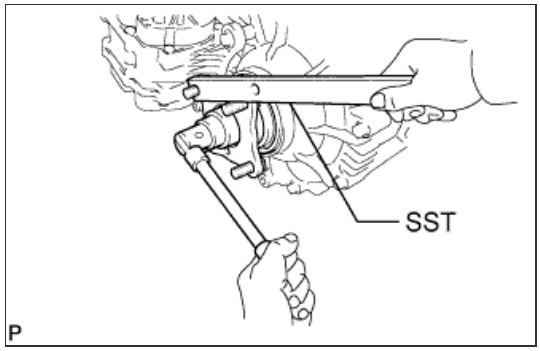
5. INSTALL REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the output shaft.

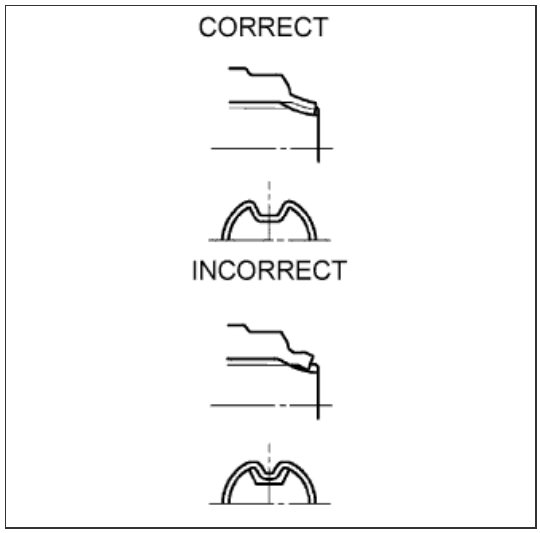
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.



6. INSTALL PROPELLER SHAFT ASSEMBLY

a. Install the propeller shaft assembly (Click here).

for Preparation Click here

1. REMOVE PROPELLER SHAFT ASSEMBLY

a. Remove the propeller shaft assembly (Click here).

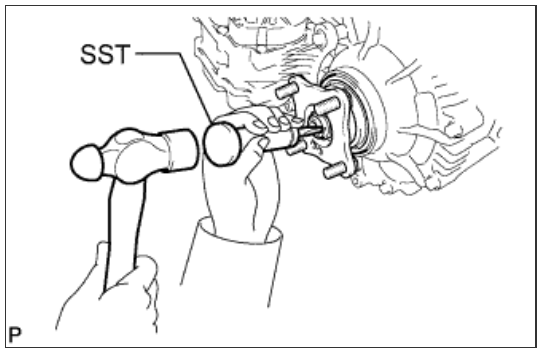
2. REMOVE REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Using SST and a hammer, release the staked part of the nut.

SST
09930-00010 (09931-00010, 09931-00020)

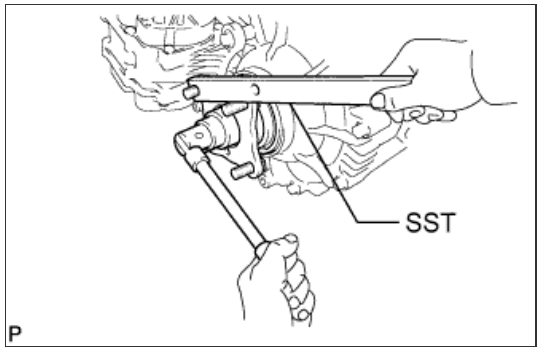
NOTICE:

- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the rear transfer output shaft.**



b. Using SST to hold the companion flange, remove the lock nut.

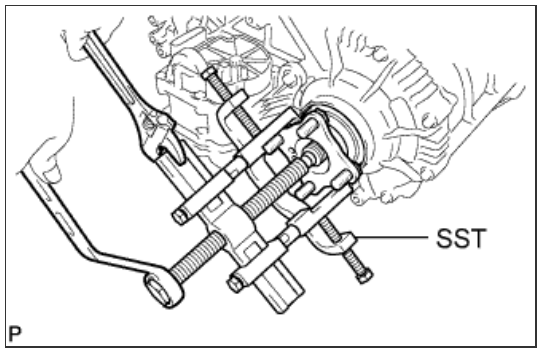
SST
09330-00021



c. Using SST, remove the companion flange.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



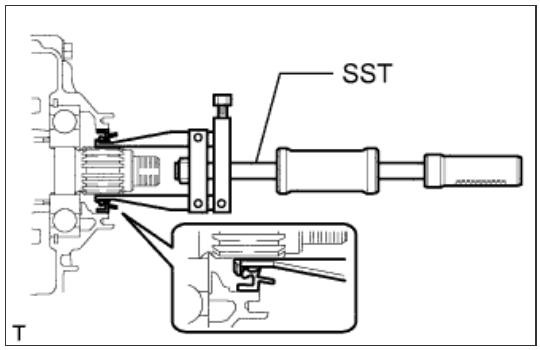
3. REMOVE TRANSFER CASE REAR OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

NOTICE:

Be careful not to damage the oil seal and rear transfer case contact surface.

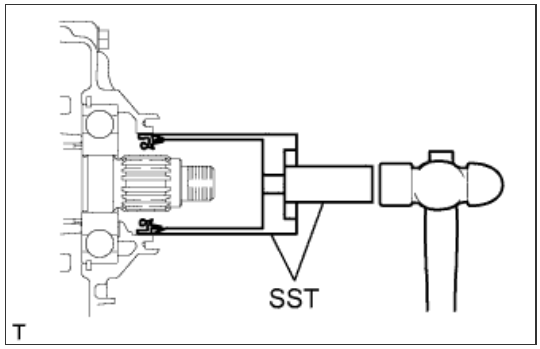


4. INSTALL TRANSFER CASE REAR OIL SEAL

a. Apply transfer oil to the spline of the output shaft.

b. Using SST and a hammer, tap in a new oil seal until its surface is flush with the housing upper surface.

SST
09649-17010
09950-70010 (09951-07150)



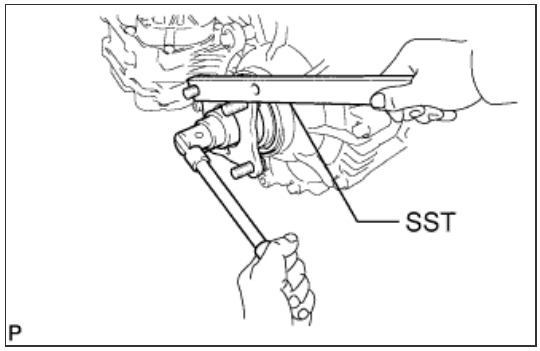
5. INSTALL REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the output shaft.

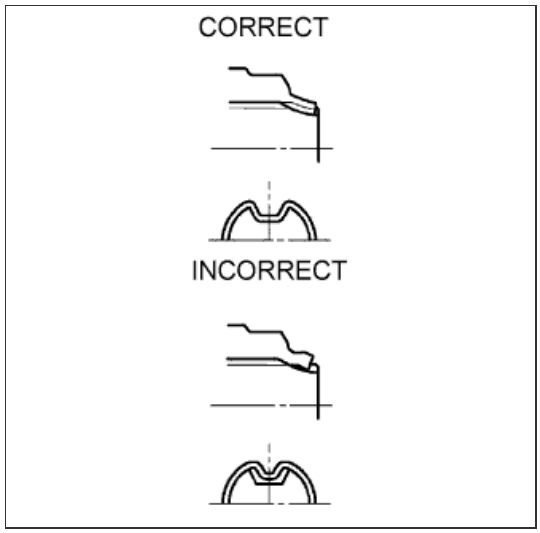
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



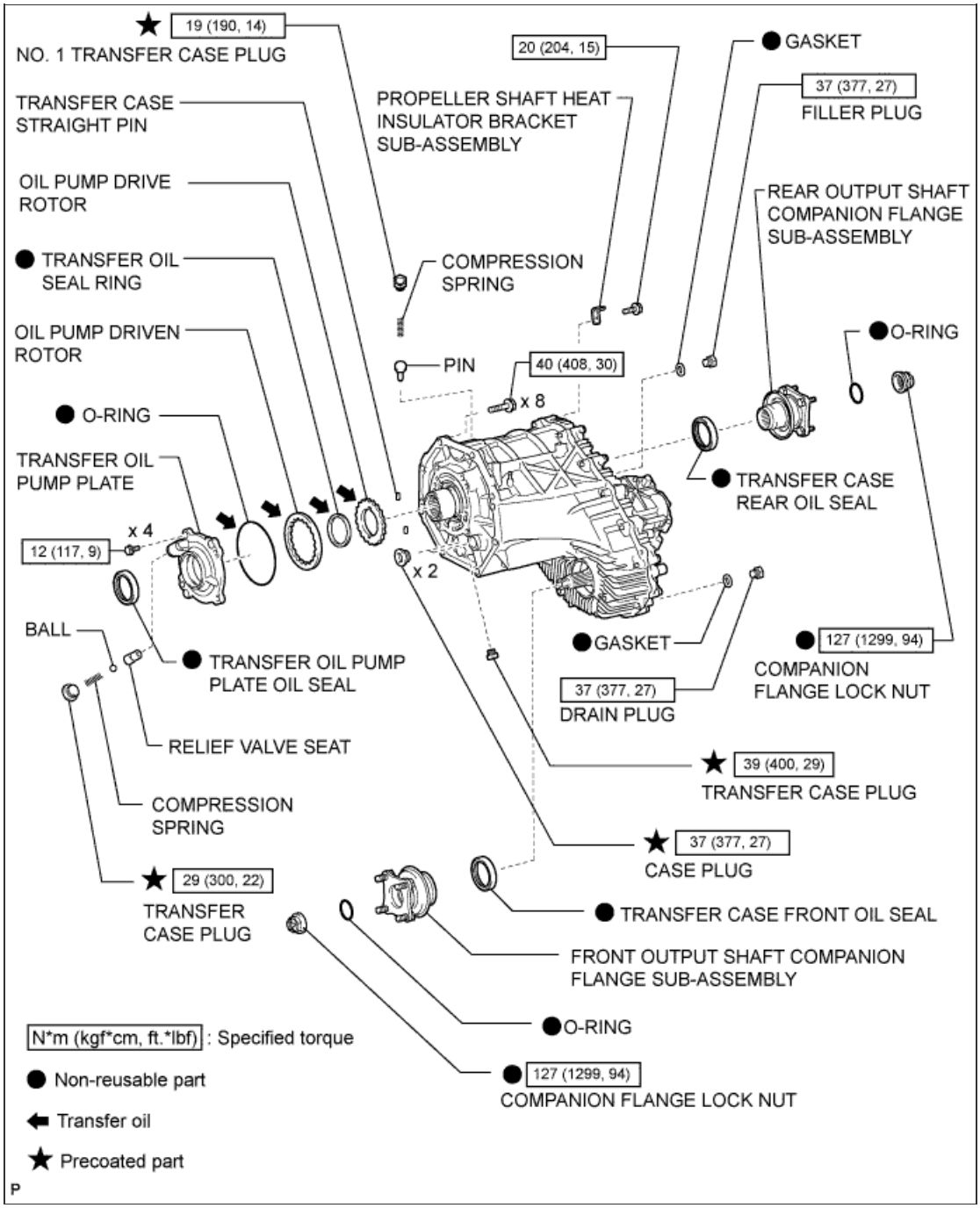
c. Using a chisel and hammer, stake the companion flange lock nut.

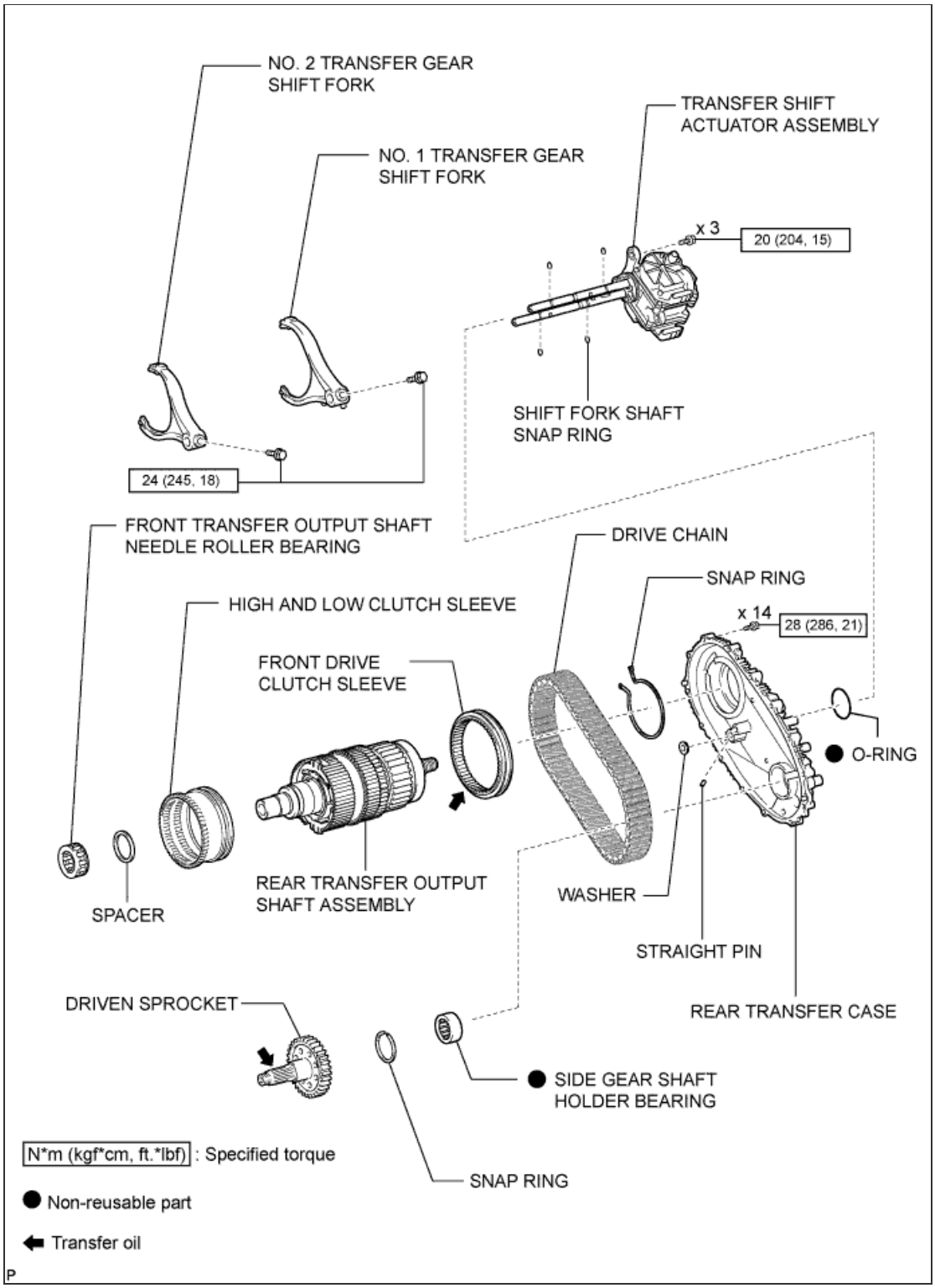


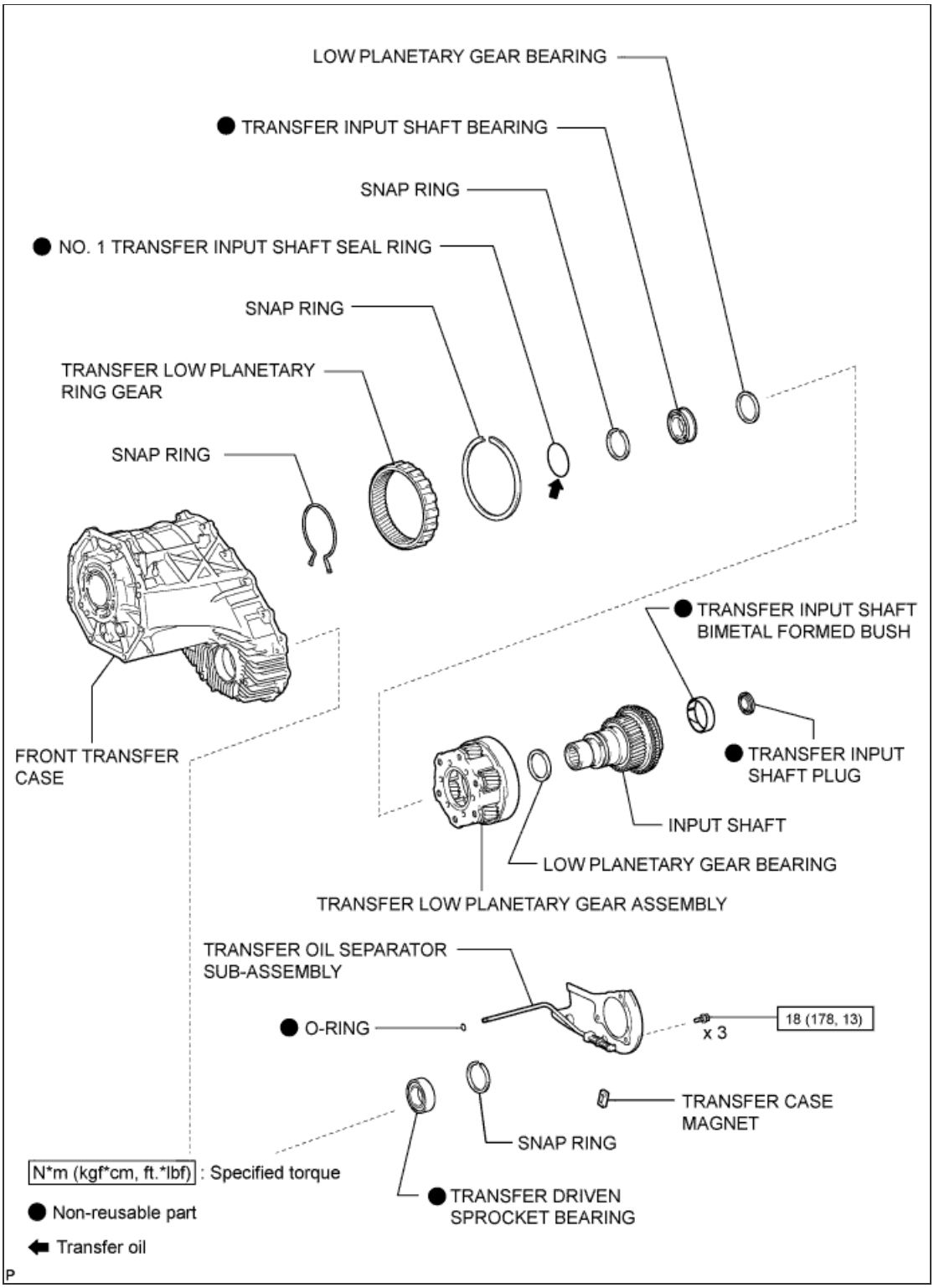
6. INSTALL PROPELLER SHAFT ASSEMBLY

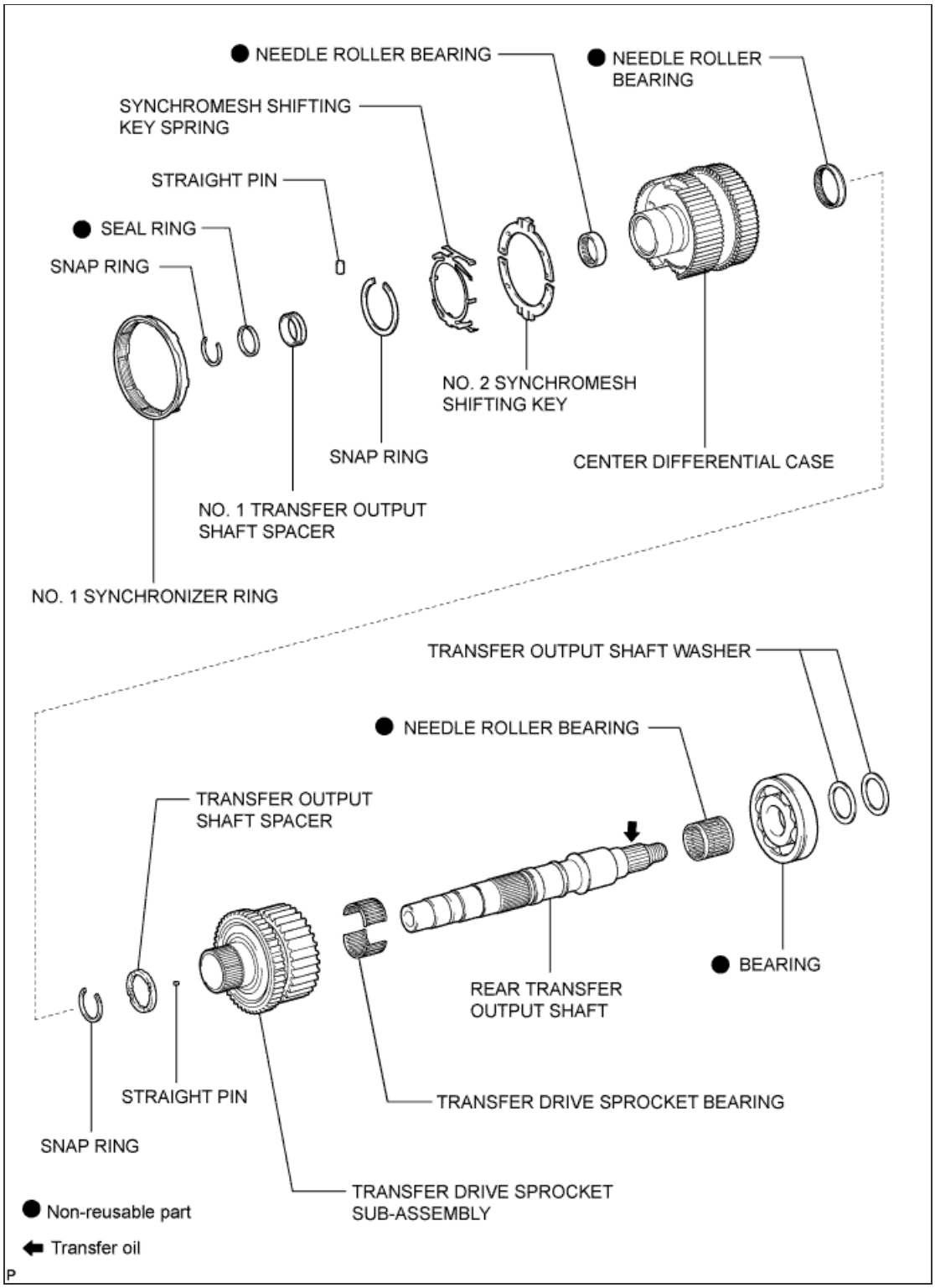
a. Install the propeller shaft assembly (Click here).

for Preparation [Click here]

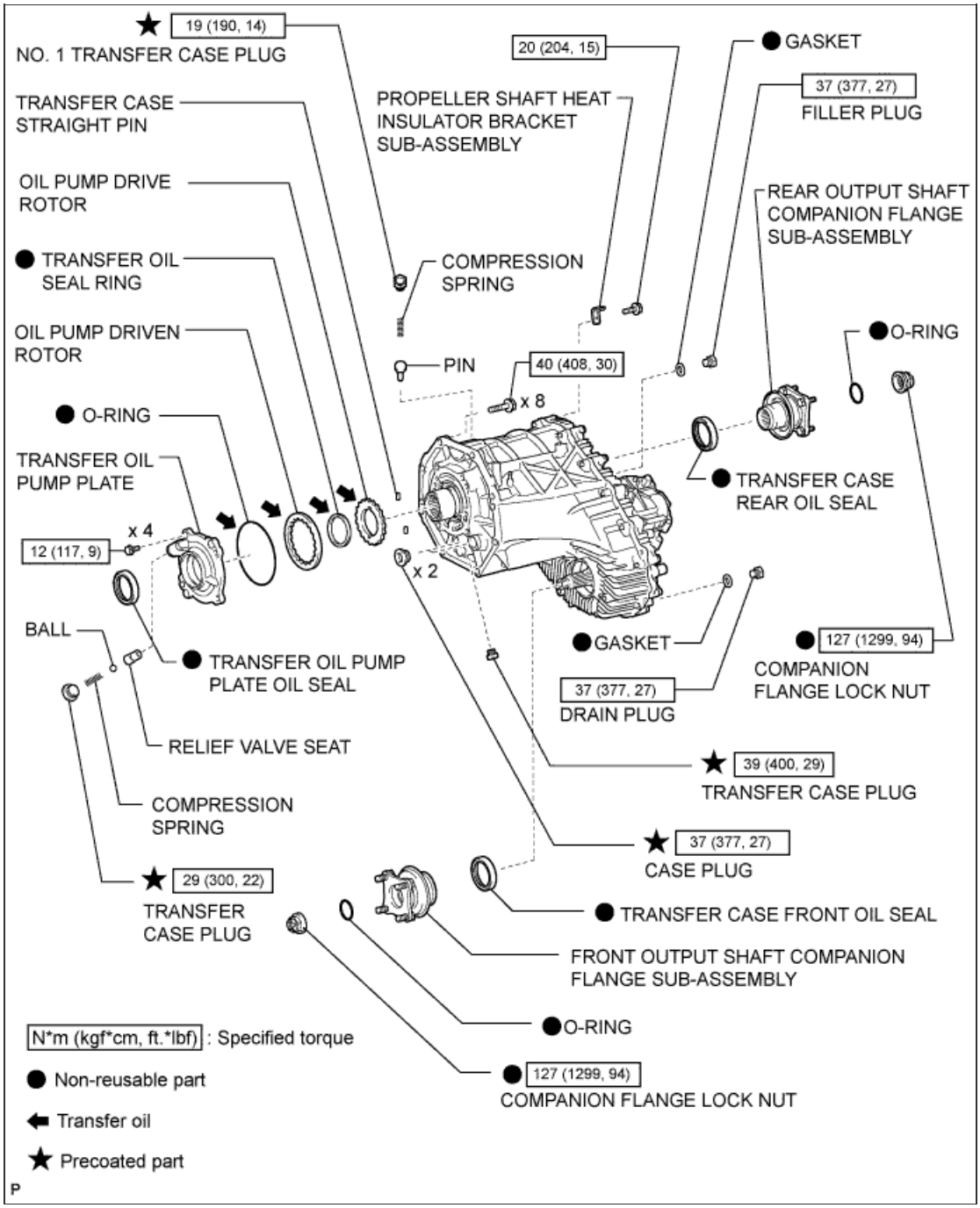


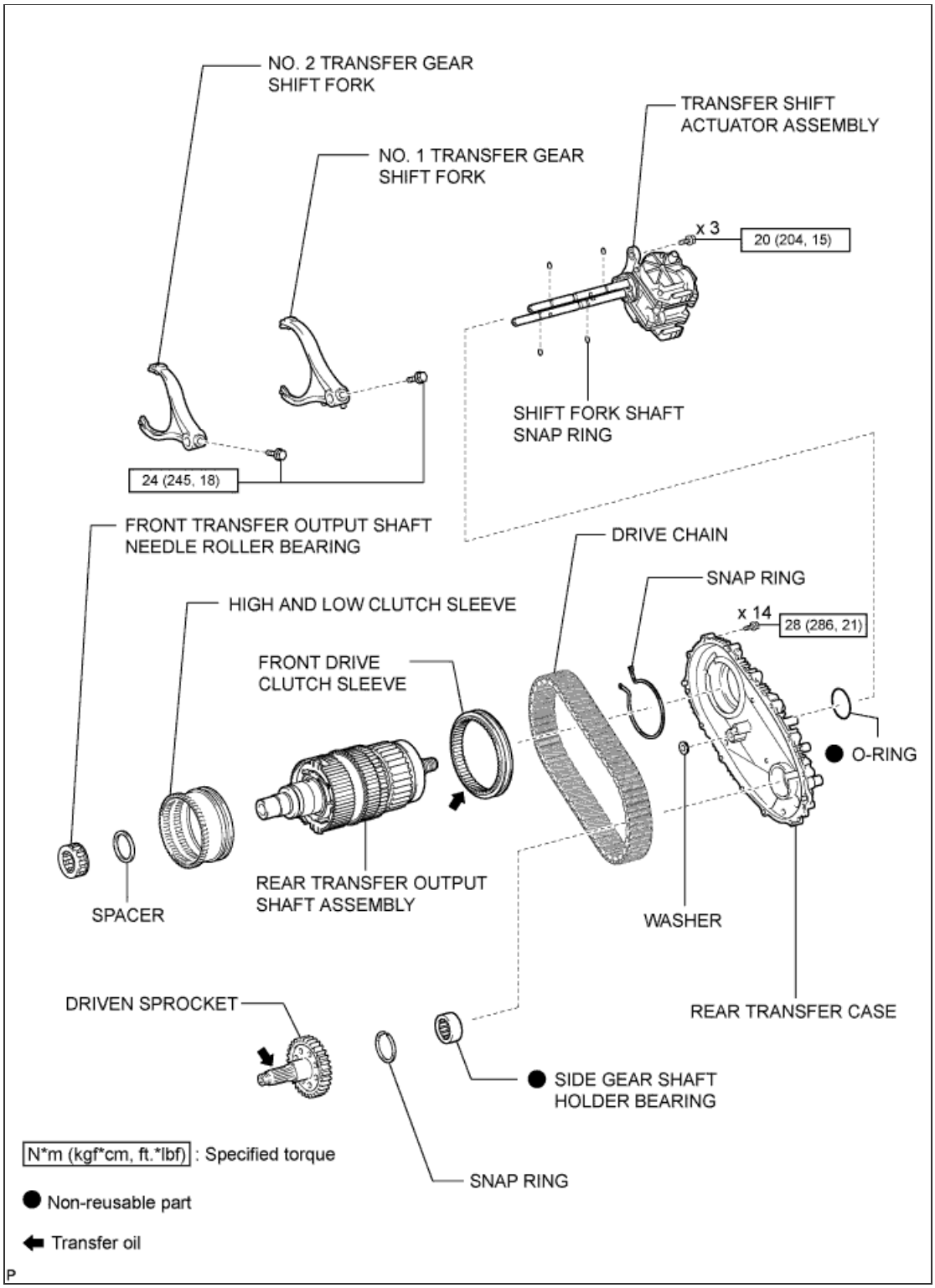

NO. 2 TRANSFER GEAR SHIFT FORK
NO. 1 TRANSFER GEAR SHIFT FORK
TRANSFER SHIFT ACTUATOR ASSEMBLY
x 3
20 (204, 15)
SHIFT FORK SHAFT SNAP RING
24 (245, 18)
FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING
DRIVE CHAIN
SNAP RING
HIGH AND LOW CLUTCH SLEEVE
x 14
28 (286, 21)
FRONT DRIVE CLUTCH SLEEVE
O-RING
SPACER
REAR TRANSFER OUTPUT SHAFT ASSEMBLY
WASHER
STRAIGHT PIN
REAR TRANSFER CASE
DRIVEN SPROCKET
SIDE GEAR SHAFT HOLDER BEARING
SNAP RING
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Transfer oil
P

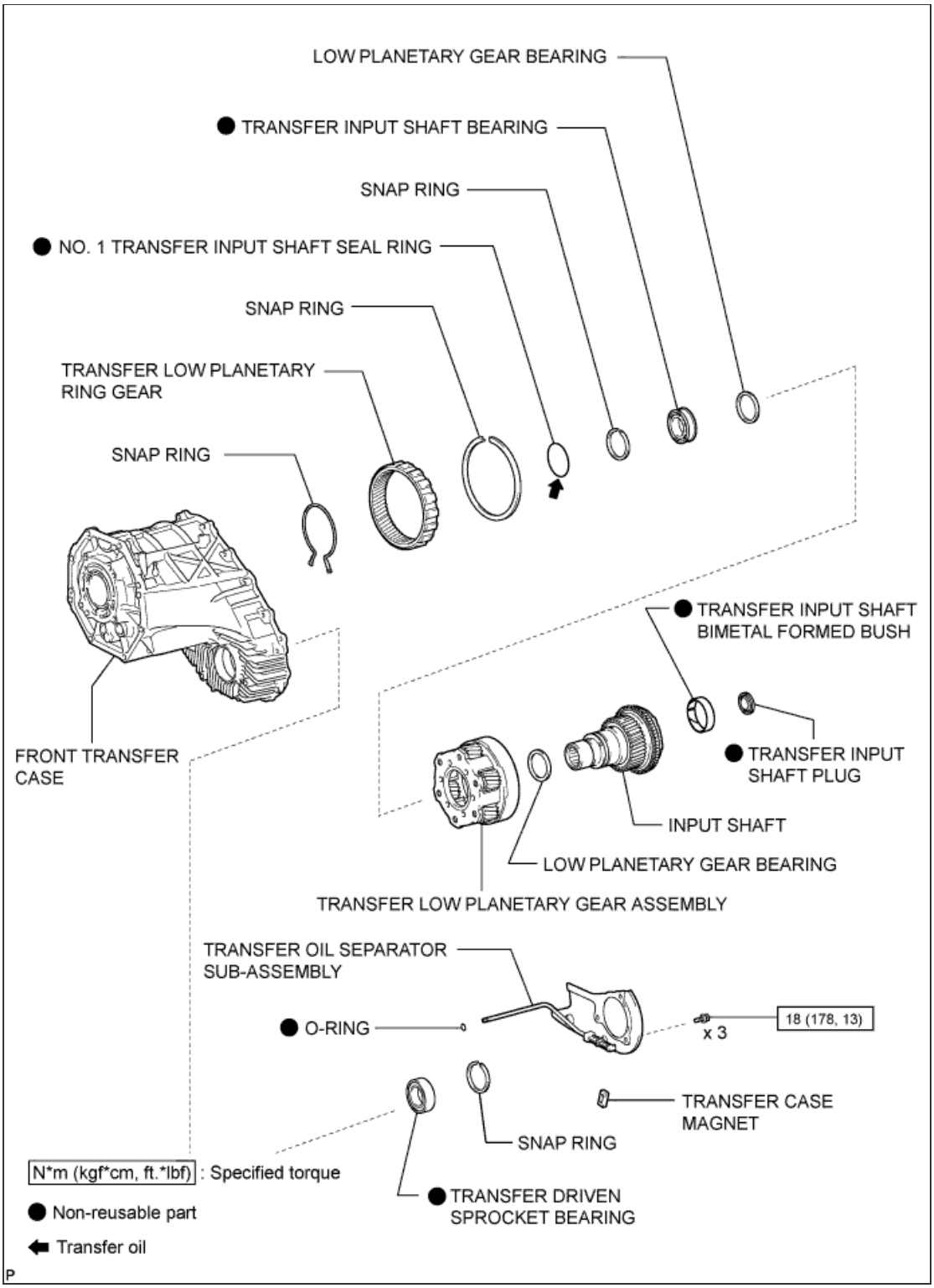

LOW PLANETARY GEAR BEARING
● TRANSFER INPUT SHAFT BEARING
SNAP RING
● NO. 1 TRANSFER INPUT SHAFT SEAL RING
SNAP RING
TRANSFER LOW PLANETARY RING GEAR
SNAP RING
● TRANSFER INPUT SHAFT BIMETAL FORMED BUSH
FRONT TRANSFER CASE
● TRANSFER INPUT SHAFT PLUG
INPUT SHAFT
LOW PLANETARY GEAR BEARING
TRANSFER LOW PLANETARY GEAR ASSEMBLY
TRANSFER OIL SEPARATOR SUB-ASSEMBLY
● O-RING
x 3
18 (178, 13)
TRANSFER CASE MAGNET
SNAP RING
● TRANSFER DRIVEN SPROCKET BEARING
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
Transfer oil
P

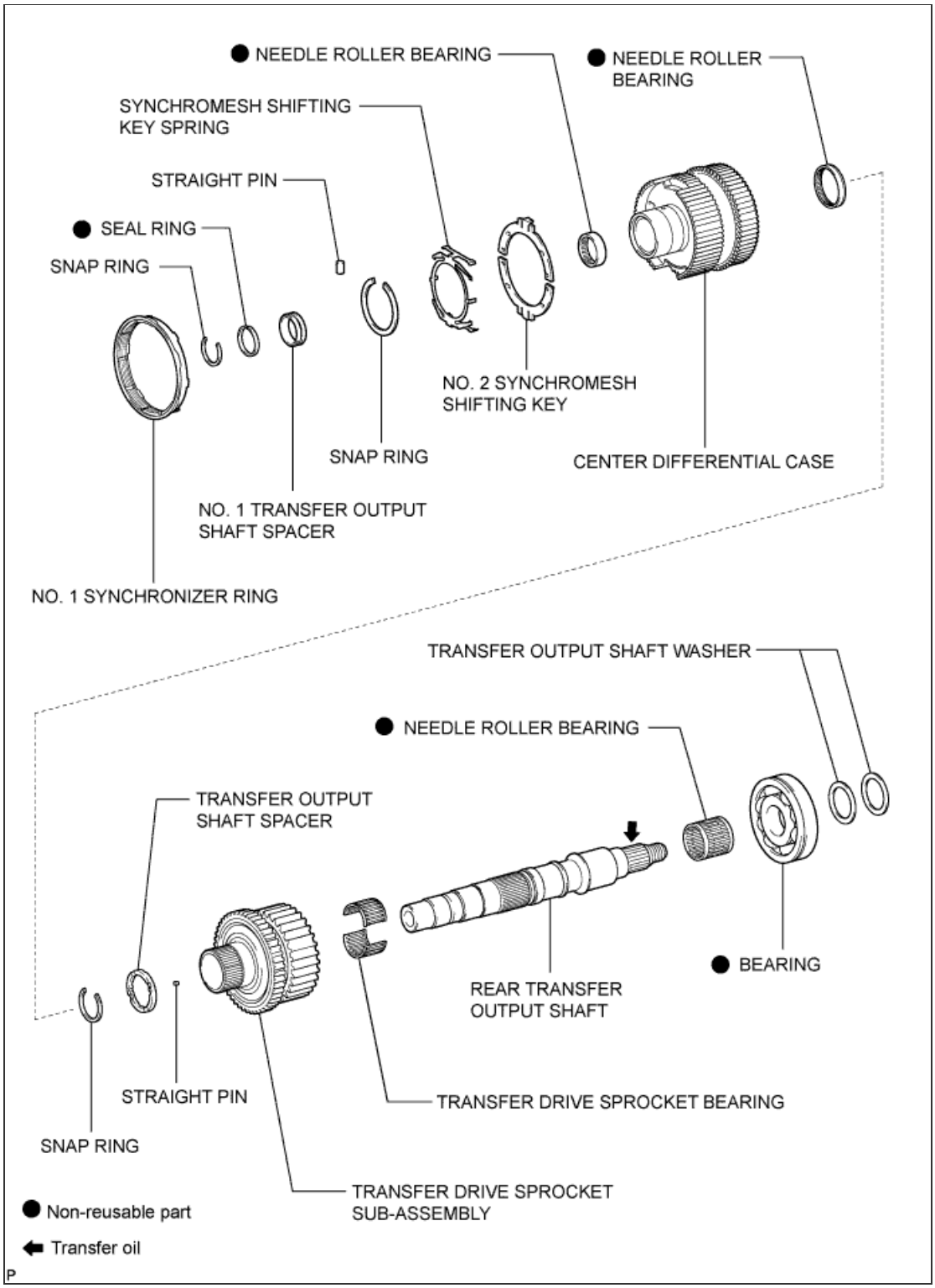

● NEEDLE ROLLER BEARING
● NEEDLE ROLLER BEARING
SYNCHROMESH SHIFTING KEY SPRING
STRAIGHT PIN
● SEAL RING
SNAP RING
NO. 2 SYNCHROMESH SHIFTING KEY
SNAP RING
CENTER DIFFERENTIAL CASE
NO. 1 TRANSFER OUTPUT SHAFT SPACER
NO. 1 SYNCHRONIZER RING
TRANSFER OUTPUT SHAFT WASHER
● NEEDLE ROLLER BEARING
TRANSFER OUTPUT SHAFT SPACER
● BEARING
REAR TRANSFER OUTPUT SHAFT
STRAIGHT PIN
TRANSFER DRIVE SPROCKET BEARING
SNAP RING
TRANSFER DRIVE SPROCKET SUB-ASSEMBLY
● Non-reusable part
Transfer oil
P

for Preparation [Click here]

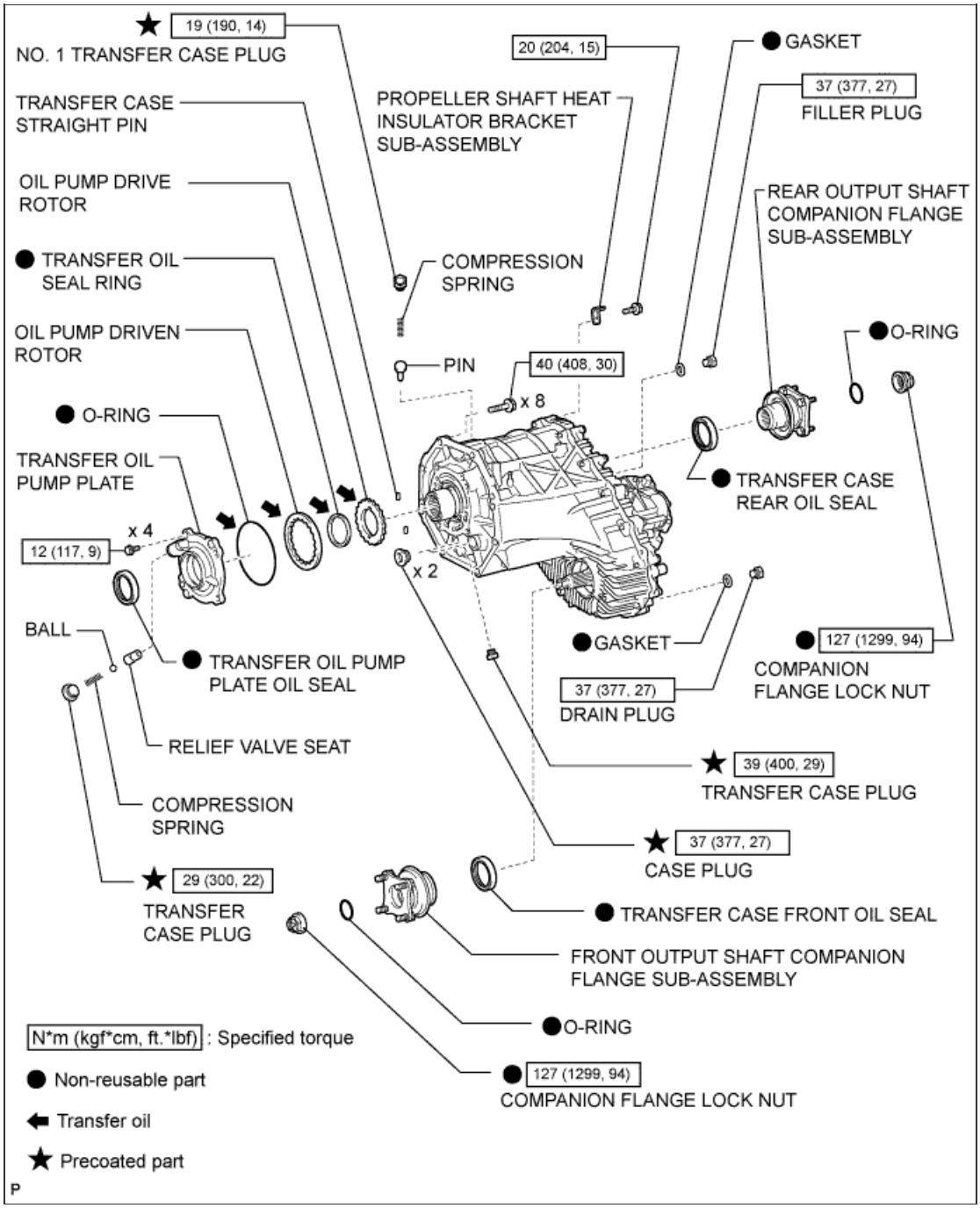


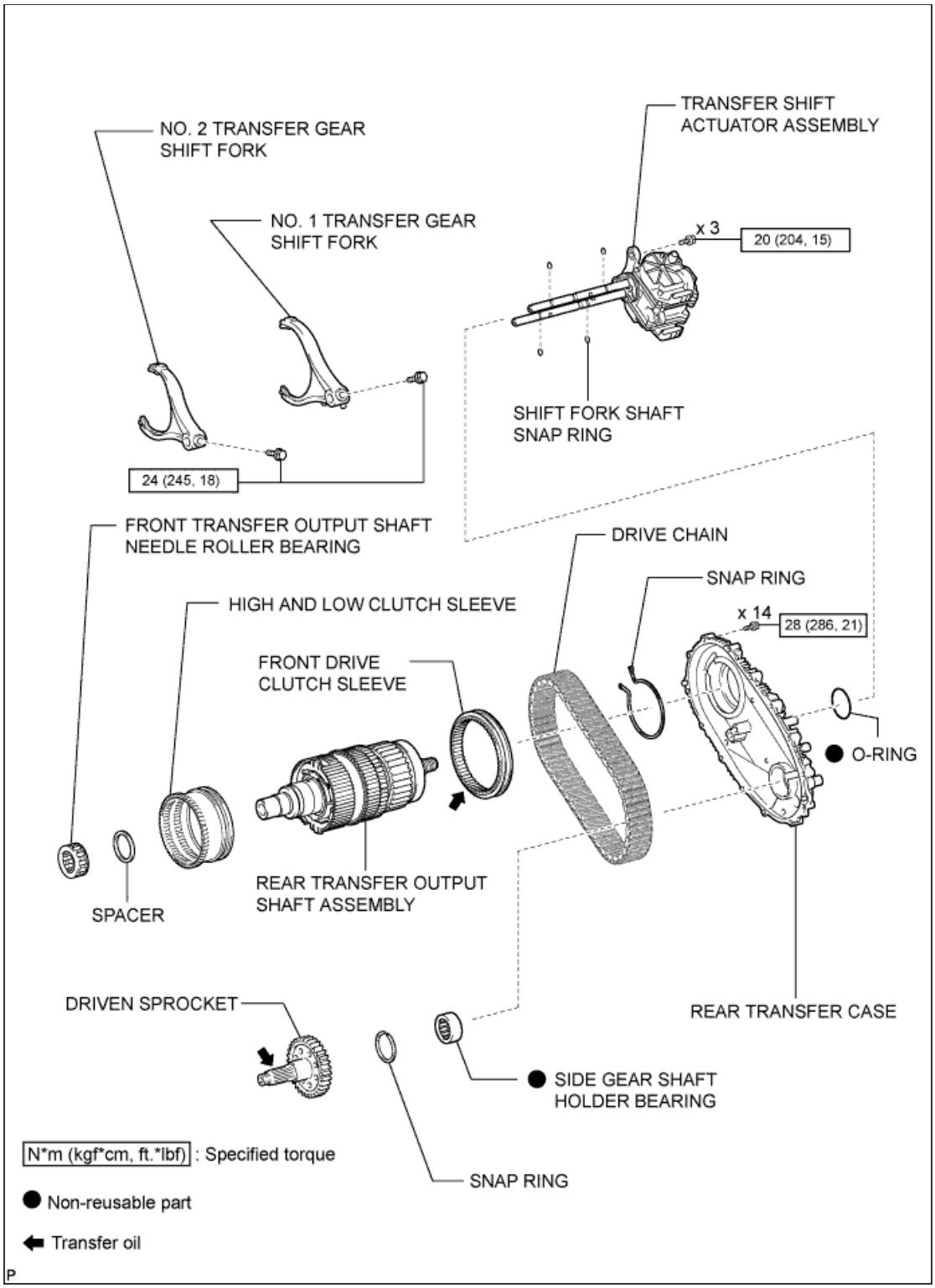

NO. 2 TRANSFER GEAR SHIFT FORK
NO. 1 TRANSFER GEAR SHIFT FORK
TRANSFER SHIFT ACTUATOR ASSEMBLY
x 3
20 (204, 15)
SHIFT FORK SHAFT SNAP RING
24 (245, 18)
FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING
DRIVE CHAIN
SNAP RING
HIGH AND LOW CLUTCH SLEEVE
x 14
28 (286, 21)
FRONT DRIVE CLUTCH SLEEVE
O-RING
SPACER
REAR TRANSFER OUTPUT SHAFT ASSEMBLY
WASHER
REAR TRANSFER CASE
DRIVEN SPROCKET
SIDE GEAR SHAFT HOLDER BEARING
SNAP RING
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Transfer oil
P

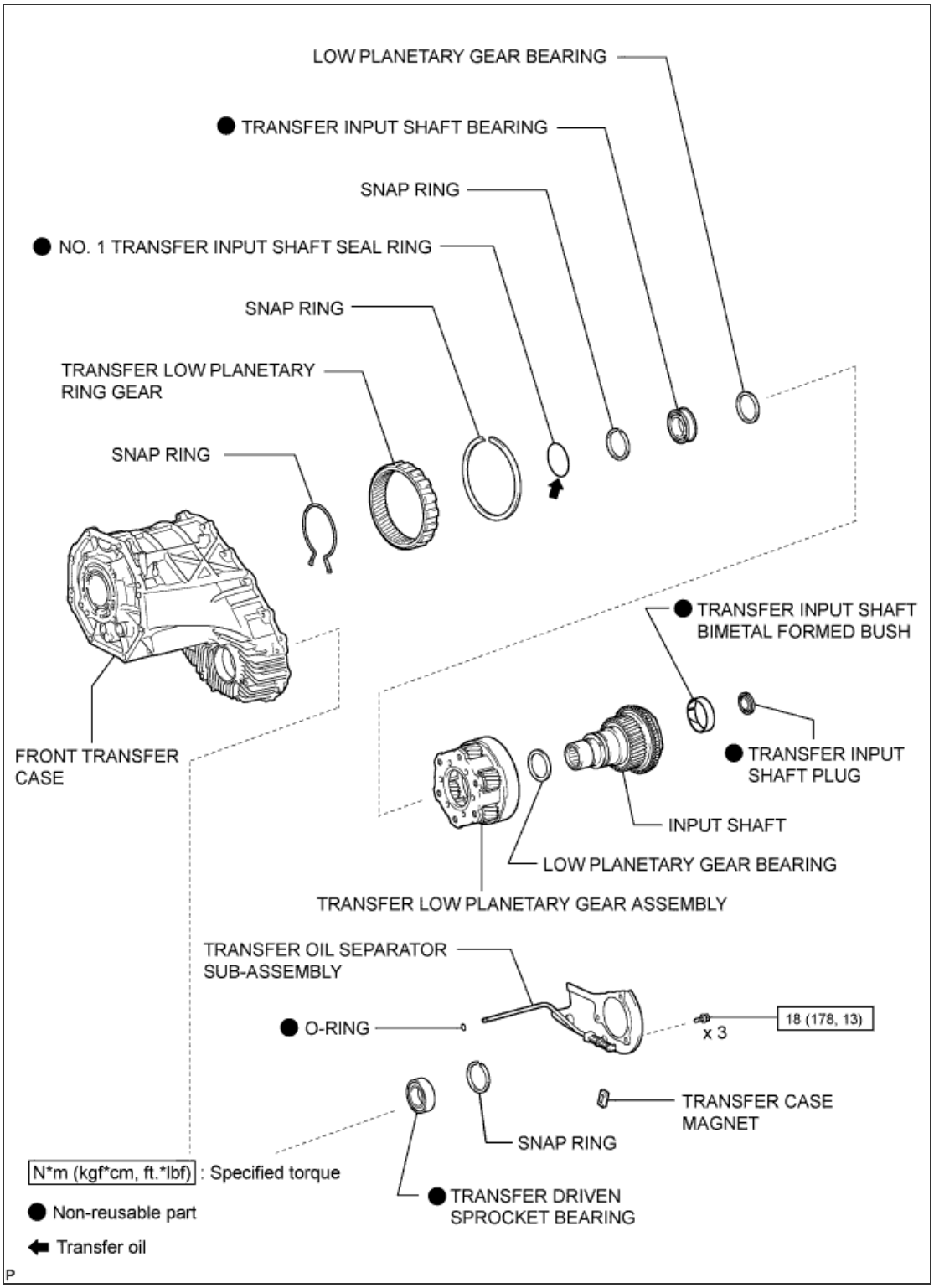

LOW PLANETARY GEAR BEARING
● TRANSFER INPUT SHAFT BEARING
SNAP RING
● NO. 1 TRANSFER INPUT SHAFT SEAL RING
SNAP RING
TRANSFER LOW PLANETARY RING GEAR
SNAP RING
● TRANSFER INPUT SHAFT BIMETAL FORMED BUSH
FRONT TRANSFER CASE
● TRANSFER INPUT SHAFT PLUG
INPUT SHAFT
LOW PLANETARY GEAR BEARING
TRANSFER LOW PLANETARY GEAR ASSEMBLY
TRANSFER OIL SEPARATOR SUB-ASSEMBLY
● O-RING
x 3
18 (178, 13)
TRANSFER CASE MAGNET
SNAP RING
● TRANSFER DRIVEN SPROCKET BEARING
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
Transfer oil
P

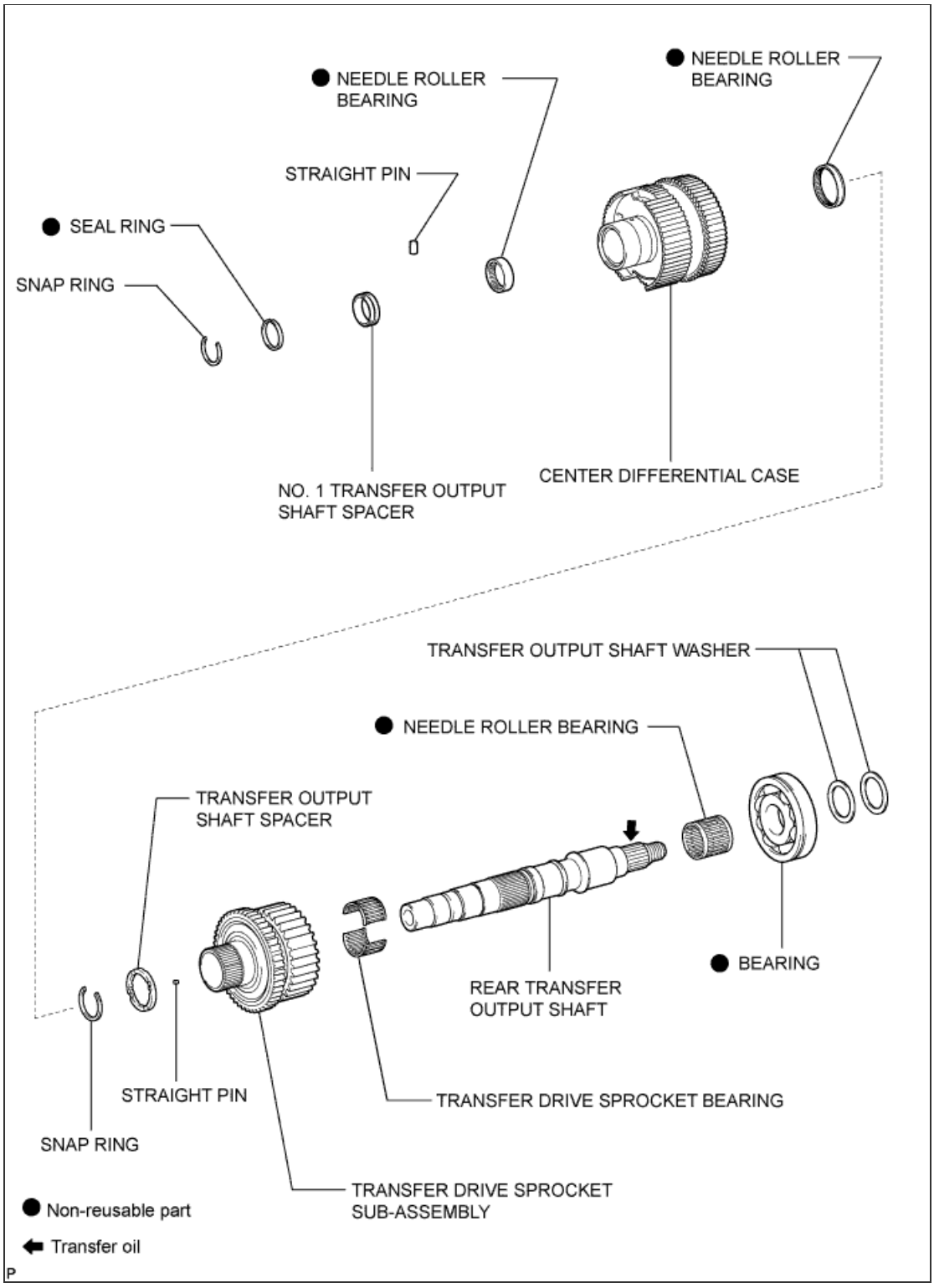

● NEEDLE ROLLER BEARING
● NEEDLE ROLLER BEARING
SYNCHROMESH SHIFTING KEY SPRING
STRAIGHT PIN
● SEAL RING
SNAP RING
NO. 2 SYNCHROMESH SHIFTING KEY
SNAP RING
CENTER DIFFERENTIAL CASE
NO. 1 TRANSFER OUTPUT SHAFT SPACER
NO. 1 SYNCHRONIZER RING
TRANSFER OUTPUT SHAFT WASHER
● NEEDLE ROLLER BEARING
TRANSFER OUTPUT SHAFT SPACER
● BEARING
REAR TRANSFER OUTPUT SHAFT
STRAIGHT PIN
TRANSFER DRIVE SPROCKET BEARING
SNAP RING
TRANSFER DRIVE SPROCKET SUB-ASSEMBLY
● Non-reusable part
Transfer oil
P

for Preparation [Click here]




NO. 2 TRANSFER GEAR SHIFT FORK
NO. 1 TRANSFER GEAR SHIFT FORK
TRANSFER SHIFT ACTUATOR ASSEMBLY
x 3
20 (204, 15)
SHIFT FORK SHAFT SNAP RING
24 (245, 18)
FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING
DRIVE CHAIN
SNAP RING
HIGH AND LOW CLUTCH SLEEVE
x 14
28 (286, 21)
FRONT DRIVE CLUTCH SLEEVE
O-RING
SPACER
REAR TRANSFER OUTPUT SHAFT ASSEMBLY
DRIVEN SPROCKET
REAR TRANSFER CASE
SIDE GEAR SHAFT HOLDER BEARING
SNAP RING
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Transfer oil
P


LOW PLANETARY GEAR BEARING
● TRANSFER INPUT SHAFT BEARING
SNAP RING
● NO. 1 TRANSFER INPUT SHAFT SEAL RING
SNAP RING
TRANSFER LOW PLANETARY RING GEAR
SNAP RING
● TRANSFER INPUT SHAFT BIMETAL FORMED BUSH
FRONT TRANSFER CASE
● TRANSFER INPUT SHAFT PLUG
INPUT SHAFT
LOW PLANETARY GEAR BEARING
TRANSFER LOW PLANETARY GEAR ASSEMBLY
TRANSFER OIL SEPARATOR SUB-ASSEMBLY
● O-RING
x 3
18 (178, 13)
TRANSFER CASE MAGNET
SNAP RING
● TRANSFER DRIVEN SPROCKET BEARING
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
Transfer oil
P


NEEDLE ROLLER BEARING
NEEDLE ROLLER BEARING
STRAIGHT PIN
SEAL RING
SNAP RING
NO. 1 TRANSFER OUTPUT SHAFT SPACER
CENTER DIFFERENTIAL CASE
TRANSFER OUTPUT SHAFT WASHER
NEEDLE ROLLER BEARING
TRANSFER OUTPUT SHAFT SPACER
REAR TRANSFER OUTPUT SHAFT
BEARING
STRAIGHT PIN
TRANSFER DRIVE SPROCKET BEARING
SNAP RING
TRANSFER DRIVE SPROCKET SUB-ASSEMBLY
Non-reusable part
Transfer oil
P

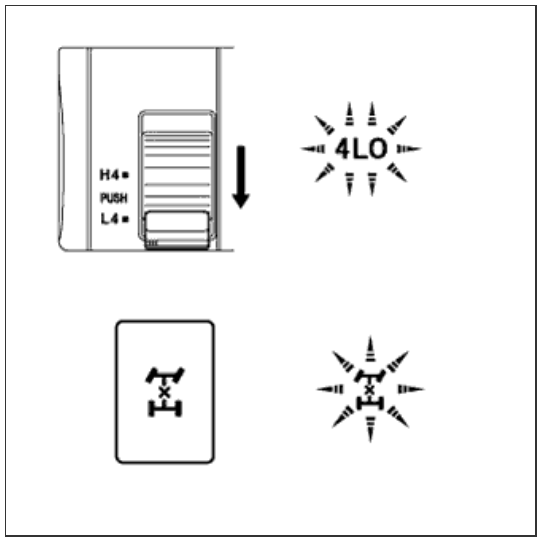
for Preparation Click here

1. CHECK VEHICLE CONDITION

a. Turn the transfer position switch from H4 to L4.

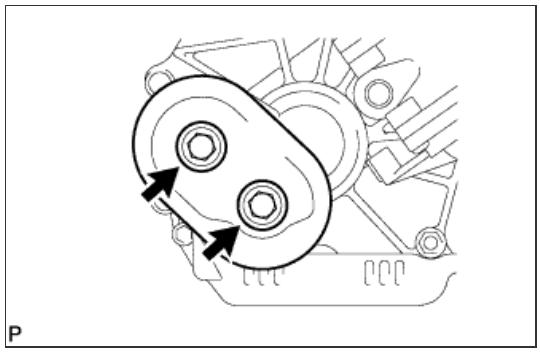
b. Push the center differential lock switch.

c. Check that the 4LO indicator light and center differential lock indicator light illuminate.

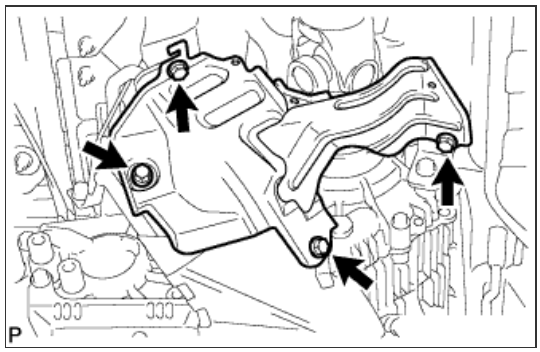


2. DRAIN TRANSFER OIL

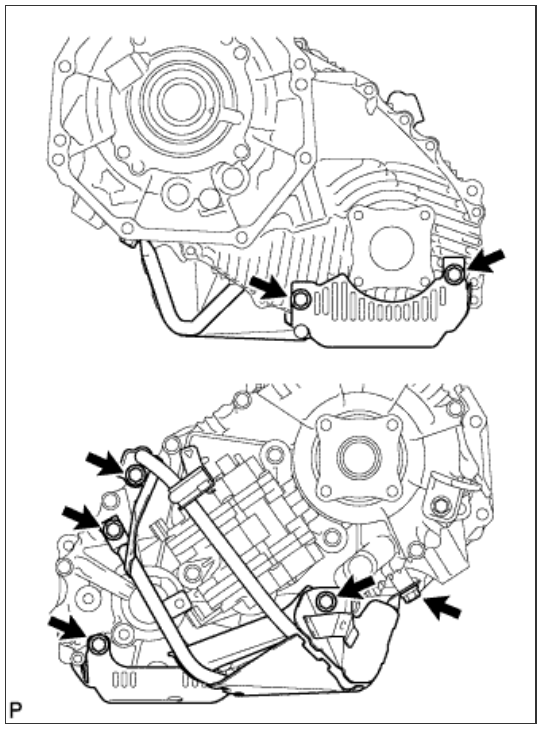
a. Remove the 2 bolts and transfer dynamic damper.



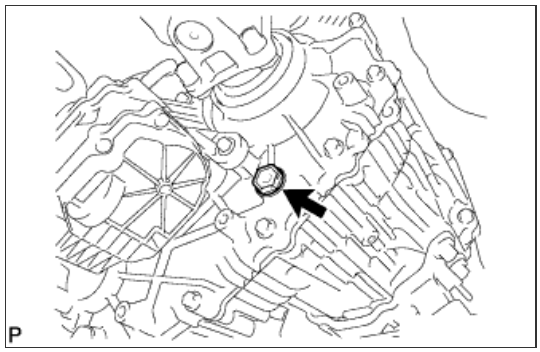
b. Remove the 4 bolts and transfer heat insulator.



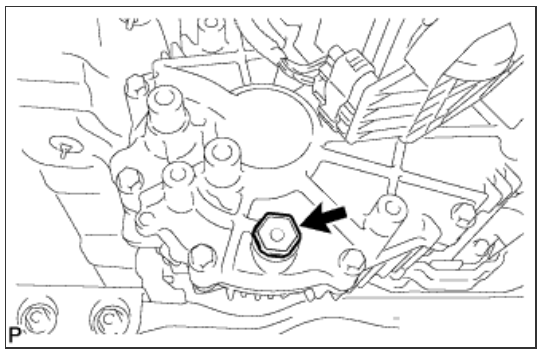
c. Remove the 7 bolts and lower transfer case protector.



d. Remove the filler plug and gasket.



e. Remove the drain plug and gasket, and drain the transfer oil.



3. REMOVE AUTOMATIC TRANSMISSION WITH TRANSFER ASSEMBLY

a. Remove the automatic transmission with transfer assembly (Click here).

4. REMOVE TRANSFER ASSEMBLY

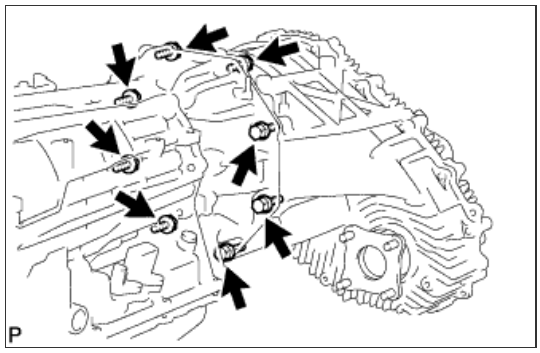
a. Remove the 8 transfer adaptor rear mounting bolts.

b. Pull the transfer straight up and remove it from the transmission.

NOTICE:

Take care not to damage the adaptor oil seal with the transfer input shaft

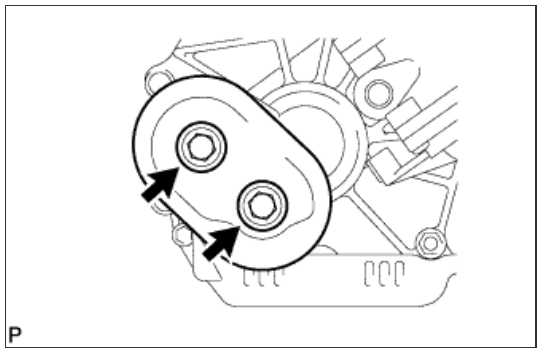
spline.



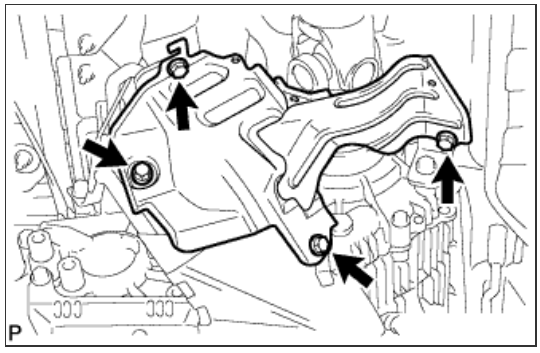
for Preparation Click here

1. DRAIN TRANSFER OIL

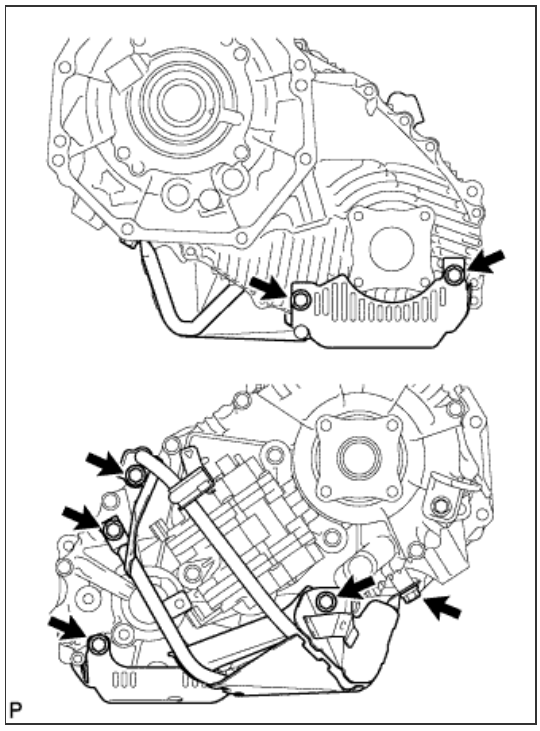
a. Remove the 2 bolts and transfer dynamic damper.



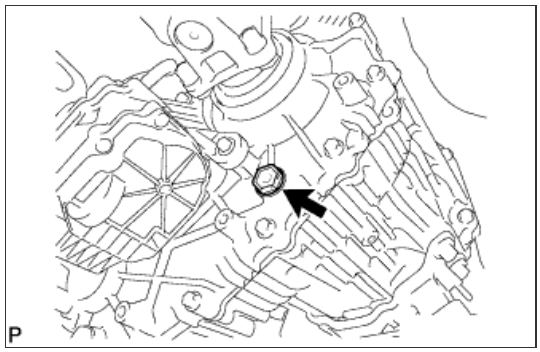
b. Remove the 4 bolts and transfer heat insulator.



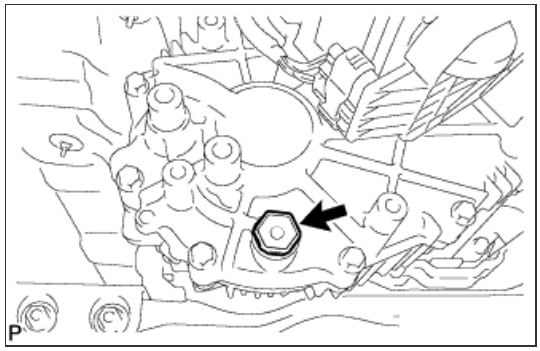
c. Remove the 7 bolts and lower transfer case protector.



d. Remove the filler plug and gasket.



e. Remove the drain plug and gasket, and drain the transfer oil.



2. REMOVE AUTOMATIC TRANSMISSION WITH TRANSFER ASSEMBLY

a. Remove the automatic transmission with transfer assembly (Click here).

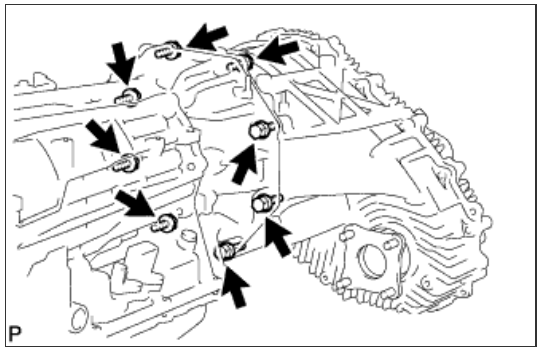
3. REMOVE TRANSFER ASSEMBLY

a. Remove the 8 transfer adaptor rear mounting bolts.

b. Pull the transfer straight up and remove it from the transmission.

NOTICE:

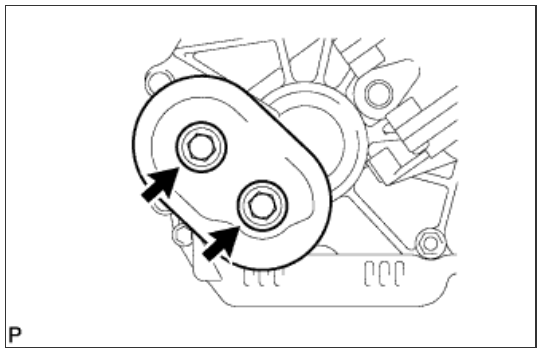
Take care not to damage the adaptor oil seal with the transfer input shaft spline.



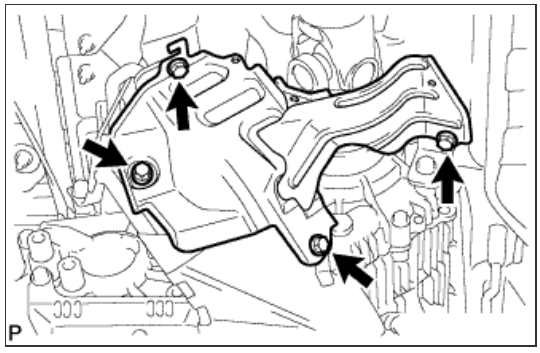
for Preparation Click here

1. DRAIN TRANSFER OIL

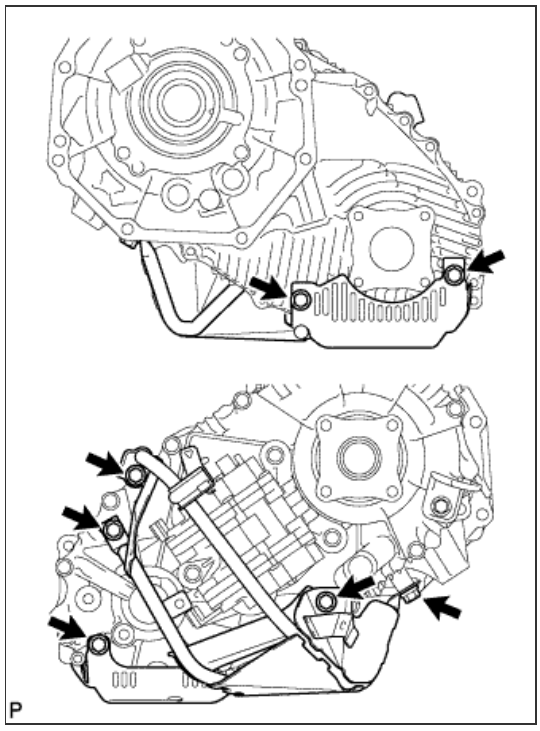
a. Remove the 2 bolts and transfer dynamic damper.



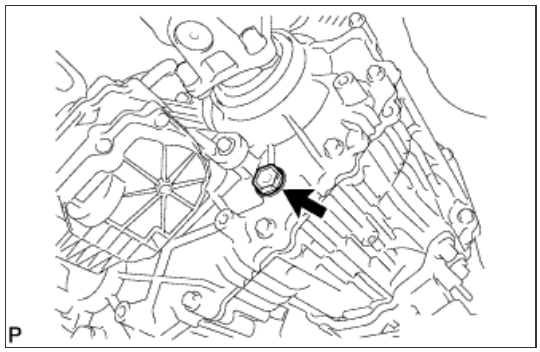
b. Remove the 4 bolts and transfer heat insulator.



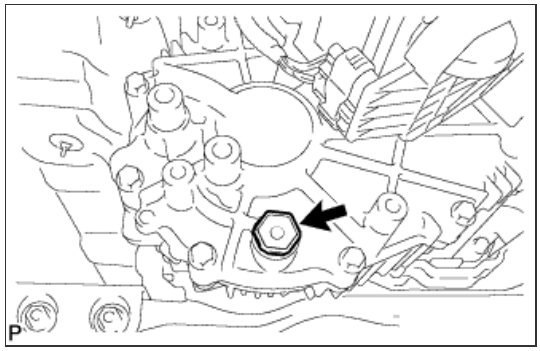
c. Remove the 7 bolts and lower transfer case protector.



d. Remove the filler plug and gasket.



e. Remove the drain plug and gasket, and drain the transfer oil.



2. REMOVE AUTOMATIC TRANSMISSION WITH TRANSFER ASSEMBLY

(Click here)

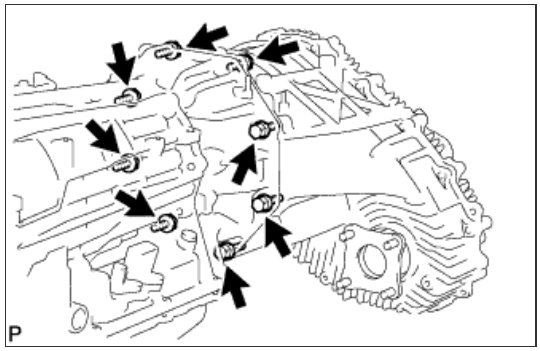
3. REMOVE TRANSFER ASSEMBLY

a. Remove the 8 transfer adaptor rear mounting bolts.

b. Pull the transfer straight up and remove it from the transmission.

NOTICE:

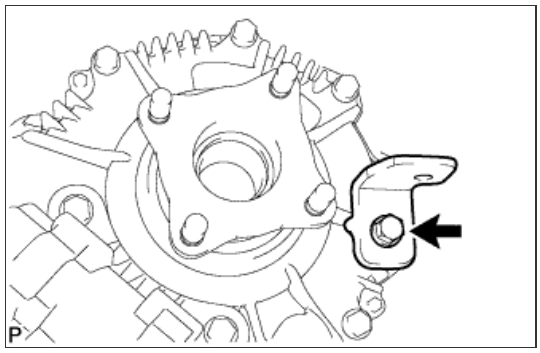
Take care not to damage the adaptor oil seal with the transfer input shaft spline.



for Preparation Click here

1. REMOVE PROPELLER SHAFT HEAT INSULATOR BRACKET SUB-ASSEMBLY

a. Remove the bolt and bracket.



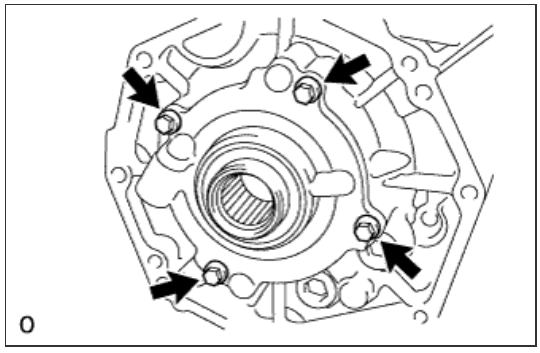
2. REMOVE TRANSFER OIL PUMP PLATE

a. Remove the 4 bolts, oil pump plate and oil pump driven rotor.

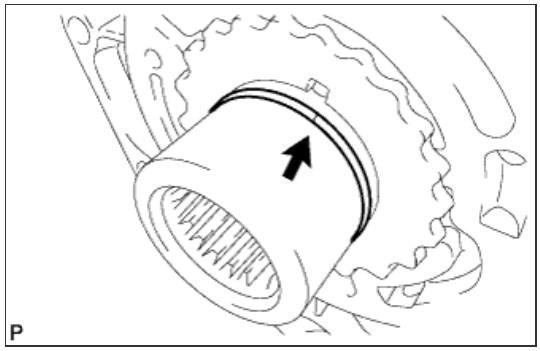
NOTICE:

Do not drop the oil pump driven rotor.

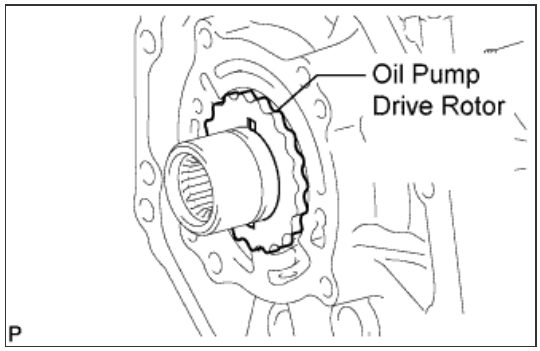
b. Remove the O-ring from the oil pump plate.



c. Remove the transfer oil seal ring from the input shaft.



d. Remove the oil pump drive rotor from the input shaft.

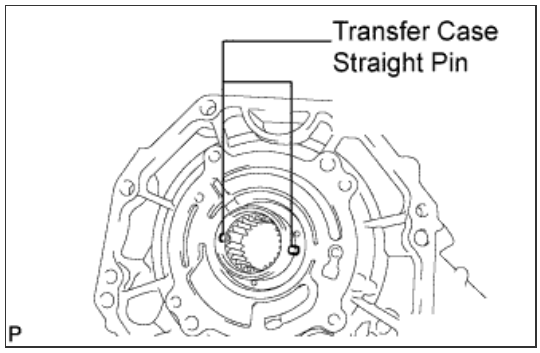


3. REMOVE TRANSFER CASE STRAIGHT PIN

a. Remove the 2 straight pins.

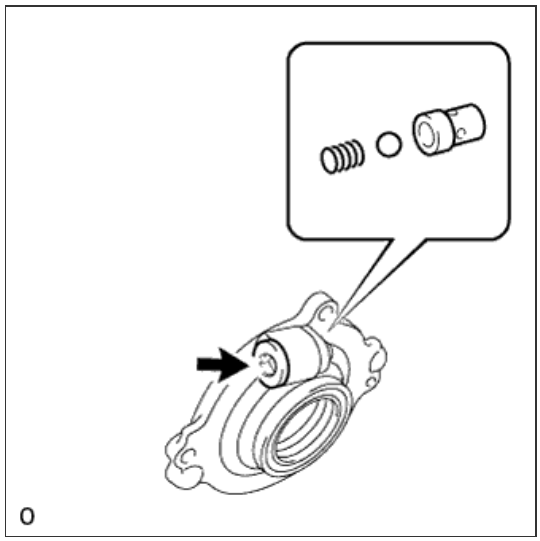
NOTICE:

Do not drop the straight pins.



4. REMOVE TRANSFER CASE PLUG

a. Using a 10 mm hexagon wrench, remove the case plug, compression spring, ball and relief valve seat.



5. REMOVE TRANSFER OIL PUMP PLATE OIL SEAL

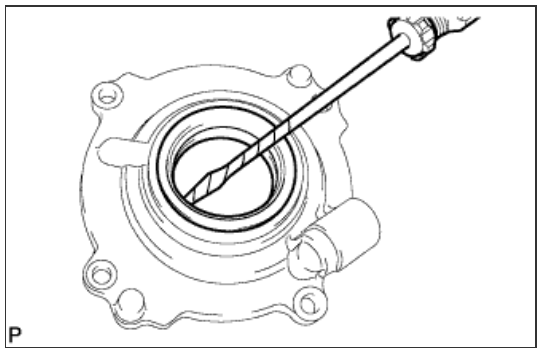
a. Using a screwdriver, pry out the oil seal from the oil pump plate.

NOTICE:

Be careful not to damage the oil seal and oil pump plate contact surfaces.

HINT:

Tape the screwdriver tip before use.



6. REMOVE FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

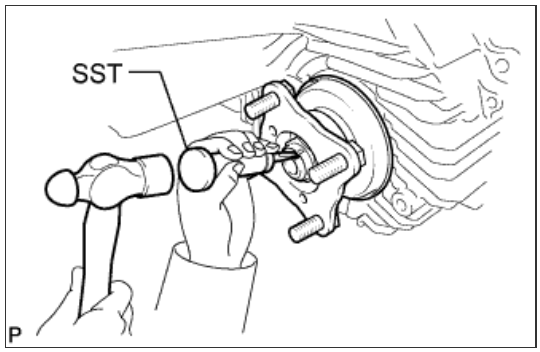
a. Using SST and a hammer, release the staked part of the nut.

SST

09930-00010 (09931-00010, 09931-00020)

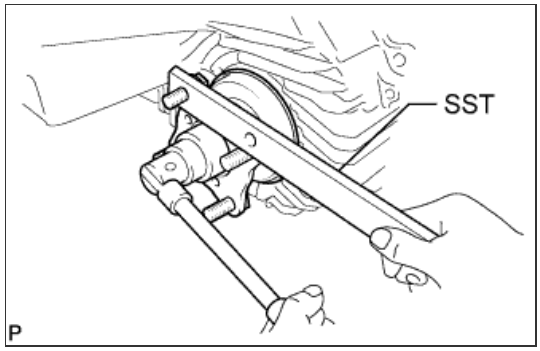
NOTICE:

- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the transfer driven sprocket.**



b. Using SST to hold the companion flange, remove the lock nut.

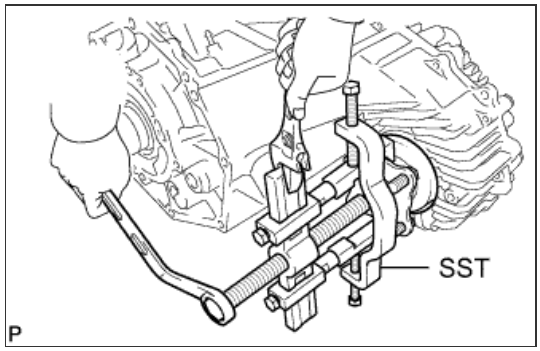
SST
09330-00021



c. Using SST, remove the companion flange.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



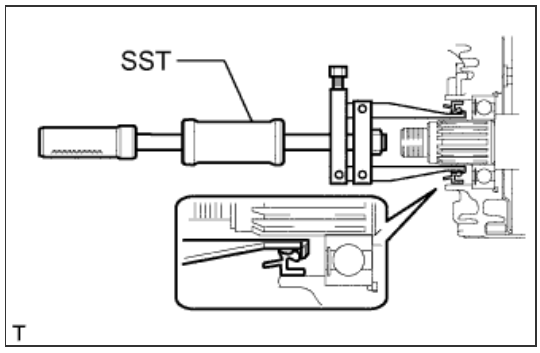
7. REMOVE TRANSFER CASE FRONT OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

NOTICE:

Be careful not to damage the oil seal and front transfer case contact surface.



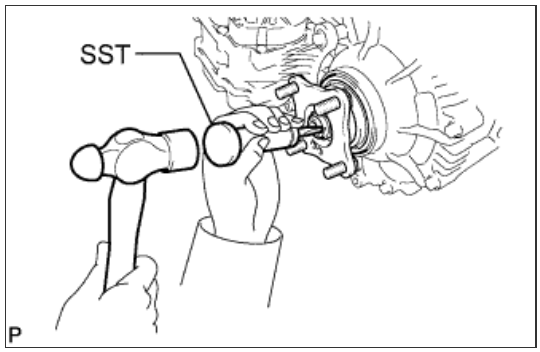
8. REMOVE REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Using SST and a hammer, release the staked part of the nut.

SST
09930-00010 (09931-00010, 09931-00020)

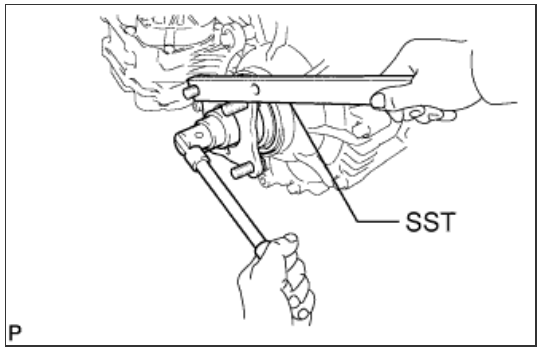
NOTICE:

- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the rear transfer output shaft.**



b. Using SST to hold the companion flange, remove the lock nut.

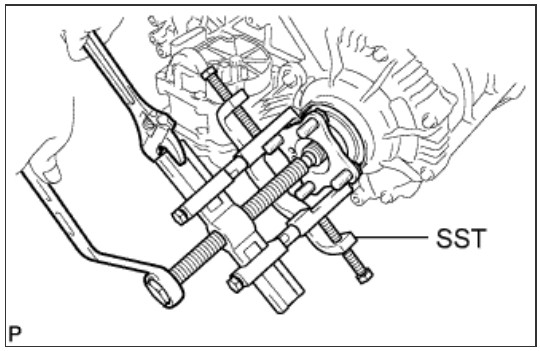
SST
09330-00021



c. Using SST, remove the companion flange.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



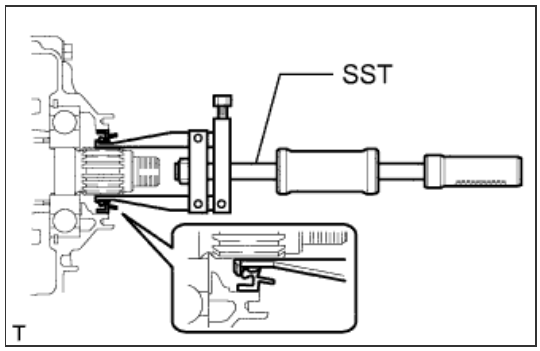
9. REMOVE TRANSFER CASE REAR OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

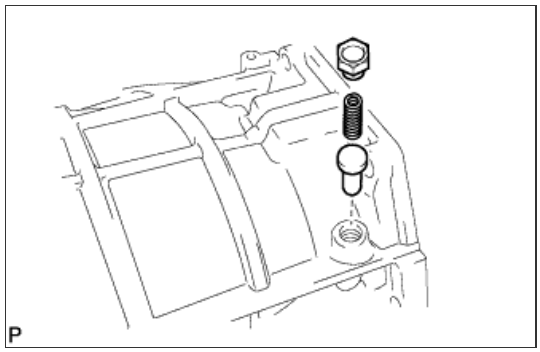
NOTICE:

Be careful not to damage the oil seal and rear transfer case contact surface.



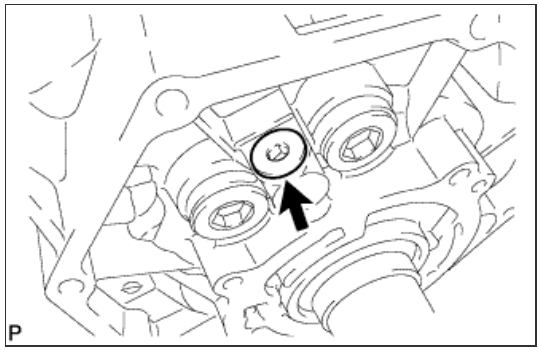
10. REMOVE NO. 1 TRANSFER CASE PLUG

a. Remove the plug, compression spring and pin.



11. REMOVE TRANSFER CASE PLUG

a. Using a 6 mm hexagon wrench, remove the plug.



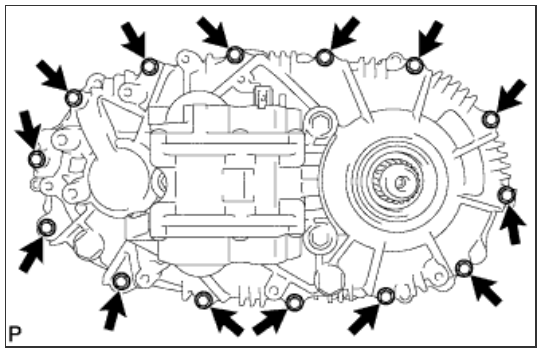
12. REMOVE REAR TRANSFER CASE ASSEMBLY

a. Remove the 14 bolts.

b. Remove the rear transfer case.

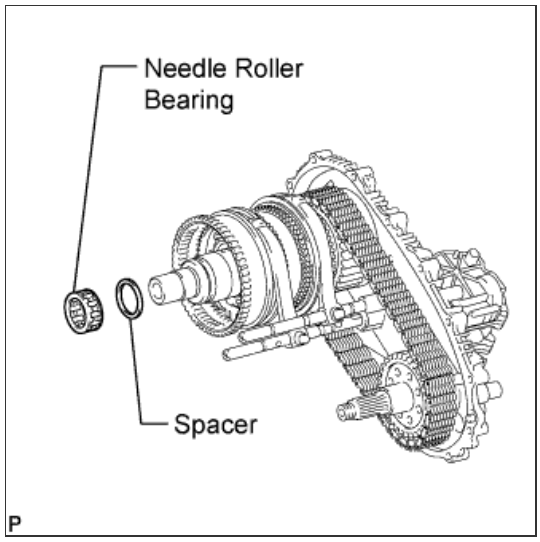
HINT:

If necessary, tap the rear transfer case with a plastic-faced hammer to remove it.



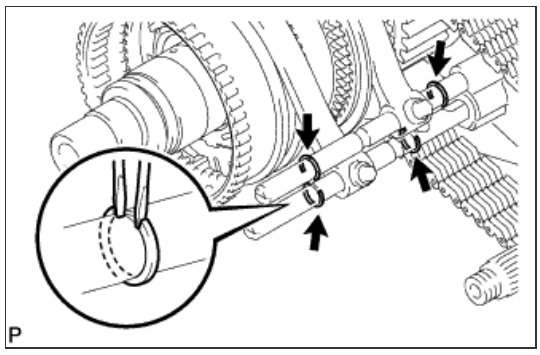
13. REMOVE FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING

a. Remove the needle roller bearing and spacer from the output shaft.

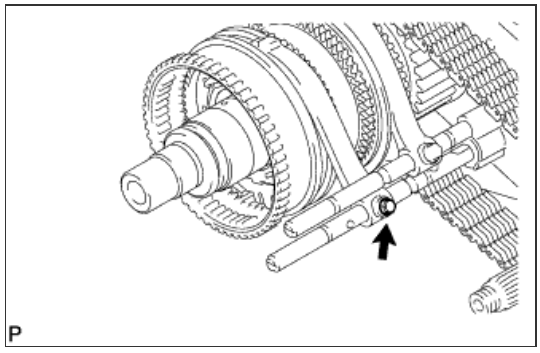


14. REMOVE NO. 2 TRANSFER GEAR SHIFT FORK

a. Using 2 screwdrivers and a hammer, tap off the 4 shift fork shaft snap rings.

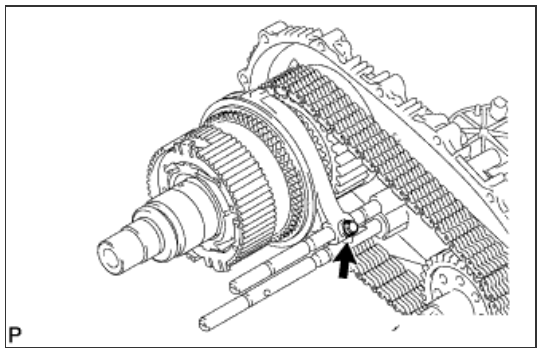


b. Remove the bolt. Then remove the No. 2 gear shift fork together with the high and low clutch sleeve from the shift actuator.

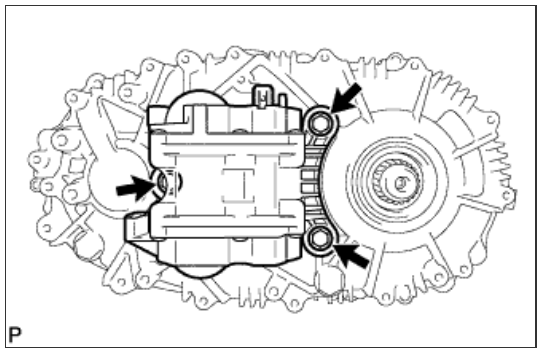


15. REMOVE TRANSFER SHIFT ACTUATOR ASSEMBLY

a. Remove the No. 1 gear shift fork bolt.



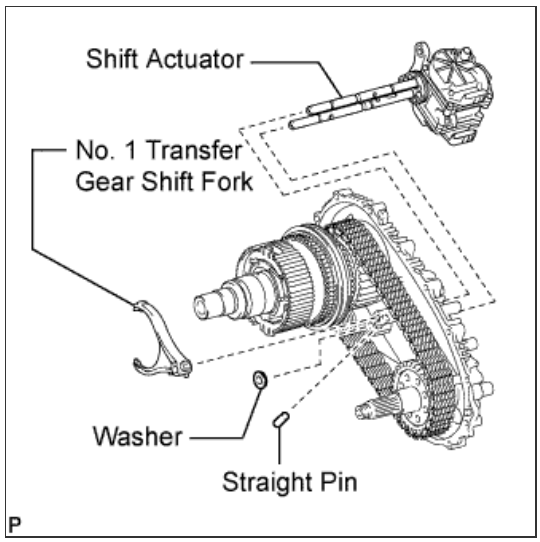
b. Remove the 3 bolts.



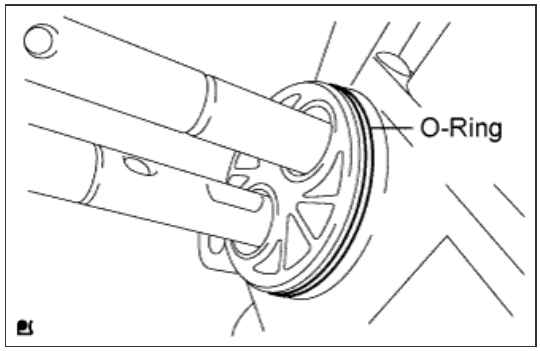
c. Remove the shift actuator, No. 1 gear shift fork, washer, and straight pin from the rear transfer case.

NOTICE:

Take care not to drop the No. 1 gear shift fork, washer, and straight pin.

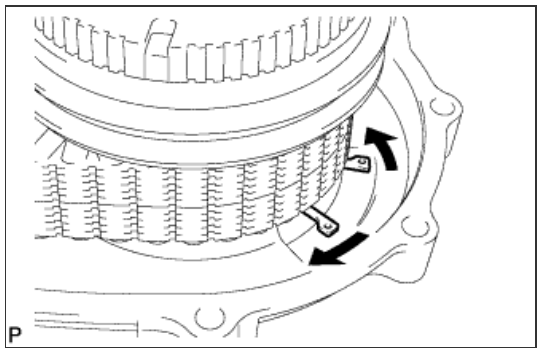


d. Remove the O-ring from the shift actuator.



16. REMOVE REAR TRANSFER OUTPUT SHAFT ASSEMBLY

a. Using a snap ring expander, expand the snap ring as shown in the illustration.

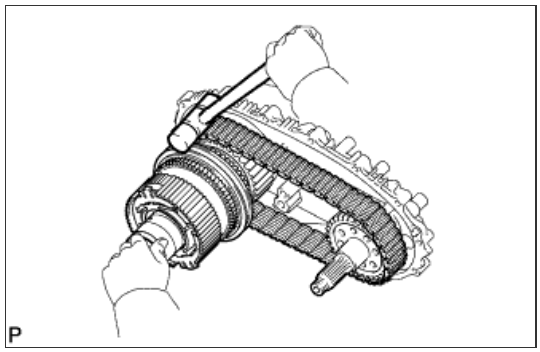


b. Using a plastic-faced hammer, carefully tap the rear transfer case, and remove the output shaft together with the drive chain and driven sprocket.

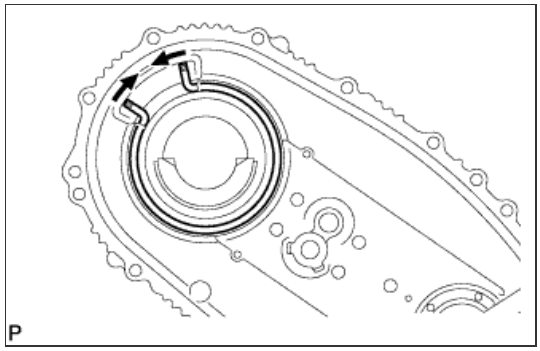
c. Remove the output shaft and driven sprocket from the drive chain.

NOTICE:

Do not drop the output shaft washers.

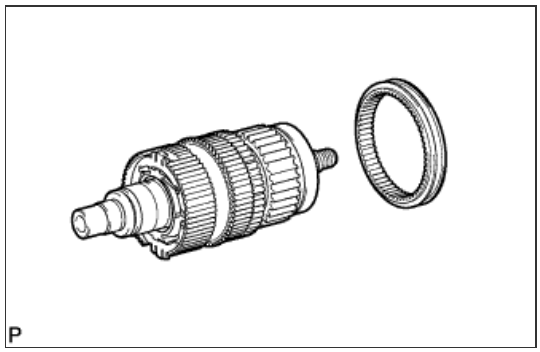


d. Using a snap ring expander, remove the snap ring from the rear transfer case.



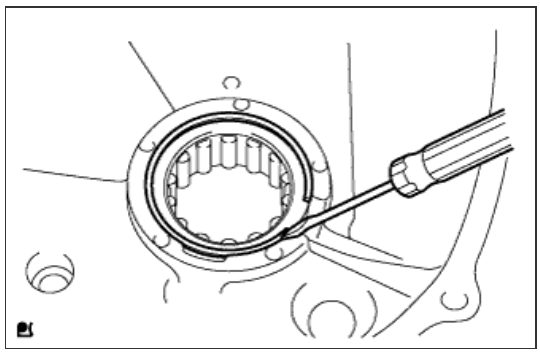
17. REMOVE FRONT DRIVE CLUTCH SLEEVE

a. Remove the clutch sleeve from the output shaft.



18. REMOVE SIDE GEAR SHAFT HOLDER BEARING

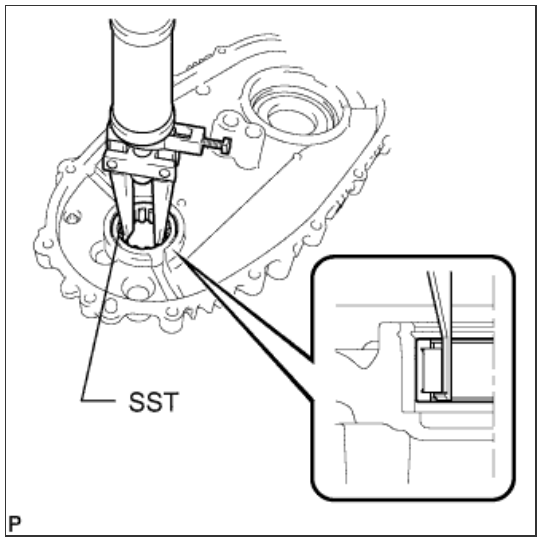
a. Using a screwdriver, remove the snap ring.



b. Using SST, remove the bearing.

SST

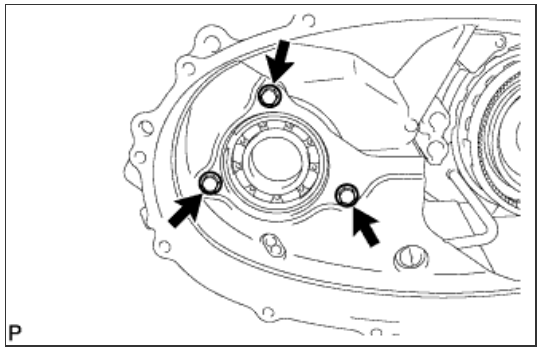
09308-00010



19. REMOVE TRANSFER OIL SEPARATOR SUB-ASSEMBLY

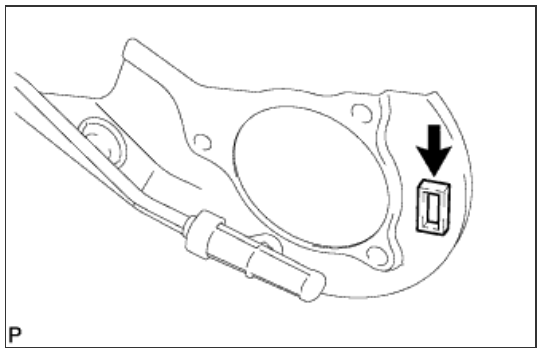
a. Remove the 3 bolts and oil separator.

b. Remove the O-ring from the oil separator.



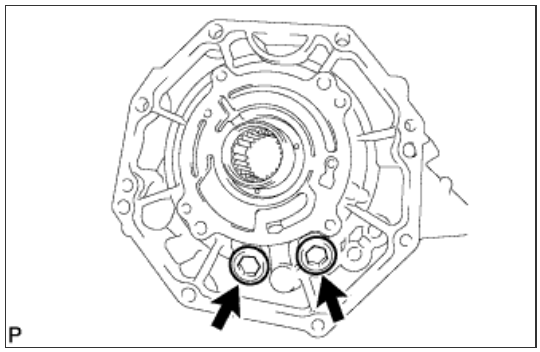
20. REMOVE TRANSFER CASE MAGNET

a. Remove the magnet from the oil separator.

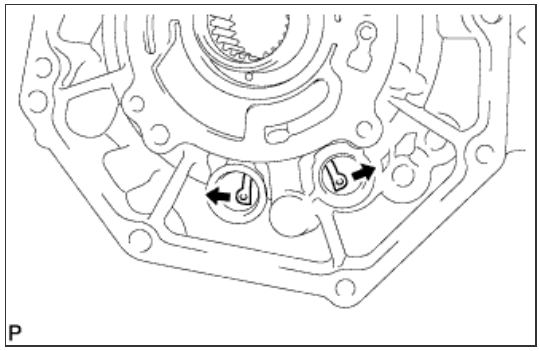


21. REMOVE TRANSFER INPUT SHAFT ASSEMBLY

a. Using a 14 mm hexagon wrench, remove the 2 case plugs from the front transfer case.

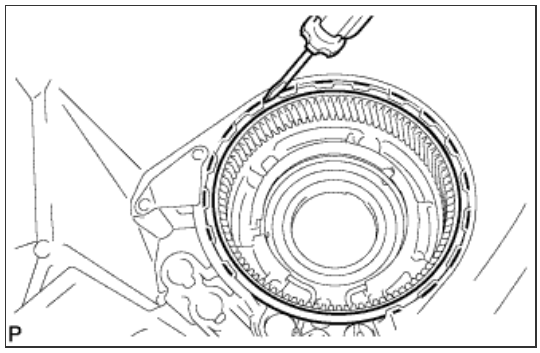


b. Using a snap ring expander, expand the snap ring as shown in the illustration. Then remove the input shaft from the front transfer case.

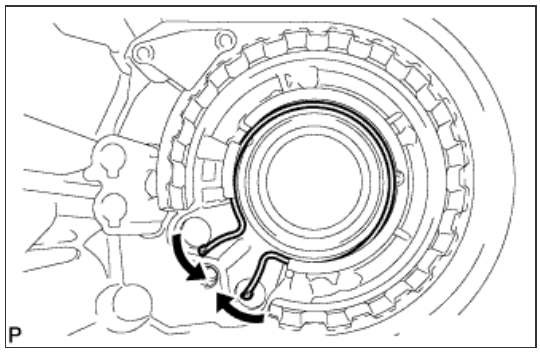


22. REMOVE TRANSFER LOW PLANETARY RING GEAR

a. Using a screwdriver, remove the snap ring. Then remove the low planetary ring gear from the front transfer case.

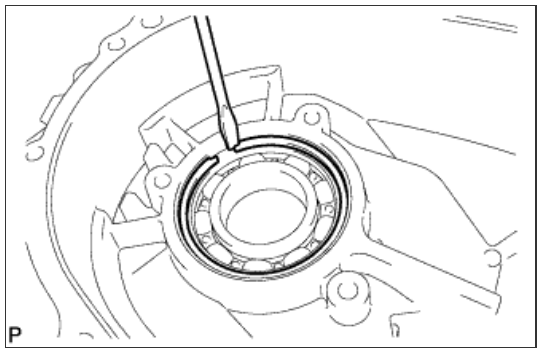


b. Using a snap ring expander, remove the snap ring from the front transfer case.



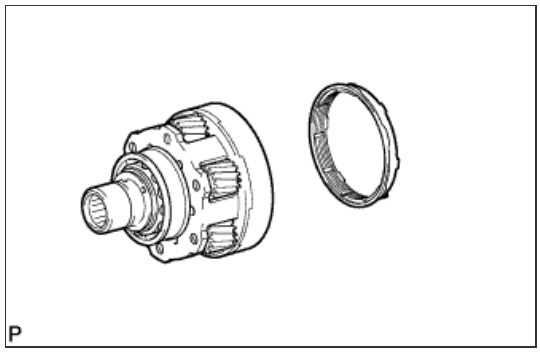
23. REMOVE TRANSFER DRIVEN SPROCKET BEARING

a. Using a screwdriver, remove the snap ring. Then remove the bearing from the front transfer case.



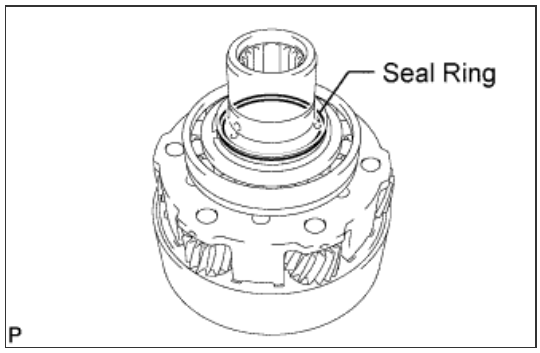
24. REMOVE NO. 1 SYNCHRONIZER RING

a. Remove the synchronizer ring from the input shaft.



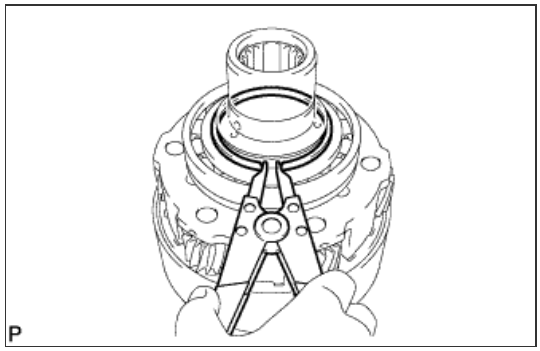
25. REMOVE NO. 1 TRANSFER INPUT SHAFT SEAL RING

a. Remove the seal ring from the input shaft.



26. REMOVE TRANSFER INPUT SHAFT BEARING

a. Using a snap ring expander, remove the snap ring.



b. Using SST and a press, press out the bearing.

SST

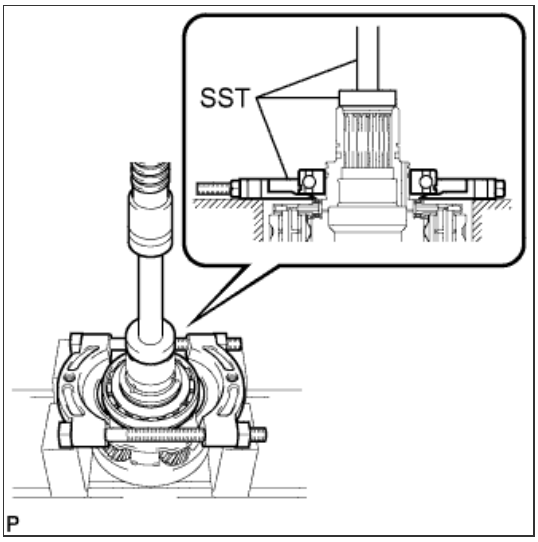
09555-55010
09950-60010 (09951-00490)
09950-70010 (09951-07100)

NOTICE:

Be careful not to drop or damage the input shaft, low planetary gear and low planetary gear bearings.

HINT:

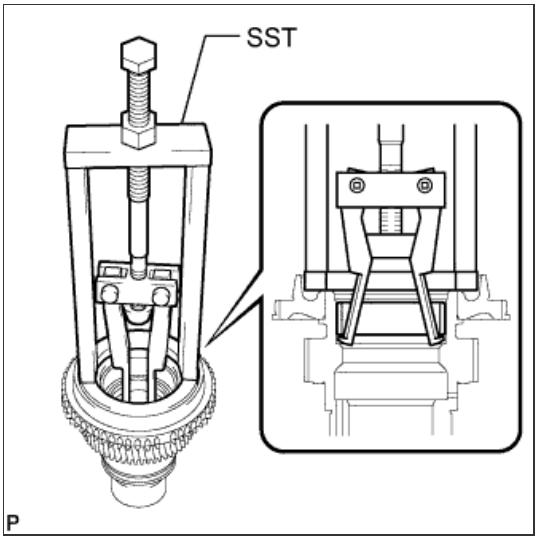
When the bearing is removed, the input shaft, low planetary gear, and 2 low planetary gear bearings will come off.



27. REMOVE TRANSFER INPUT SHAFT BIMETAL FORMED BUSH

a. Using SST, remove the bush.

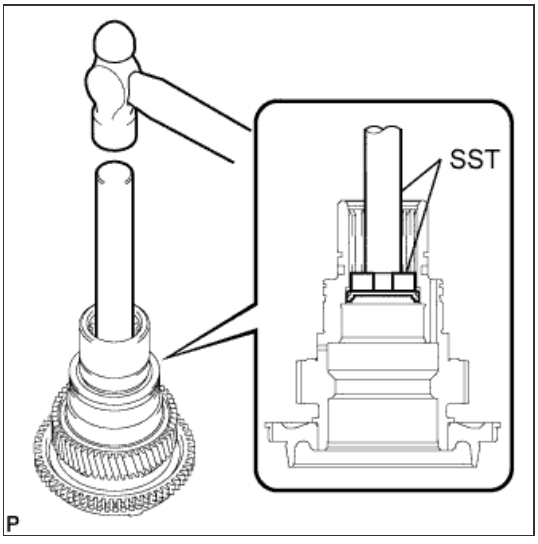
SST
09387-00041 (09387-01021, 09387-01030, 09387-01040)



28. REMOVE TRANSFER INPUT SHAFT PLUG

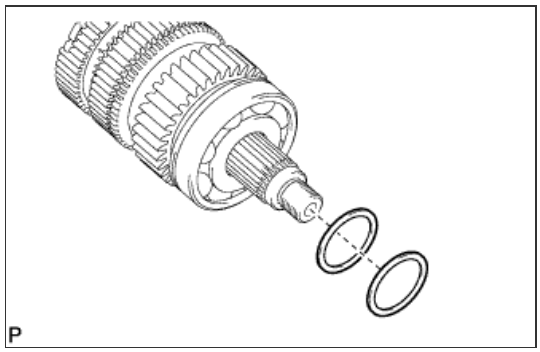
a. Using SST and a hammer, tap out the input shaft plug.

SST
09950-70010 (09951-07150)
09950-60010 (09951-00300)



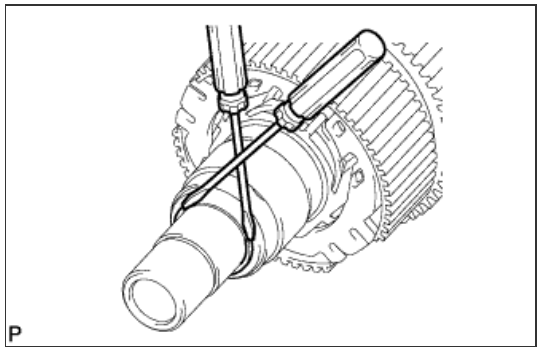
29. REMOVE TRANSFER OUTPUT SHAFT WASHER

a. Remove the 2 output shaft washers from the output shaft.

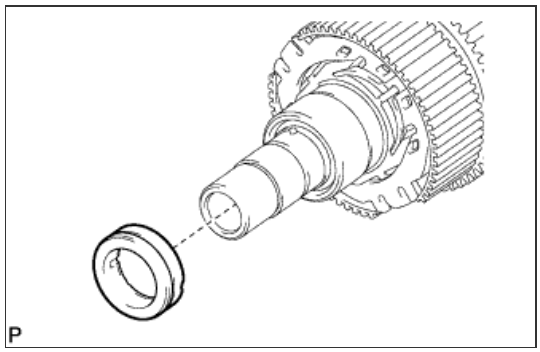


30. REMOVE NO. 1 TRANSFER OUTPUT SHAFT SPACER

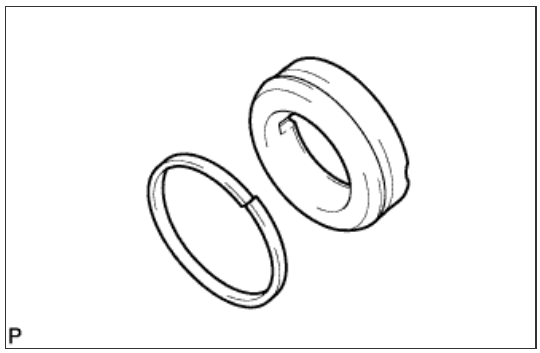
a. Using 2 screwdrivers and a hammer, tap off the snap ring.



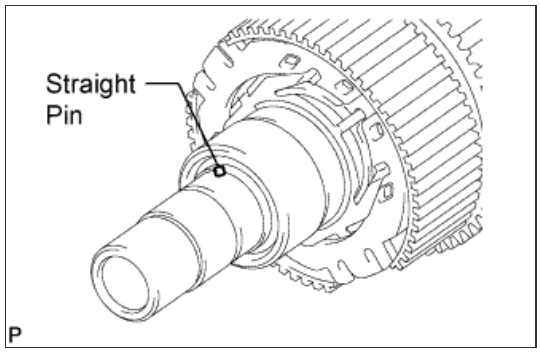
b. Remove the output shaft spacer from the output shaft.



c. Remove the seal ring from the output shaft spacer.

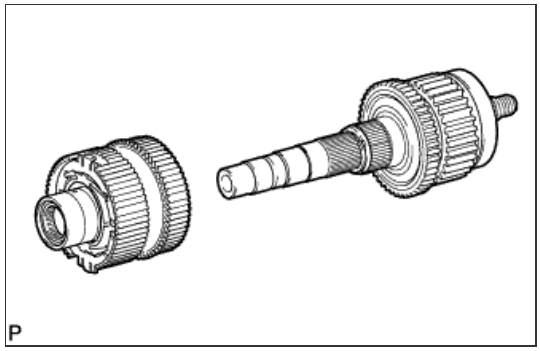


d. Remove the straight pin from the output shaft.

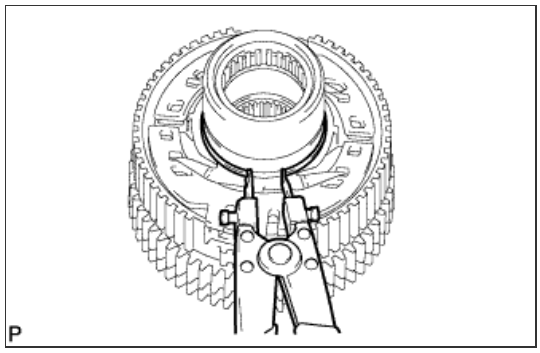


31. REMOVE CENTER DIFFERENTIAL CASE

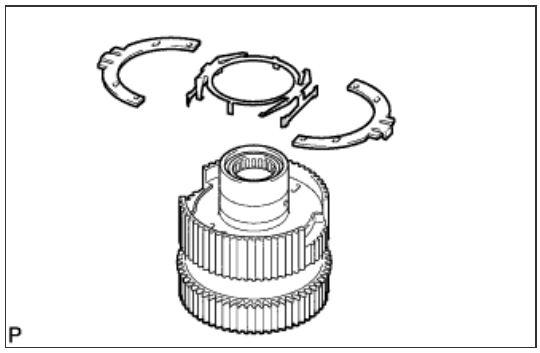
a. Remove the center differential case from the output shaft.



b. Using a snap ring expander, remove the snap ring.

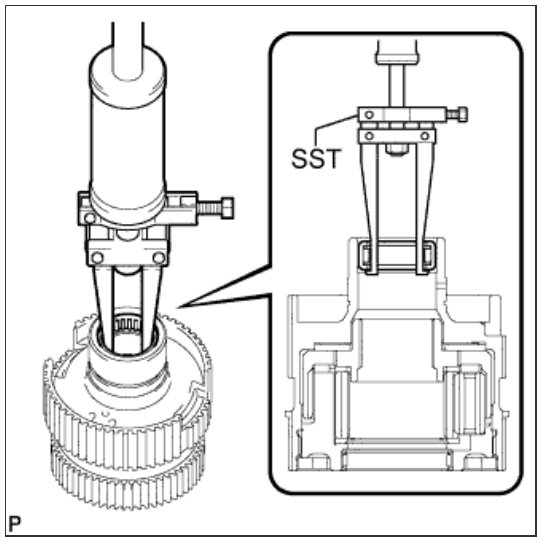


c. Remove the synchromesh shifting key spring and No. 2 synchromesh shifting keys from the center differential case.



d. Using SST, remove the needle roller bearing.

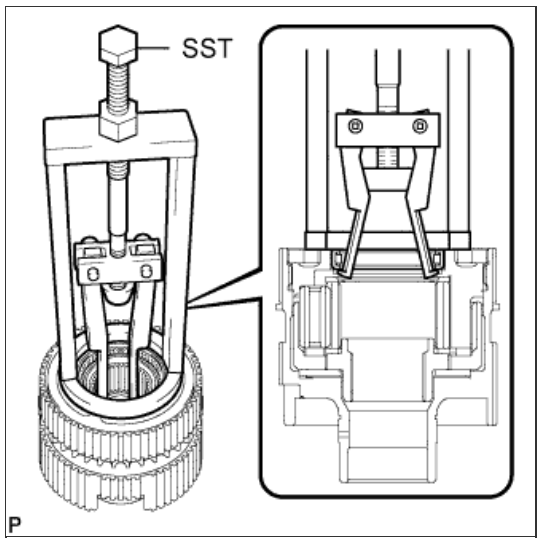
SST
09308-00010



e. Using SST, remove the needle roller bearing.

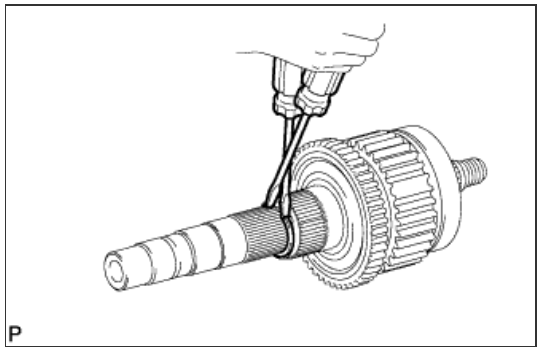
SST

09387-00041 (09387-01021, 09387-01030, 09387-01040)

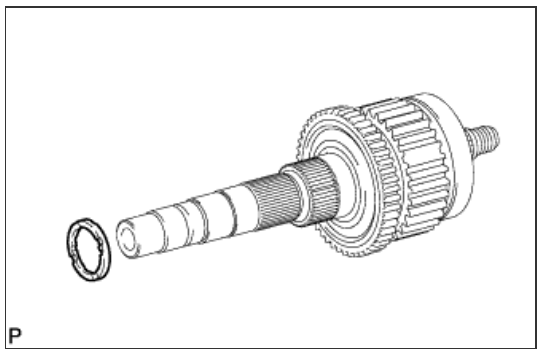


32. REMOVE TRANSFER OUTPUT SHAFT SPACER

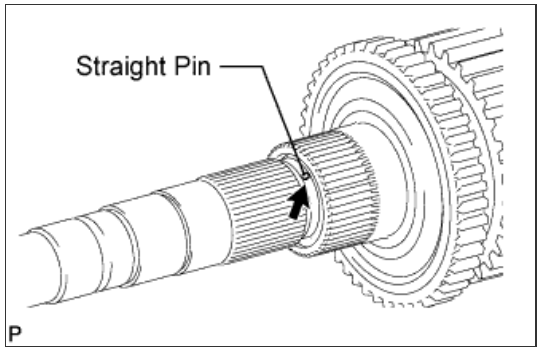
a. Using 2 screwdrivers and a hammer, tap off the snap ring.



b. Remove the output shaft spacer from the output shaft.

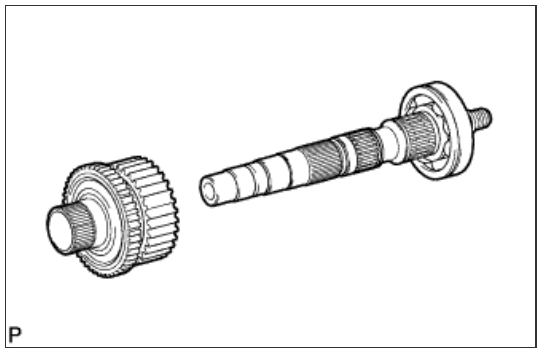


c. Remove the straight pin from the output shaft.



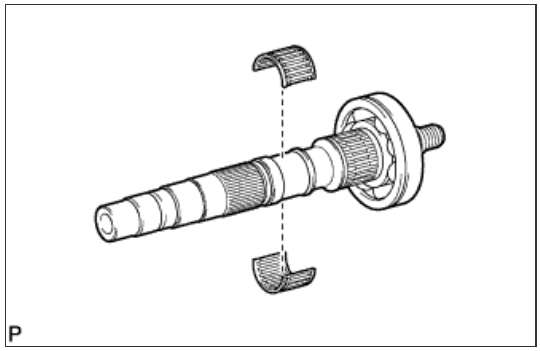
33. REMOVE TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Remove the drive sprocket from the output shaft.



34. REMOVE TRANSFER DRIVE SPROCKET BEARING

a. Remove the bearing from the output shaft.



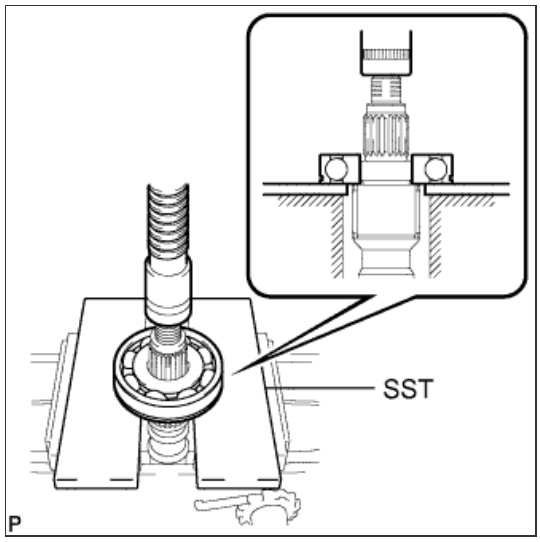
35. REMOVE REAR TRANSFER OUTPUT SHAFT

a. Using SST and a press, press out the bearing.

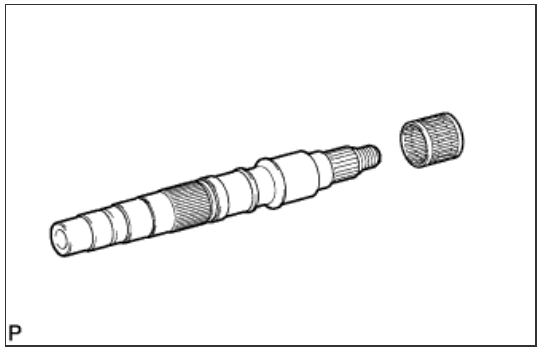
SST
09527-10011

NOTICE:

Be careful not to drop or damage the output shaft.



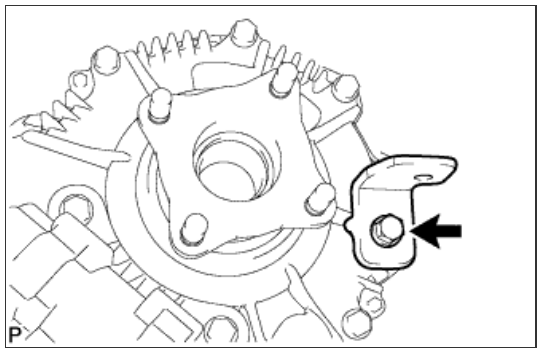
b. Remove the needle roller bearing from the output shaft.



for Preparation Click here

1. REMOVE PROPELLER SHAFT HEAT INSULATOR BRACKET SUB-ASSEMBLY

a. Remove the bolt and bracket.



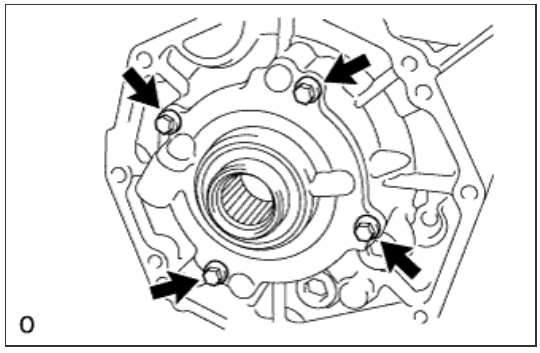
2. REMOVE TRANSFER OIL PUMP PLATE

a. Remove the 4 bolts, oil pump plate and oil pump driven rotor.

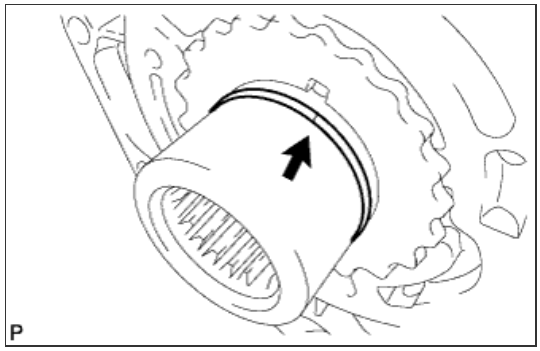
NOTICE:

Do not drop the oil pump driven rotor.

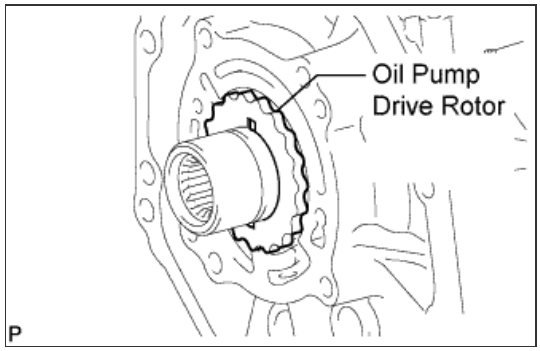
b. Remove the O-ring from the oil pump plate.



c. Remove the transfer oil seal ring from the input shaft.



d. Remove the oil pump drive rotor from the input shaft.

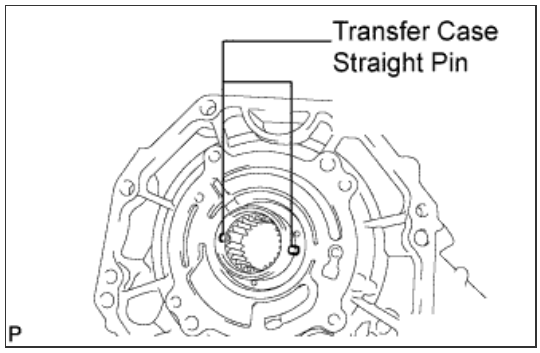


3. REMOVE TRANSFER CASE STRAIGHT PIN

a. Remove the 2 straight pins.

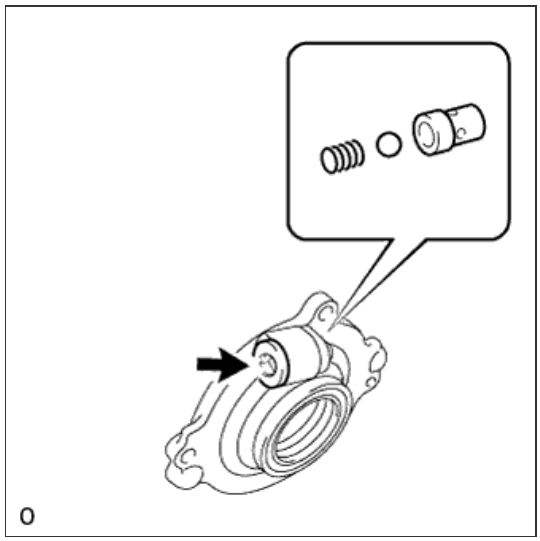
NOTICE:

Do not drop the straight pins.



4. REMOVE TRANSFER CASE PLUG

a. Using a 10 mm hexagon wrench, remove the case plug, compression spring, ball and relief valve seat.



5. REMOVE TRANSFER OIL PUMP PLATE OIL SEAL

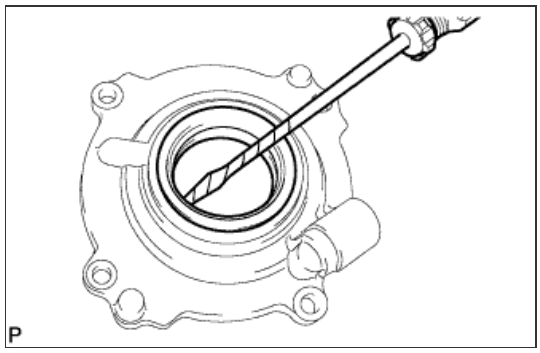
a. Using a screwdriver, pry out the oil seal from the oil pump plate.

NOTICE:

Be careful not to damage the oil seal and oil pump plate contact surfaces.

HINT:

Tape the screwdriver tip before use.



6. REMOVE FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

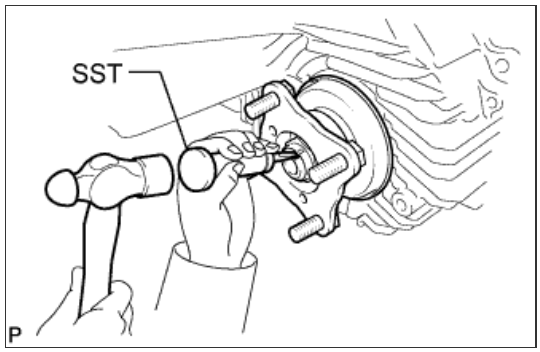
a. Using SST and a hammer, release the staked part of the nut.

SST

09930-00010 (09931-00010, 09931-00020)

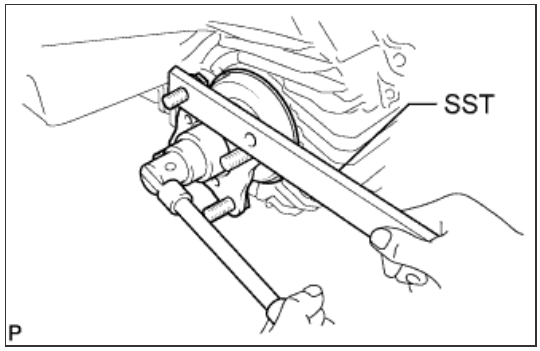
NOTICE:

- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the transfer driven sprocket.**



b. Using SST to hold the companion flange, remove the lock nut.

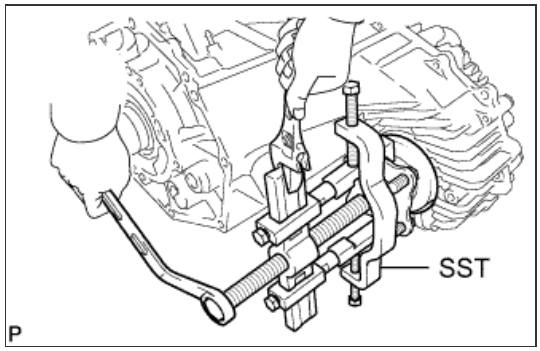
SST
09330-00021



c. Using SST, remove the companion flange.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



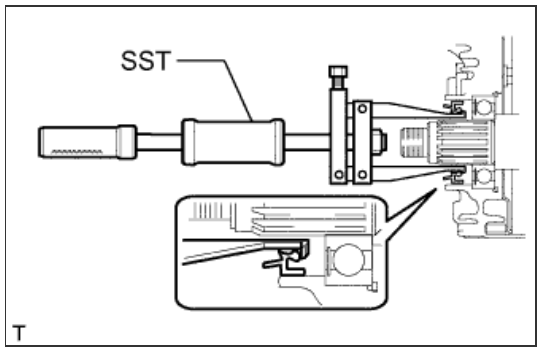
7. REMOVE TRANSFER CASE FRONT OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

NOTICE:

Be careful not to damage the oil seal and front transfer case contact surface.



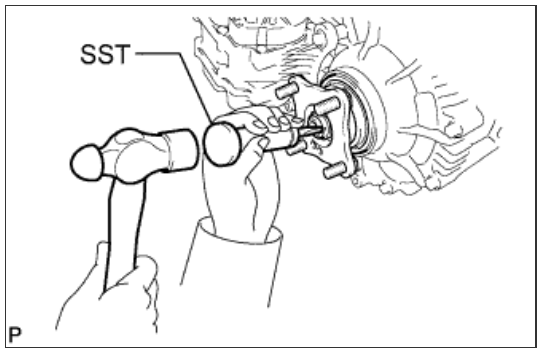
8. REMOVE REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Using SST and a hammer, release the staked part of the nut.

SST
09930-00010 (09931-00010, 09931-00020)

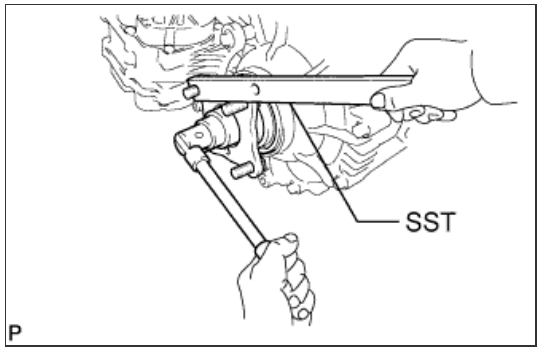
NOTICE:

- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the rear transfer output shaft.**



b. Using SST to hold the companion flange, remove the lock nut.

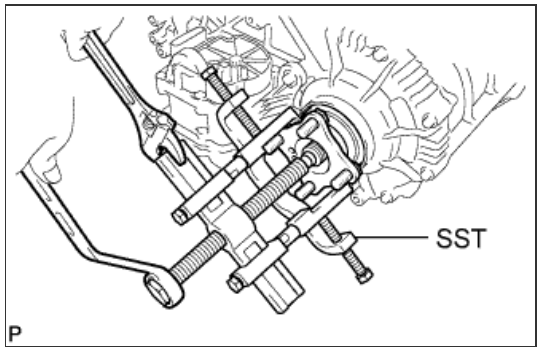
SST
09330-00021



c. Using SST, remove the companion flange.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



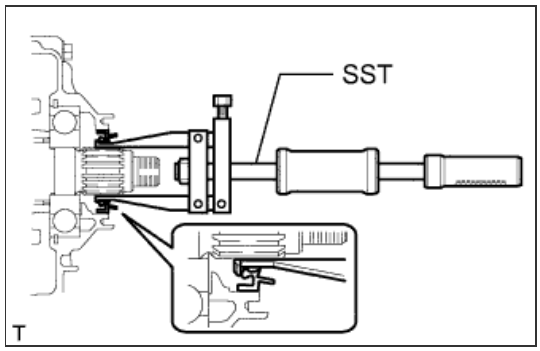
9. REMOVE TRANSFER CASE REAR OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

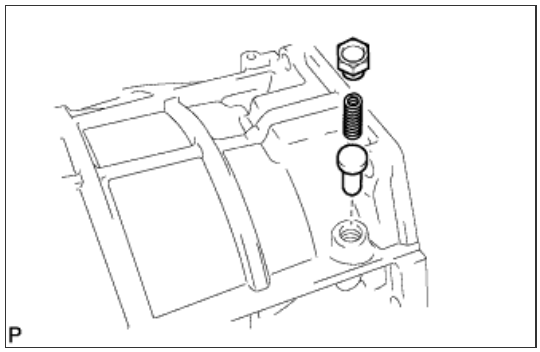
NOTICE:

Be careful not to damage the oil seal and rear transfer case contact surface.



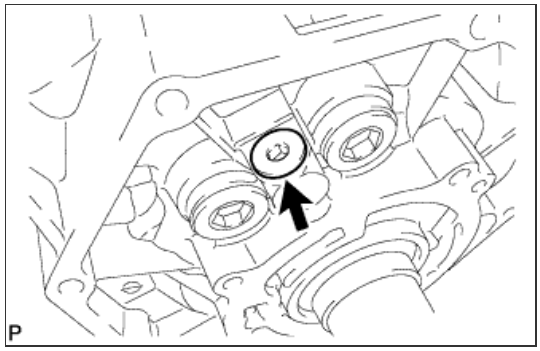
10. REMOVE NO. 1 TRANSFER CASE PLUG

a. Remove the plug, compression spring and pin.



11. REMOVE TRANSFER CASE PLUG

a. Using a 6 mm hexagon wrench, remove the plug.



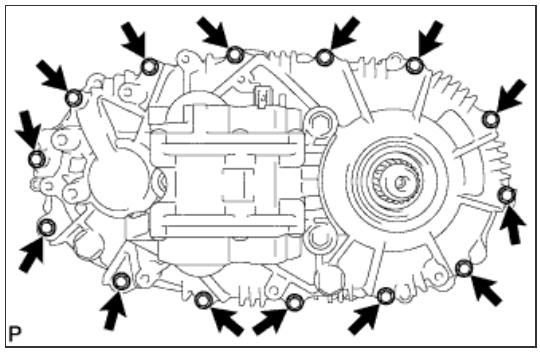
12. REMOVE REAR TRANSFER CASE ASSEMBLY

a. Remove the 14 bolts.

b. Remove the rear transfer case.

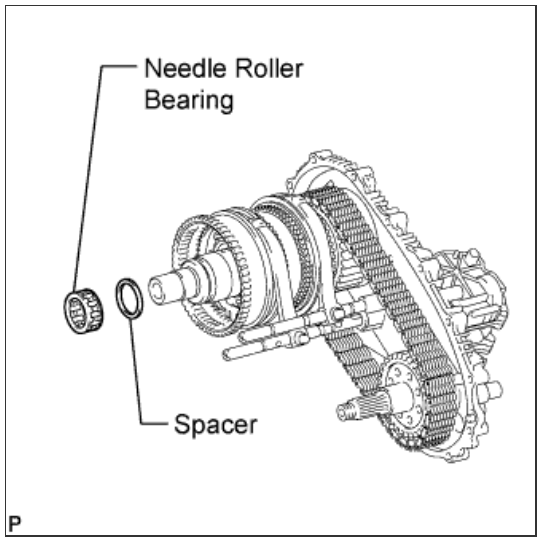
HINT:

If necessary, tap the rear transfer case with a plastic-faced hammer to remove it.



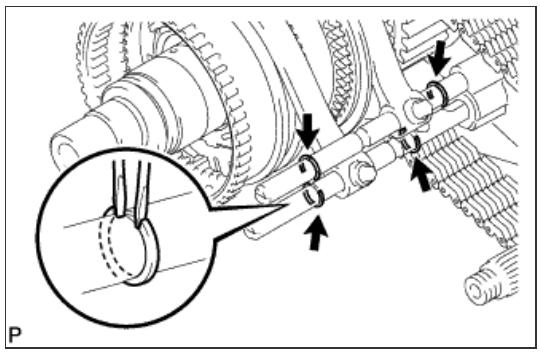
13. REMOVE FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING

a. Remove the needle roller bearing and spacer from the output shaft.

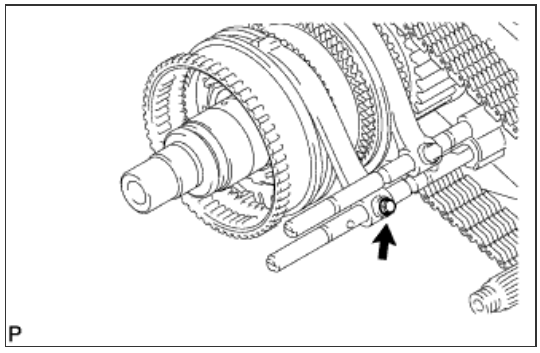


14. REMOVE NO. 2 TRANSFER GEAR SHIFT FORK

a. Using 2 screwdrivers and a hammer, tap off the 4 shift fork shaft snap rings.

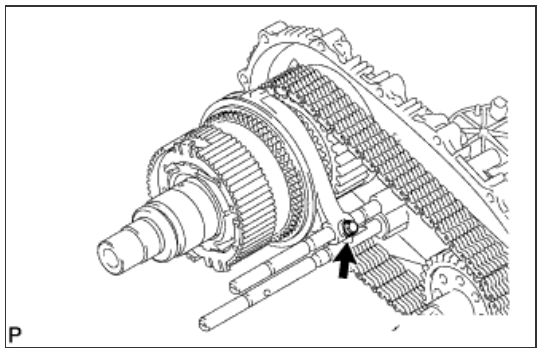


b. Remove the bolt. Then remove the No. 2 gear shift fork together with the high and low clutch sleeve from the shift actuator.

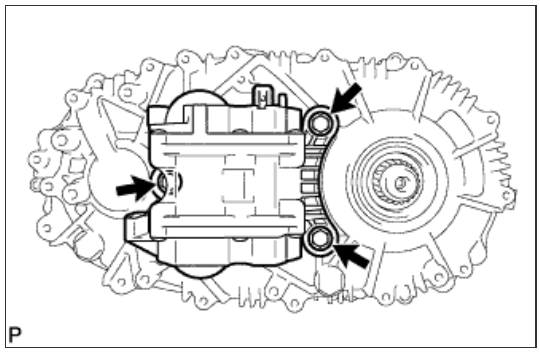


15. REMOVE TRANSFER SHIFT ACTUATOR ASSEMBLY

a. Remove the No. 1 gear shift fork bolt.



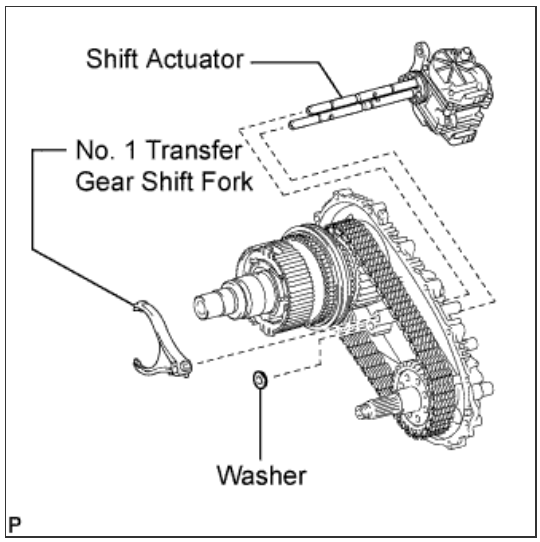
b. Remove the 3 bolts.



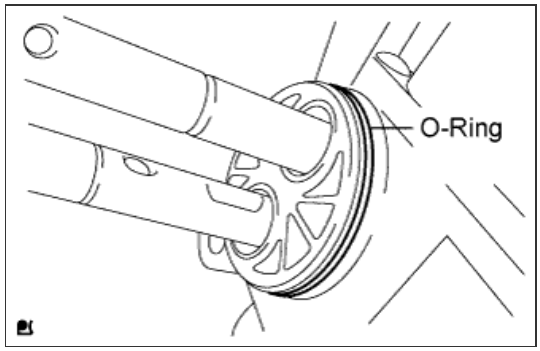
c. Remove the shift actuator, No. 1 gear shift fork and washer from the rear transfer case.

NOTICE:

Take care not to drop the No. 1 gear shift fork and washer.

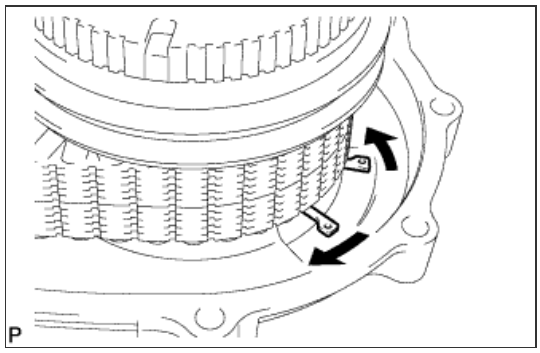


d. Remove the O-ring from the shift actuator.



16. REMOVE REAR TRANSFER OUTPUT SHAFT ASSEMBLY

a. Using a snap ring expander, expand the snap ring as shown in the illustration.

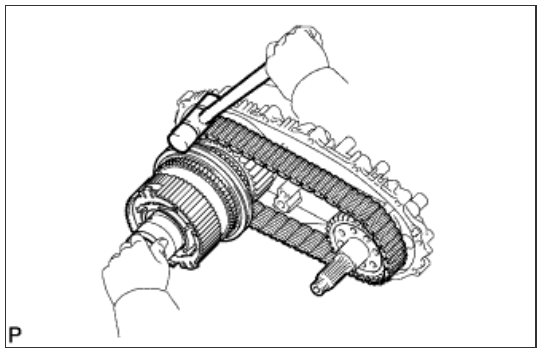


b. Using a plastic-faced hammer, carefully tap the rear transfer case, and remove the output shaft together with the drive chain and driven sprocket.

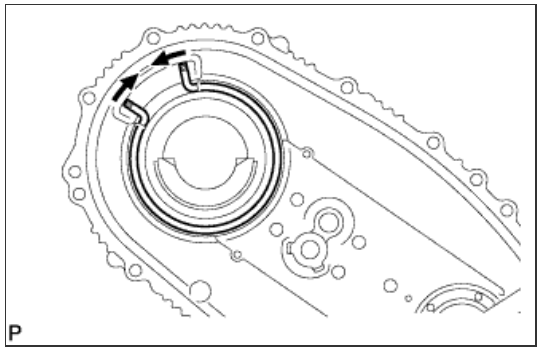
c. Remove the output shaft and driven sprocket from the drive chain.

NOTICE:

Do not drop the output shaft washers.

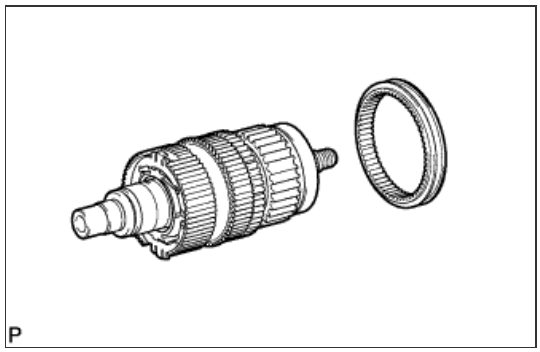


d. Using a snap ring expander, remove the snap ring from the rear transfer case.



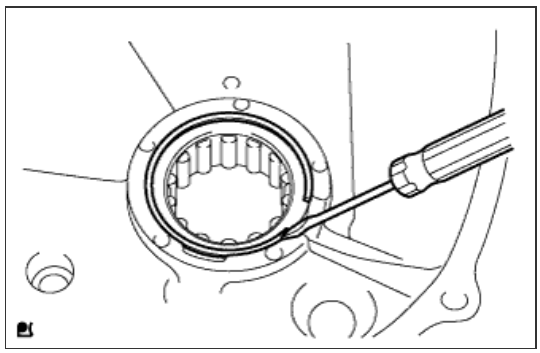
17. REMOVE FRONT DRIVE CLUTCH SLEEVE

a. Remove the clutch sleeve from the output shaft.



18. REMOVE SIDE GEAR SHAFT HOLDER BEARING

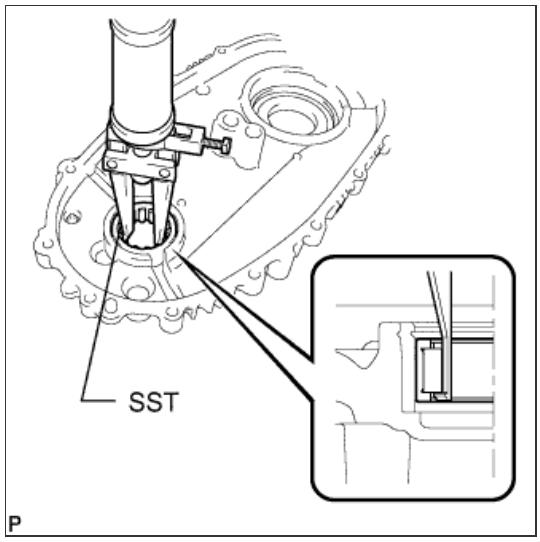
a. Using a screwdriver, remove the snap ring.



b. Using SST, remove the bearing.

SST

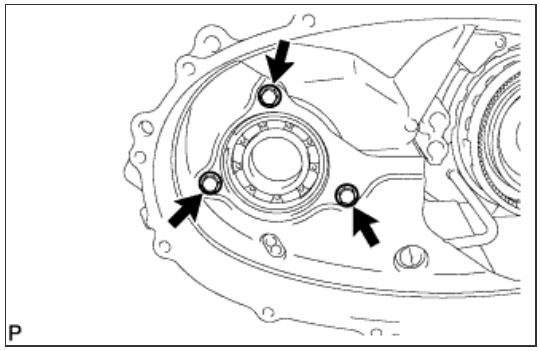
09308-00010



19. REMOVE TRANSFER OIL SEPARATOR SUB-ASSEMBLY

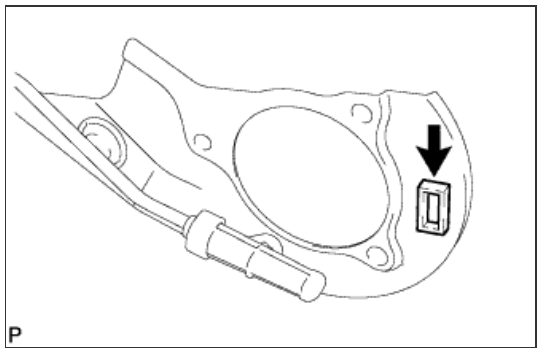
a. Remove the 3 bolts and oil separator.

b. Remove the O-ring from the oil separator.



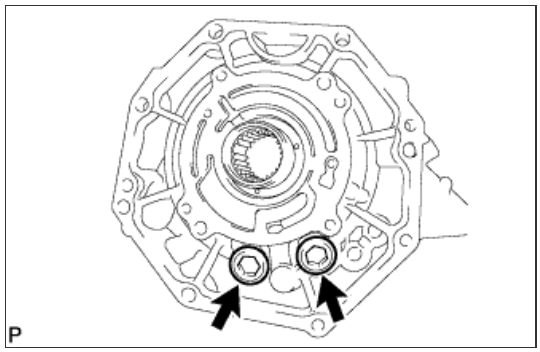
20. REMOVE TRANSFER CASE MAGNET

a. Remove the magnet from the oil separator.

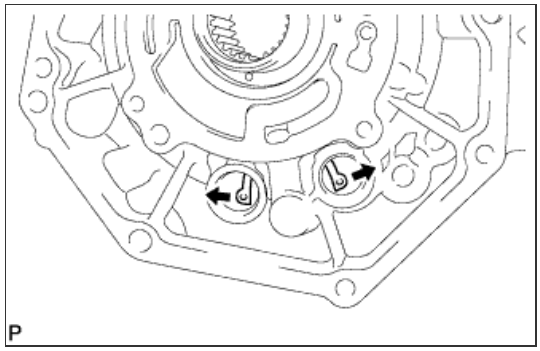


21. REMOVE TRANSFER INPUT SHAFT ASSEMBLY

a. Using a 14 mm hexagon wrench, remove the 2 case plugs from the front transfer case.

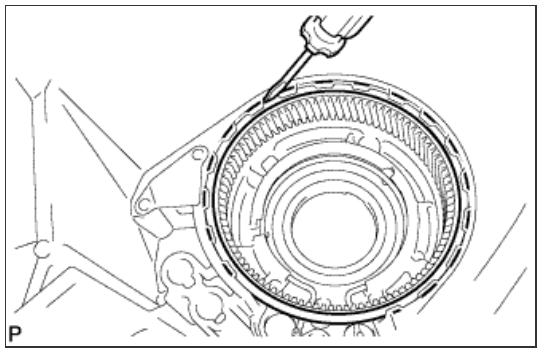


b. Using a snap ring expander, expand the snap ring as shown in the illustration. Then remove the input shaft from the front transfer case.

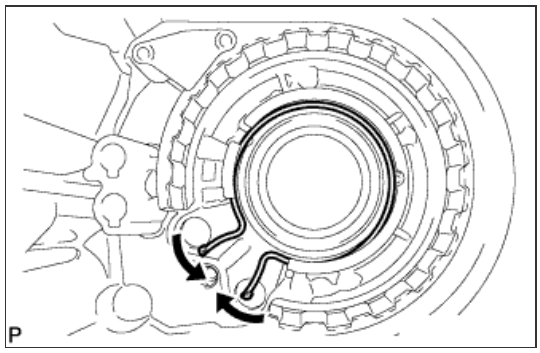


22. REMOVE TRANSFER LOW PLANETARY RING GEAR

a. Using a screwdriver, remove the snap ring. Then remove the low planetary ring gear from the front transfer case.

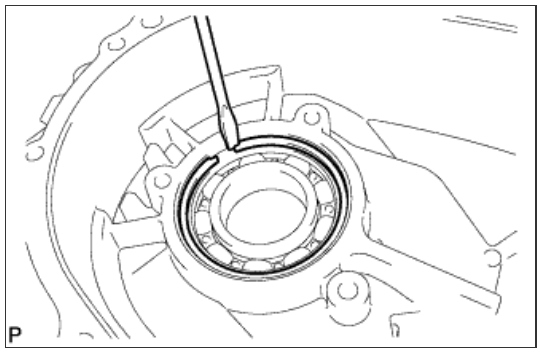


b. Using a snap ring expander, remove the snap ring from the front transfer case.



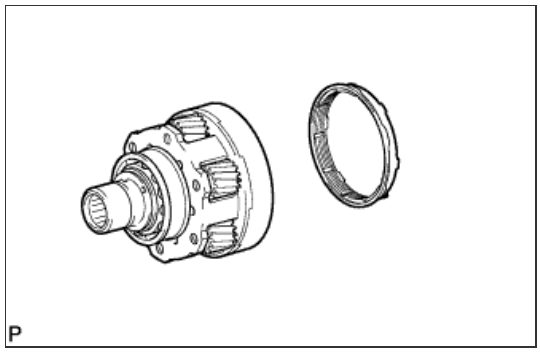
23. REMOVE TRANSFER DRIVEN SPROCKET BEARING

a. Using a screwdriver, remove the snap ring. Then remove the bearing from the front transfer case.



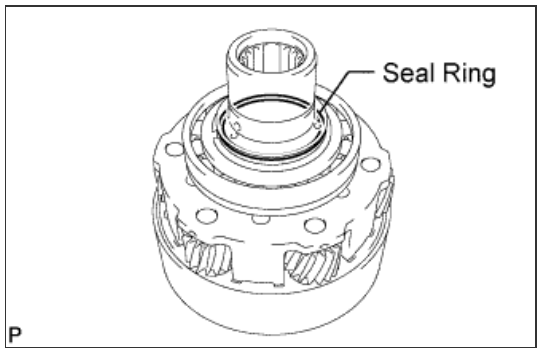
24. REMOVE NO. 1 SYNCHRONIZER RING

a. Remove the synchronizer ring from the input shaft.



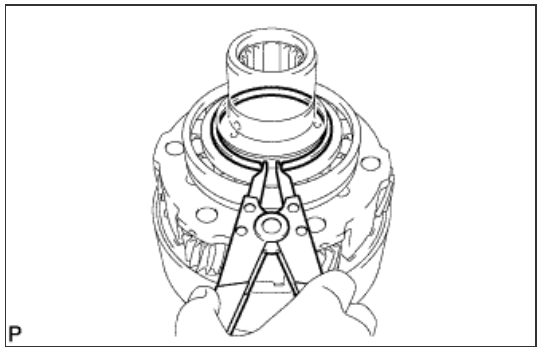
25. REMOVE NO. 1 TRANSFER INPUT SHAFT SEAL RING

a. Remove the seal ring from the input shaft.



26. REMOVE TRANSFER INPUT SHAFT BEARING

a. Using a snap ring expander, remove the snap ring.



b. Using SST and a press, press out the bearing.

SST

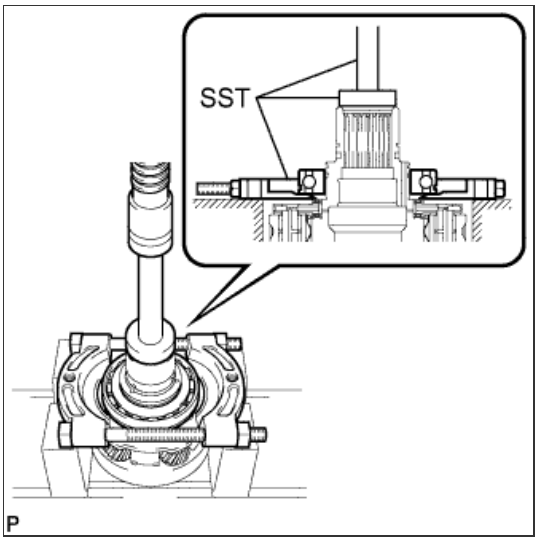
09555-55010
09950-60010 (09951-00490)
09950-70010 (09951-07100)

NOTICE:

Be careful not to drop or damage the input shaft, low planetary gear and low planetary gear bearings.

HINT:

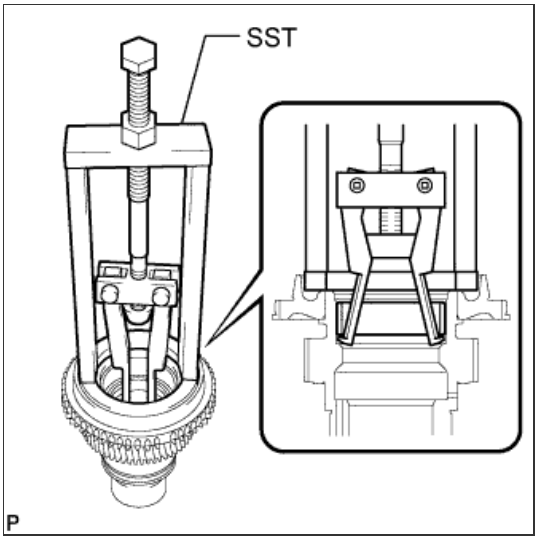
When the bearing is removed, the input shaft, low planetary gear, and 2 low planetary gear bearings will come off.



27. REMOVE TRANSFER INPUT SHAFT BIMETAL FORMED BUSH

a. Using SST, remove the bush.

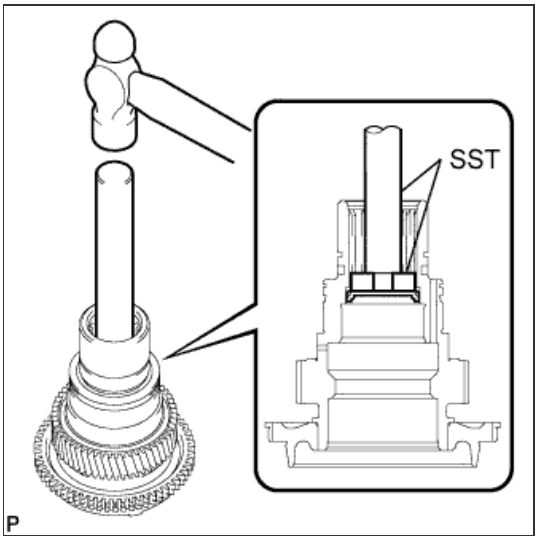
SST
09387-00041 (09387-01021, 09387-01030, 09387-01040)



28. REMOVE TRANSFER INPUT SHAFT PLUG

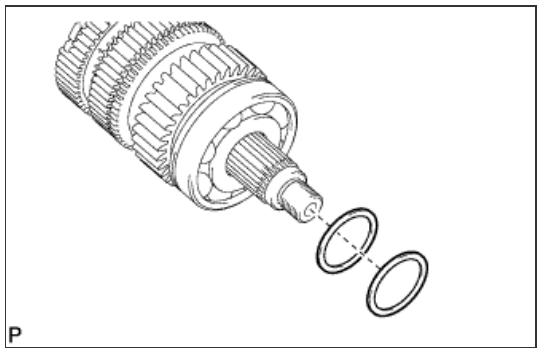
a. Using SST and a hammer, tap out the input shaft plug.

SST
09950-70010 (09951-07150)
09950-60010 (09951-00300)



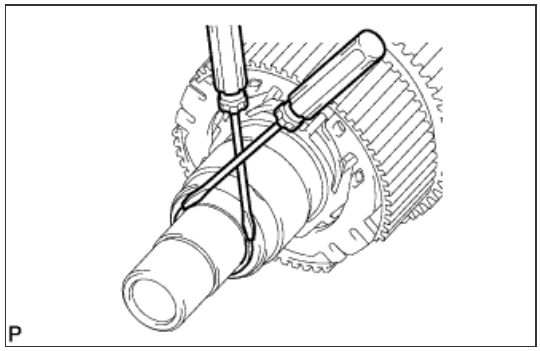
29. REMOVE TRANSFER OUTPUT SHAFT WASHER

a. Remove the 2 output shaft washers from the output shaft.

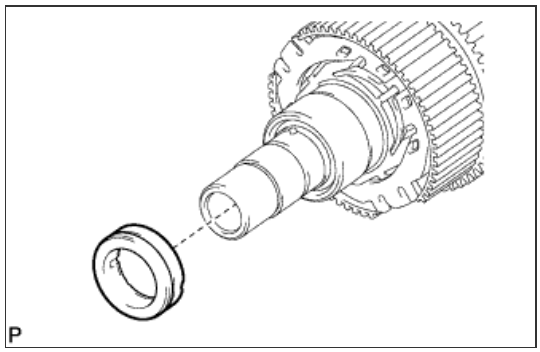


30. REMOVE NO. 1 TRANSFER OUTPUT SHAFT SPACER

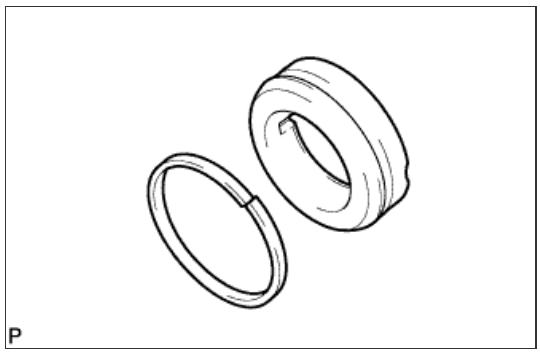
a. Using 2 screwdrivers and a hammer, tap off the snap ring.



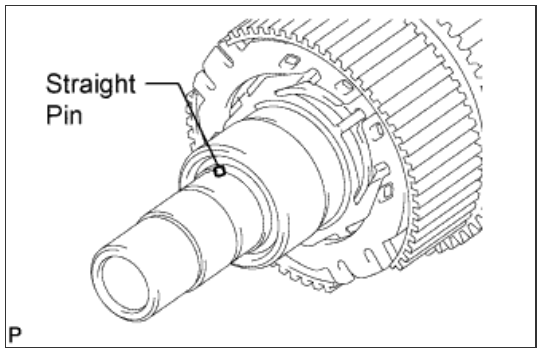
b. Remove the output shaft spacer from the output shaft.



c. Remove the seal ring from the output shaft spacer.

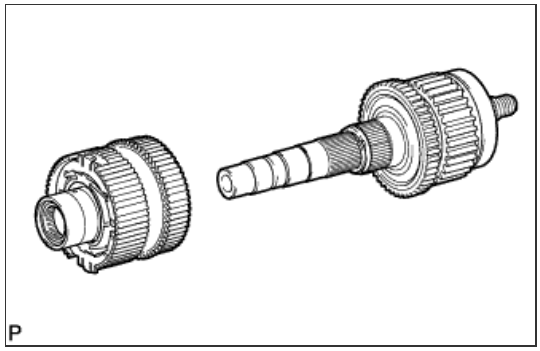


d. Remove the straight pin from the output shaft.

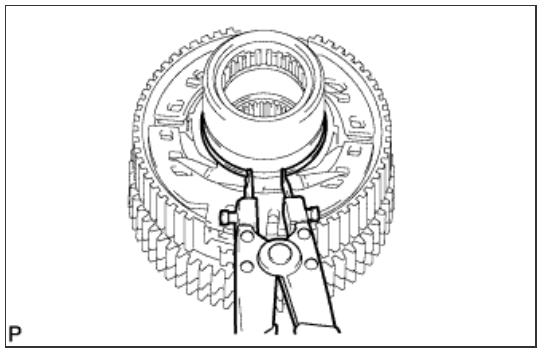


31. REMOVE CENTER DIFFERENTIAL CASE

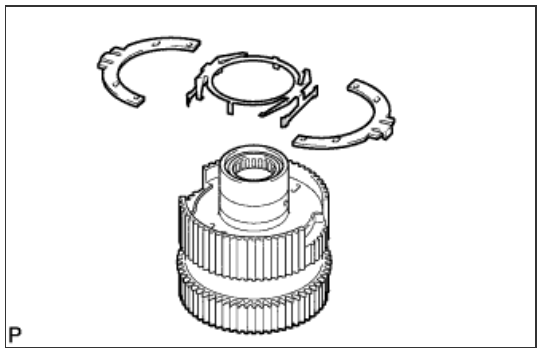
a. Remove the center differential case from the output shaft.



b. Using a snap ring expander, remove the snap ring.

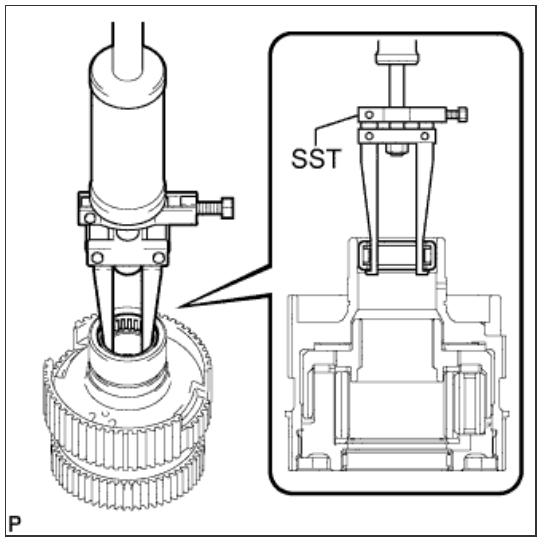


c. Remove the synchromesh shifting key spring and No. 2 synchromesh shifting keys from the center differential case.



d. Using SST, remove the needle roller bearing.

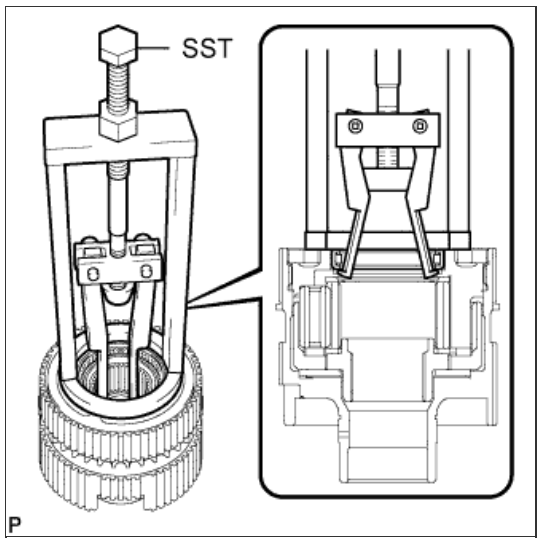
SST
09308-00010



e. Using SST, remove the needle roller bearing.

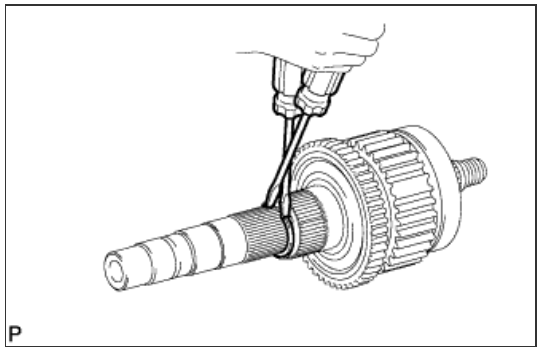
SST

09387-00041 (09387-01021, 09387-01030, 09387-01040)

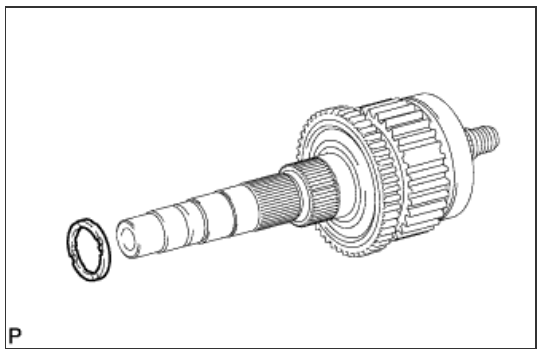


32. REMOVE TRANSFER OUTPUT SHAFT SPACER

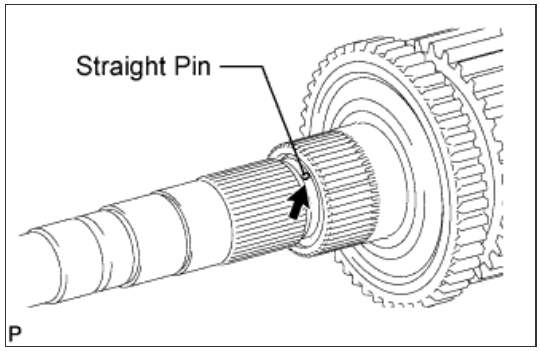
a. Using 2 screwdrivers and a hammer, tap off the snap ring.



b. Remove the output shaft spacer from the output shaft.

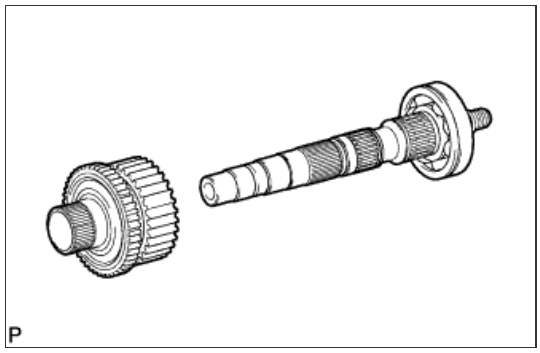


c. Remove the straight pin from the output shaft.



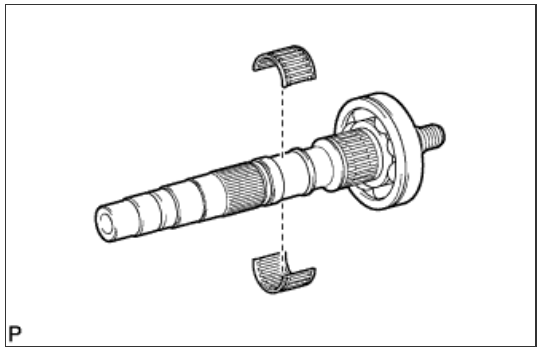
33. REMOVE TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Remove the drive sprocket from the output shaft.



34. REMOVE TRANSFER DRIVE SPROCKET BEARING

a. Remove the bearing from the output shaft.



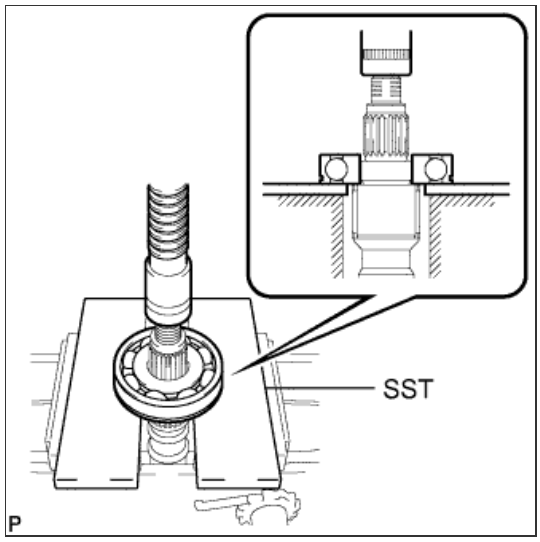
35. REMOVE REAR TRANSFER OUTPUT SHAFT

a. Using SST and a press, press out the bearing.

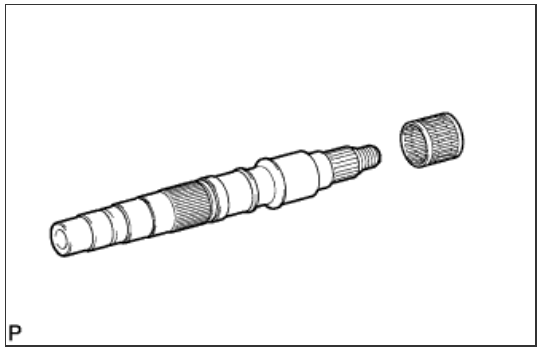
SST
09527-10011

NOTICE:

Be careful not to drop or damage the output shaft.



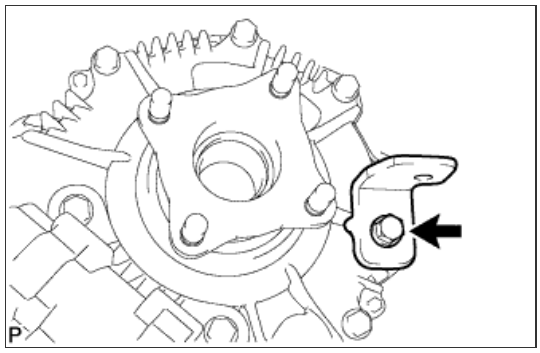
b. Remove the needle roller bearing from the output shaft.



for Preparation Click here

1. REMOVE PROPELLER SHAFT HEAT INSULATOR BRACKET SUB-ASSEMBLY

a. Remove the bolt and bracket.



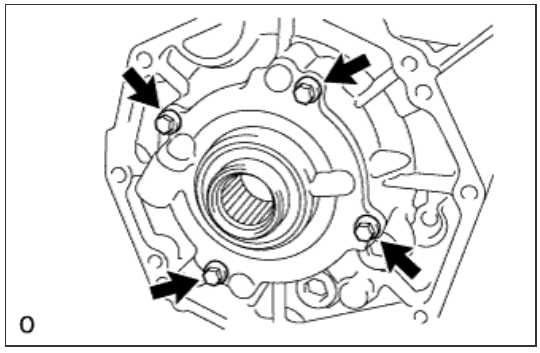
2. REMOVE TRANSFER OIL PUMP PLATE

a. Remove the 4 bolts, oil pump plate and oil pump driven rotor.

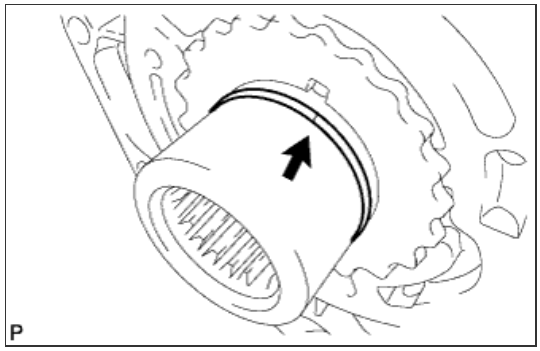
NOTICE:

Do not drop the oil pump driven rotor.

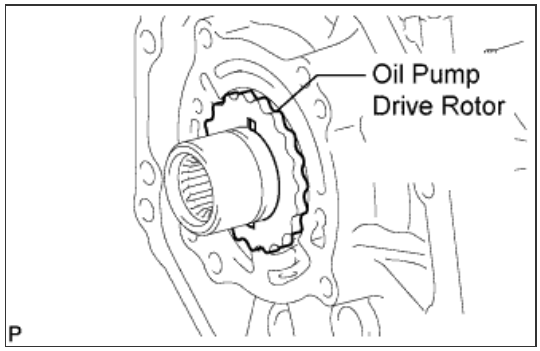
b. Remove the O-ring from the oil pump plate.



c. Remove the transfer oil seal ring from the input shaft.



d. Remove the oil pump drive rotor from the input shaft.

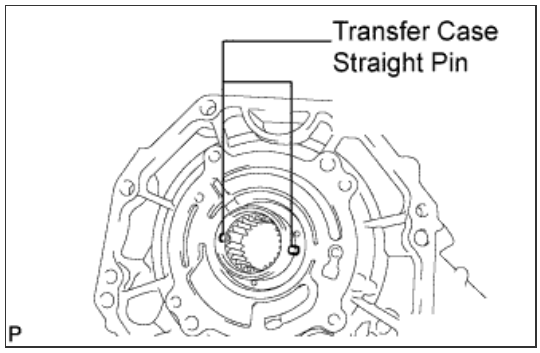


3. REMOVE TRANSFER CASE STRAIGHT PIN

a. Remove the 2 straight pins.

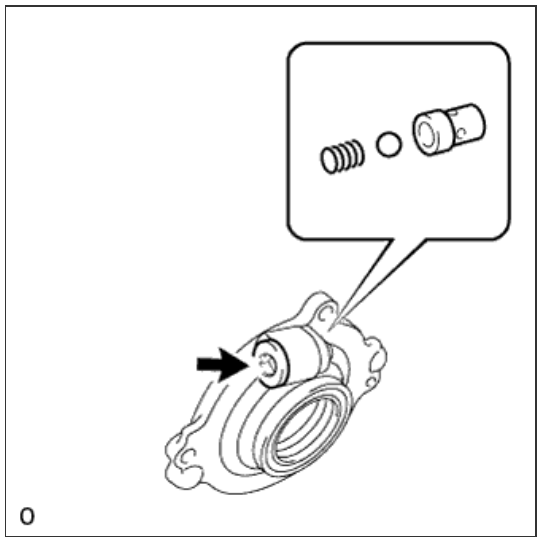
NOTICE:

Do not drop the straight pins.



4. REMOVE TRANSFER CASE PLUG

a. Using a 10 mm hexagon wrench, remove the case plug, compression spring, ball and relief valve seat.



5. REMOVE TRANSFER OIL PUMP PLATE OIL SEAL

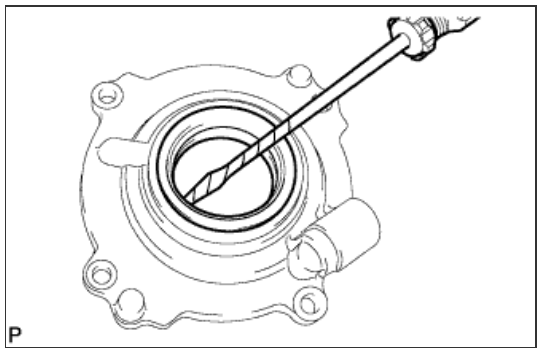
a. Using a screwdriver, pry out the oil seal from the oil pump plate.

NOTICE:

Be careful not to damage the oil seal and oil pump plate contact surfaces.

HINT:

Tape the screwdriver tip before use.



6. REMOVE FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

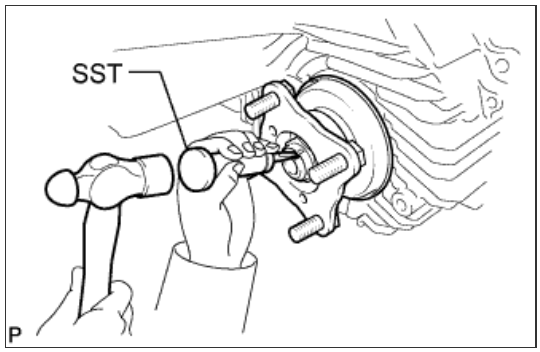
a. Using SST and a hammer, release the staked part of the nut.

SST

09930-00010 (09931-00010, 09931-00020)

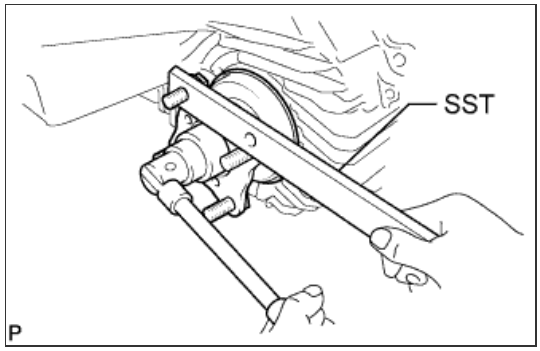
NOTICE:

- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the transfer driven sprocket.**



b. Using SST to hold the companion flange, remove the lock nut.

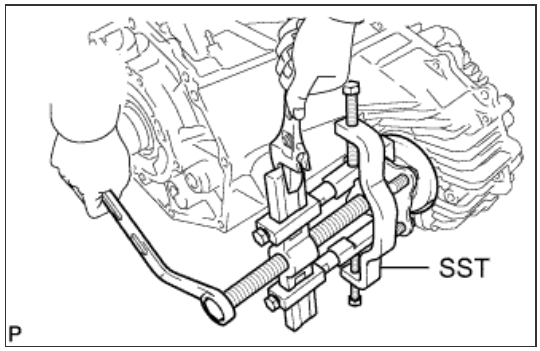
SST
09330-00021



c. Using SST, remove the companion flange.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



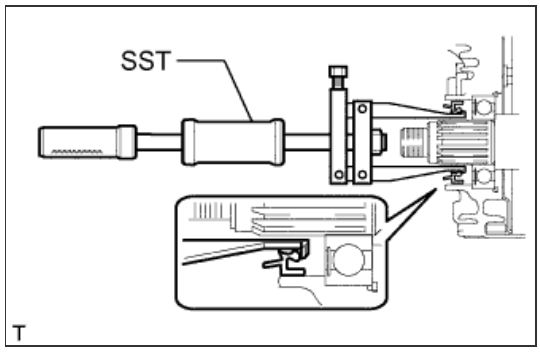
7. REMOVE TRANSFER CASE FRONT OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

NOTICE:

Be careful not to damage the oil seal and front transfer case contact surface.



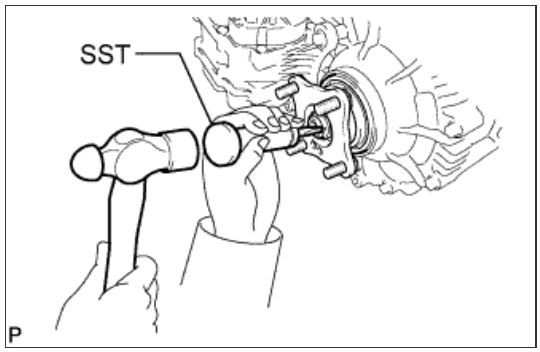
8. REMOVE REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Using SST and a hammer, release the staked part of the nut.

SST
09930-00010 (09931-00010, 09931-00020)

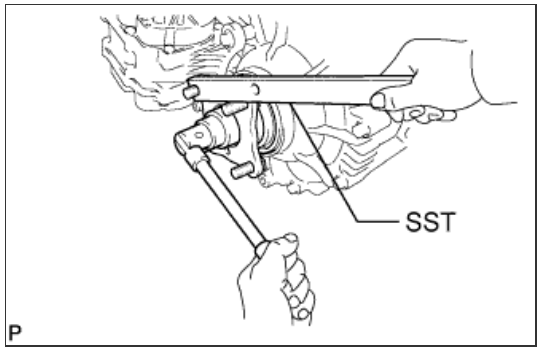
NOTICE:

- **Be sure to use SST with the tapered surface facing the shaft.**
- **Do not grind the tip of SST with a grinder, etc.**
- **Completely loosen the staked part of the nut when removing it.**
- **Do not damage the threads of the rear transfer output shaft.**



b. Using SST to hold the companion flange, remove the lock nut.

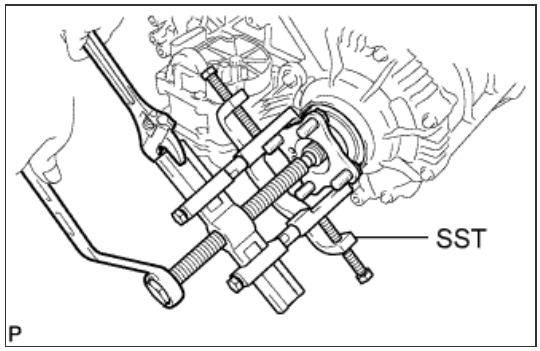
SST
09330-00021



c. Using SST, remove the companion flange.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

d. Remove the O-ring from the companion flange.



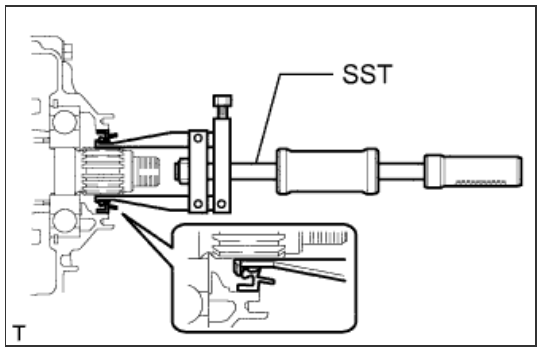
9. REMOVE TRANSFER CASE REAR OIL SEAL

a. Using SST, tap out the oil seal.

SST
09308-00010

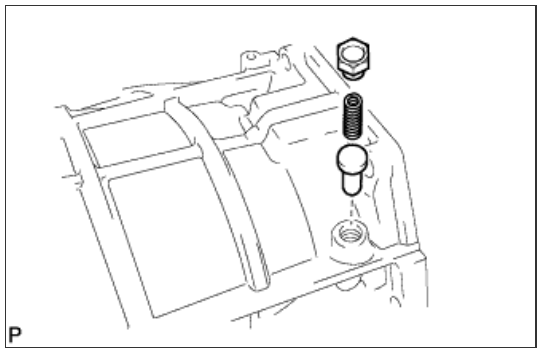
NOTICE:

Be careful not to damage the oil seal and rear transfer case contact surface.



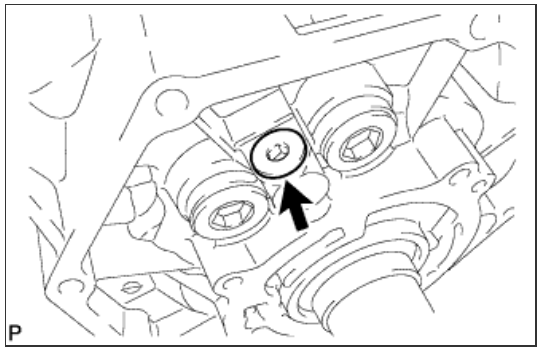
10. REMOVE NO. 1 TRANSFER CASE PLUG

a. Remove the plug, compression spring and pin.



11. REMOVE TRANSFER CASE PLUG

a. Using a 6 mm hexagon wrench, remove the plug.



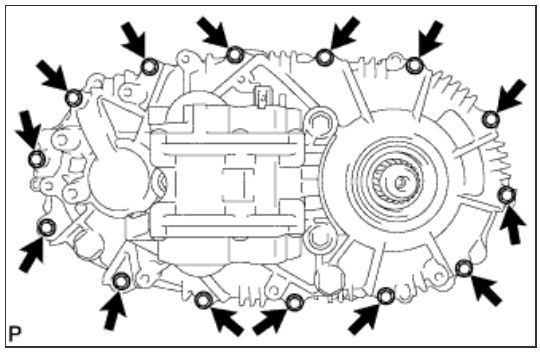
12. REMOVE REAR TRANSFER CASE ASSEMBLY

a. Remove the 14 bolts.

b. Remove the rear transfer case.

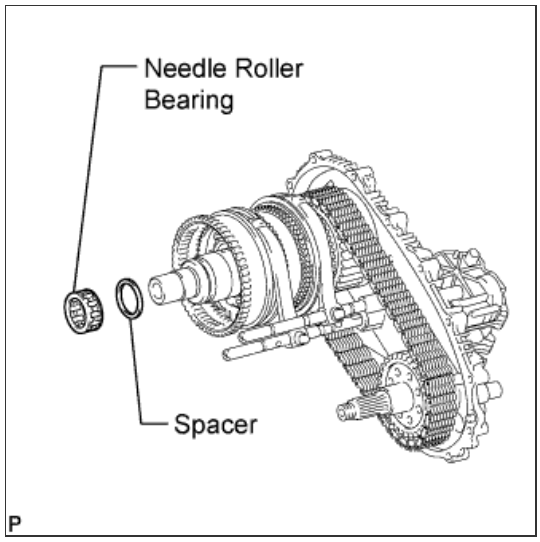
HINT:

If necessary, tap the rear transfer case with a plastic-faced hammer to remove it.



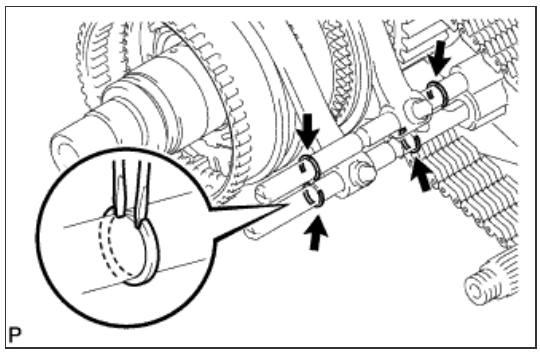
13. REMOVE FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING

a. Remove the needle roller bearing and spacer from the output shaft.

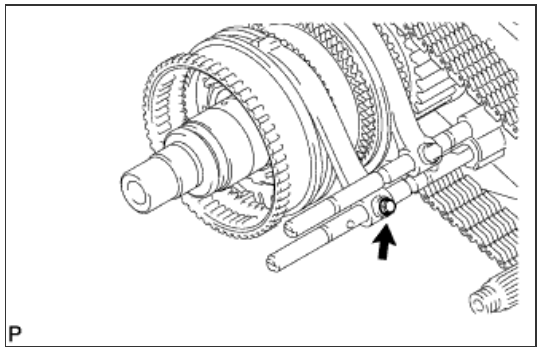


14. REMOVE NO. 2 TRANSFER GEAR SHIFT FORK

a. Using 2 screwdrivers and a hammer, tap off the 4 shift fork shaft snap rings.

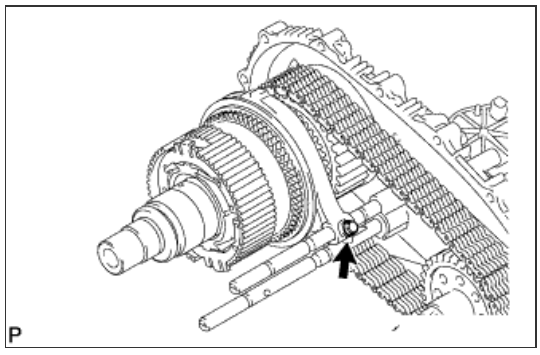


b. Remove the bolt. Then remove the No. 2 gear shift fork together with the high and low clutch sleeve from the shift actuator.

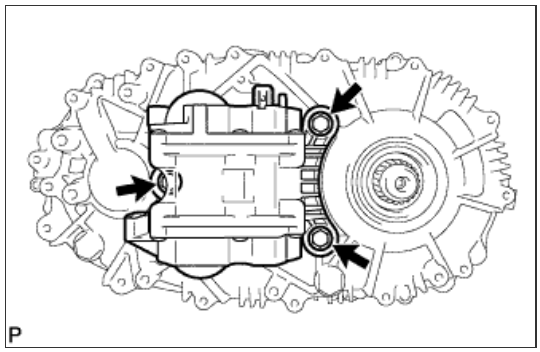


15. REMOVE TRANSFER SHIFT ACTUATOR ASSEMBLY

a. Remove the No. 1 gear shift fork bolt.



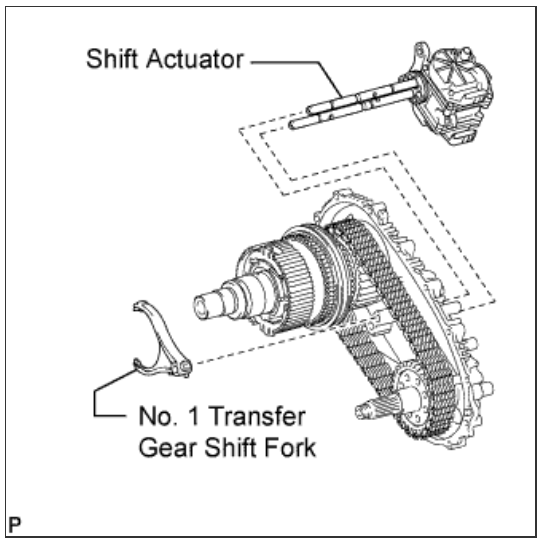
b. Remove the 3 bolts.



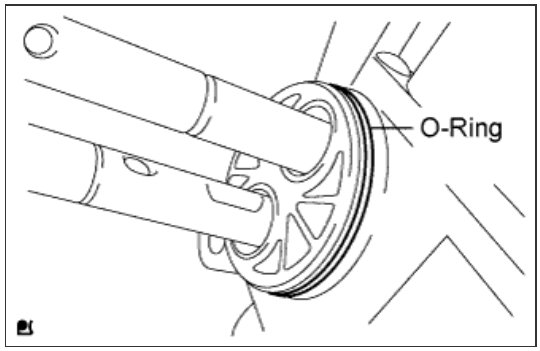
c. Remove the shift actuator and No. 1 gear shift fork from the rear transfer case.

NOTICE:

Take care not to drop the No. 1 gear shift fork.

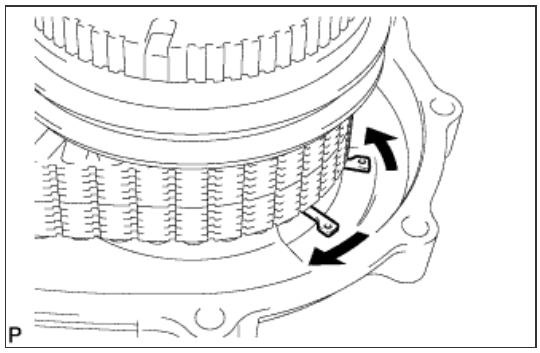


d. Remove the O-ring from the shift actuator.



16. REMOVE REAR TRANSFER OUTPUT SHAFT ASSEMBLY

a. Using a snap ring expander, expand the snap ring as shown in the illustration.

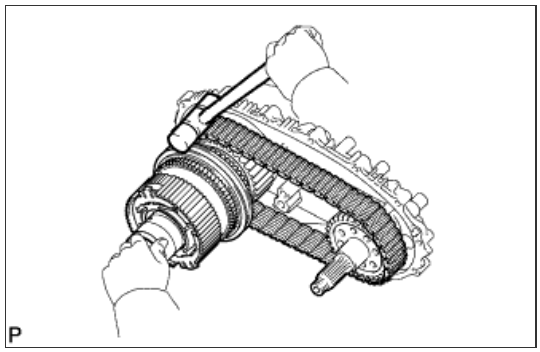


b. Using a plastic-faced hammer, carefully tap the rear transfer case, and remove the output shaft together with the drive chain and driven sprocket.

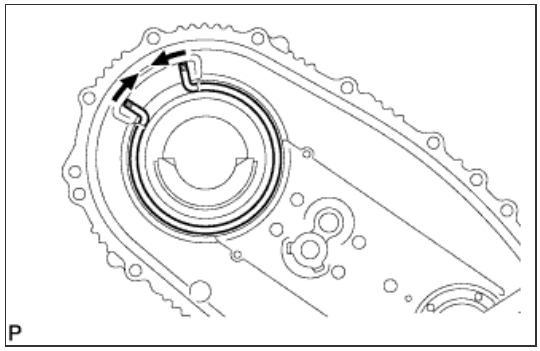
c. Remove the output shaft and driven sprocket from the drive chain.

NOTICE:

Do not drop the output shaft washers.

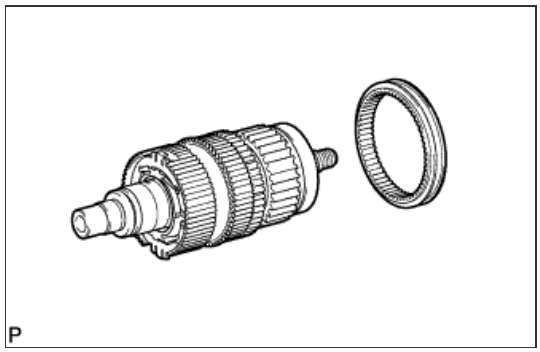


d. Using a snap ring expander, remove the snap ring from the rear transfer case.



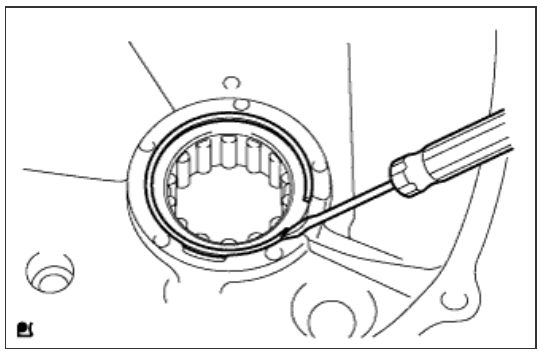
17. REMOVE FRONT DRIVE CLUTCH SLEEVE

a. Remove the clutch sleeve from the output shaft.



18. REMOVE SIDE GEAR SHAFT HOLDER BEARING

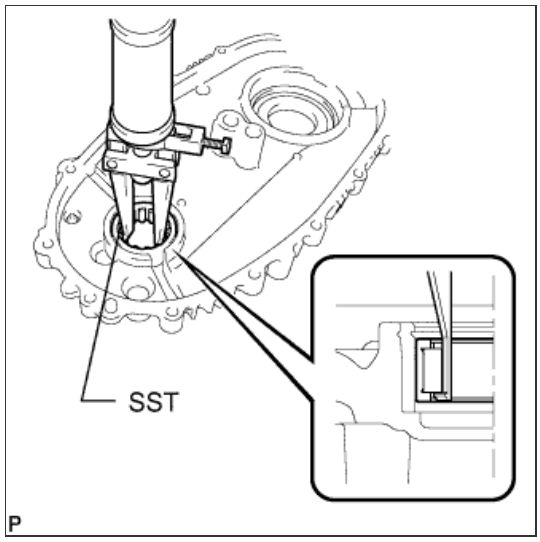
a. Using a screwdriver, remove the snap ring.



b. Using SST, remove the bearing.

SST

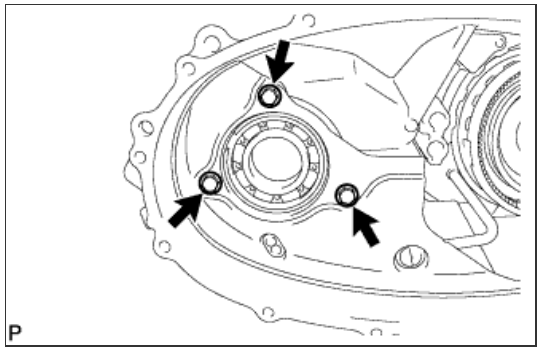
09308-00010



19. REMOVE TRANSFER OIL SEPARATOR SUB-ASSEMBLY

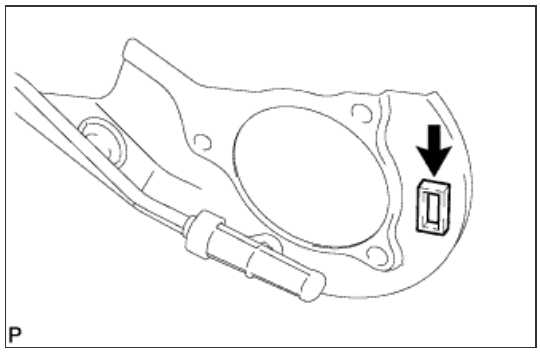
a. Remove the 3 bolts and oil separator.

b. Remove the O-ring from the oil separator.



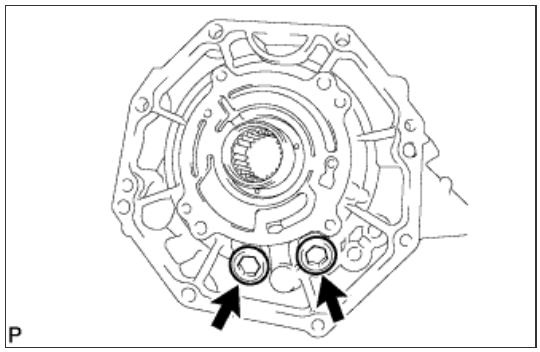
20. REMOVE TRANSFER CASE MAGNET

a. Remove the magnet from the oil separator.

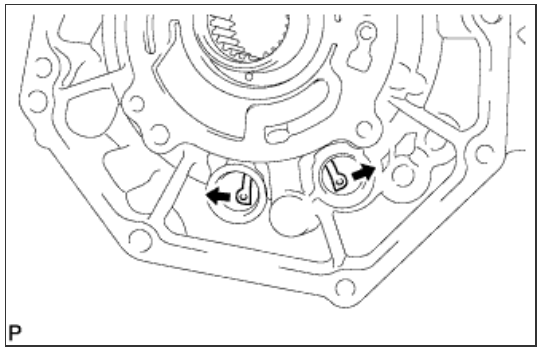


21. REMOVE TRANSFER INPUT SHAFT ASSEMBLY

a. Using a 14 mm hexagon wrench, remove the 2 case plugs from the front transfer case.

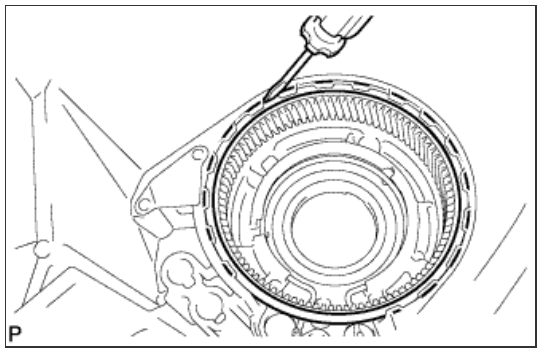


b. Using a snap ring expander, expand the snap ring as shown in the illustration. Then remove the input shaft from the front transfer case.

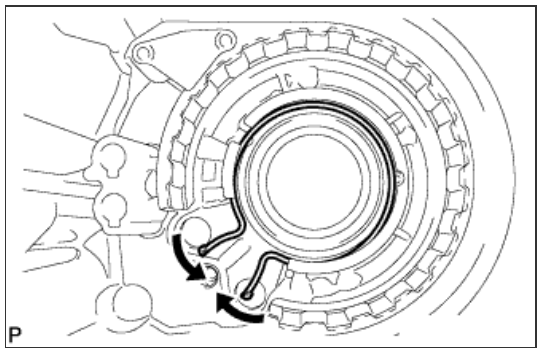


22. REMOVE TRANSFER LOW PLANETARY RING GEAR

a. Using a screwdriver, remove the snap ring. Then remove the low planetary ring gear from the front transfer case.

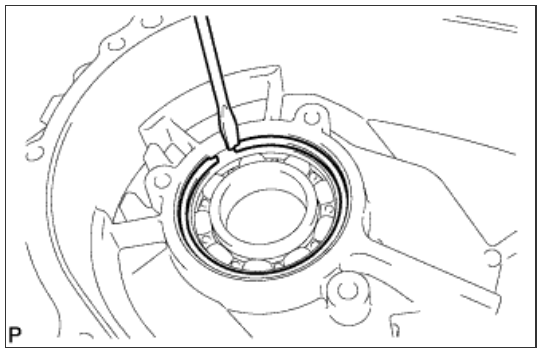


b. Using a snap ring expander, remove the snap ring from the front transfer case.



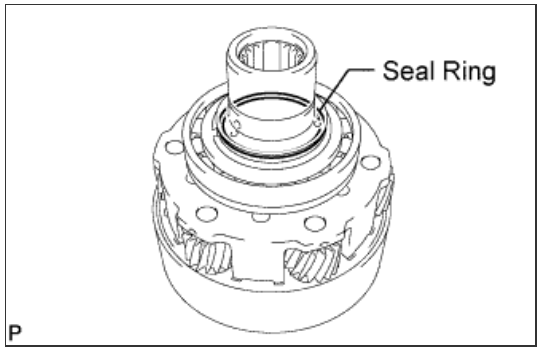
23. REMOVE TRANSFER DRIVEN SPROCKET BEARING

a. Using a screwdriver, remove the snap ring. Then remove the bearing from the front transfer case.



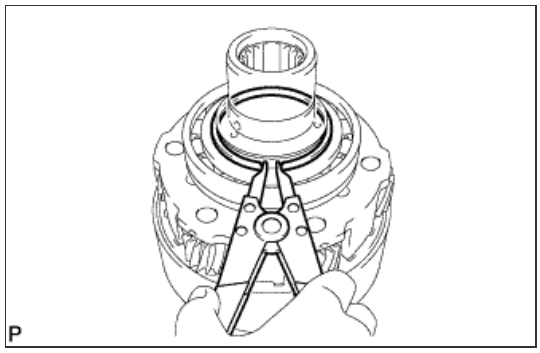
24. REMOVE NO. 1 TRANSFER INPUT SHAFT SEAL RING

a. Remove the seal ring from the input shaft.



25. REMOVE TRANSFER INPUT SHAFT BEARING

a. Using a snap ring expander, remove the snap ring.



b. Using SST and a press, press out the bearing.

SST

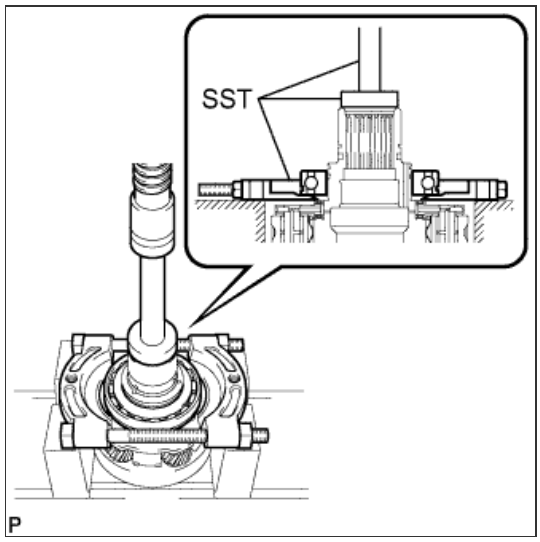
09555-55010
09950-60010 (09951-00490)
09950-70010 (09951-07100)

NOTICE:

Be careful not to drop or damage the input shaft, low planetary gear and low planetary gear bearings.

HINT:

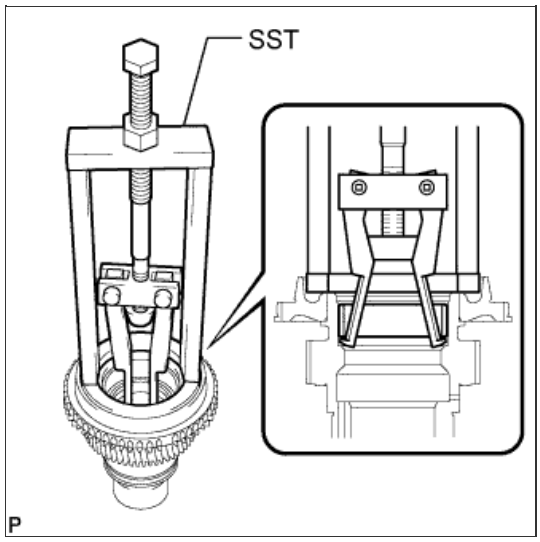
When the bearing is removed, the input shaft, low planetary gear, and 2 low planetary gear bearings will come off.



26. REMOVE TRANSFER INPUT SHAFT BIMETAL FORMED BUSH

a. Using SST, remove the bush.

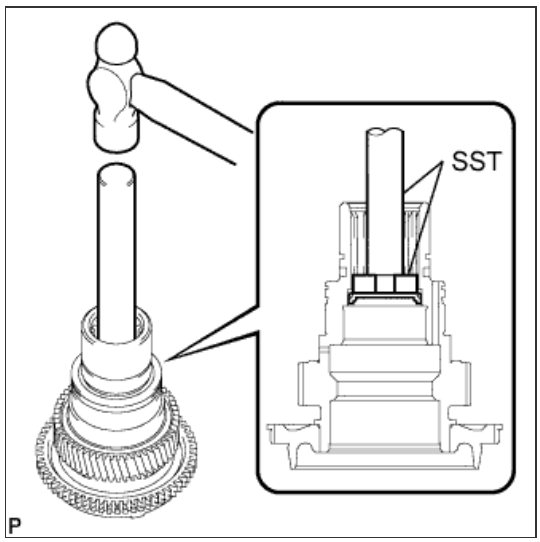
SST
09387-00041 (09387-01021, 09387-01030, 09387-01040)



27. REMOVE TRANSFER INPUT SHAFT PLUG

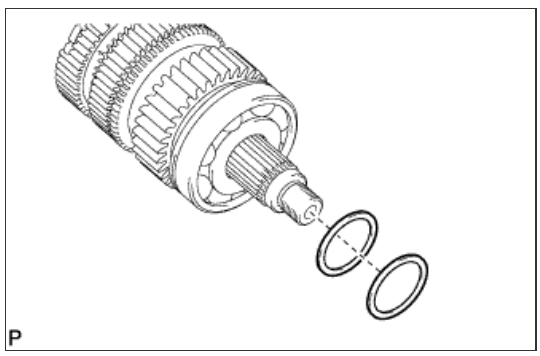
a. Using SST and a hammer, tap out the input shaft plug.

SST
09950-70010 (09951-07150)
09950-60010 (09951-00300)



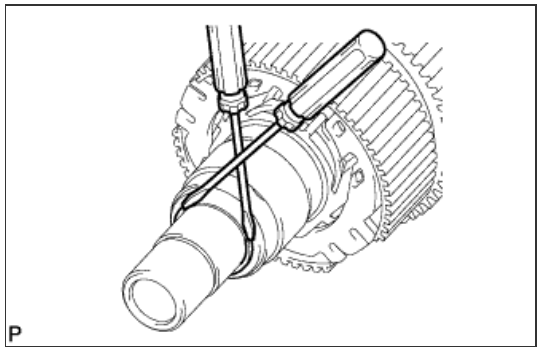
28. REMOVE TRANSFER OUTPUT SHAFT WASHER

a. Remove the 2 output shaft washers from the output shaft.

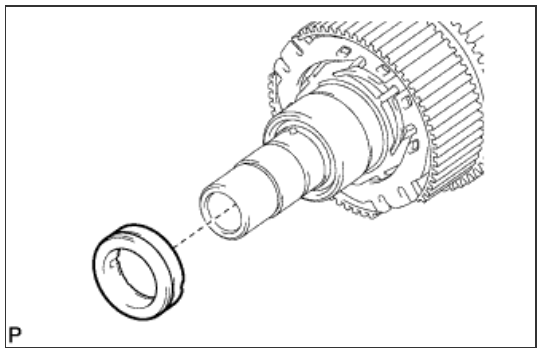


29. REMOVE NO. 1 TRANSFER OUTPUT SHAFT SPACER

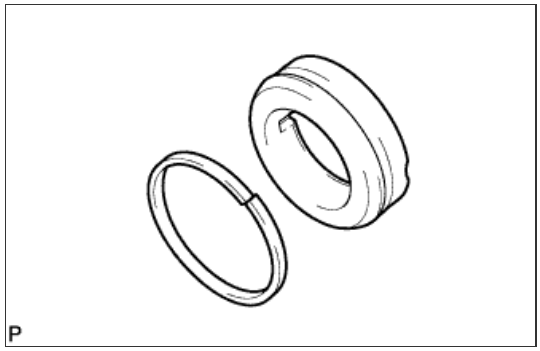
a. Using 2 screwdrivers and a hammer, tap off the snap ring.



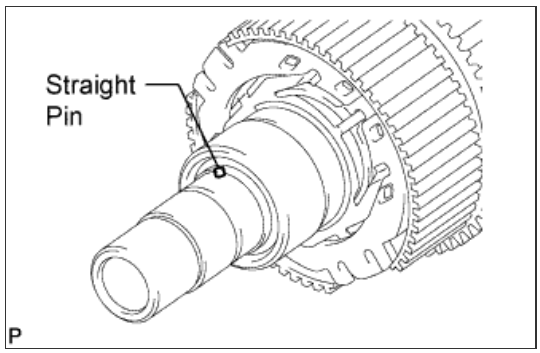
b. Remove the output shaft spacer from the output shaft.



c. Remove the seal ring from the output shaft spacer.

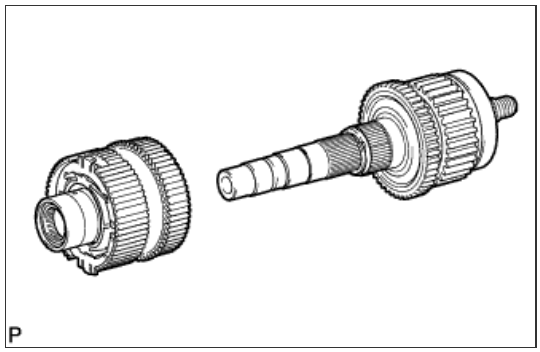


d. Remove the straight pin from the output shaft.



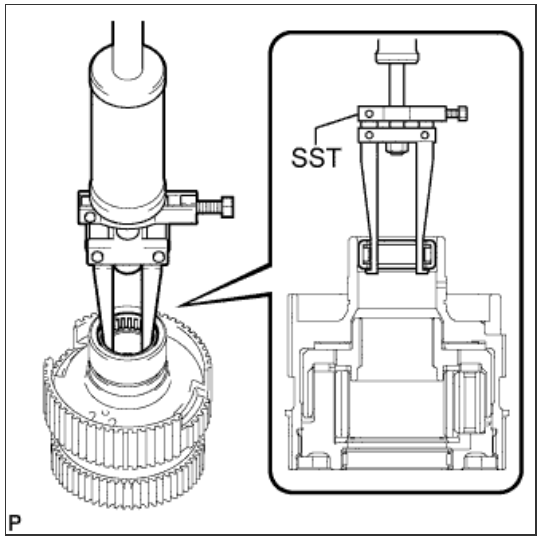
30. REMOVE CENTER DIFFERENTIAL CASE

a. Remove the center differential case from the output shaft.



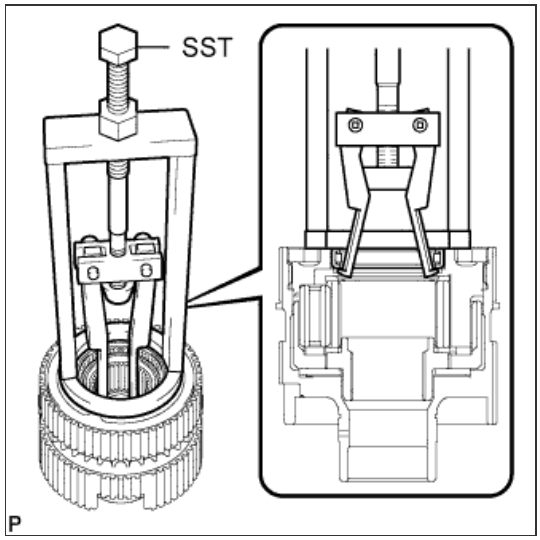
b. Using SST, remove the needle roller bearing.

SST
09308-00010



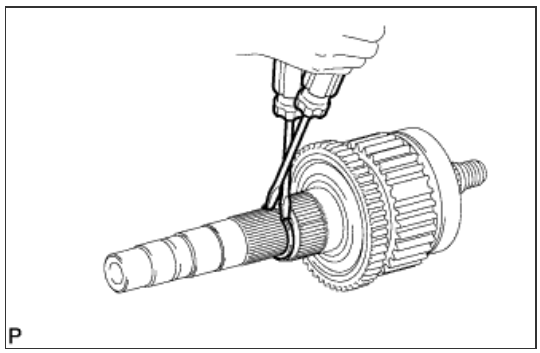
c. Using SST, remove the needle roller bearing.

SST
09387-00041 (09387-01021, 09387-01030, 09387-01040)

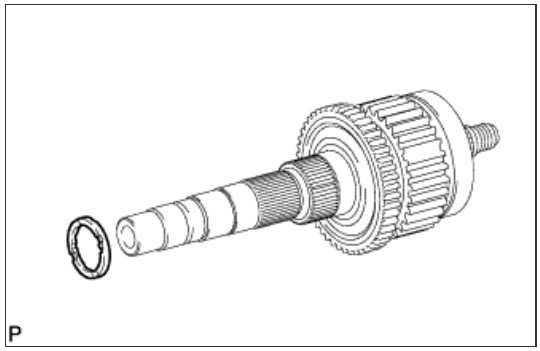


31. REMOVE TRANSFER OUTPUT SHAFT SPACER

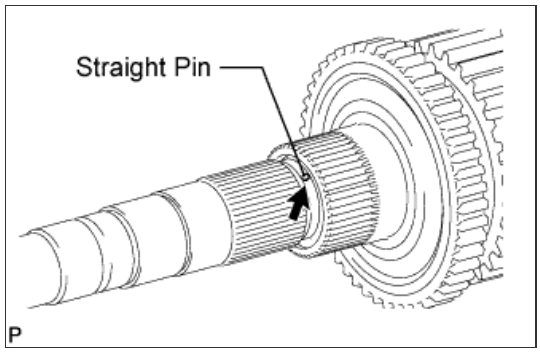
a. Using 2 screwdrivers and a hammer, tap off the snap ring.



b. Remove the output shaft spacer from the output shaft.

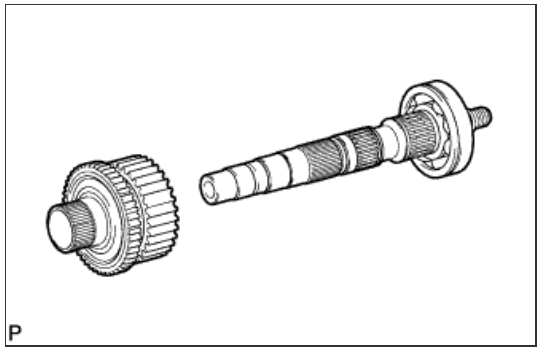


c. Remove the straight pin from the output shaft.



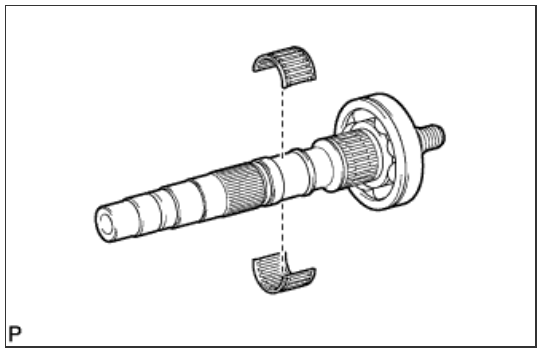
32. REMOVE TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Remove the drive sprocket from the output shaft.



33. REMOVE TRANSFER DRIVE SPROCKET BEARING

a. Remove the bearing from the output shaft.



34. REMOVE REAR TRANSFER OUTPUT SHAFT

a. Using SST and a press, press out the bearing.

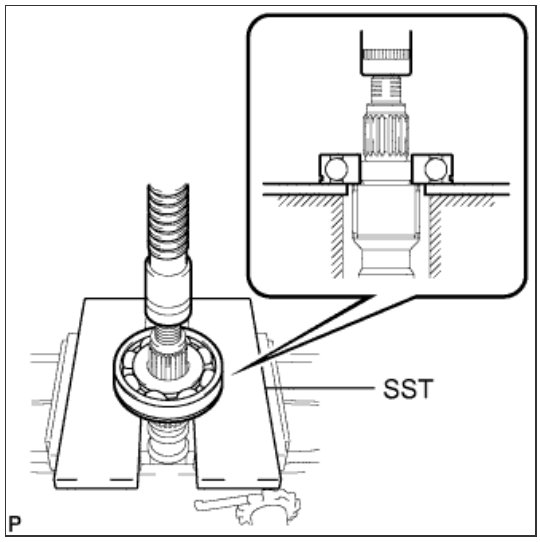
a. Using SST and a press, press out the bearing.

SST

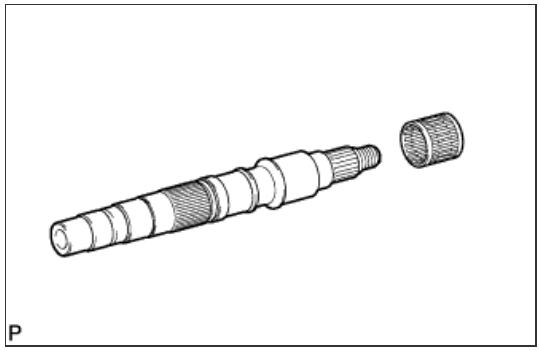
09527-10011

NOTICE:

Be careful not to drop or damage the output shaft.



b. Remove the needle roller bearing from the output shaft.



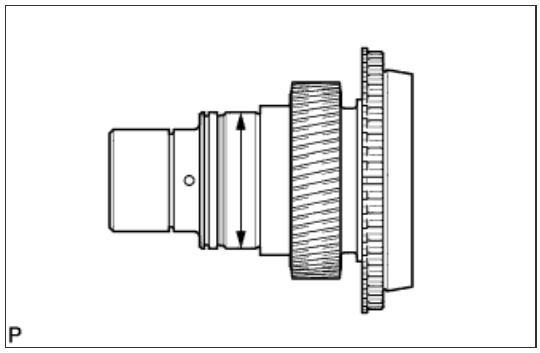
for Preparation Click here

1. INSPECT TRANSFER INPUT SHAFT

a. Using a micrometer, measure the diameter of the input shaft journal surface.

Minimum Diameter:
68 mm (2.68 in.)

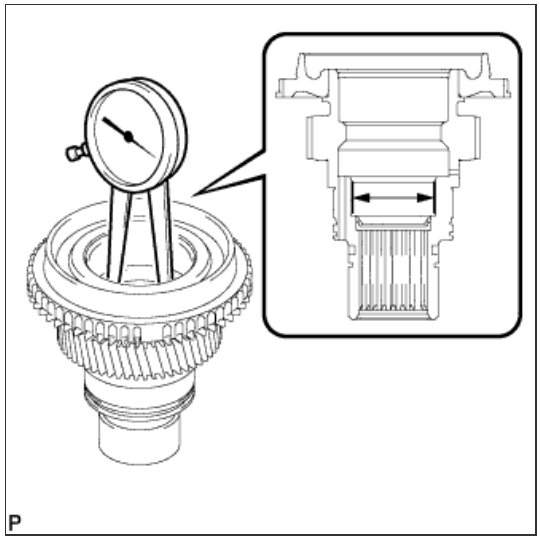
If the diameter is less than the minimum, replace the input shaft.



b. Using a dial indicator, measure the inside diameter of the input shaft bush.

Maximum Inside Diameter:
46 mm (1.81 in.)

If the inside diameter is more than the maximum, replace the input shaft.



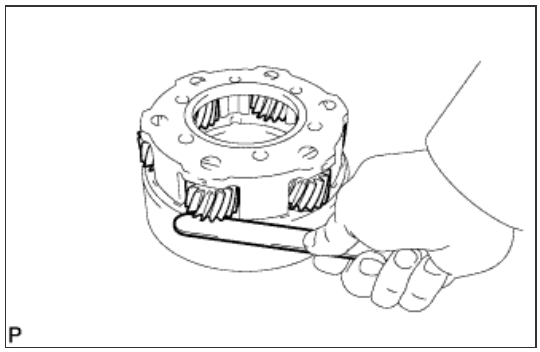
2. INSPECT TRANSFER LOW PLANETARY GEAR ASSEMBLY

a. Using a feeler gauge, measure the thrust clearance of the pinion gear.

Standard Clearance:
0.11 to 0.85 mm (0.00434 to 0.0334 in.)

Maximum Clearance:
0.85 mm (0.0334 in.)

If the clearance is more than the maximum, replace the low planetary gear assembly.

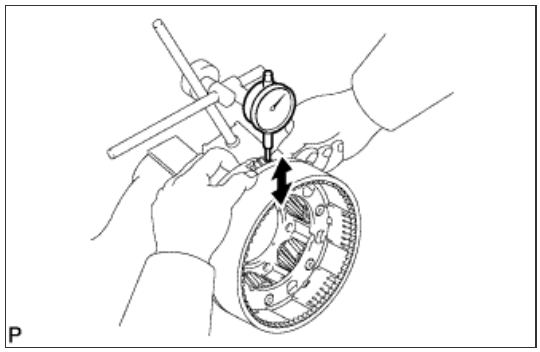


b. Using a dial indicator, measure the radial clearance of the pinion gear.

Standard Clearance:
0.01 to 0.04 mm (0.000434 to 0.00150 in.)

Maximum Clearance:
0.04 mm (0.00150 in.)

If the clearance is more than the maximum, replace the low planetary gear assembly.



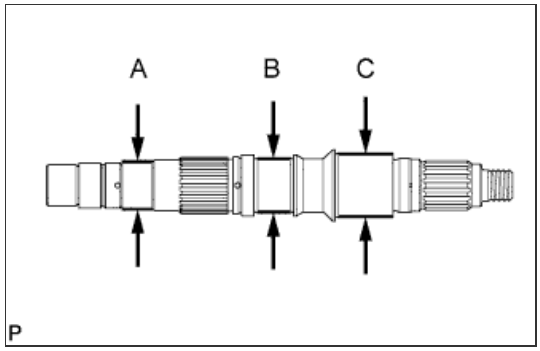
3. INSPECT REAR TRANSFER OUTPUT SHAFT

a. Using a micrometer, measure the diameter of the output shaft journals.

Minimum Diameter:

Journal	Specified Condition
A	38 mm (1.50 in.)
B	42 mm (1.65 in.)
C	49 mm (1.93 in.)

If the diameter is less than the minimum, replace the output shaft.

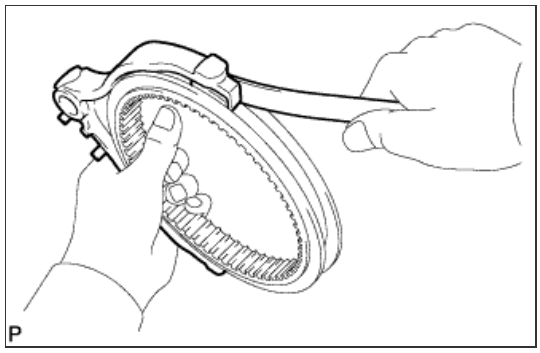


4. INSPECT NO. 1 TRANSFER GEAR SHIFT FORK AND FRONT DRIVE CLUTCH SLEEVE

a. Using a feeler gauge, measure the clearance between the clutch sleeve and gear shift fork.

Maximum Clearance:
0.8 mm (0.0315 in.)

If the clearance is more than the maximum, replace the clutch sleeve or shift fork.

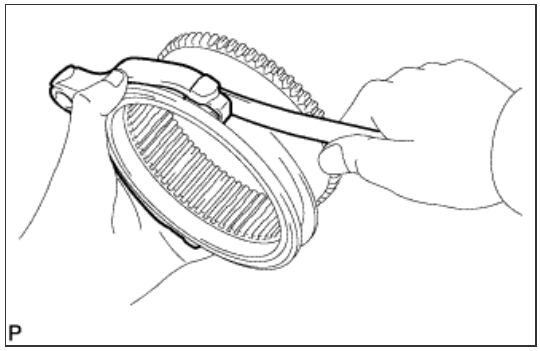


5. INSPECT AND ADJUST NO. 2 TRANSFER GEAR SHIFT FORK AND HIGH AND LOW CLUTCH SLEEVE

a. Using a feeler gauge, measure the clearance between the clutch sleeve and gear shift fork.

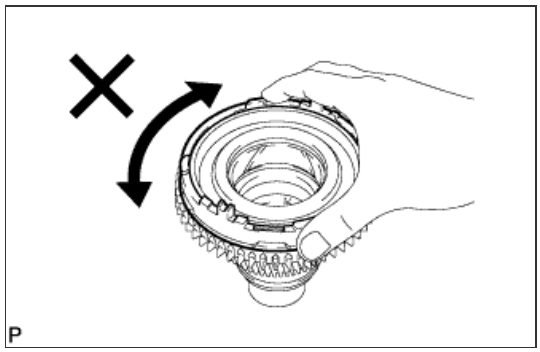
Maximum Clearance:
3.15 mm (0.124 in.)

If the clearance is more than the maximum, replace the clutch sleeve or shift fork.



6. INSPECT NO. 1 SYNCHRONIZER RING

a. Apply gear oil to the cone of the input shaft, and check that it does not turn in both directions while pushing the No. 1 synchronizer ring.
If it can turn, replace the No. 1 synchronizer ring.

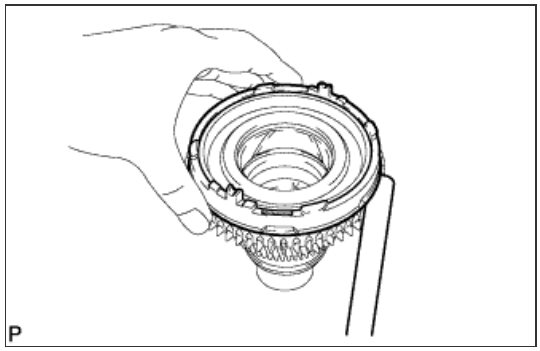


b. Push the No. 1 synchronizer ring to the cone of the input shaft. Measure the clearance between the No. 1 synchronizer ring and input shaft.

Standard Clearance:
0.86 to 1.54 mm (0.0339 to 0.0606 in.)

Minimum Clearance:
0.86 mm (0.0339 in.)

If the clearance is less than the minimum, replace the No. 1 synchronizer ring with a new one.



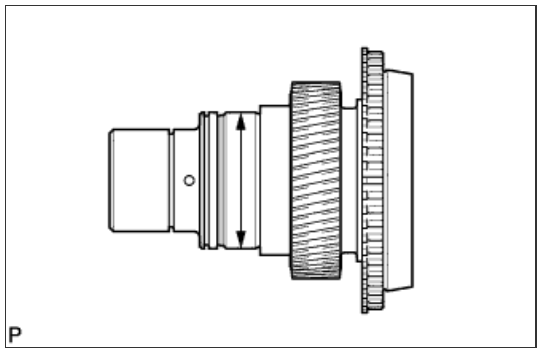
for Preparation Click here

1. INSPECT TRANSFER INPUT SHAFT

a. Using a micrometer, measure the diameter of the input shaft journal surface.

Minimum Diameter:
68 mm (2.68 in.)

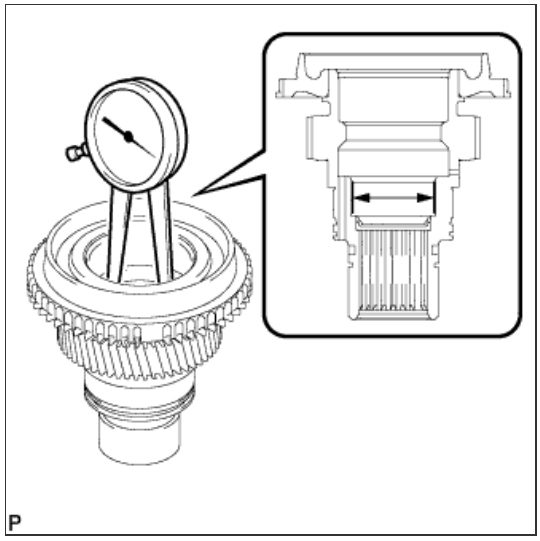
If the diameter is less than the minimum, replace the input shaft.



b. Using a dial indicator, measure the inside diameter of the input shaft bush.

Maximum Inside Diameter:
46 mm (1.81 in.)

If the inside diameter is more than the maximum, replace the input shaft.



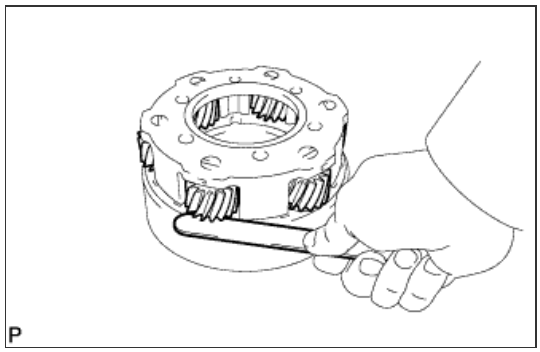
2. INSPECT TRANSFER LOW PLANETARY GEAR ASSEMBLY

a. Using a feeler gauge, measure the thrust clearance of the pinion gear.

Standard Clearance:
0.11 to 0.85 mm (0.00434 to 0.0334 in.)

Maximum Clearance:
0.85 mm (0.0334 in.)

If the clearance is more than the maximum, replace the low planetary gear assembly.

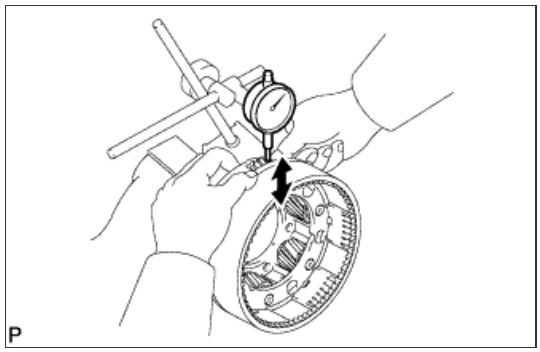


b. Using a dial indicator, measure the radial clearance of the pinion gear.

Standard Clearance:
0.01 to 0.04 mm (0.000434 to 0.00150 in.)

Maximum Clearance:
0.04 mm (0.00150 in.)

If the clearance is more than the maximum, replace the low planetary gear assembly.



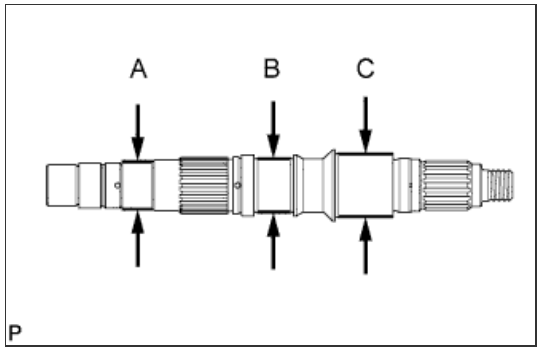
3. INSPECT REAR TRANSFER OUTPUT SHAFT

a. Using a micrometer, measure the diameter of the output shaft journals.

Minimum Diameter:

Journal	Specified Condition
A	38 mm (1.50 in.)
B	42 mm (1.65 in.)
C	49 mm (1.93 in.)

If the diameter is less than the minimum, replace the output shaft.

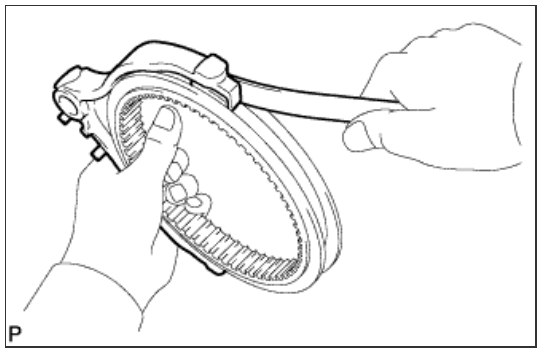


4. INSPECT NO. 1 TRANSFER GEAR SHIFT FORK AND FRONT DRIVE CLUTCH SLEEVE

a. Using a feeler gauge, measure the clearance between the clutch sleeve and gear shift fork.

Maximum Clearance:
0.8 mm (0.0315 in.)

If the clearance is more than the maximum, replace the clutch sleeve or shift fork.

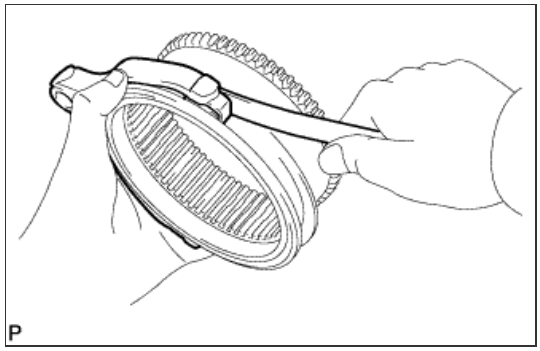


5. INSPECT AND ADJUST NO. 2 TRANSFER GEAR SHIFT FORK AND HIGH AND LOW CLUTCH SLEEVE

a. Using a feeler gauge, measure the clearance between the clutch sleeve and gear shift fork.

Maximum Clearance:
3.15 mm (0.124 in.)

If the clearance is more than the maximum, replace the clutch sleeve or shift fork.



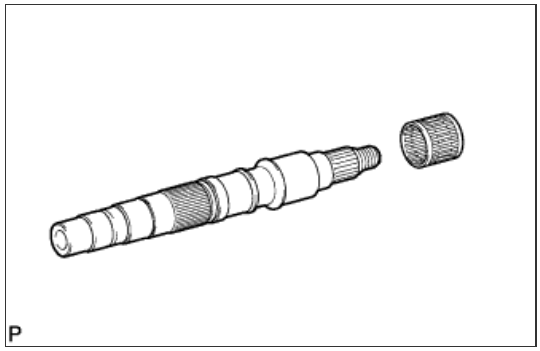
for Preparation Click here

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL REAR TRANSFER OUTPUT SHAFT

a. Install a new needle roller bearing.

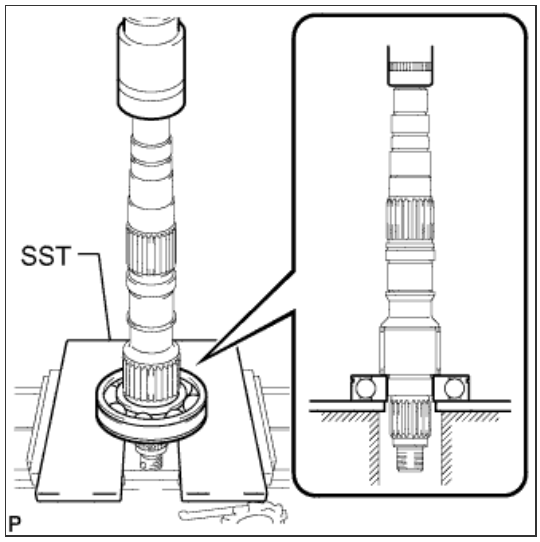


b. Using SST and a press, press in a new bearing.

SST
09527-10011

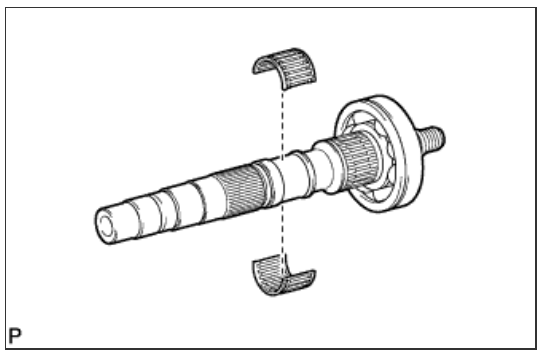
NOTICE:

Set the snap ring groove of the bearing to the front side.



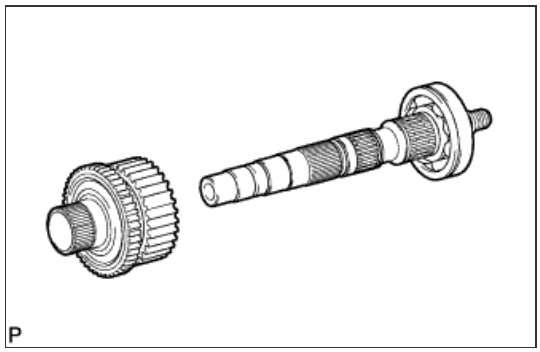
2. INSTALL TRANSFER DRIVE SPROCKET BEARING

a. Install the bearing to the output shaft.



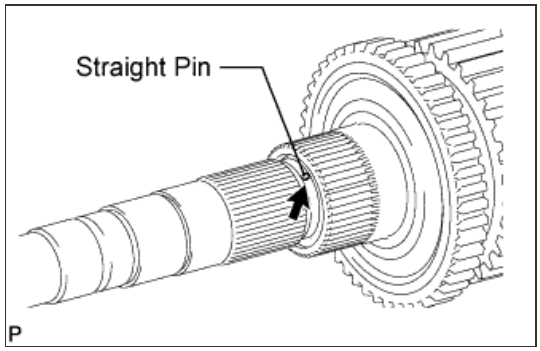
3. INSTALL TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Install the drive sprocket to the output shaft.

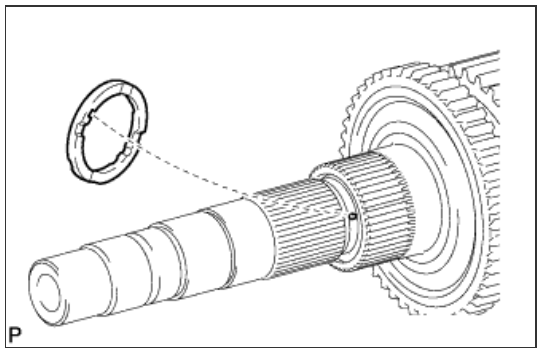


4. INSTALL TRANSFER OUTPUT SHAFT SPACER

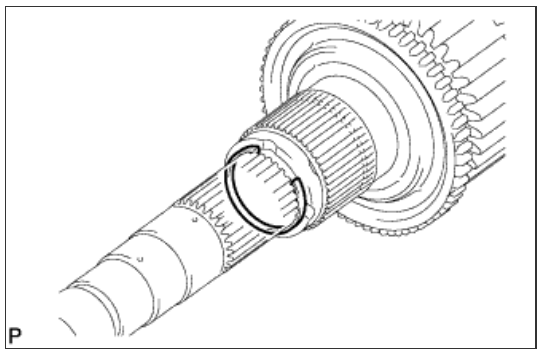
a. Install the straight pin to the output shaft.



b. Align the straight pin with the straight pin groove of the output shaft spacer, and slide on the output shaft spacer.



c. Using a screwdriver and hammer, tap on the snap ring.



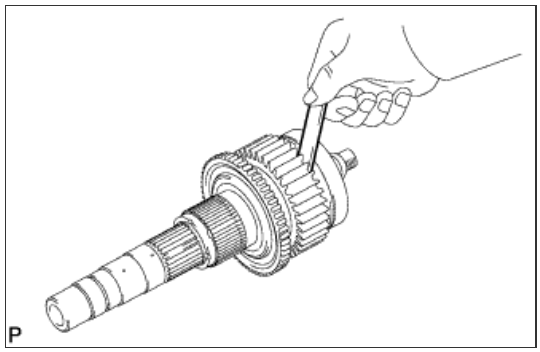
5. INSPECT TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Using a feeler gauge, measure the drive sprocket thrust clearance.

Standard Clearance:
0.10 to 0.47 mm (0.00394 to 0.0185 in.)

Maximum Clearance:
0.47 mm (0.0185 in.)

If the clearance is more than the maximum, replace the drive sprocket sub-assembly.



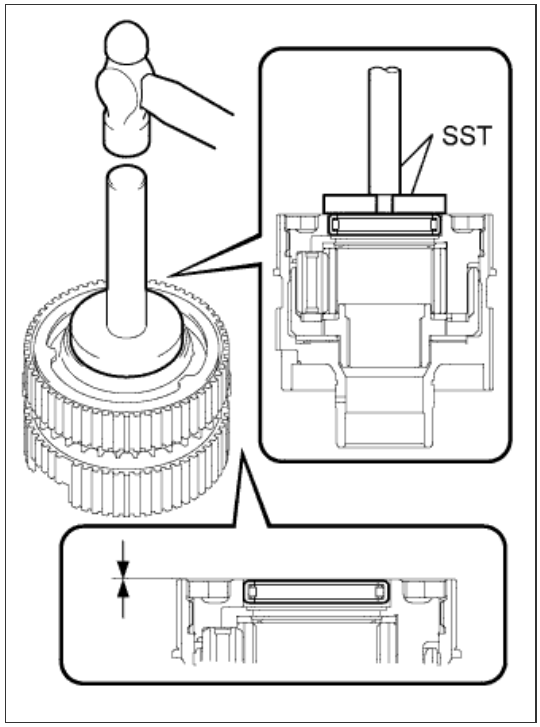
6. INSTALL CENTER DIFFERENTIAL CASE

a. Using SST and a hammer, tap in a new needle roller bearing until its surface is 0 to 0.5 mm (0 to 0.0197 in.) from the center differential case upper surface.

SST
09950-60020 (09951-00710)
09950-70010 (09951-07100)

NOTICE:

- **Be careful not to damage the center differential case.**
- **Install the bearing so that the mark is on the outside.**

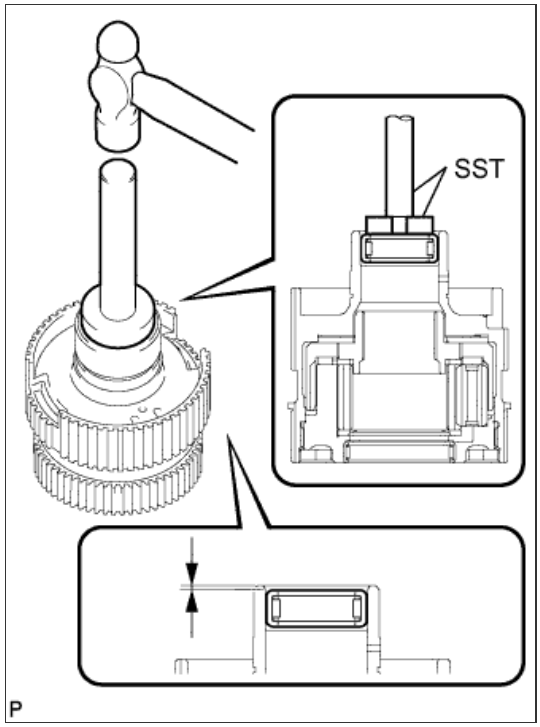


b. Using SST and a hammer, tap in a new needle roller bearing until its surface is 1.5 to 2.0 mm (0.0591 to 0.0787 in.) from the center differential case upper surface.

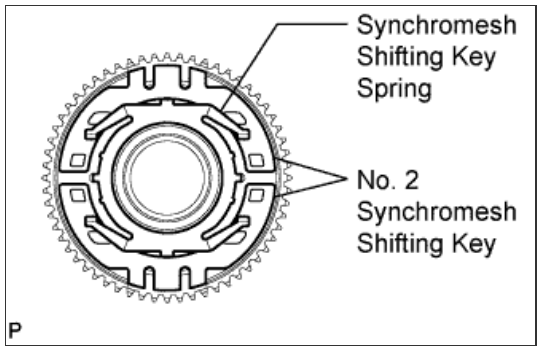
SST
09950-60010 (09951-00460)
09950-70010 (09951-07100)

NOTICE:

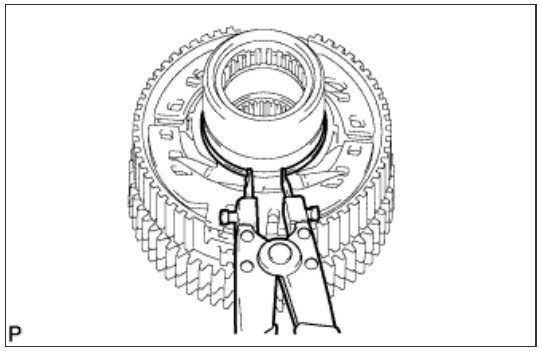
- **Be careful not to damage the center differential case.**
- **Install the bearing so that the mark is on the outside.**



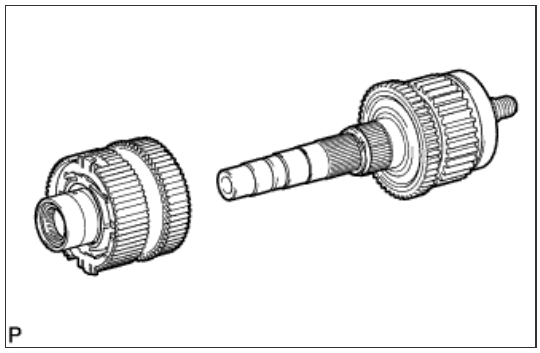
c. Install the synchromesh shifting key spring and No. 2 synchromesh shifting keys as shown in the illustration.



d. Using a snap ring expander, install the snap ring.

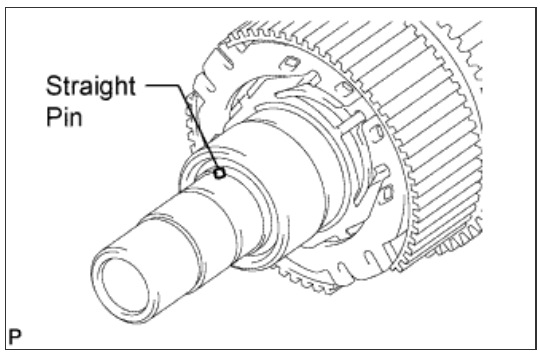


e. Install the center differential case to the output shaft.

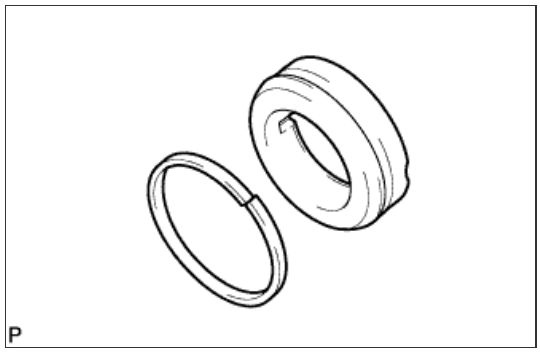


7. INSTALL NO. 1 TRANSFER OUTPUT SHAFT SPACER

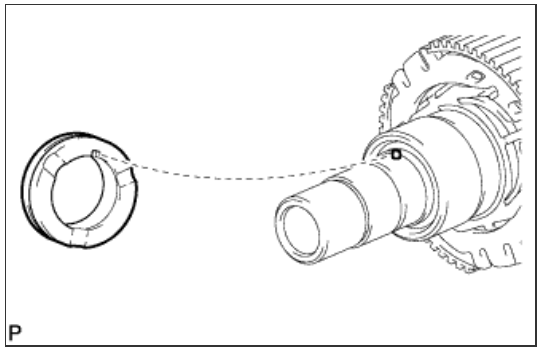
a. Install the straight pin to the output shaft.



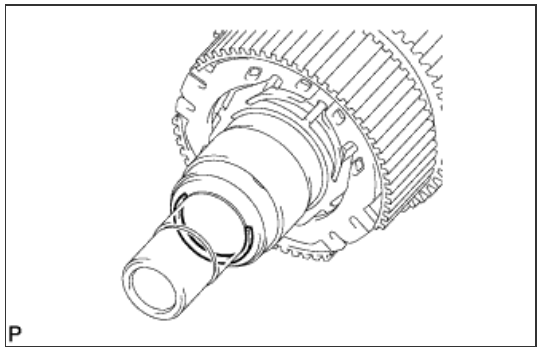
b. Install a new seal ring to the output shaft spacer.



c. Align the pin with the straight pin groove of the output shaft spacer, and slide on the output shaft spacer.

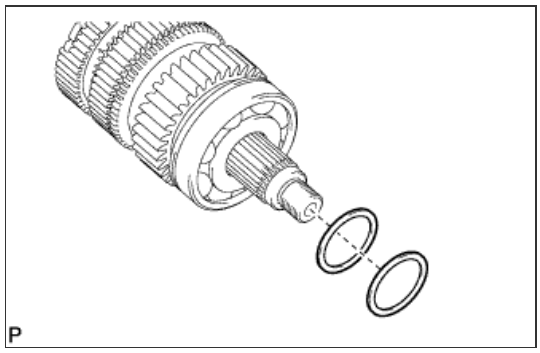


d. Using a screwdriver and hammer, tap on the snap ring.



8. INSTALL TRANSFER OUTPUT SHAFT WASHER

a. Install the 2 output shaft washers to the output shaft.



9. INSTALL TRANSFER INPUT SHAFT PLUG

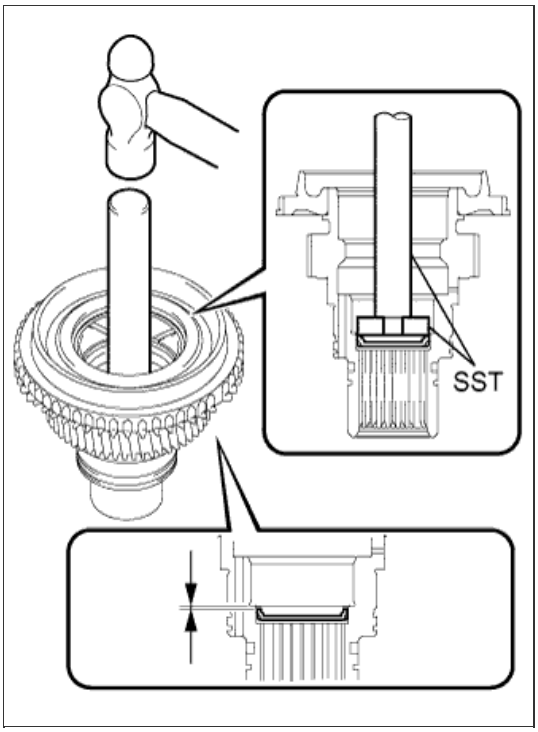
a. Using SST and a hammer, tap in a new input shaft plug until its surface is 1.0 to 1.8 mm (0.0394 to 0.0709 in.) from the input shaft upper surface.

SST

09950-60010 (09951-00410)
09950-70010 (09951-07150)

NOTICE:

Be careful not to damage or deform the input shaft plug when tapping it.



10. INSTALL TRANSFER INPUT SHAFT BIMETAL FORMED BUSH

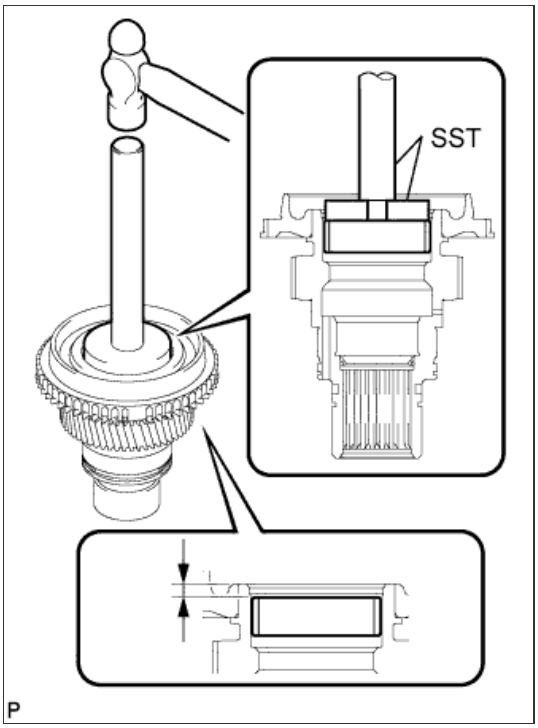
a. Using SST and a hammer, tap in a new bush until its surface is 5.5 to 5.9 mm (0.217 to 0.232 in.) from the input shaft upper surface.

SST

09950-70010 (09951-07150)
09950-60010 (09951-00610)

NOTICE:

Be careful not to damage the input shaft.

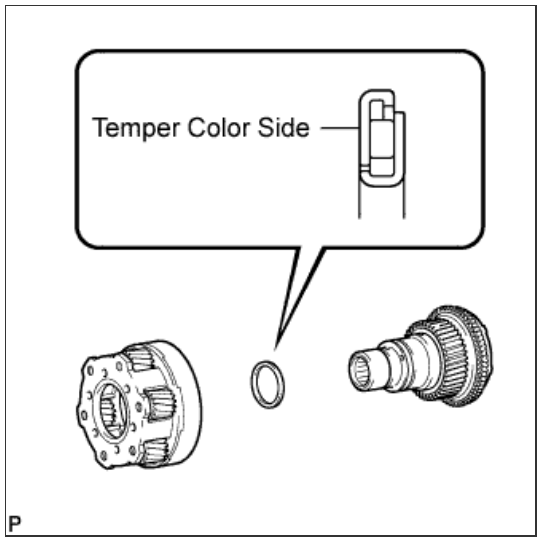


11. INSTALL TRANSFER INPUT SHAFT BEARING

a. Install the low planetary gear bearing and low planetary gear to the input shaft.

NOTICE:

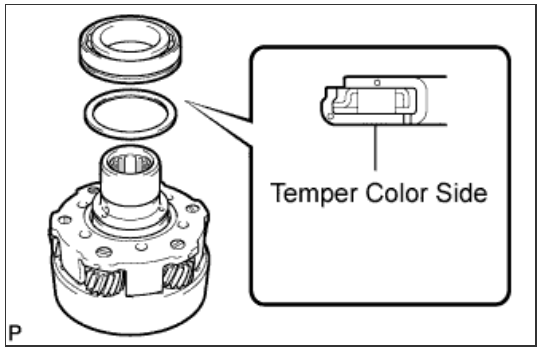
- **Make sure the low planetary gear bearing is installed in the correct direction.**
- **Install the low planetary gear bearing so that its temper color side faces the low planetary gear.**



b. Install the low planetary gear bearing and a new input shaft bearing to the input shaft.

NOTICE:

- **Make sure the input shaft bearing is installed in the correct direction.**
- **Make sure the low planetary gear bearing is installed in the correct direction.**
- **Install the low planetary gear bearing so that its temper color side faces the low planetary gear.**

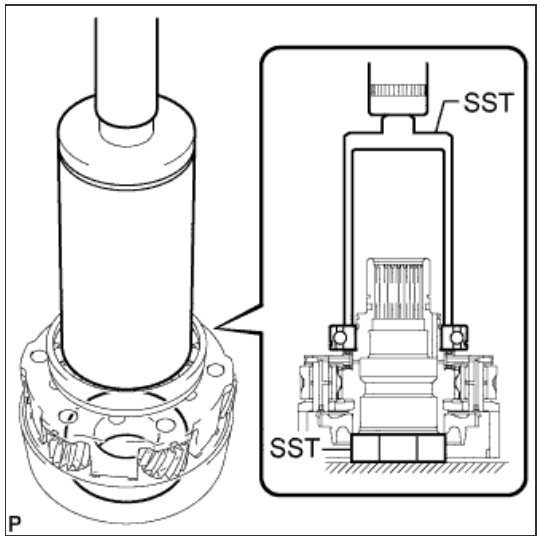


c. Using SST and a press, press in the bearing.

SST
09513-36040
09515-21010

NOTICE:

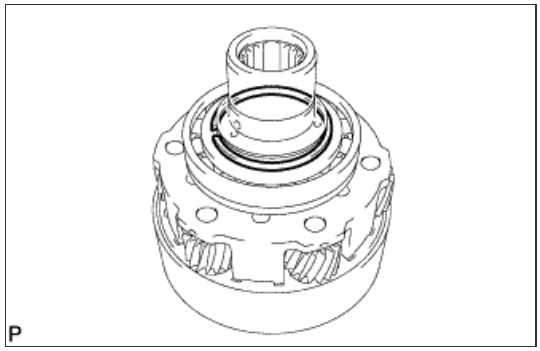
After press-fitting the bearing to the input shaft, check that the bearing moves smoothly.



d. Select a snap ring that allows for minimum axial play and install it to the shaft.

Standard Snap Ring Thickness:

Mark	Specified Condition
C	2.13 to 2.18 mm (0.0839 to 0.0858 in.)
D	2.18 to 2.23 mm (0.0858 to 0.0878 in.)
E	2.23 to 2.28 mm (0.0878 to 0.0898 in.)
F	2.28 to 2.33 mm (0.0898 to 0.0917 in.)
G	2.33 to 2.38 mm (0.0917 to 0.0937 in.)
H	2.38 to 2.43 mm (0.0937 to



	0.0957 in.)
J	2.43 to 2.48 mm (0.0957 to 0.0976 in.)

e. Using a snap ring expander, install the snap ring.

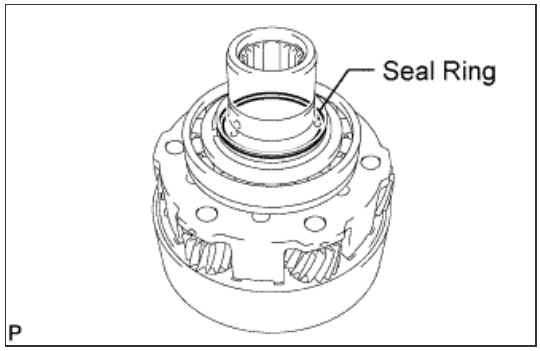
NOTICE:

Make sure that the snap ring is firmly installed to the groove.

12. INSTALL NO. 1 TRANSFER INPUT SHAFT SEAL RING

a. Apply transfer oil to a new seal ring.

b. Install the seal ring to the input shaft.

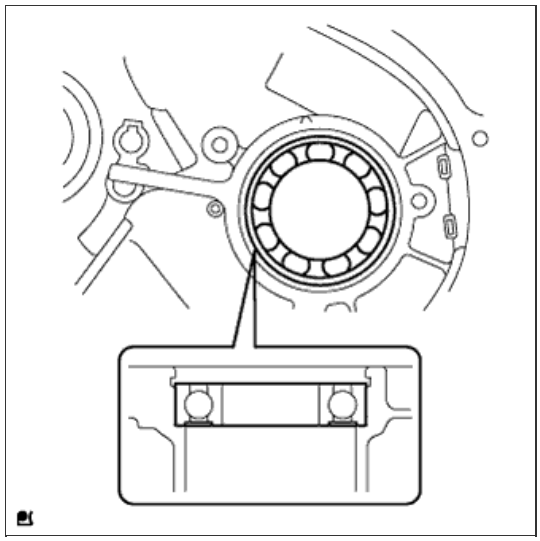


13. INSTALL TRANSFER DRIVEN SPROCKET BEARING

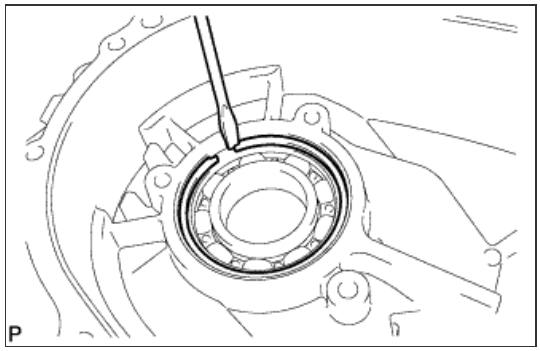
a. Install a new bearing to the front transfer case in the direction shown in the illustration.

NOTICE:

Make sure the bearing is installed in the correct direction.

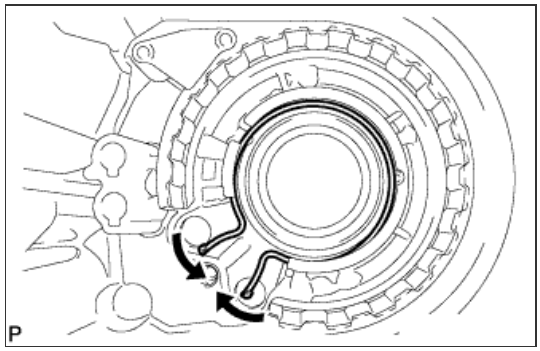


b. Using a screwdriver, install the snap ring.



14. INSTALL TRANSFER LOW PLANETARY RING GEAR

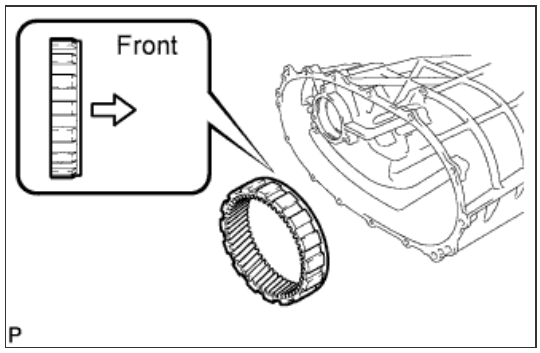
a. Using a snap ring expander, install the snap ring to the front transfer case.



b. Install the low planetary ring gear to the front transfer case.

NOTICE:

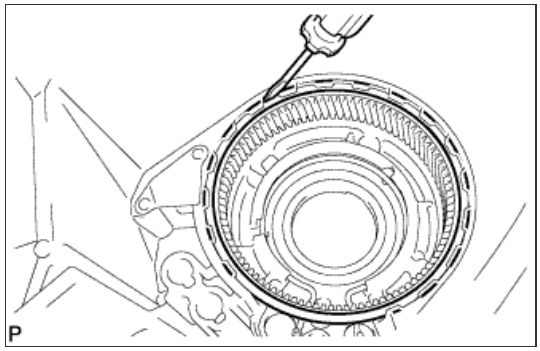
Make sure to install the low planetary ring gear in the correct direction.



c. Using a screwdriver, install the snap ring.

NOTICE:

Make sure that the snap ring is firmly installed to the groove.



15. INSTALL INPUT SHAFT ASSEMBLY

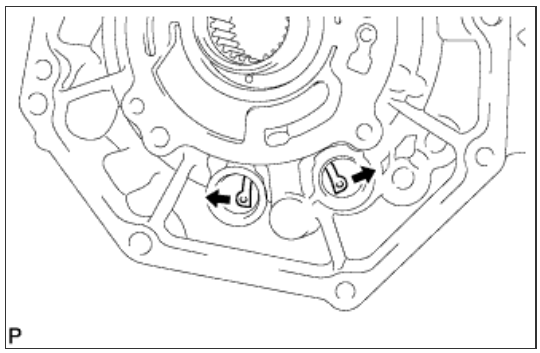
a. While expanding the snap ring, install the input shaft to the front transfer case.

b. Apply adhesive to the threads of the 2 case plugs.

Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

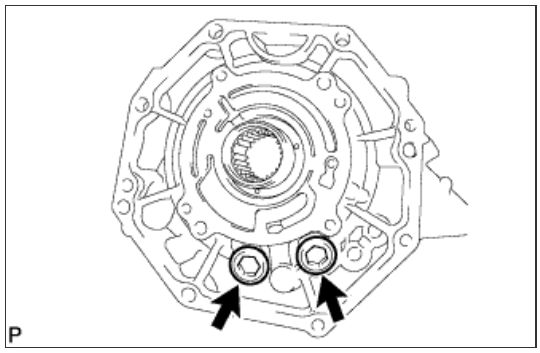
NOTICE:

Install the plugs within 3 minutes of application.



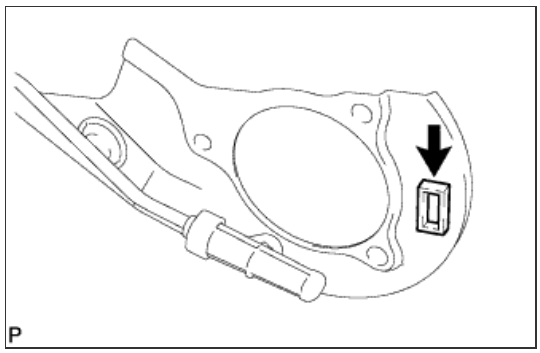
c. Using a 14 mm hexagon wrench, install the 2 case plugs.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



16. INSTALL TRANSFER CASE MAGNET

a. Install the magnet to the oil separator.

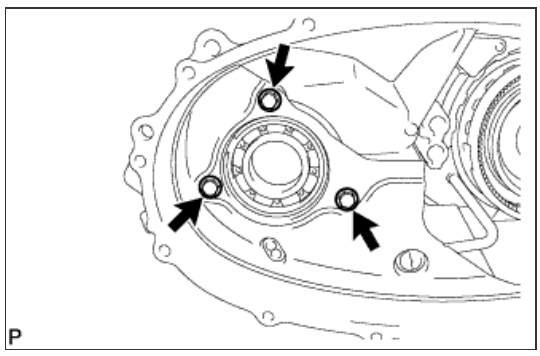


17. INSTALL TRANSFER OIL SEPARATOR SUB-ASSEMBLY

a. Install a new O-ring to the oil separator.

b. Install the oil separator with the 3 bolts.

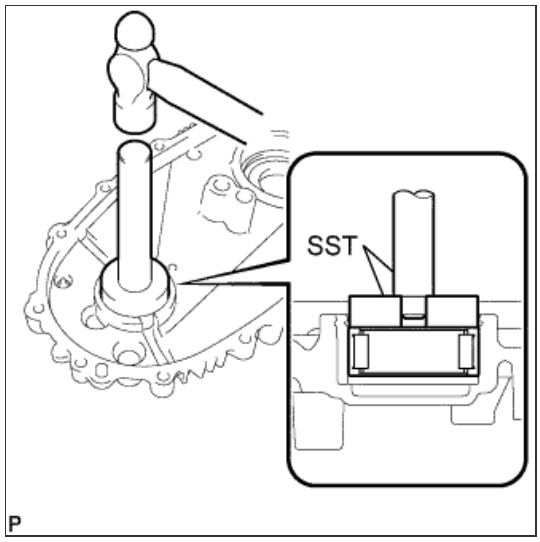
Torque:
18 N*m{ 178 kgf*cm , 13 ft.*lbf }



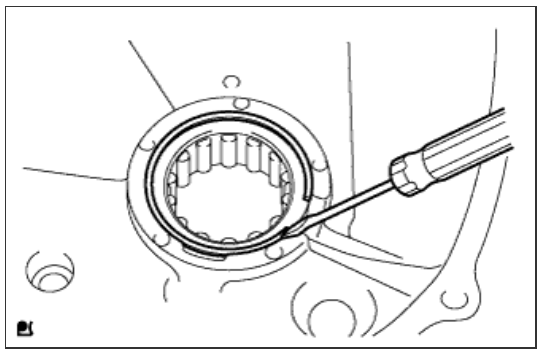
18. INSTALL SIDE GEAR SHAFT HOLDER BEARING

a. Using SST and a hammer, tap in a new bearing to the rear transfer case.

SST
09950-60010 (09951-00590)
09950-70010 (09951-07100)



b. Using a screwdriver, install the snap ring.



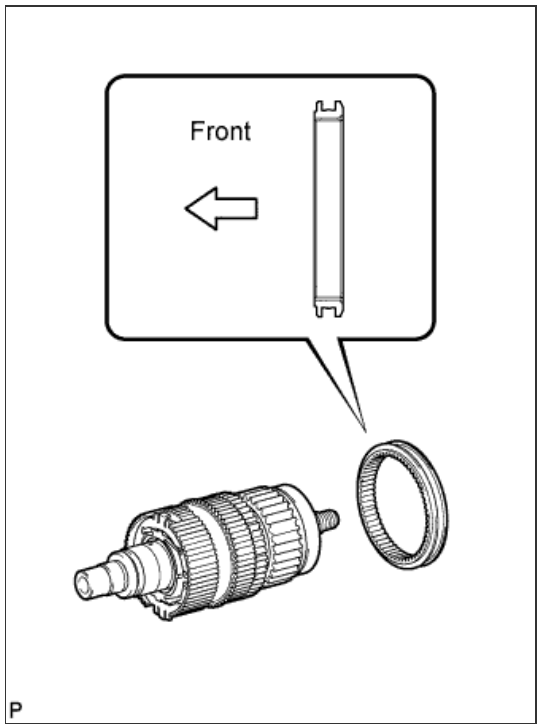
19. INSTALL FRONT DRIVE CLUTCH SLEEVE

a. Apply gear oil to the connecting areas of the clutch sleeve and center differential case.

b. Install the clutch sleeve onto the output shaft.

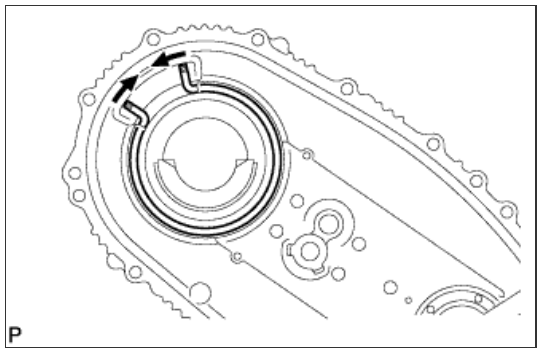
NOTICE:

Make sure that the clutch sleeve is installed facing the correct direction.



20. INSTALL REAR TRANSFER OUTPUT SHAFT ASSEMBLY

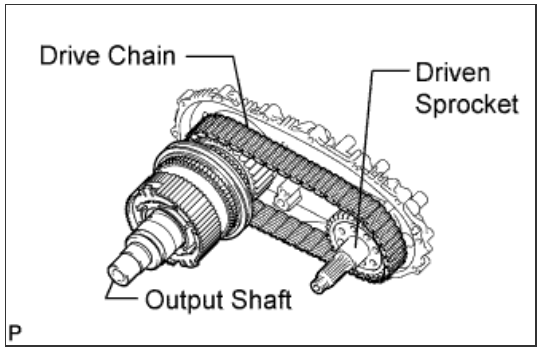
a. Install the snap ring to the rear transfer case.



b. Install the output shaft, drive chain and driven sprocket.

NOTICE:

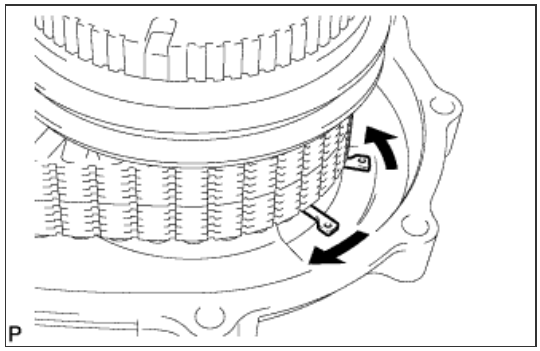
Do not drop the output shaft washers.



c. Using a snap ring expander, install the snap ring to the output shaft.

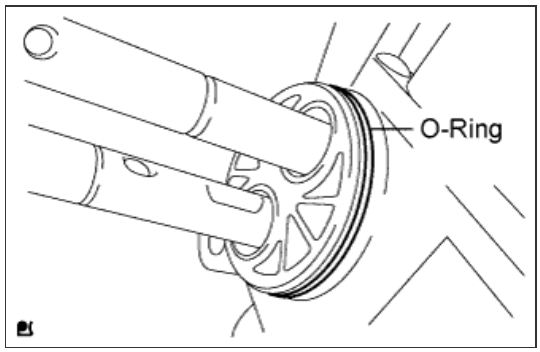
NOTICE:

Make sure that the snap ring is firmly installed to the groove.



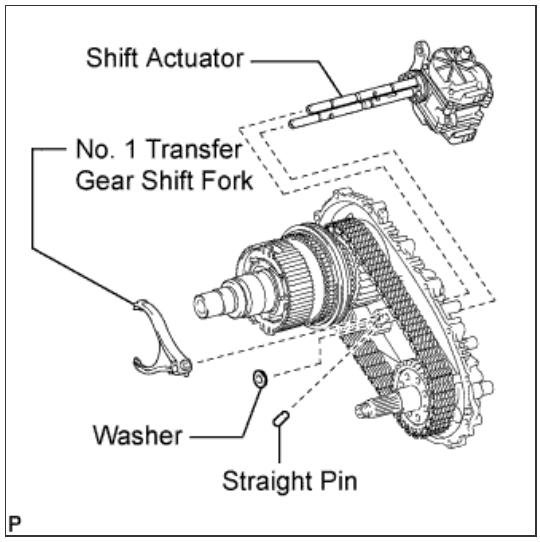
21. INSTALL TRANSFER SHIFT ACTUATOR ASSEMBLY

a. Install a new O-ring to the shift actuator.



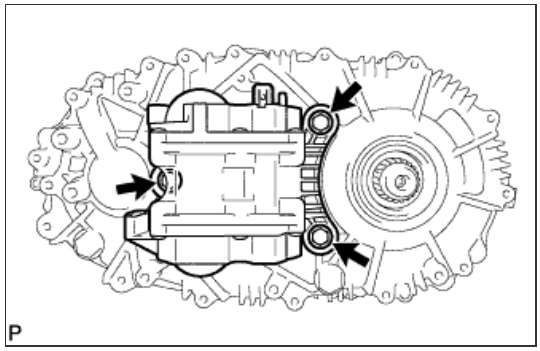
b. Set the No. 1 gear shift fork to the front drive clutch sleeve.

c. Set the washer and straight pin to the rear transfer case.



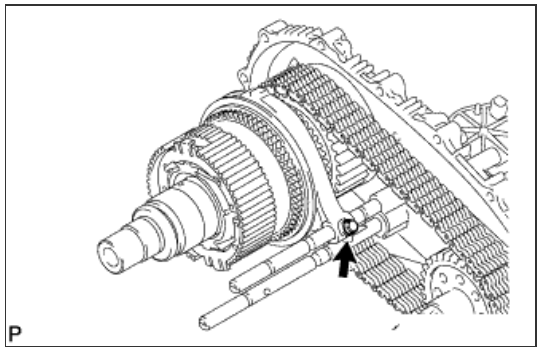
d. Install the shift actuator to the rear transfer case with the 3 bolts.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }



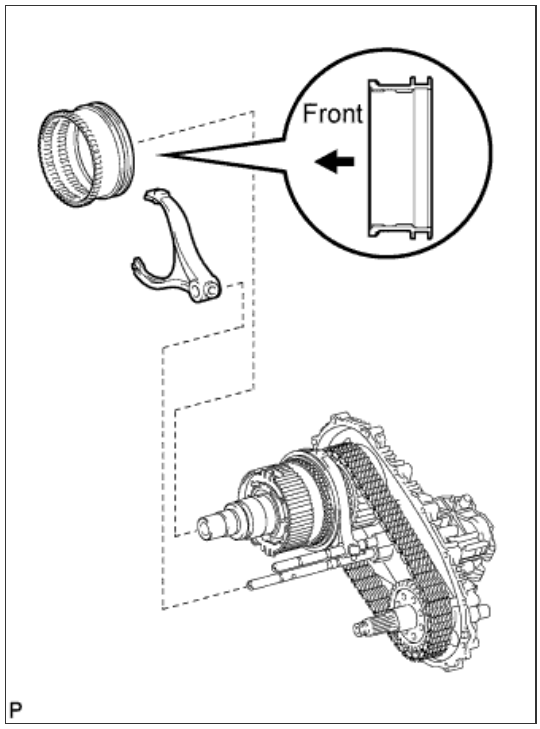
e. Install the No. 1 gear shift fork to the shift actuator with the bolt.

Torque:
24 N*m{ 245 kgf*cm , 18 ft.*lbf }



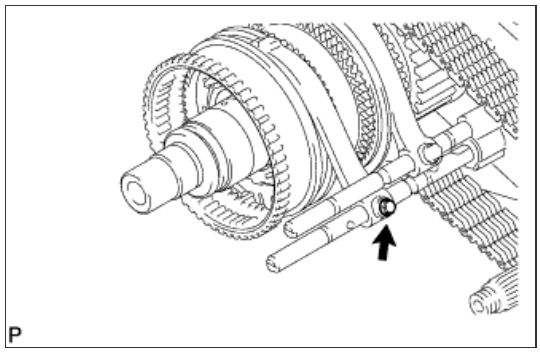
22. INSTALL NO. 2 TRANSFER GEAR SHIFT FORK

a. Set the No. 2 gear shift fork together with the high and low clutch sleeve to the shift actuator.

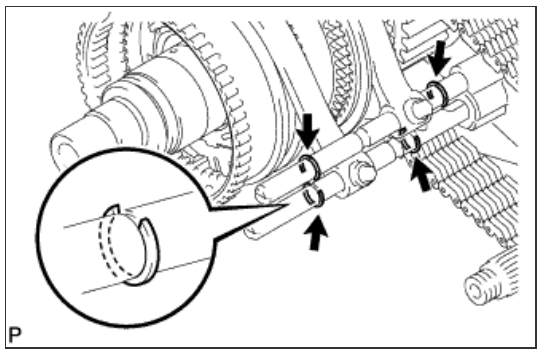


b. Install the No. 2 gear shift fork to the shift actuator with the bolt.

Torque:
24 N*m{ 245 kgf*cm , 18 ft.*lbf }

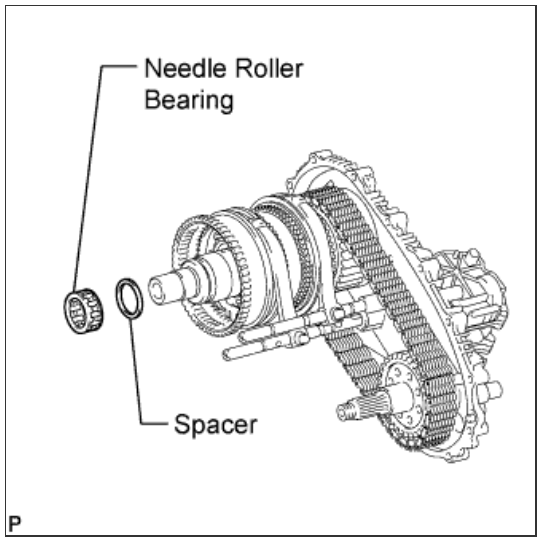


c. Using a screwdriver and hammer, tap the 4 shift fork shaft snap rings to the shift fork shaft.



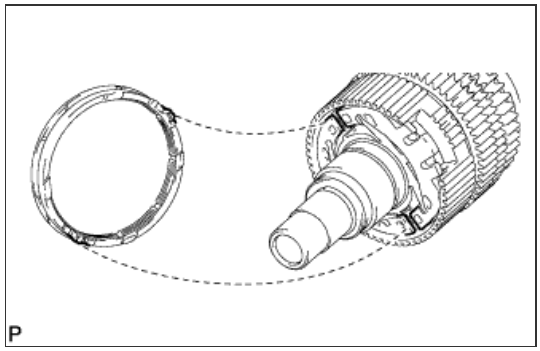
23. INSTALL FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING

a. Install the needle roller bearing and spacer to the output shaft.



24. INSTALL NO. 1 SYNCHRONIZER RING

a. Align the protrusion of the synchronizer ring with the notch on the differential case and install it.



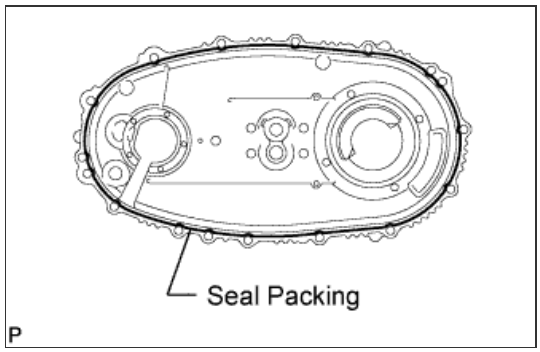
25. INSTALL REAR TRANSFER CASE ASSEMBLY

a. Apply seal packing to the rear transfer case as shown in the illustration.

Seal Packing:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent

NOTICE:

If the removed rear transfer case will be reused: After removing the rear transfer case, be sure to perform the following before reinstalling it: 1) using a knife, cut off any old FIPG material on the rear transfer case contact surface, 2) clean off any remaining old FIPG material from the rear transfer case contact surface, and 3) reapply seal packing to the rear transfer case.

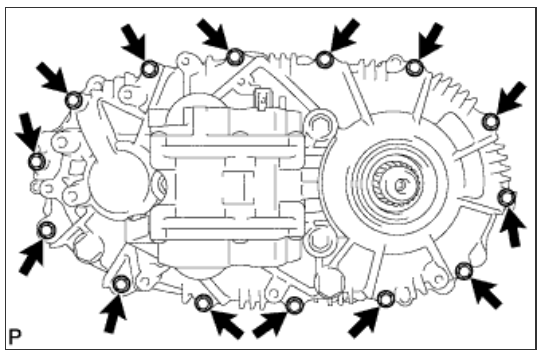


b. Install the rear transfer case with the 14 bolts.

Torque:
28 N*m{ 286 kgf*cm , 21 ft.*lbf }

NOTICE:

Tighten the bolts within 10 minutes of applying the seal packing. The seal packing will dry very quickly.



26. INSTALL TRANSFER CASE PLUG

a. Apply adhesive to the threads of the plug.

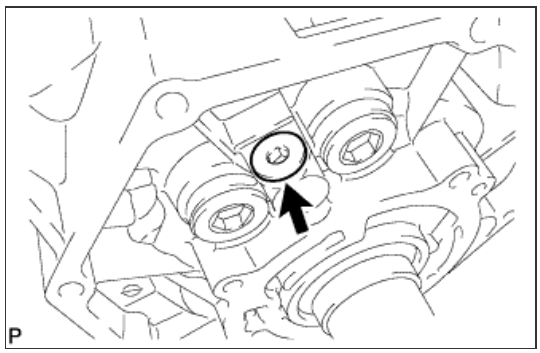
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

b. Using a 6 mm hexagon wrench, install the plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }



27. INSTALL NO. 1 TRANSFER CASE PLUG

a. Install the pin and compression spring to the front transfer case.

b. Apply adhesive to the threads of the plug.

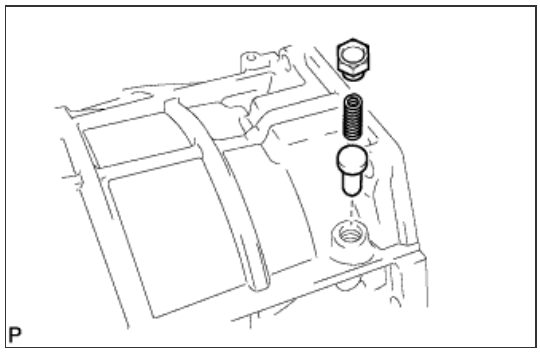
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

c. Install the plug.

Torque:
19 N*m{ 190 kgf*cm , 14 ft.*lbf }

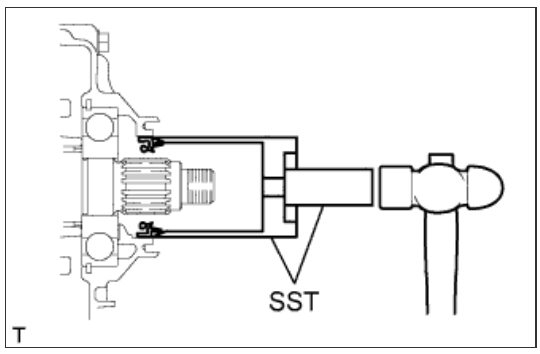


28. INSTALL TRANSFER CASE REAR OIL SEAL

a. Apply transfer oil to the spline of the output shaft.

b. Using SST and a hammer, tap in a new oil seal until its surface is flush with the housing upper surface.

SST
09649-17010
09950-70010 (09951-07150)



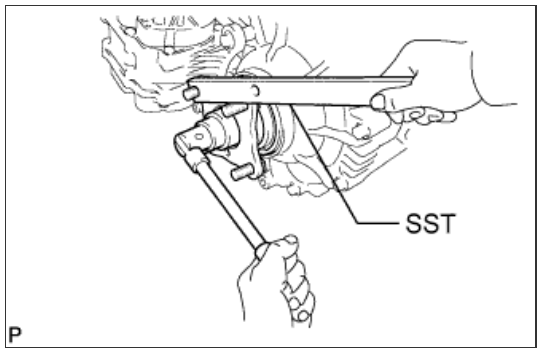
29. INSTALL REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the output shaft.

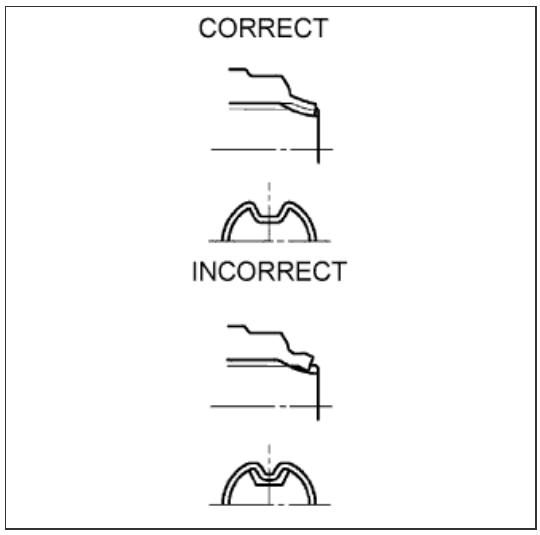
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.

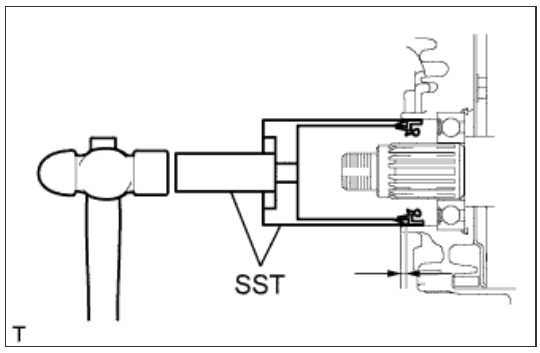


30. INSTALL TRANSFER CASE FRONT OIL SEAL

a. Apply transfer oil to the spline of the driven sprocket.

b. Using SST and a hammer, tap in a new oil seal until its surface is 1 to 1.5 mm (0.0394 to 0.0590 in.) from the case upper surface.

SST
09649-17010
09950-70010 (09951-07150)



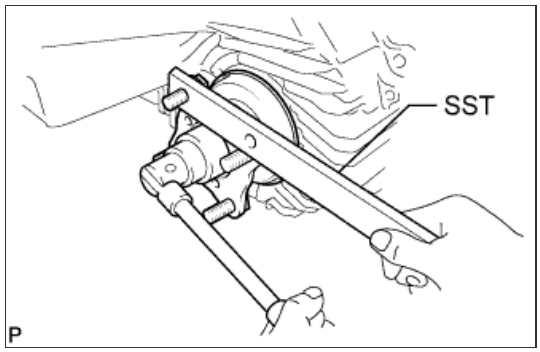
31. INSTALL FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the drive sprocket.

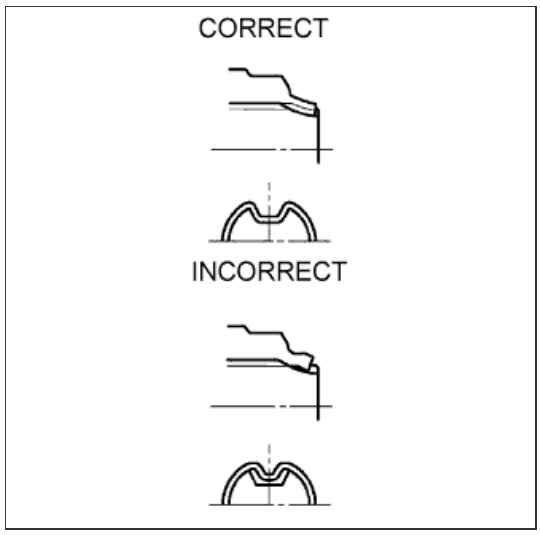
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.



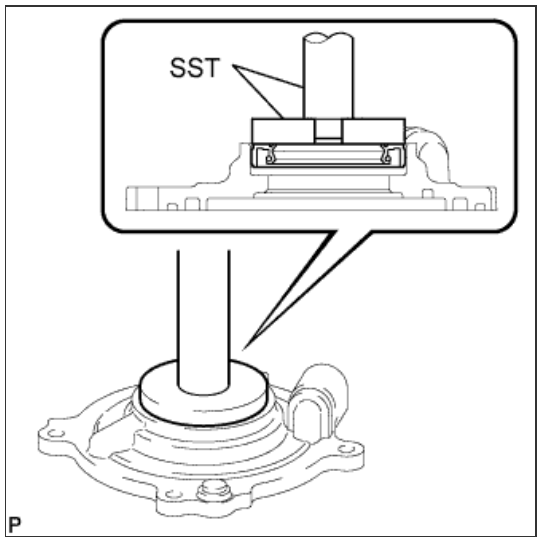
32. INSTALL TRANSFER OIL PUMP PLATE OIL SEAL

a. Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump plate upper surface.

SST
09950-60020 (09951-00680)
09950-70010 (09951-07100)

NOTICE:

Be careful not to damage the oil pump plate.



33. INSTALL TRANSFER CASE PLUG

a. Install the relief valve seat, ball and compression spring to the oil pump plate.

b. Apply adhesive to the threads of the plug.

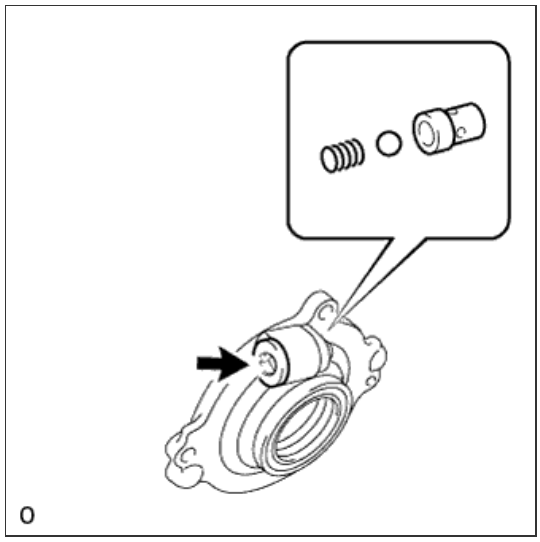
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

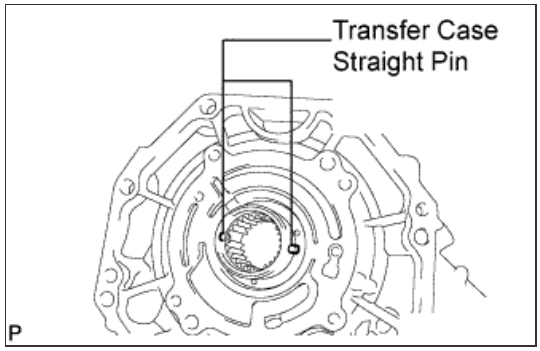
c. Using a 10 mm hexagon wrench, install the plug.

Torque:
29 N*m{ 300 kgf*cm , 22 ft.*lbf }



34. INSTALL TRANSFER CASE STRAIGHT PIN

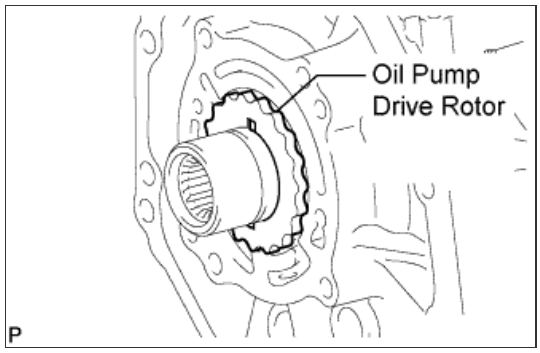
a. Install the 2 straight pins to the input shaft.



35. INSTALL TRANSFER OIL PUMP PLATE

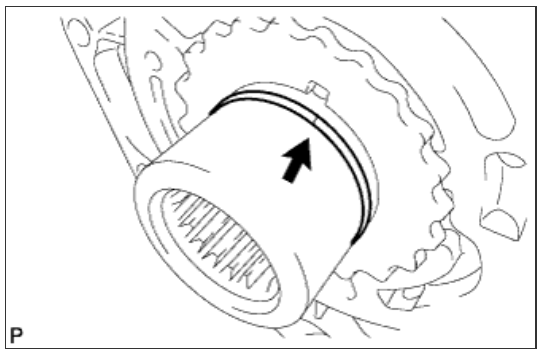
a. Apply transfer oil to a new O-ring, the drive rotor, driven rotor and a new transfer oil seal ring.

b. Install the drive rotor to the input shaft.



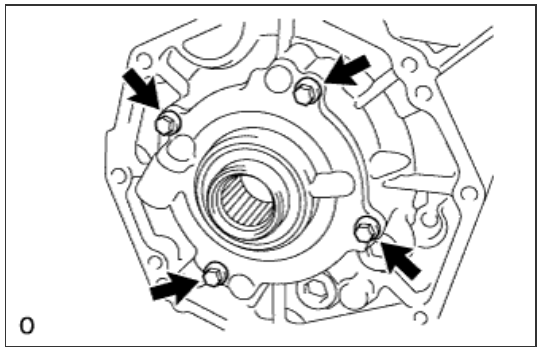
c. Install the transfer oil seal ring to the input shaft.

d. Install the O-ring to the oil pump plate.



e. Install the oil pump plate and driven rotor to the front transfer case with the 4 bolts.

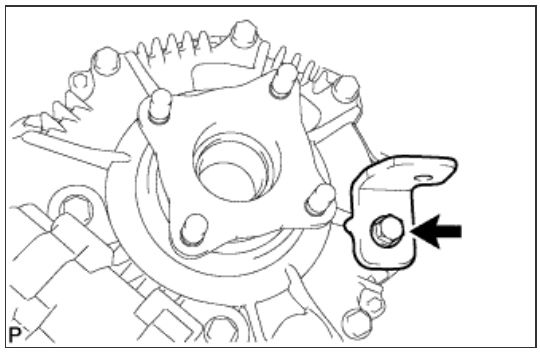
Torque:
12 N*m{ 117 kgf*cm , 9 ft.*lbf }



36. INSTALL PROPELLER SHAFT HEAT INSULATOR BRACKET SUB-ASSEMBLY

a. Install the bracket to the rear transfer case with the bolt.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }



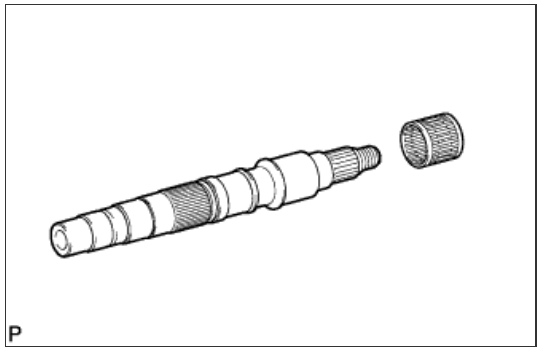
for Preparation Click here

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL REAR TRANSFER OUTPUT SHAFT

a. Install a new needle roller bearing.

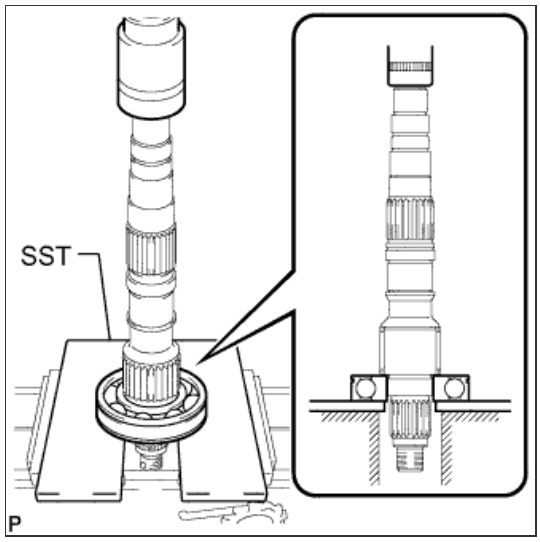


b. Using SST and a press, press in a new bearing.

SST
09527-10011

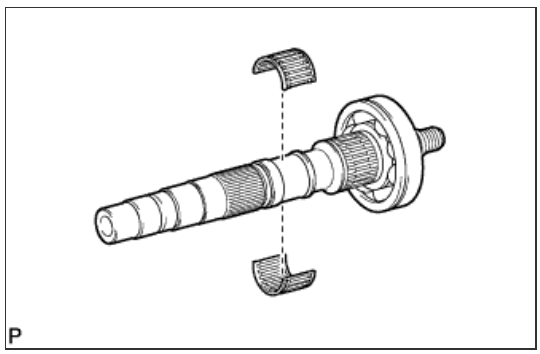
NOTICE:

Set the snap ring groove of the bearing to the front side.



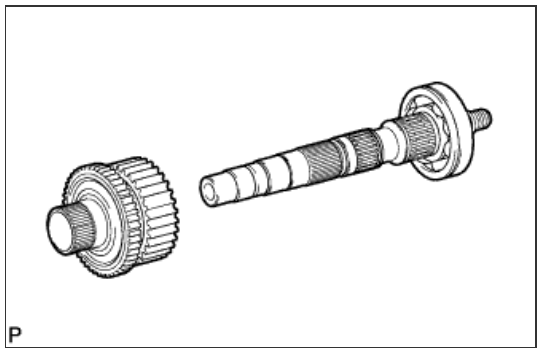
2. INSTALL TRANSFER DRIVE SPROCKET BEARING

a. Install the bearing to the output shaft.



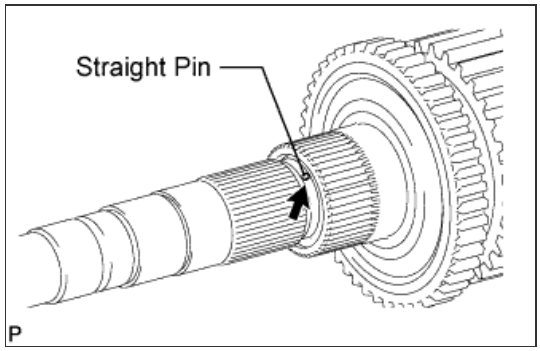
3. INSTALL TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Install the drive sprocket to the output shaft.

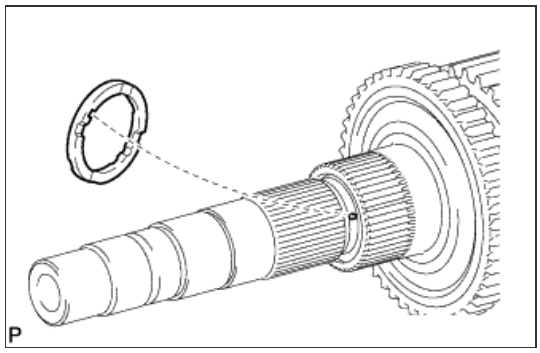


4. INSTALL TRANSFER OUTPUT SHAFT SPACER

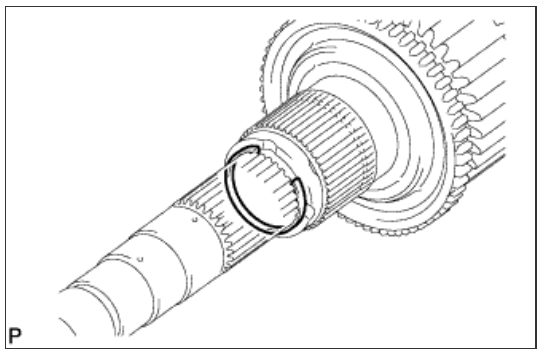
a. Install the straight pin to the output shaft.



b. Align the straight pin with the straight pin groove of the output shaft spacer, and slide on the output shaft spacer.



c. Using a screwdriver and hammer, tap on the snap ring.



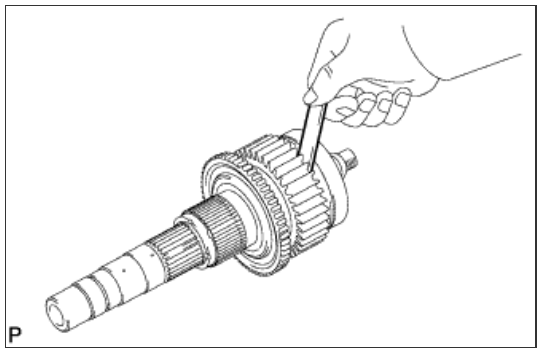
5. INSPECT TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Using a feeler gauge, measure the drive sprocket thrust clearance.

Standard Clearance:
0.10 to 0.47 mm (0.00394 to 0.0185 in.)

Maximum Clearance:
0.47 mm (0.0185 in.)

If the clearance is more than the maximum, replace the drive sprocket sub-assembly.



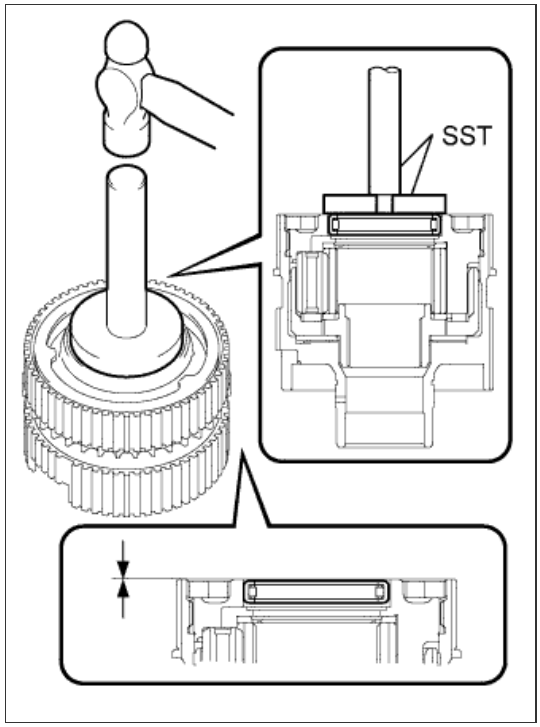
6. INSTALL CENTER DIFFERENTIAL CASE

a. Using SST and a hammer, tap in a new needle roller bearing until its surface is 0 to 0.5 mm (0 to 0.0197 in.) from the center differential case upper surface.

SST
09950-60020 (09951-00710)
09950-70010 (09951-07100)

NOTICE:

- **Be careful not to damage the center differential case.**
- **Install the bearing so that the mark is on the outside.**

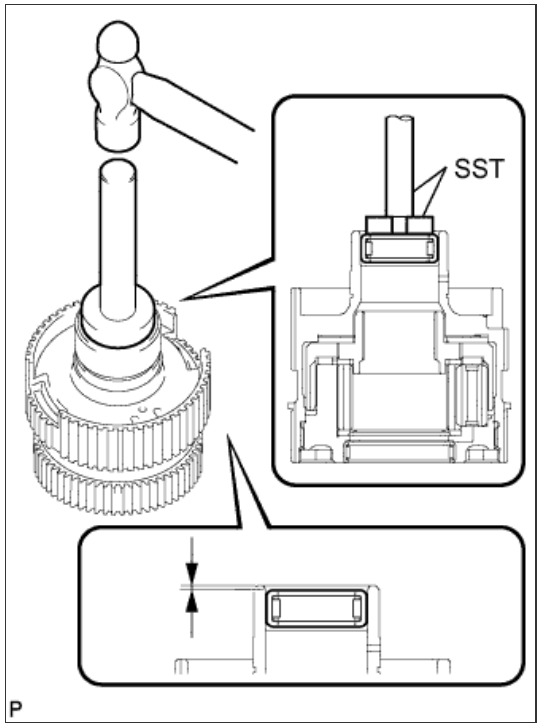


b. Using SST and a hammer, tap in a new needle roller bearing until its surface is 1.5 to 2.0 mm (0.0591 to 0.0787 in.) from the center differential case upper surface.

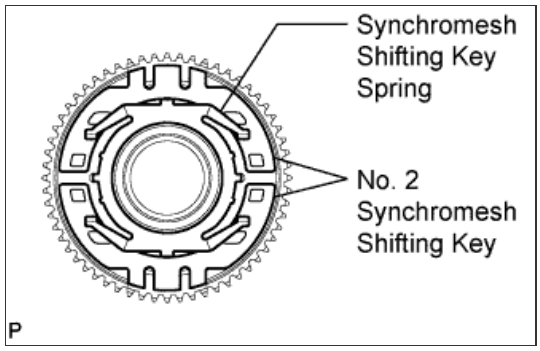
SST
09950-60010 (09951-00460)
09950-70010 (09951-07100)

NOTICE:

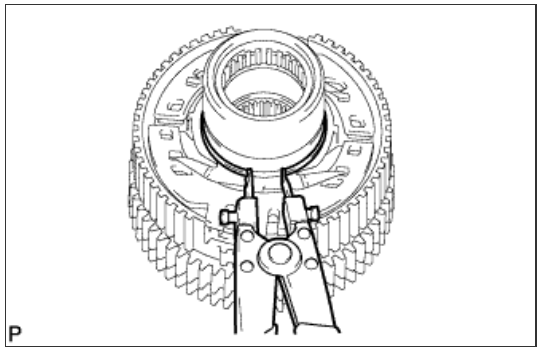
- **Be careful not to damage the center differential case.**
- **Install the bearing so that the mark is on the outside.**



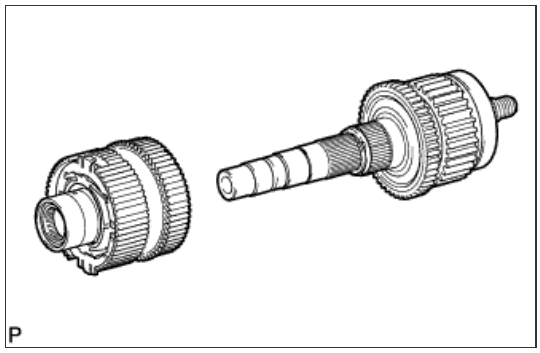
c. Install the synchromesh shifting key spring and No. 2 synchromesh shifting keys as shown in the illustration.



d. Using a snap ring expander, install the snap ring.

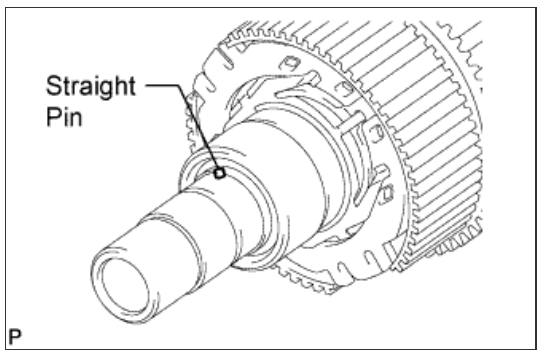


e. Install the center differential case to the output shaft.

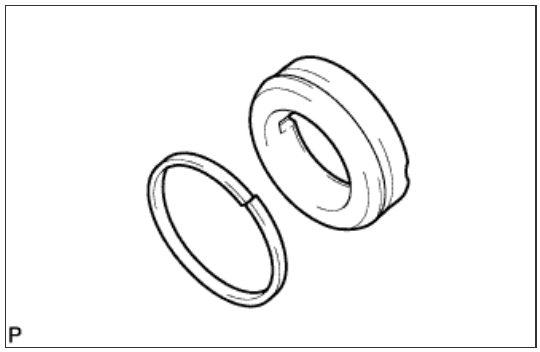


7. INSTALL NO. 1 TRANSFER OUTPUT SHAFT SPACER

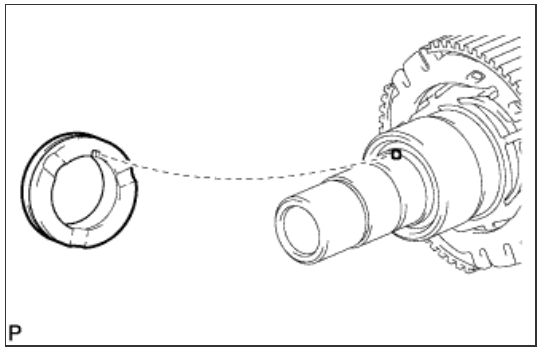
a. Install the straight pin to the output shaft.



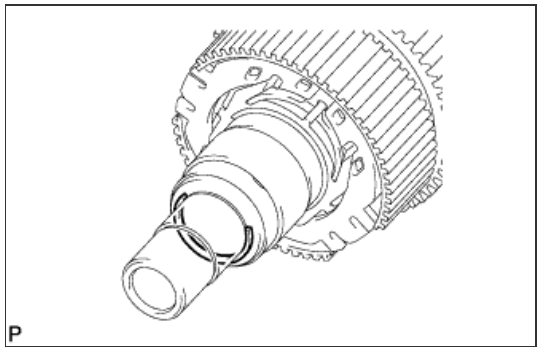
b. Install a new seal ring to the output shaft spacer.



c. Align the pin with the straight pin groove of the output shaft spacer, and slide on the output shaft spacer.

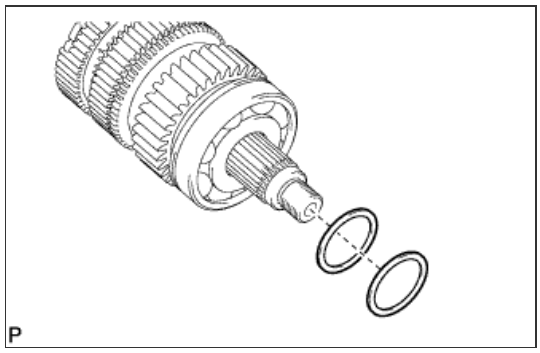


d. Using a screwdriver and hammer, tap on the snap ring.



8. INSTALL TRANSFER OUTPUT SHAFT WASHER

a. Install the 2 output shaft washers to the output shaft.



9. INSTALL TRANSFER INPUT SHAFT PLUG

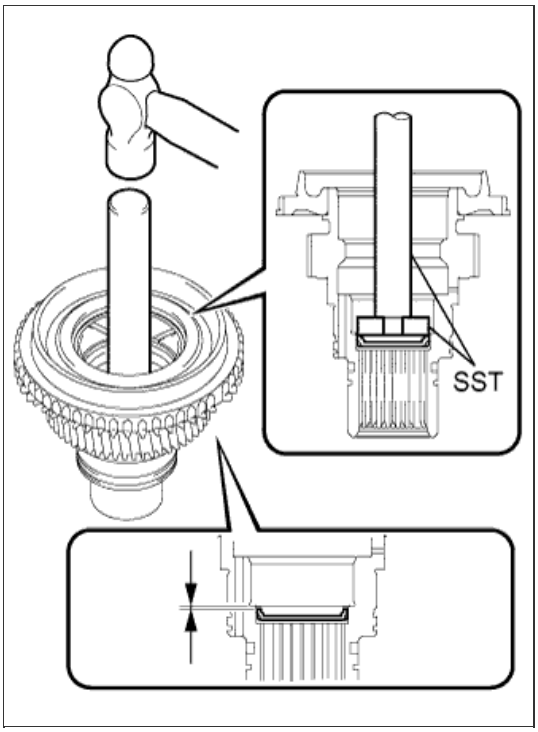
a. Using SST and a hammer, tap in a new input shaft plug until its surface is 1.0 to 1.8 mm (0.0394 to 0.0709 in.) from the input shaft upper surface.

SST

09950-60010 (09951-00410)
09950-70010 (09951-07150)

NOTICE:

Be careful not to damage or deform the input shaft plug when tapping it.



10. INSTALL TRANSFER INPUT SHAFT BIMETAL FORMED BUSH

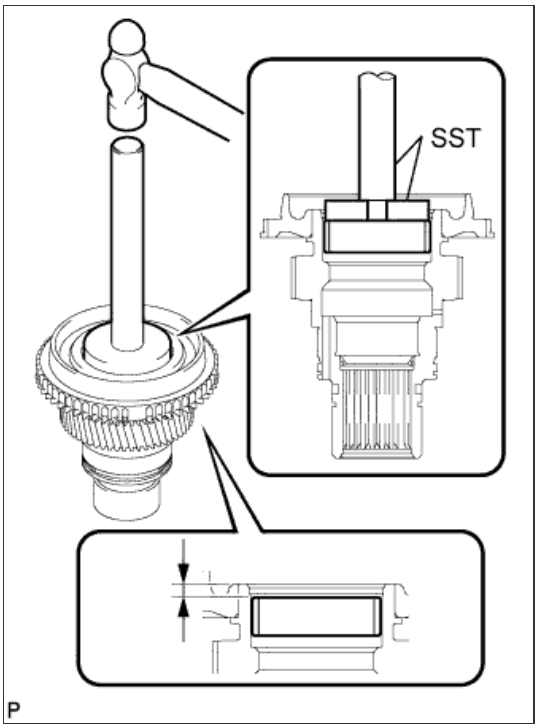
a. Using SST and a hammer, tap in a new bush until its surface is 5.5 to 5.9 mm (0.217 to 0.232 in.) from the input shaft upper surface.

SST

09950-70010 (09951-07150)
09950-60010 (09951-00610)

NOTICE:

Be careful not to damage the input shaft.

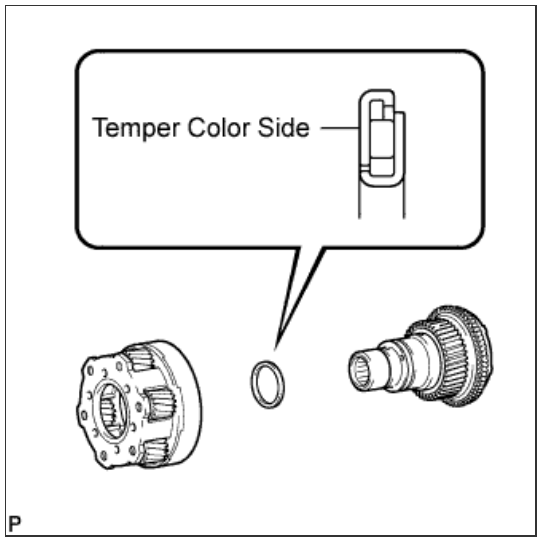


11. INSTALL TRANSFER INPUT SHAFT BEARING

a. Install the low planetary gear bearing and low planetary gear to the input shaft.

NOTICE:

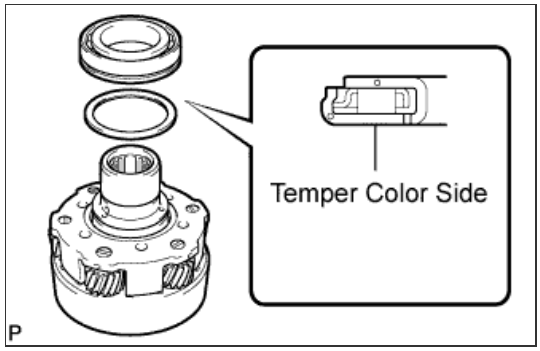
- **Make sure the low planetary gear bearing is installed in the correct direction.**
- **Install the low planetary gear bearing so that its temper color side faces the low planetary gear.**



b. Install the low planetary gear bearing and a new input shaft bearing to the input shaft.

NOTICE:

- **Make sure the input shaft bearing is installed in the correct direction.**
- **Make sure the low planetary gear bearing is installed in the correct direction.**
- **Install the low planetary gear bearing so that its temper color side faces the low planetary gear.**

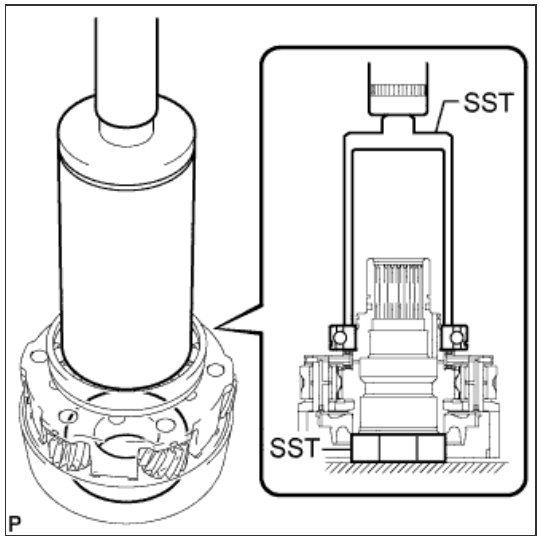


c. Using SST and a press, press in the bearing.

SST
09513-36040
09515-21010

NOTICE:

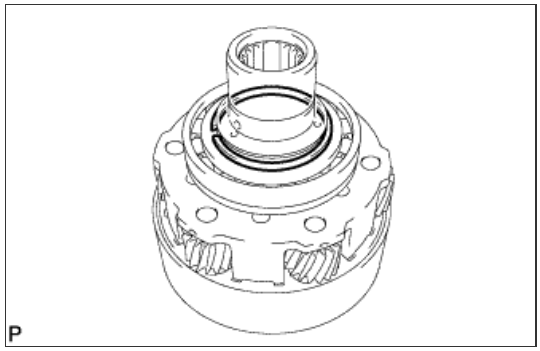
After press-fitting the bearing to the input shaft, check that the bearing moves smoothly.



d. Select a snap ring that allows for minimum axial play and install it to the shaft.

Standard Snap Ring Thickness:

Mark	Specified Condition
C	2.13 to 2.18 mm (0.0839 to 0.0858 in.)
D	2.18 to 2.23 mm (0.0858 to 0.0878 in.)
E	2.23 to 2.28 mm (0.0878 to 0.0898 in.)
F	2.28 to 2.33 mm (0.0898 to 0.0917 in.)
G	2.33 to 2.38 mm (0.0917 to 0.0937 in.)
H	2.38 to 2.43 mm (0.0937 to



	0.0957 in.)
J	2.43 to 2.48 mm (0.0957 to 0.0976 in.)

e. Using a snap ring expander, install the snap ring.

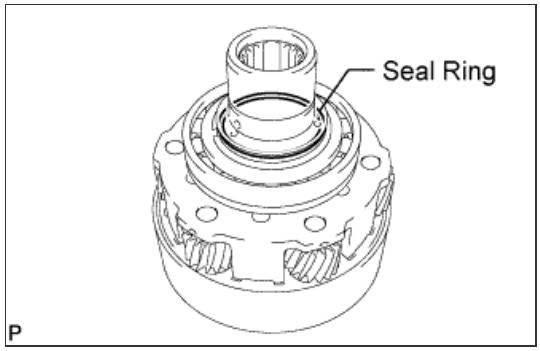
NOTICE:

Make sure that the snap ring is firmly installed to the groove.

12. INSTALL NO. 1 TRANSFER INPUT SHAFT SEAL RING

a. Apply transfer oil to a new seal ring.

b. Install the seal ring to the input shaft.

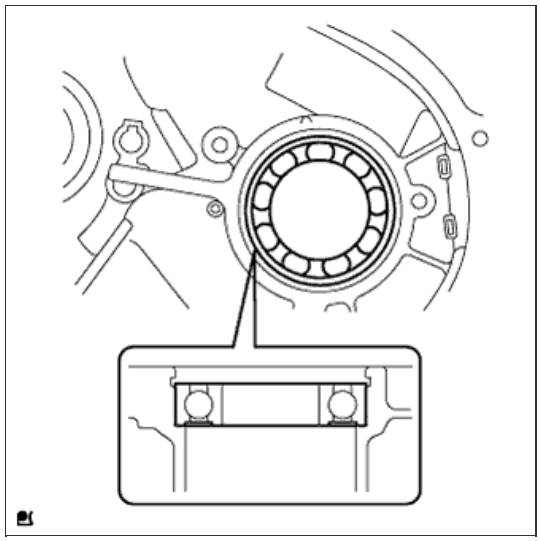


13. INSTALL TRANSFER DRIVEN SPROCKET BEARING

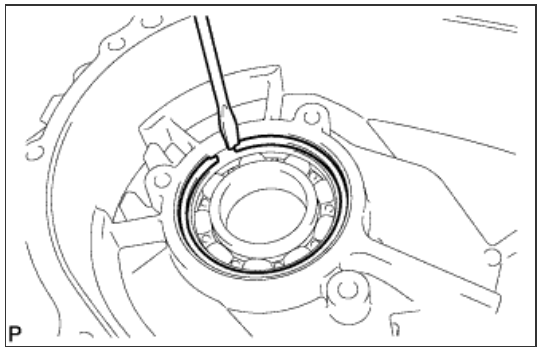
a. Install a new bearing to the front transfer case in the direction shown in the illustration.

NOTICE:

Make sure the bearing is installed in the correct direction.

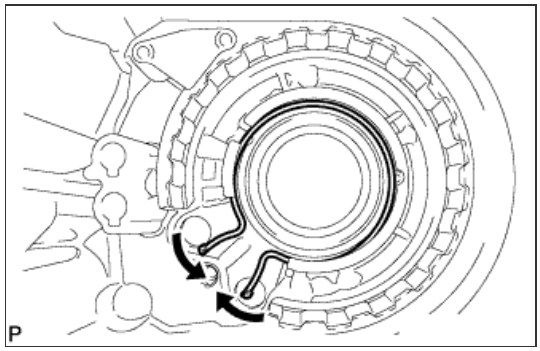


b. Using a screwdriver, install the snap ring.



14. INSTALL TRANSFER LOW PLANETARY RING GEAR

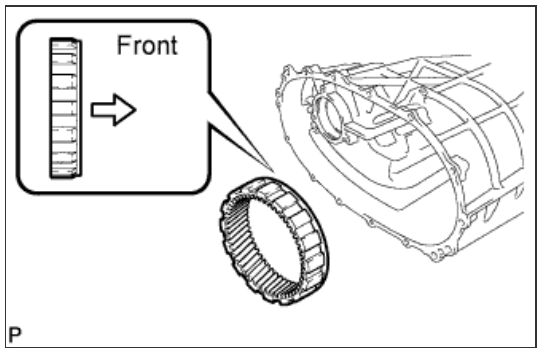
a. Using a snap ring expander, install the snap ring to the front transfer case.



b. Install the low planetary ring gear to the front transfer case.

NOTICE:

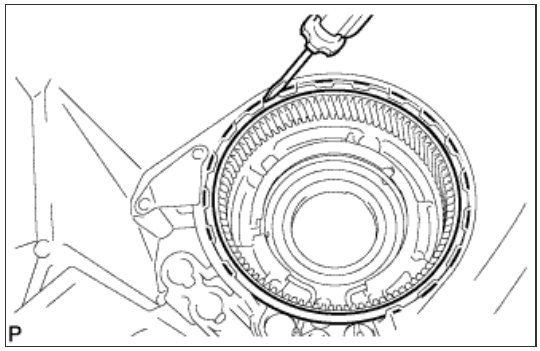
Make sure to install the low planetary ring gear in the correct direction.



c. Using a screwdriver, install the snap ring.

NOTICE:

Make sure that the snap ring is firmly installed to the groove.



15. INSTALL INPUT SHAFT ASSEMBLY

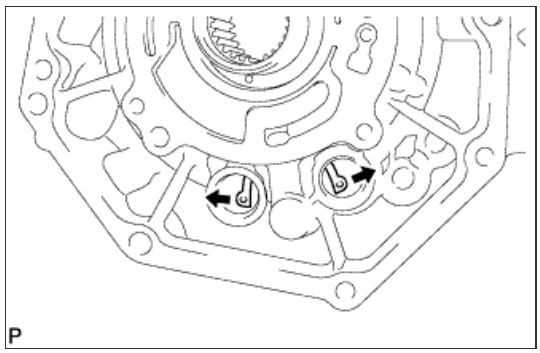
a. While expanding the snap ring, install the input shaft to the front transfer case.

b. Apply adhesive to the threads of the 2 case plugs.

Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

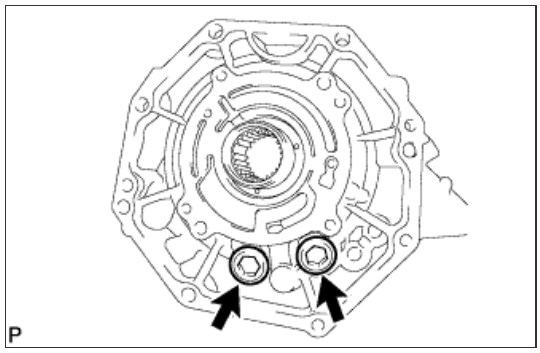
NOTICE:

Install the plugs within 3 minutes of application.



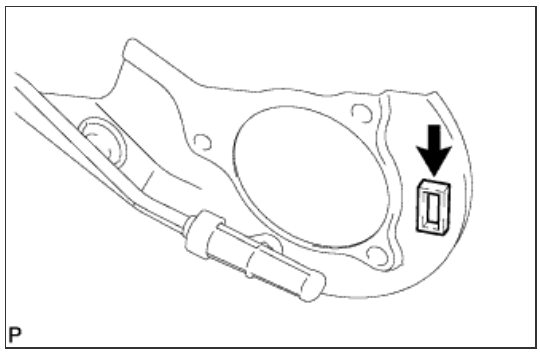
c. Using a 14 mm hexagon wrench, install the 2 case plugs.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



16. INSTALL TRANSFER CASE MAGNET

a. Install the magnet to the oil separator.

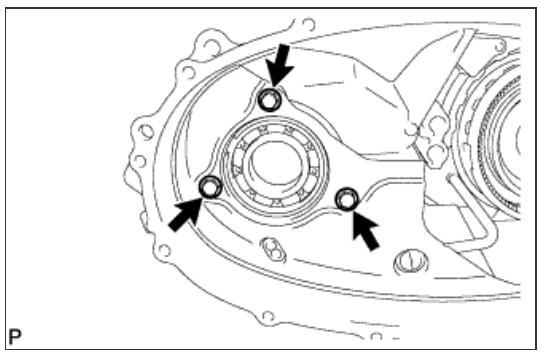


17. INSTALL TRANSFER OIL SEPARATOR SUB-ASSEMBLY

a. Install a new O-ring to the oil separator.

b. Install the oil separator with the 3 bolts.

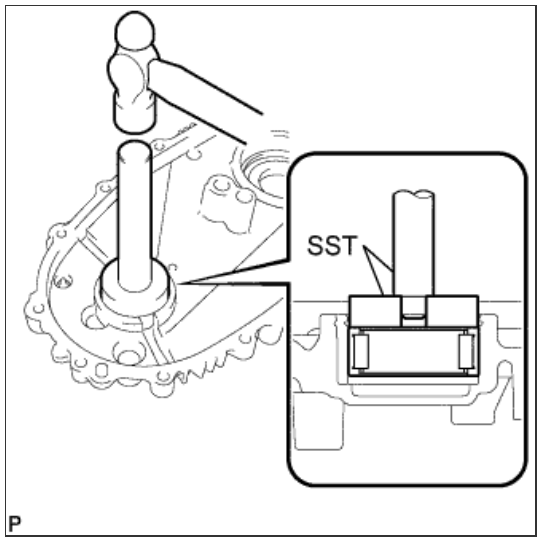
Torque:
18 N*m{ 178 kgf*cm , 13 ft.*lbf }



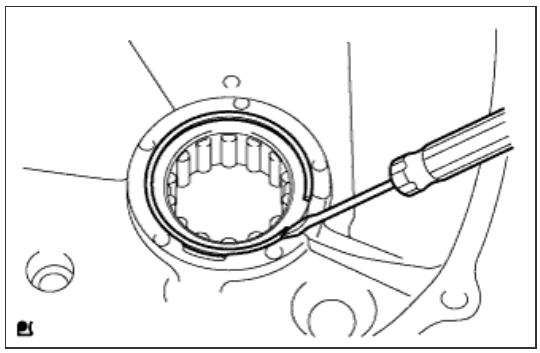
18. INSTALL SIDE GEAR SHAFT HOLDER BEARING

a. Using SST and a hammer, tap in a new bearing to the rear transfer case.

SST
09950-60010 (09951-00590)
09950-70010 (09951-07100)



b. Using a screwdriver, install the snap ring.



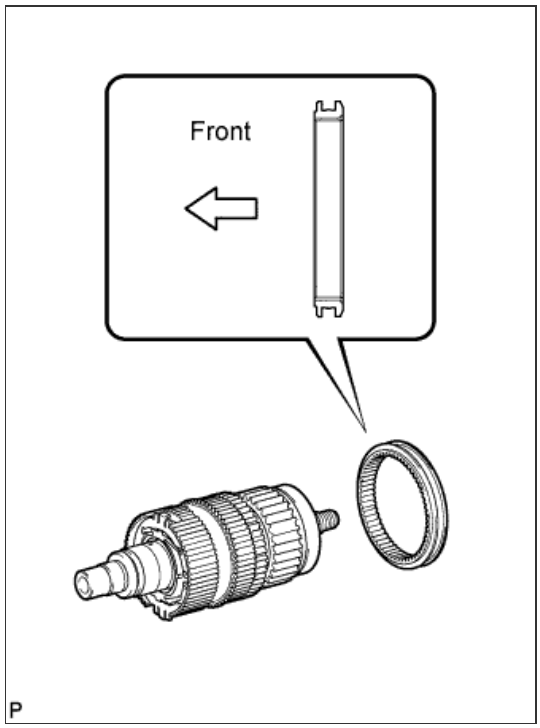
19. INSTALL FRONT DRIVE CLUTCH SLEEVE

a. Apply gear oil to the connecting areas of the clutch sleeve and center differential case.

b. Install the clutch sleeve onto the output shaft.

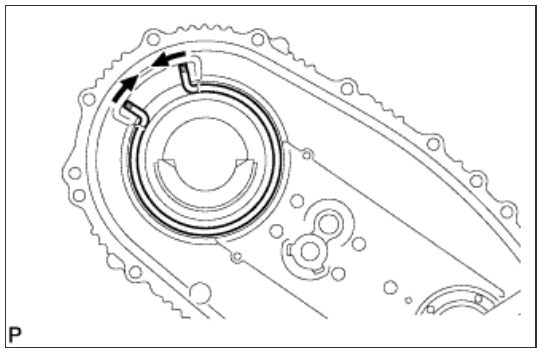
NOTICE:

Make sure that the clutch sleeve is installed facing the correct direction.



20. INSTALL REAR TRANSFER OUTPUT SHAFT ASSEMBLY

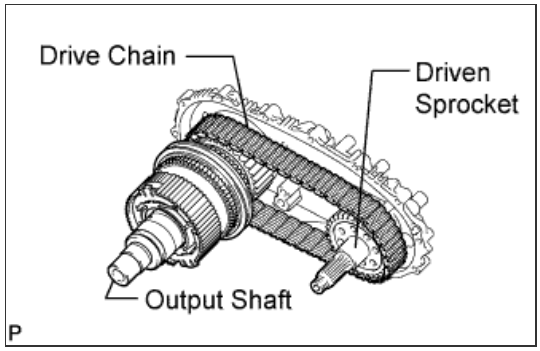
a. Install the snap ring to the rear transfer case.



b. Install the output shaft, drive chain and driven sprocket.

NOTICE:

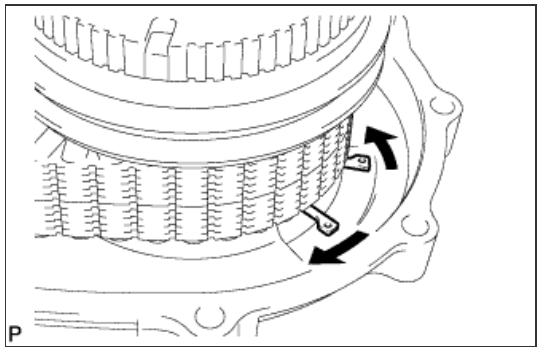
Do not drop the output shaft washers.



c. Using a snap ring expander, install the snap ring to the output shaft.

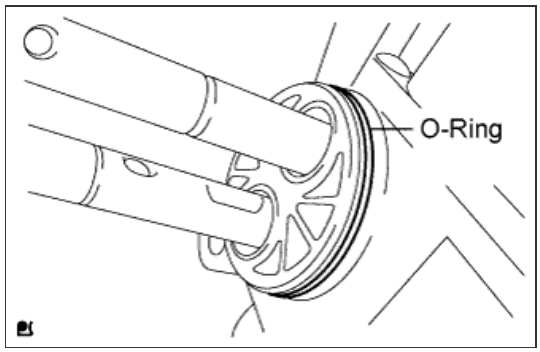
NOTICE:

Make sure that the snap ring is firmly installed to the groove.



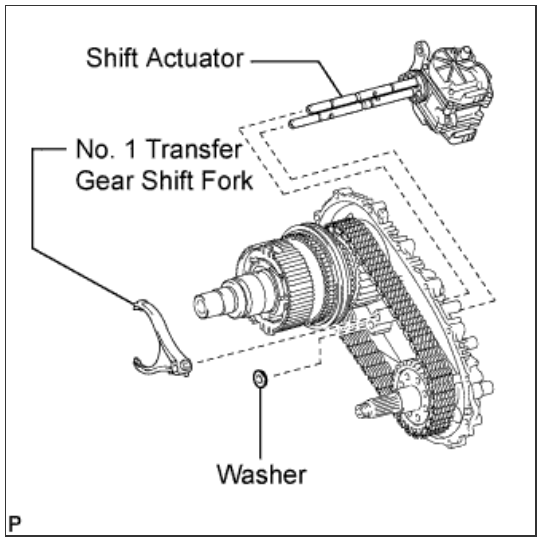
21. INSTALL TRANSFER SHIFT ACTUATOR ASSEMBLY

a. Install a new O-ring to the shift actuator.



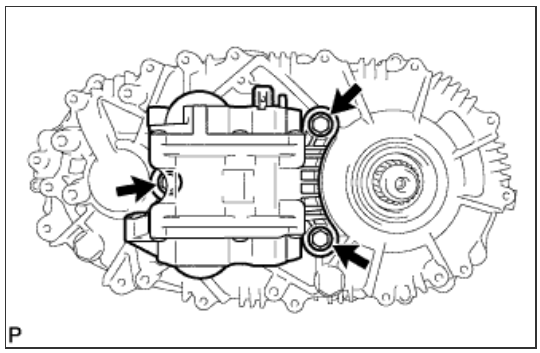
b. Set the No. 1 gear shift fork to the front drive clutch sleeve.

c. Set the washer to the rear transfer case.



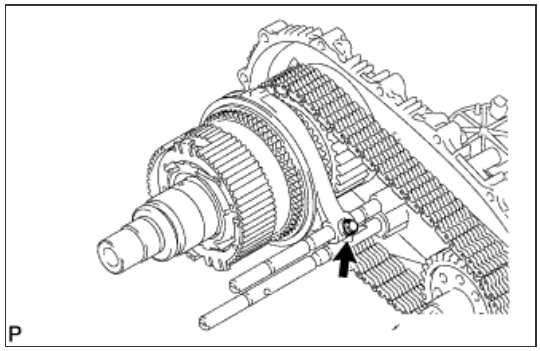
d. Install the shift actuator to the rear transfer case with the 3 bolts.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }



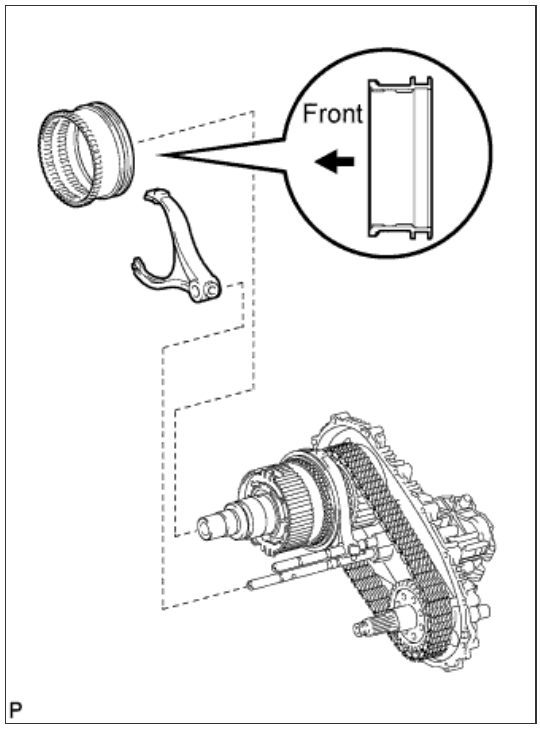
e. Install the No. 1 gear shift fork to the shift actuator with the bolt.

Torque:
24 N*m{ 245 kgf*cm , 18 ft.*lbf }



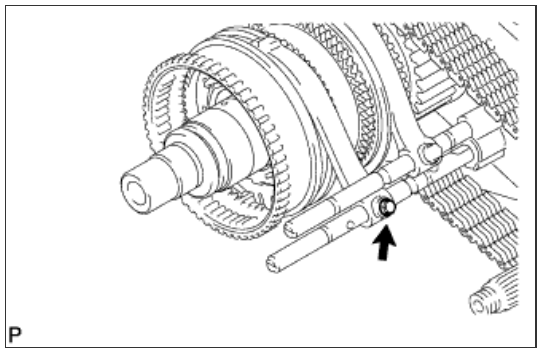
22. INSTALL NO. 2 TRANSFER GEAR SHIFT FORK

a. Set the No. 2 gear shift fork together with the high and low clutch sleeve to the shift actuator.

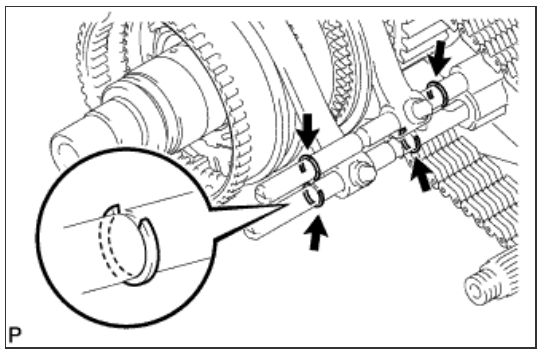


b. Install the No. 2 gear shift fork to the shift actuator with the bolt.

Torque:
24 N*m{ 245 kgf*cm , 18 ft.*lbf }

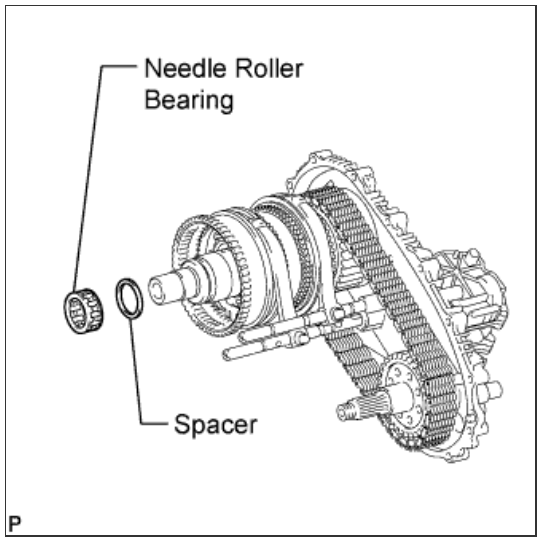


c. Using a screwdriver and hammer, tap the 4 shift fork shaft snap rings to the shift fork shaft.



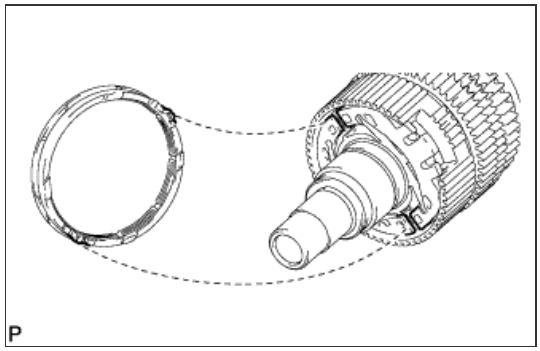
23. INSTALL FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING

a. Install the needle roller bearing and spacer to the output shaft.



24. INSTALL NO. 1 SYNCHRONIZER RING

a. Align the protrusion of the synchronizer ring with the notch on the differential case and install it.



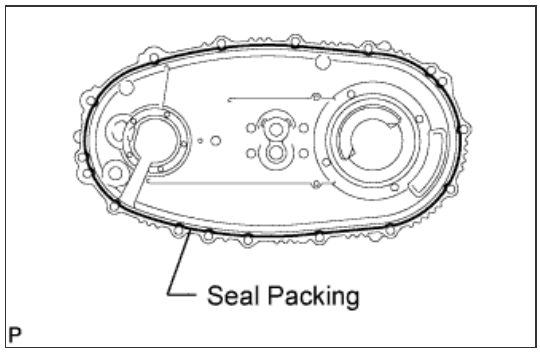
25. INSTALL REAR TRANSFER CASE ASSEMBLY

a. Apply seal packing to the rear transfer case as shown in the illustration.

Seal Packing:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent

NOTICE:

If the removed rear transfer case will be reused: After removing the rear transfer case, be sure to perform the following before reinstalling it: 1) using a knife, cut off any old FIPG material on the rear transfer case contact surface, 2) clean off any remaining old FIPG material from the rear transfer case contact surface, and 3) reapply seal packing to the rear transfer case.

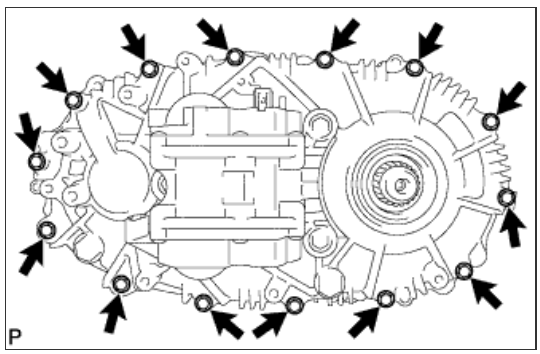


b. Install the rear transfer case with the 14 bolts.

Torque:
28 N*m{ 286 kgf*cm , 21 ft.*lbf }

NOTICE:

Tighten the bolts within 10 minutes of applying the seal packing. The seal packing will dry very quickly.



26. INSTALL TRANSFER CASE PLUG

a. Apply adhesive to the threads of the plug.

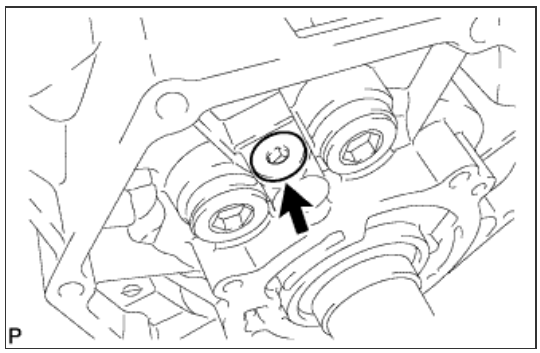
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

b. Using a 6 mm hexagon wrench, install the plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }



27. INSTALL NO. 1 TRANSFER CASE PLUG

a. Install the pin and compression spring to the front transfer case.

b. Apply adhesive to the threads of the plug.

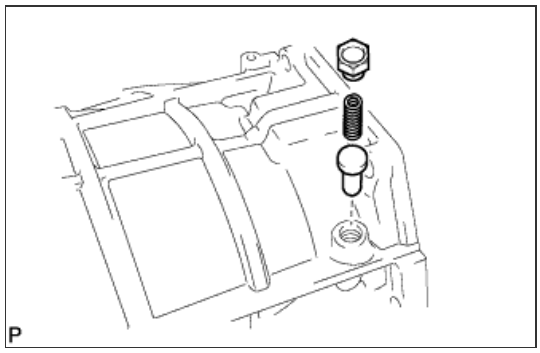
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

c. Install the plug.

Torque:
19 N*m{ 190 kgf*cm , 14 ft.*lbf }

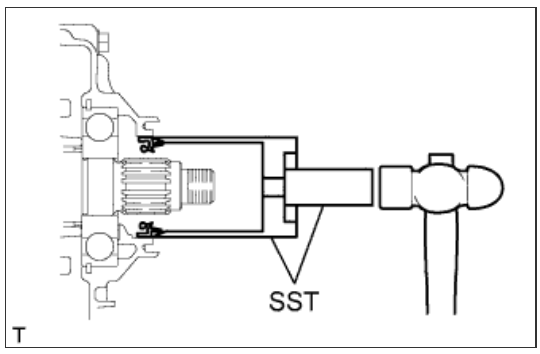


28. INSTALL TRANSFER CASE REAR OIL SEAL

a. Apply transfer oil to the spline of the output shaft.

b. Using SST and a hammer, tap in a new oil seal until its surface is flush with the housing upper surface.

SST
09649-17010
09950-70010 (09951-07150)



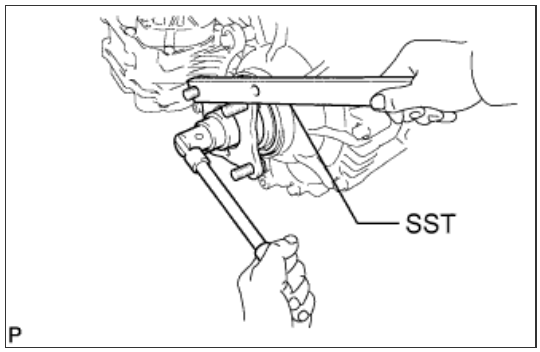
29. INSTALL REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the output shaft.

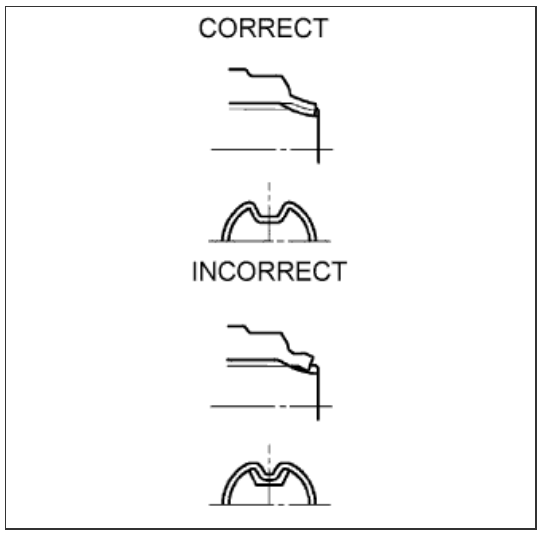
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.

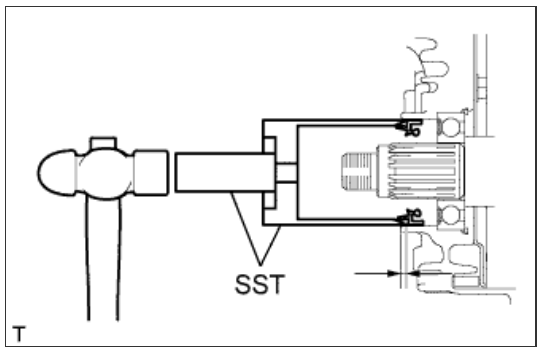


30. INSTALL TRANSFER CASE FRONT OIL SEAL

a. Apply transfer oil to the spline of the driven sprocket.

b. Using SST and a hammer, tap in a new oil seal until its surface is 1 to 1.5 mm (0.0394 to 0.0590 in.) from the case upper surface.

SST
09649-17010
09950-70010 (09951-07150)



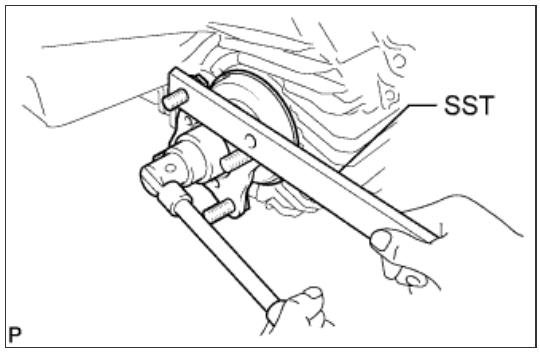
31. INSTALL FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the drive sprocket.

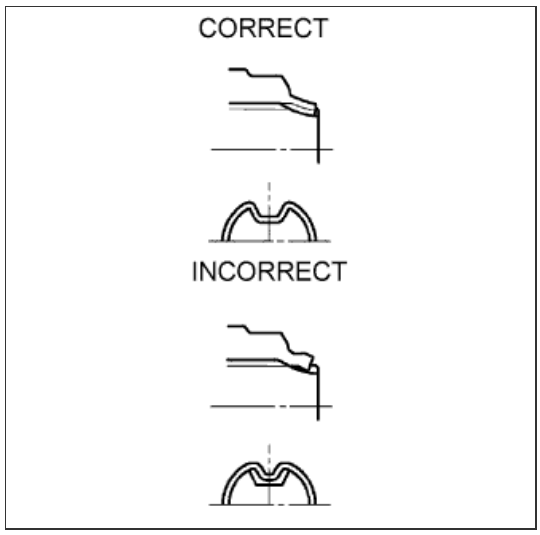
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.



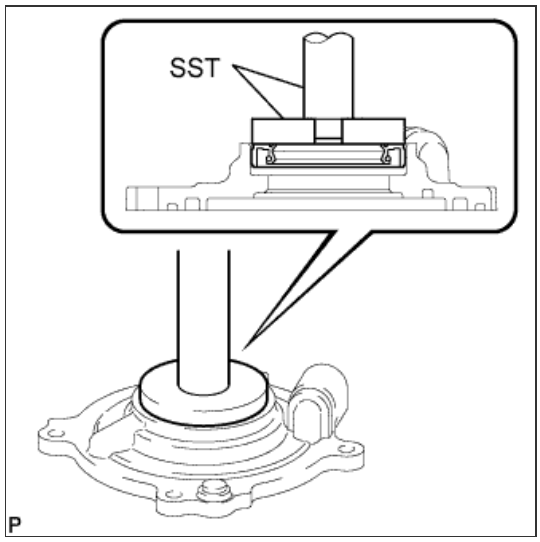
32. INSTALL TRANSFER OIL PUMP PLATE OIL SEAL

a. Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump plate upper surface.

SST
09950-60020 (09951-00680)
09950-70010 (09951-07100)

NOTICE:

Be careful not to damage the oil pump plate.



33. INSTALL TRANSFER CASE PLUG

a. Install the relief valve seat, ball and compression spring to the oil pump plate.

b. Apply adhesive to the threads of the plug.

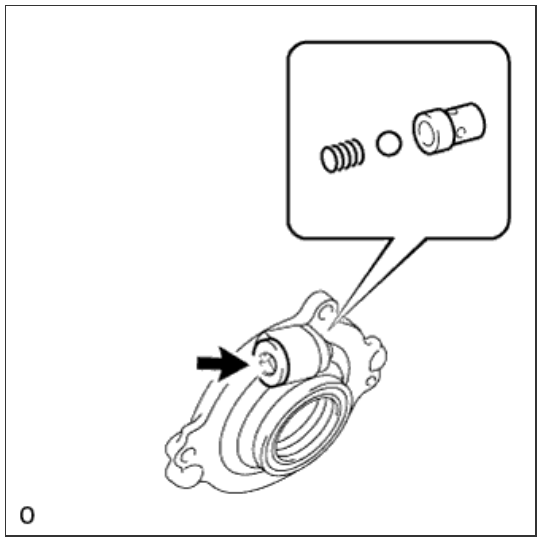
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

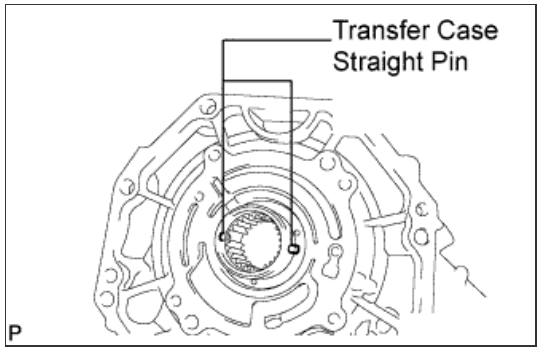
c. Using a 10 mm hexagon wrench, install the plug.

Torque:
29 N*m{ 300 kgf*cm , 22 ft.*lbf }



34. INSTALL TRANSFER CASE STRAIGHT PIN

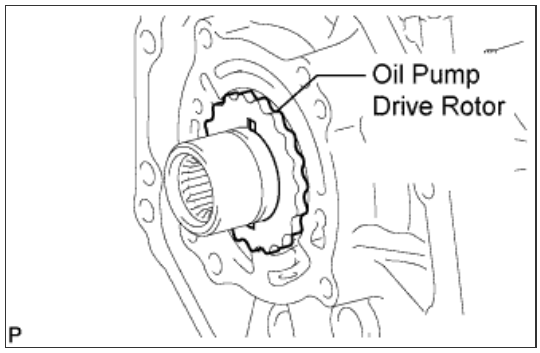
a. Install the 2 straight pins to the input shaft.



35. INSTALL TRANSFER OIL PUMP PLATE

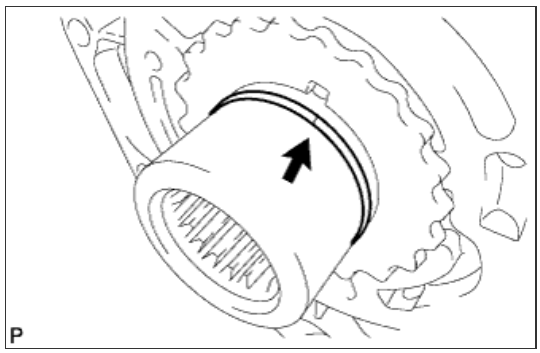
a. Apply transfer oil to a new O-ring, the drive rotor, driven rotor and a new transfer oil seal ring.

b. Install the drive rotor to the input shaft.



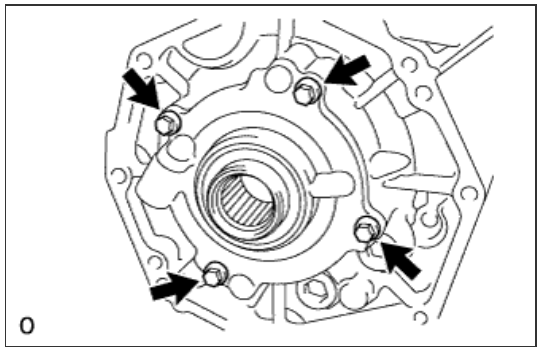
c. Install the transfer oil seal ring to the input shaft.

d. Install the O-ring to the oil pump plate.



e. Install the oil pump plate and driven rotor to the front transfer case with the 4 bolts.

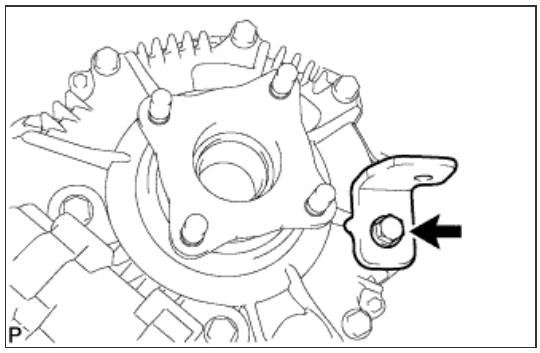
Torque:
12 N*m{ 117 kgf*cm , 9 ft.*lbf }



36. INSTALL PROPELLER SHAFT HEAT INSULATOR BRACKET SUB-ASSEMBLY

a. Install the bracket to the rear transfer case with the bolt.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }



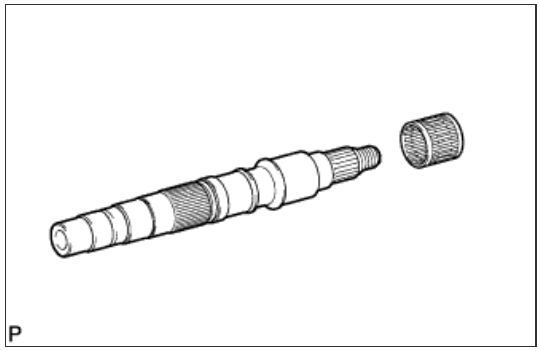
for Preparation Click here

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL REAR TRANSFER OUTPUT SHAFT

a. Install a new needle roller bearing.

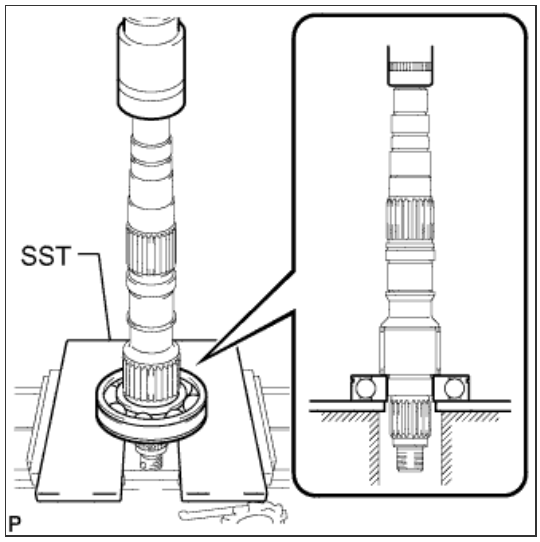


b. Using SST and a press, press in a new bearing.

SST
09527-10011

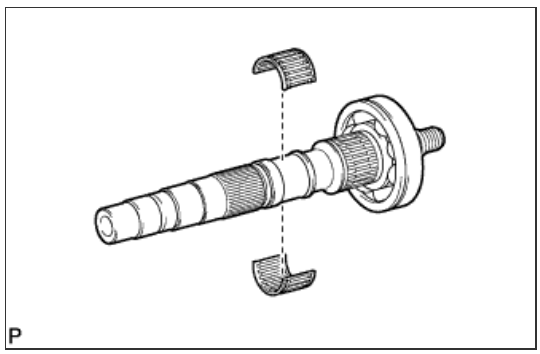
NOTICE:

Set the snap ring groove of the bearing to the front side.



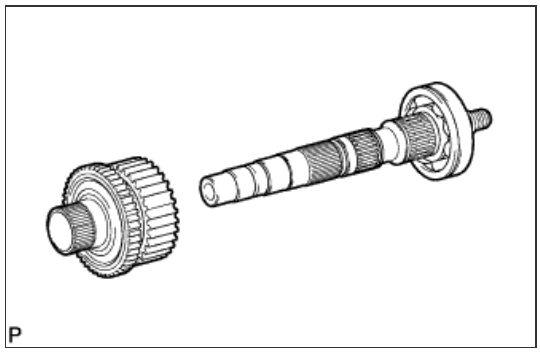
2. INSTALL TRANSFER DRIVE SPROCKET BEARING

a. Install the bearing to the output shaft.



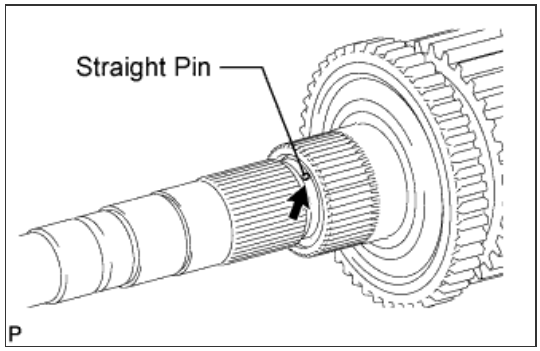
3. INSTALL TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Install the drive sprocket to the output shaft.

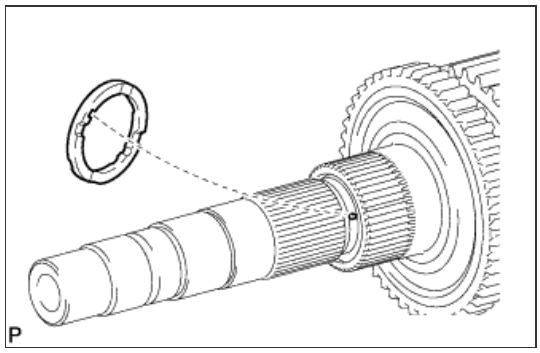


4. INSTALL TRANSFER OUTPUT SHAFT SPACER

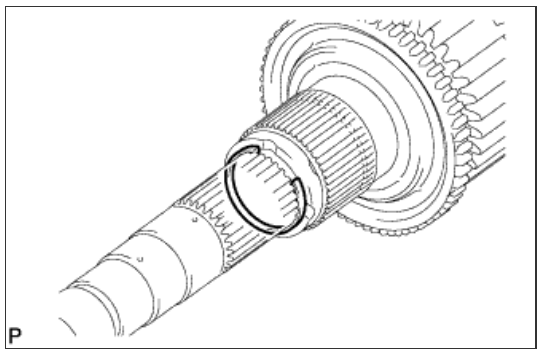
a. Install the straight pin to the output shaft.



b. Align the straight pin with the straight pin groove of the output shaft spacer, and slide on the output shaft spacer.



c. Using a screwdriver and hammer, tap on the snap ring.



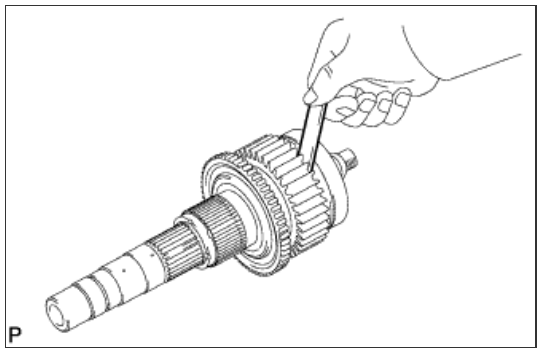
5. INSPECT TRANSFER DRIVE SPROCKET SUB-ASSEMBLY

a. Using a feeler gauge, measure the drive sprocket thrust clearance.

Standard Clearance:
0.10 to 0.47 mm (0.00394 to 0.0185 in.)

Maximum Clearance:
0.47 mm (0.0185 in.)

If the clearance is more than the maximum, replace the drive sprocket sub-assembly.



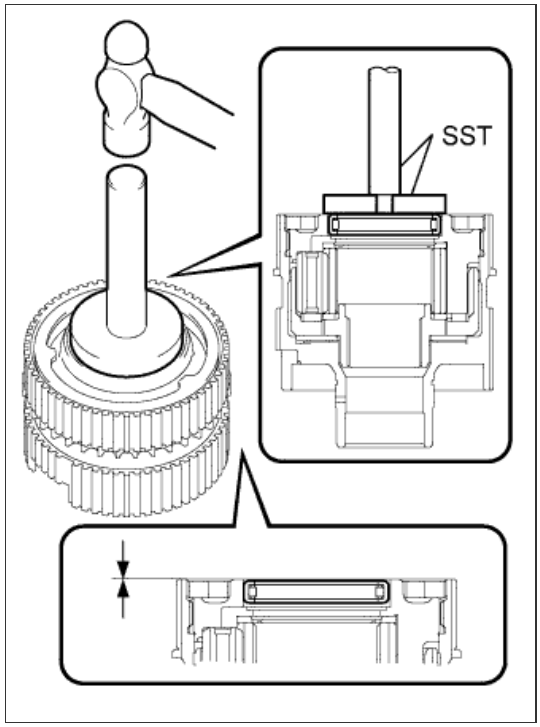
6. INSTALL CENTER DIFFERENTIAL CASE

a. Using SST and a hammer, tap in a new needle roller bearing until its surface is 0 to 0.5 mm (0 to 0.0197 in.) from the center differential case upper surface.

SST
09950-60020 (09951-00710)
09950-70010 (09951-07100)

NOTICE:

- **Be careful not to damage the center differential case.**
- **Install the bearing so that the mark is on the outside.**

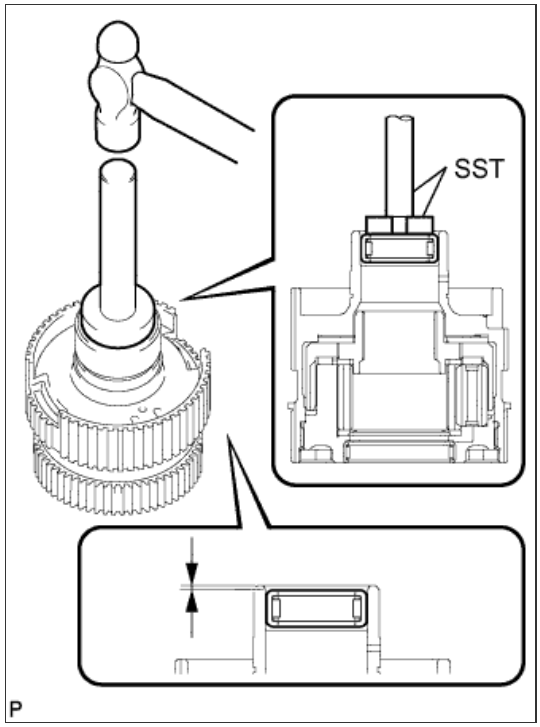


b. Using SST and a hammer, tap in a new needle roller bearing until its surface is 1.5 to 2.0 mm (0.0591 to 0.0787 in.) from the center differential case upper surface.

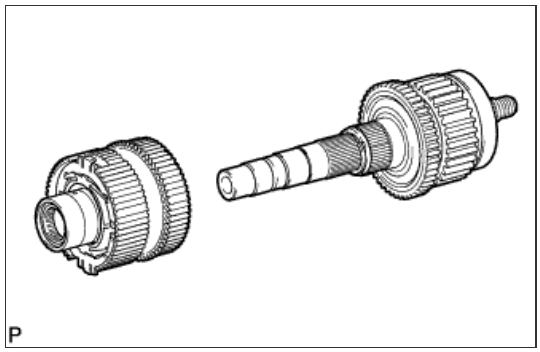
SST
09950-60010 (09951-00460)
09950-70010 (09951-07100)

NOTICE:

- **Be careful not to damage the center differential case.**
- **Install the bearing so that the mark is on the outside.**

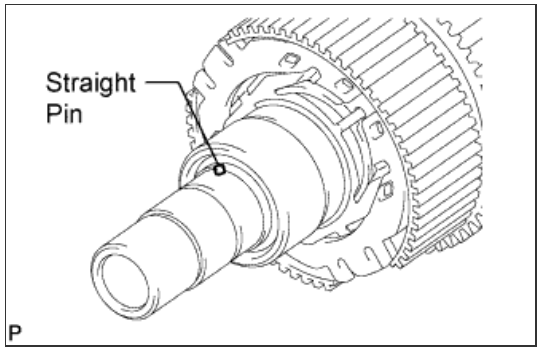


c. Install the center differential case to the output shaft.

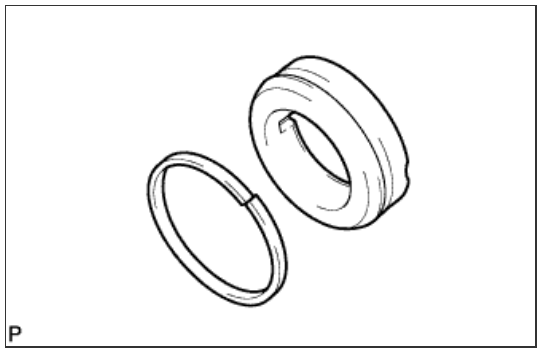


7. INSTALL NO. 1 TRANSFER OUTPUT SHAFT SPACER

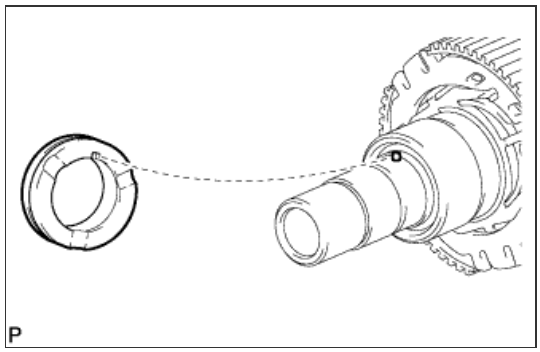
a. Install the straight pin to the output shaft.



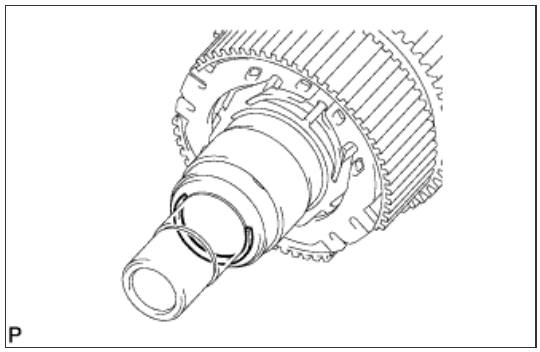
b. Install a new seal ring to the output shaft spacer.



c. Align the pin with the straight pin groove of the output shaft spacer, and slide on the output shaft spacer.

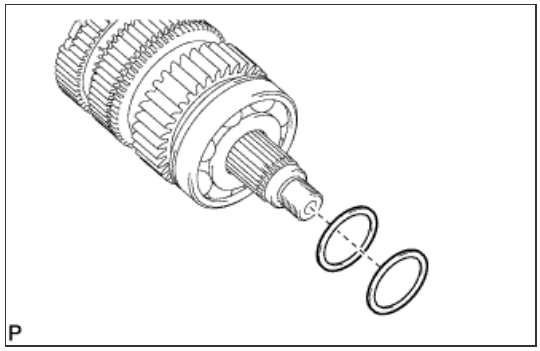


d. Using a screwdriver and hammer, tap on the snap ring.



8. INSTALL TRANSFER OUTPUT SHAFT WASHER

a. Install the 2 output shaft washers to the output shaft.



9. INSTALL TRANSFER INPUT SHAFT PLUG

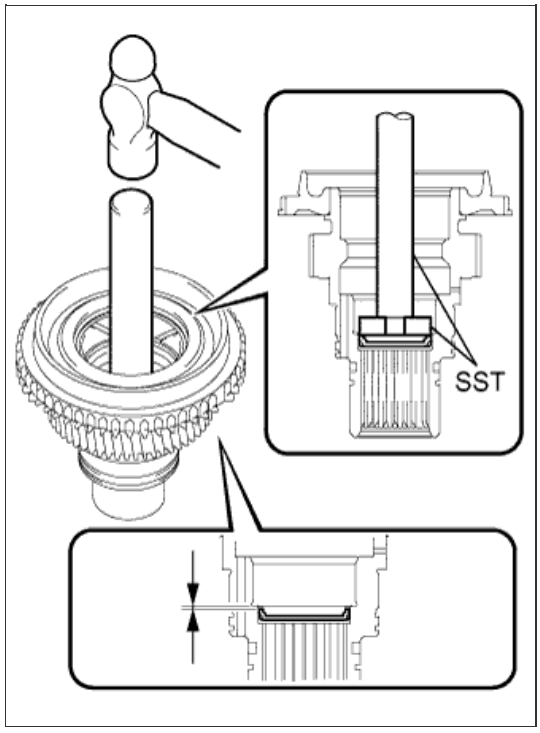
a. Using SST and a hammer, tap in a new input shaft plug until its surface is 1.0 to 1.8 mm (0.0394 to 0.0709 in.) from the input shaft upper surface.

SST

09950-60010 (09951-00410)
09950-70010 (09951-07150)

NOTICE:

Be careful not to damage or deform the input shaft plug when tapping it.



10. INSTALL TRANSFER INPUT SHAFT BIMETAL FORMED BUSH

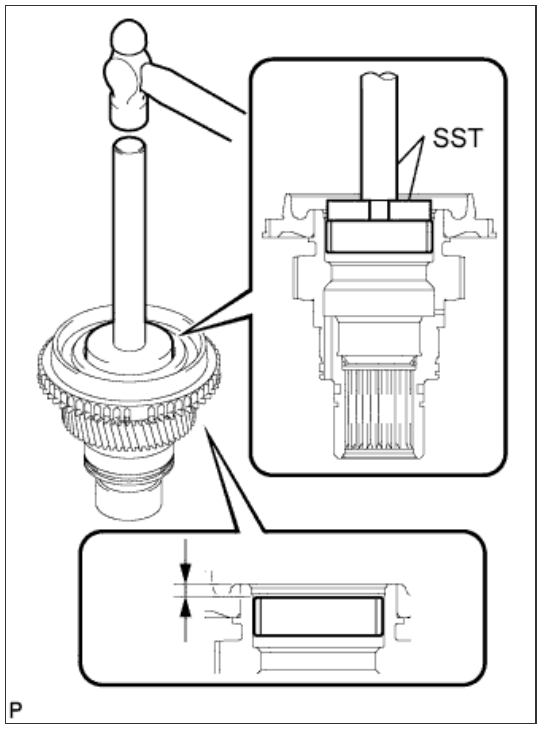
a. Using SST and a hammer, tap in a new bush until its surface is 5.5 to 5.9 mm (0.217 to 0.232 in.) from the input shaft upper surface.

SST

09950-70010 (09951-07150)
09950-60010 (09951-00610)

NOTICE:

Be careful not to damage the input shaft.

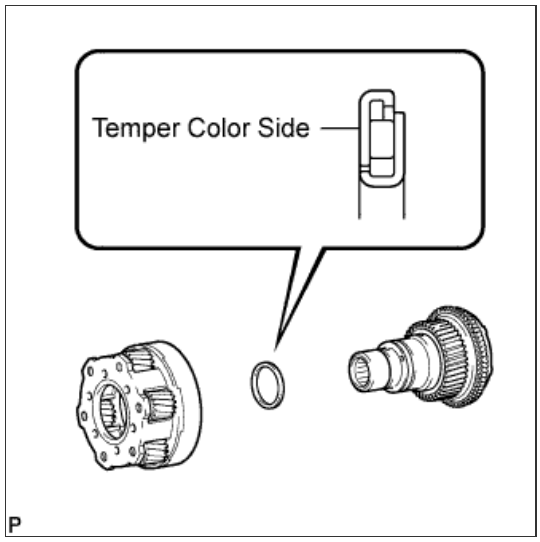


11. INSTALL TRANSFER INPUT SHAFT BEARING

a. Install the low planetary gear bearing and low planetary gear to the input shaft.

NOTICE:

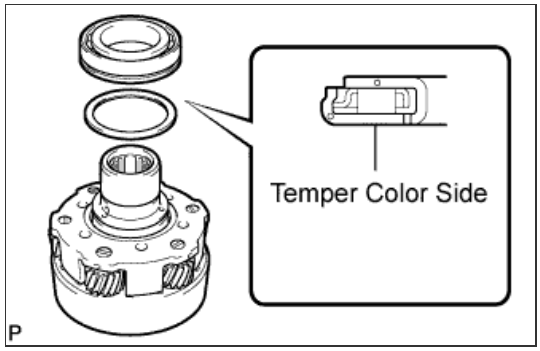
- **Make sure the low planetary gear bearing is installed in the correct direction.**
- **Install the low planetary gear bearing so that its temper color side faces the low planetary gear.**



b. Install the low planetary gear bearing and a new input shaft bearing to the input shaft.

NOTICE:

- **Make sure the input shaft bearing is installed in the correct direction.**
- **Make sure the low planetary gear bearing is installed in the correct direction.**
- **Install the low planetary gear bearing so that its temper color side faces the low planetary gear.**



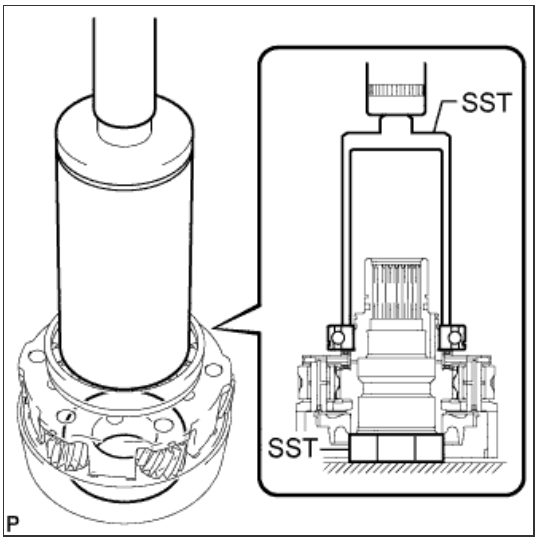
c. Using SST and a press, press in the bearing.

SST

09513-36040
09515-21010

NOTICE:

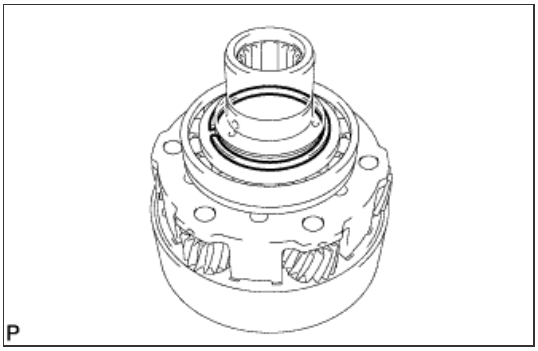
After press-fitting the bearing to the input shaft, check that the bearing moves smoothly.



d. Select a snap ring that allows for minimum axial play and install it to the shaft.

Standard Snap Ring Thickness:

Mark	Specified Condition
C	2.13 to 2.18 mm (0.0839 to 0.0858 in.)
D	2.18 to 2.23 mm (0.0858 to 0.0878 in.)
E	2.23 to 2.28 mm (0.0878 to 0.0898 in.)
F	2.28 to 2.33 mm (0.0898 to 0.0917 in.)
G	2.33 to 2.38 mm (0.0917 to 0.0937 in.)
H	2.38 to 2.43 mm (0.0937 to 0.0957 in.)
J	2.43 to 2.48 mm (0.0957 to 0.0976 in.)



e. Using a snap ring expander, install the snap ring.

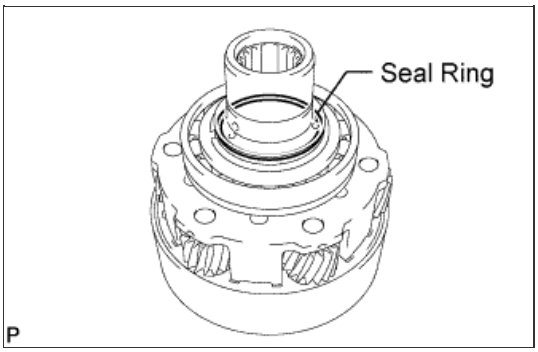
NOTICE:

Make sure that the snap ring is firmly installed to the groove.

12. INSTALL NO. 1 TRANSFER INPUT SHAFT SEAL RING

a. Apply transfer oil to a new seal ring.

b. Install the seal ring to the input shaft.



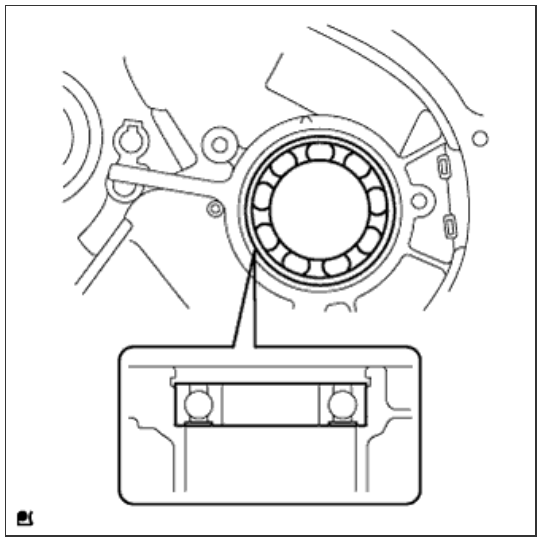
13. INSTALL TRANSFER DRIVEN SPROCKET BEARING

a. Install a new bearing to the front transfer case in the direction shown in the

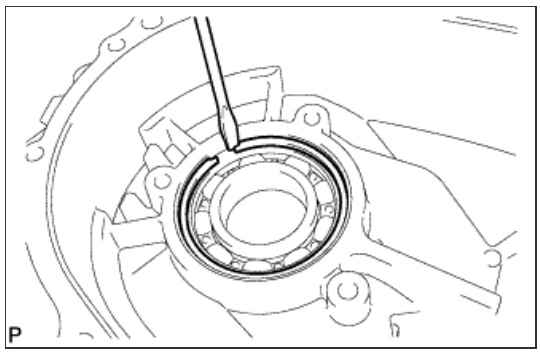
illustration.

NOTICE:

Make sure the bearing is installed in the correct direction.

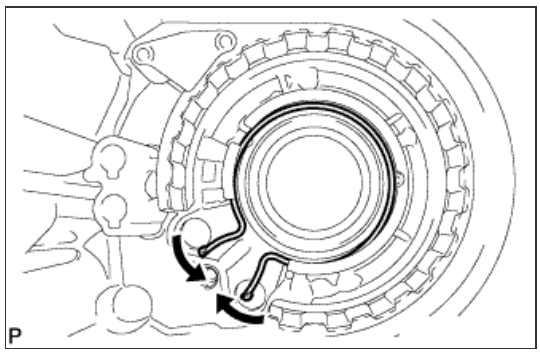


b. Using a screwdriver, install the snap ring.



14. INSTALL TRANSFER LOW PLANETARY RING GEAR

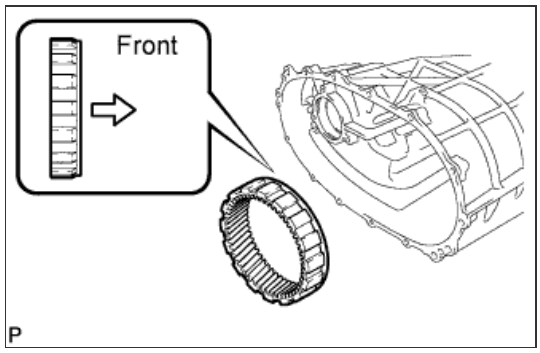
a. Using a snap ring expander, install the snap ring to the front transfer case.



b. Install the low planetary ring gear to the front transfer case.

NOTICE:

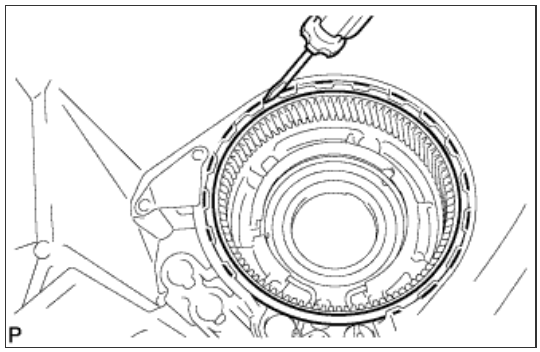
Make sure to install the low planetary ring gear in the correct direction.



c. Using a screwdriver, install the snap ring.

NOTICE:

Make sure that the snap ring is firmly installed to the groove.



15. INSTALL INPUT SHAFT ASSEMBLY

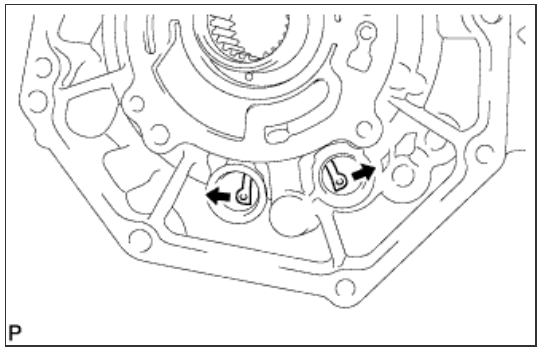
a. While expanding the snap ring, install the input shaft to the front transfer case.

b. Apply adhesive to the threads of the 2 case plugs.

Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

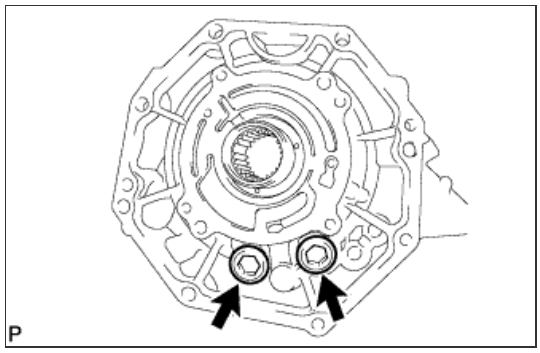
NOTICE:

Install the plugs within 3 minutes of application.



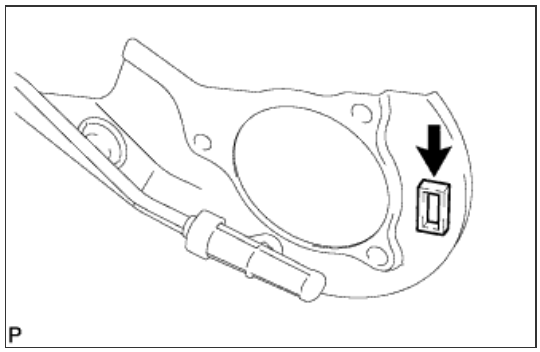
c. Using a 14 mm hexagon wrench, install the 2 case plugs.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



16. INSTALL TRANSFER CASE MAGNET

a. Install the magnet to the oil separator.



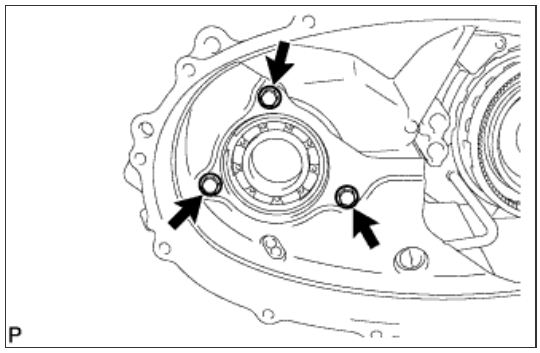
17. INSTALL TRANSFER OIL SEPARATOR SUB-ASSEMBLY

a. Install a new O-ring to the oil separator.

b. Install the oil separator with the 3 bolts

b. Install the oil separator with the 3 bolts.

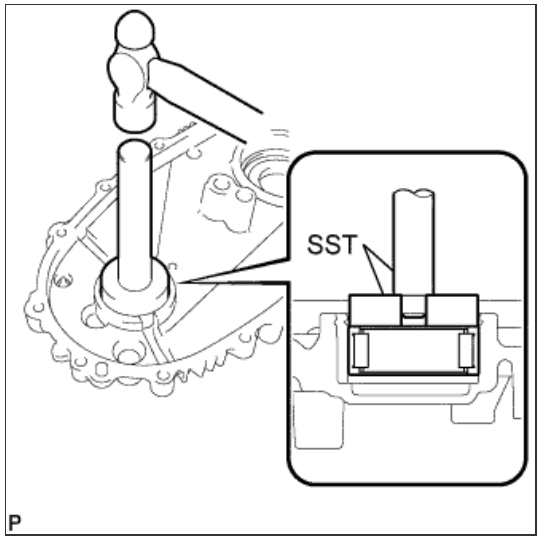
Torque:
18 N*m{ 178 kgf*cm , 13 ft.*lbf }



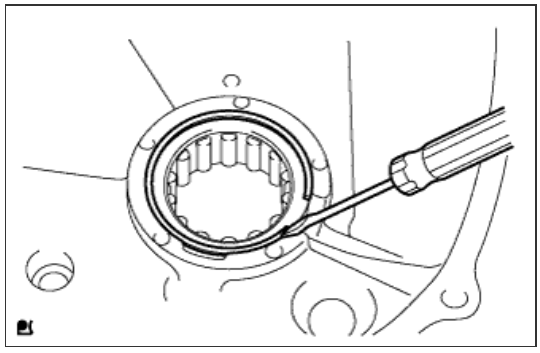
18. INSTALL SIDE GEAR SHAFT HOLDER BEARING

a. Using SST and a hammer, tap in a new bearing to the rear transfer case.

SST
09950-60010 (09951-00590)
09950-70010 (09951-07100)



b. Using a screwdriver, install the snap ring.



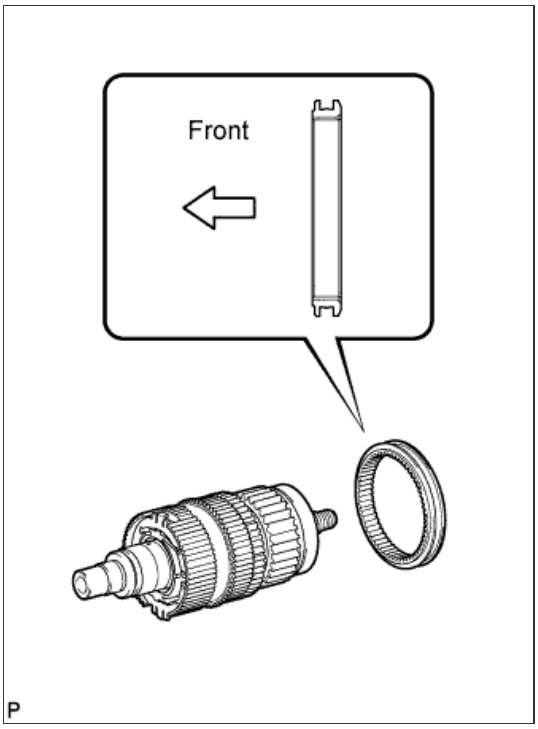
19. INSTALL FRONT DRIVE CLUTCH SLEEVE

a. Apply gear oil to the connecting areas of the clutch sleeve and center differential case.

b. Install the clutch sleeve onto the output shaft.

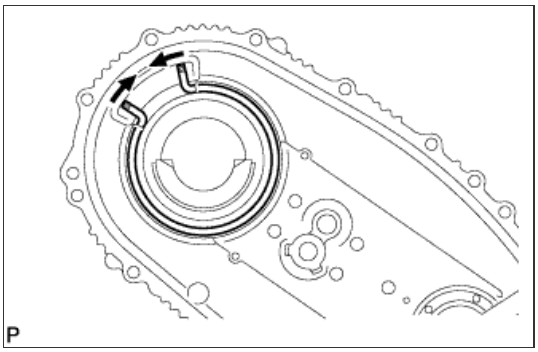
NOTICE:

Make sure that the clutch sleeve is installed facing the correct direction.



20. INSTALL REAR TRANSFER OUTPUT SHAFT ASSEMBLY

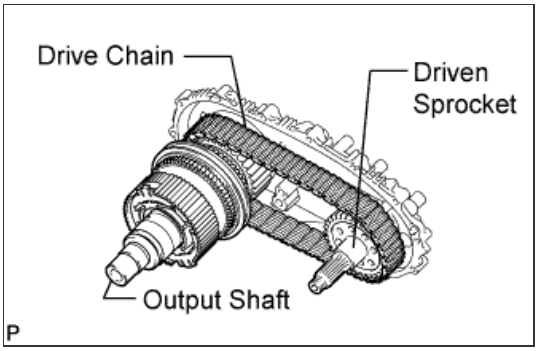
a. Install the snap ring to the rear transfer case.



b. Install the output shaft, drive chain and driven sprocket.

NOTICE:

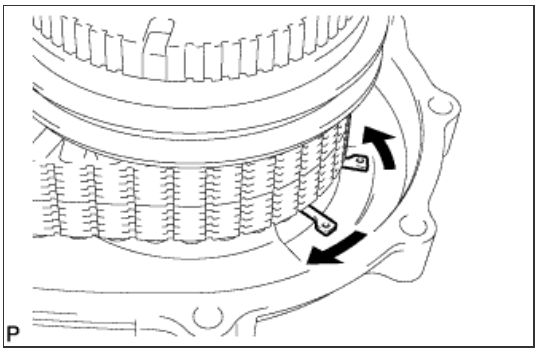
Do not drop the output shaft washers.



c. Using a snap ring expander, install the snap ring to the output shaft.

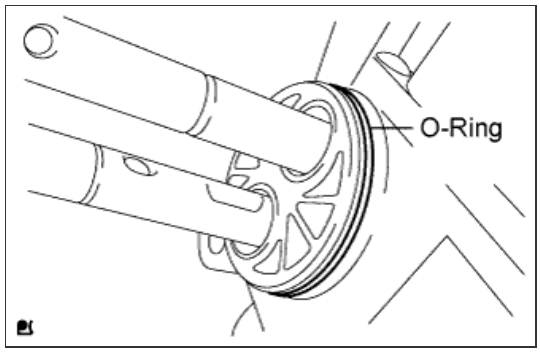
NOTICE:

Make sure that the snap ring is firmly installed to the groove.

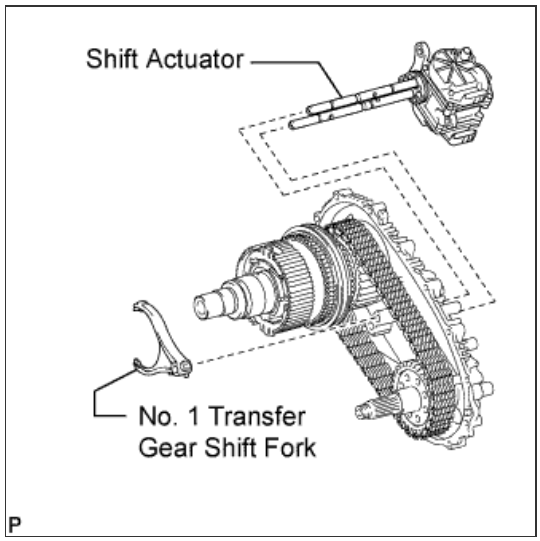


21. INSTALL TRANSFER SHIFT ACTUATOR ASSEMBLY

a. Install a new O-ring to the shift actuator.

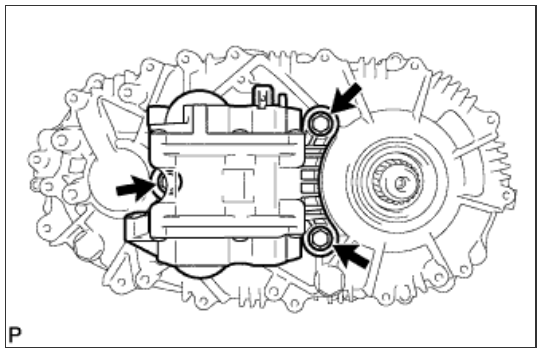


b. Set the No. 1 gear shift fork to the front drive clutch sleeve.



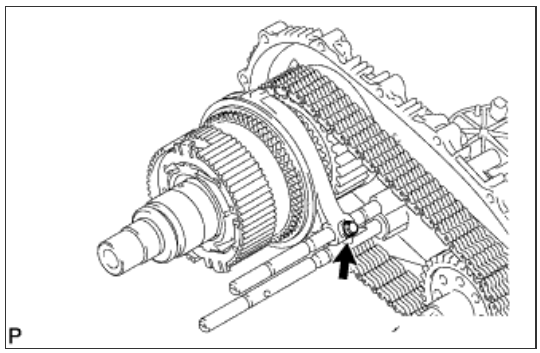
c. Install the shift actuator to the rear transfer case with the 3 bolts.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }



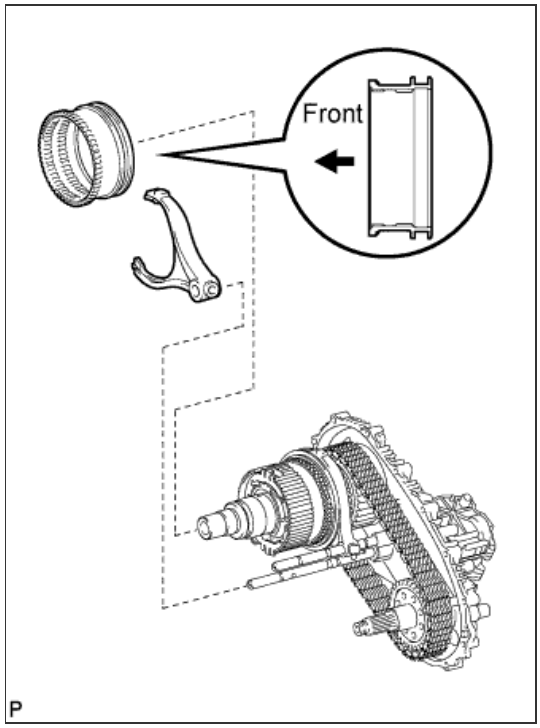
d. Install the No. 1 gear shift fork to the shift actuator with the bolt.

Torque:
24 N*m{ 245 kgf*cm , 18 ft.*lbf }



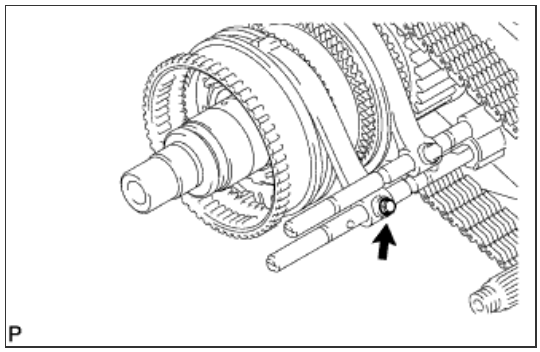
22. INSTALL NO. 2 TRANSFER GEAR SHIFT FORK

a. Set the No. 2 gear shift fork together with the high and low clutch sleeve to the shift actuator.

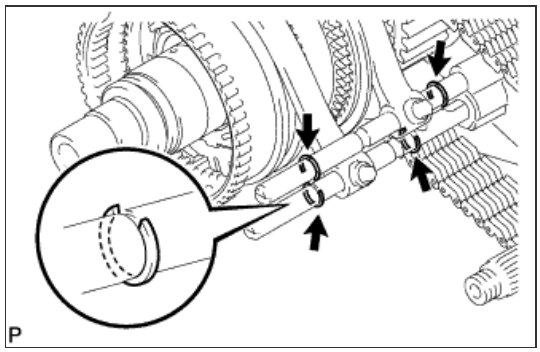


b. Install the No. 2 gear shift fork to the shift actuator with the bolt.

Torque:
24 N*m{ 245 kgf*cm , 18 ft.*lbf }

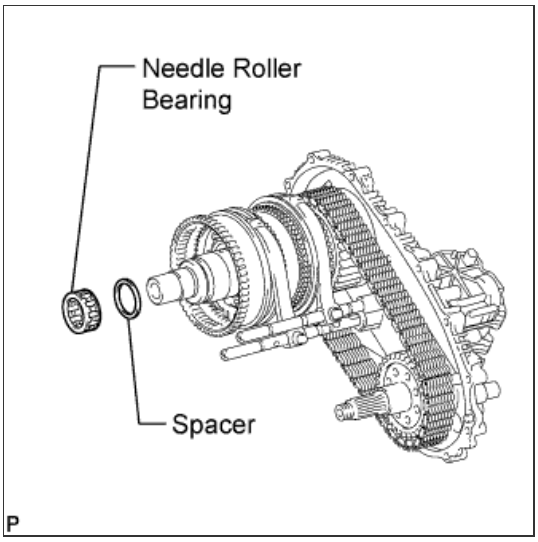


c. Using a screwdriver and hammer, tap the 4 shift fork shaft snap rings to the shift fork shaft.



23. INSTALL FRONT TRANSFER OUTPUT SHAFT NEEDLE ROLLER BEARING

a. Install the needle roller bearing and spacer to the output shaft.



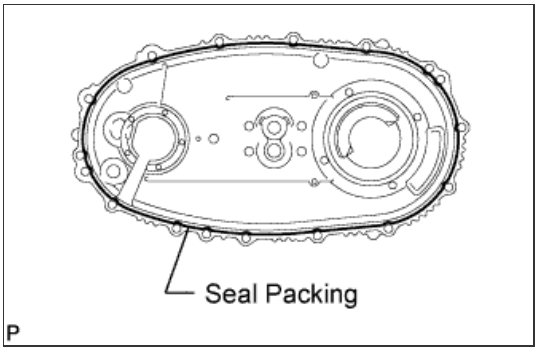
24. INSTALL REAR TRANSFER CASE ASSEMBLY

a. Apply seal packing to the rear transfer case as shown in the illustration.

Seal Packing:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent

NOTICE:

If the removed rear transfer case will be reused: After removing the rear transfer case, be sure to perform the following before reinstalling it: 1) using a knife, cut off any old FIPG material on the rear transfer case contact surface, 2) clean off any remaining old FIPG material from the rear transfer case contact surface, and 3) reapply seal packing to the rear transfer case.

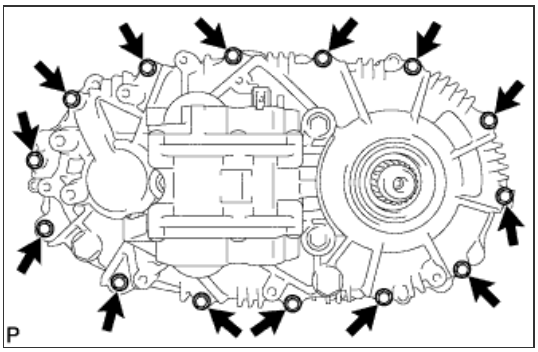


b. Install the rear transfer case with the 14 bolts.

Torque:
28 N*m{ 286 kgf*cm , 21 ft.*lbf }

NOTICE:

Tighten the bolts within 10 minutes of applying the seal packing. The seal packing will dry very quickly.



25. INSTALL TRANSFER CASE PLUG

a. Apply adhesive to the threads of the plug.

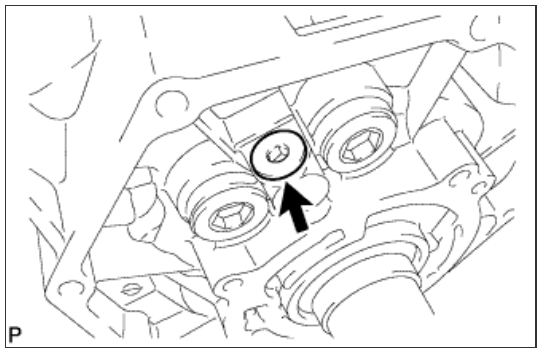
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

b. Using a 6 mm hexagon wrench, install the plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }



26. INSTALL NO. 1 TRANSFER CASE PLUG

a. Install the pin and compression spring to the front transfer case.

b. Apply adhesive to the threads of the plug.

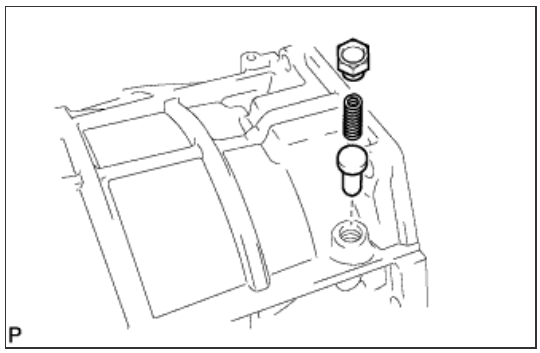
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

c. Install the plug.

Torque:
19 N*m{ 190 kgf*cm , 14 ft.*lbf }

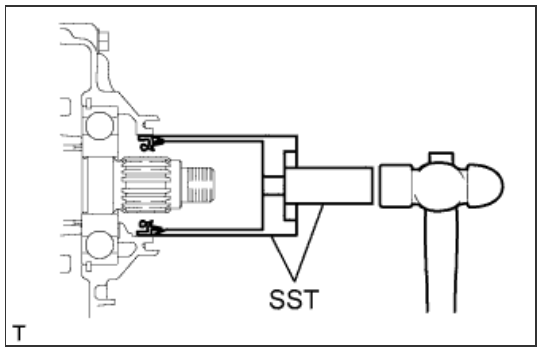


27. INSTALL TRANSFER CASE REAR OIL SEAL

a. Apply transfer oil to the spline of the output shaft.

b. Using SST and a hammer, tap in a new oil seal until its surface is flush with the housing upper surface.

SST
09649-17010
09950-70010 (09951-07150)



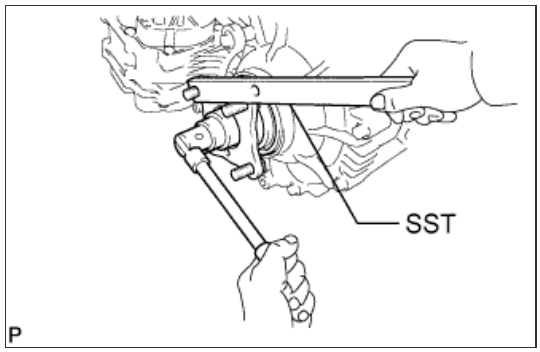
28. INSTALL REAR OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the output shaft.

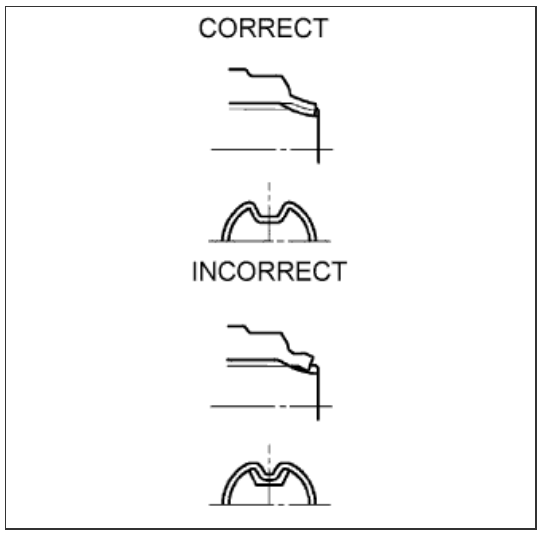
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.

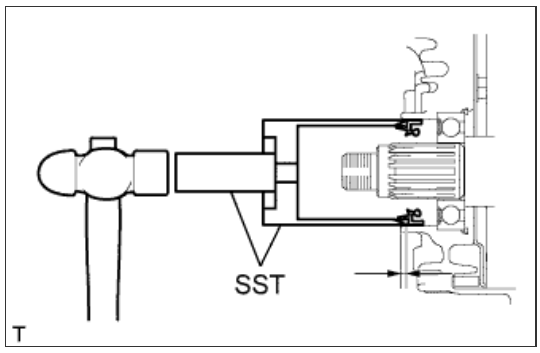


29. INSTALL TRANSFER CASE FRONT OIL SEAL

a. Apply transfer oil to the spline of the driven sprocket.

b. Using SST and a hammer, tap in a new oil seal until its surface is 1 to 1.5 mm (0.0394 to 0.0590 in.) from the case upper surface.

SST
09649-17010
09950-70010 (09951-07150)



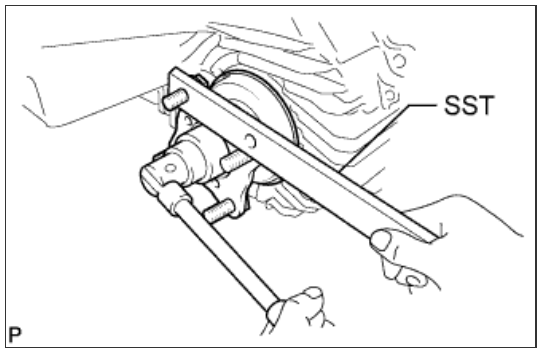
30. INSTALL FRONT OUTPUT SHAFT COMPANION FLANGE SUB-ASSEMBLY

a. Install the companion flange onto the drive sprocket.

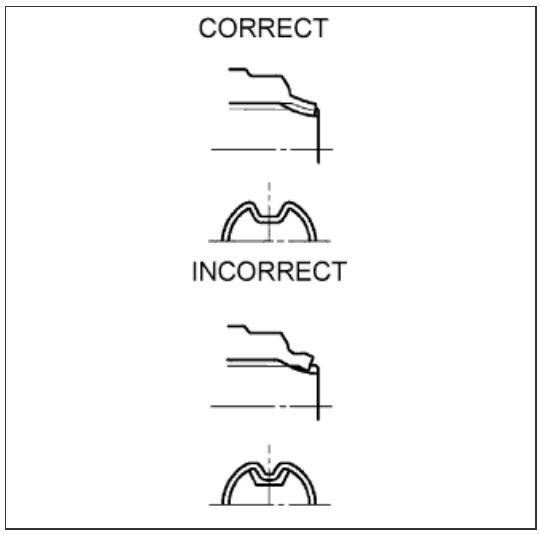
b. Using SST to hold the companion flange, install a new O-ring and companion flange lock nut.

SST
09330-00021

Torque:
127 N*m{ 1299 kgf*cm , 94 ft.*lbf }



c. Using a chisel and hammer, stake the companion flange lock nut.



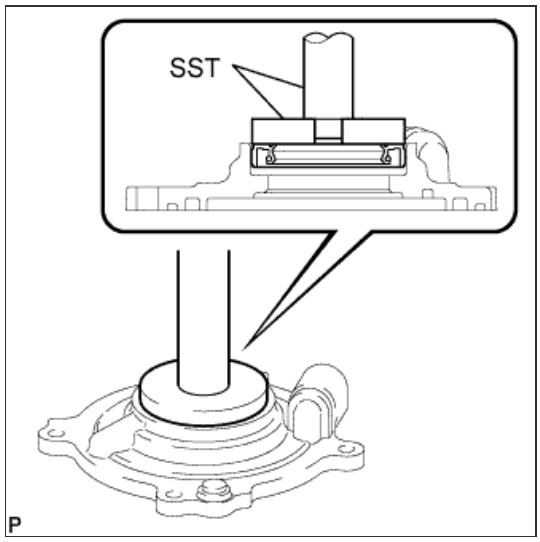
31. INSTALL TRANSFER OIL PUMP PLATE OIL SEAL

a. Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump plate upper surface.

SST
09950-60020 (09951-00680)
09950-70010 (09951-07100)

NOTICE:

Be careful not to damage the oil pump plate.



32. INSTALL TRANSFER CASE PLUG

a. Install the relief valve seat, ball and compression spring to the oil pump plate.

b. Apply adhesive to the threads of the plug.

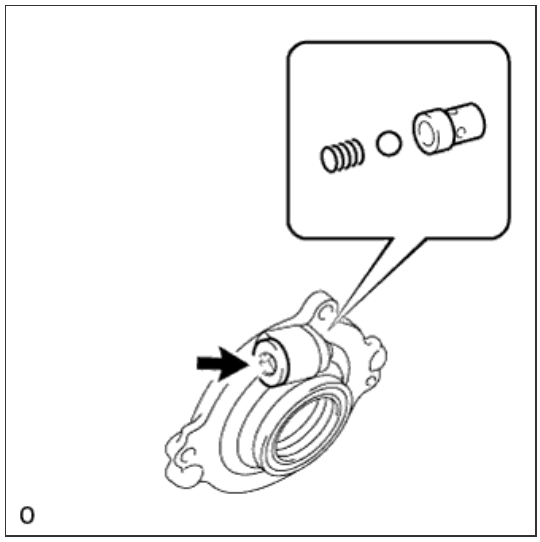
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

NOTICE:

Install the plug within 3 minutes of application.

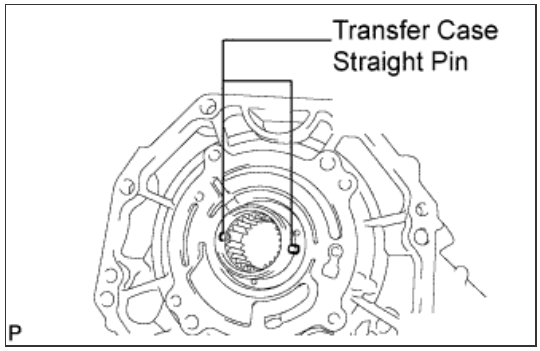
c. Using a 10 mm hexagon wrench, install the plug.

Torque:
29 N*m{ 300 kgf*cm , 22 ft.*lbf }



33. INSTALL TRANSFER CASE STRAIGHT PIN

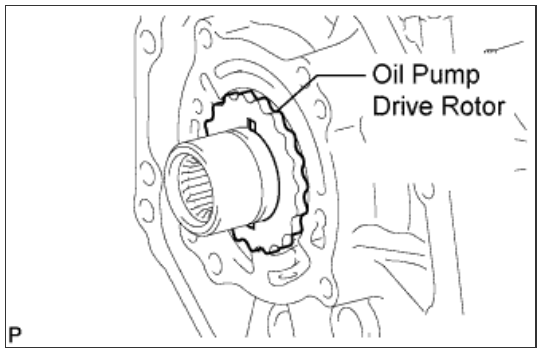
a. Install the 2 straight pins to the input shaft.



34. INSTALL TRANSFER OIL PUMP PLATE

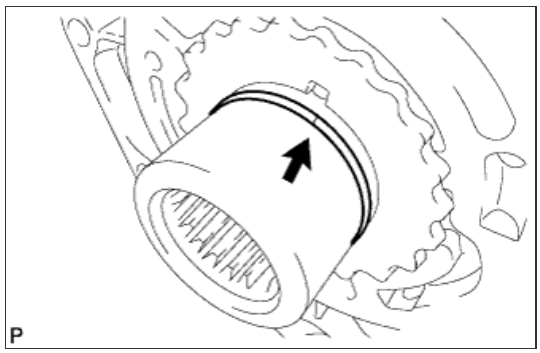
a. Apply transfer oil to a new O-ring, the drive rotor, driven rotor and a new transfer oil seal ring.

b. Install the drive rotor to the input shaft.



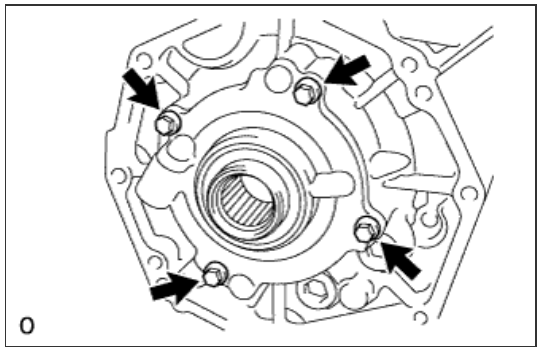
c. Install the transfer oil seal ring to the input shaft.

d. Install the O-ring to the oil pump plate.



e. Install the oil pump plate and driven rotor to the front transfer case with the 4 bolts.

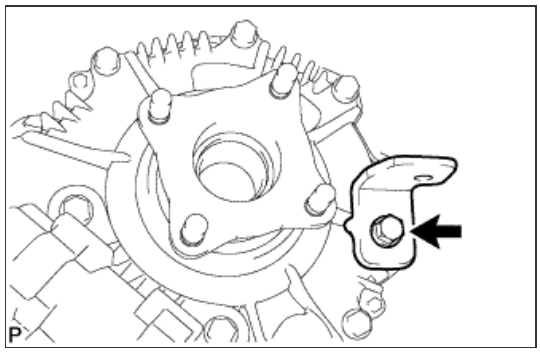
Torque:
12 N*m{ 117 kgf*cm , 9 ft.*lbf }



35. INSTALL PROPELLER SHAFT HEAT INSULATOR BRACKET SUB-ASSEMBLY

a. Install the bracket to the rear transfer case with the bolt.

Torque:
20 N*m{ 204 kgf*cm , 15 ft.*lbf }



for Preparation Click here

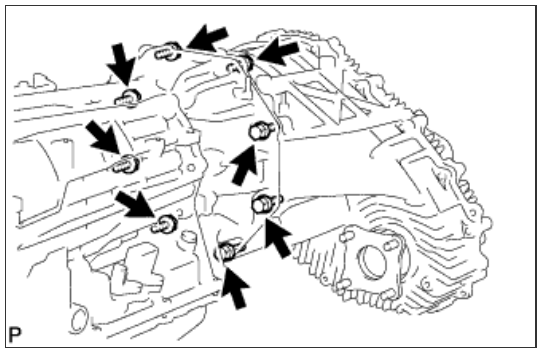
1. INSTALL TRANSFER ASSEMBLY

a. Install the transfer with the 8 bolts.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }

NOTICE:

Take care not to damage the adaptor oil seal with the transfer input shaft spline.



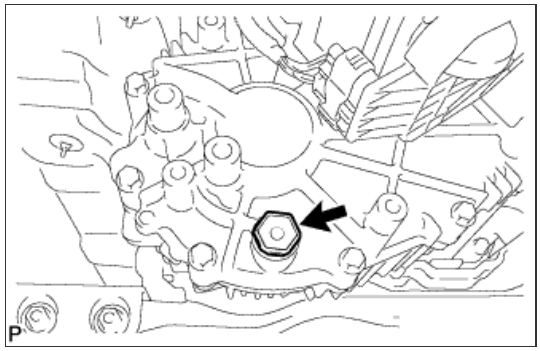
2. INSTALL AUTOMATIC TRANSMISSION WITH TRANSFER ASSEMBLY

a. Install the automatic transmission with transfer assembly (Click here).

3. ADD TRANSFER OIL

a. Install a new gasket to the drain plug and then install the plug.

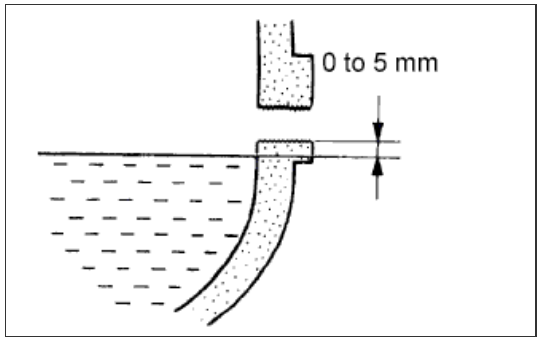
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



b. Add oil so that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.

NOTICE:

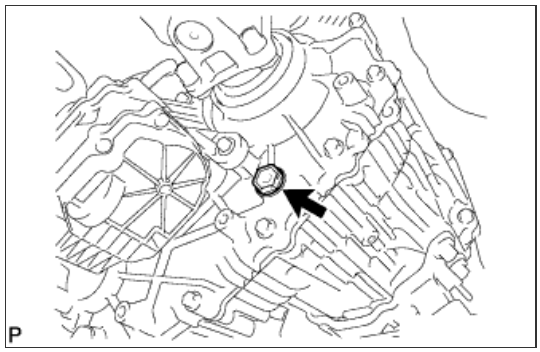
- **Add oil slowly.**
- **Add oil a little at a time, waiting several minutes between each addition of oil.**



c. Wait approximately 5 minutes and check that the oil level has not changed.

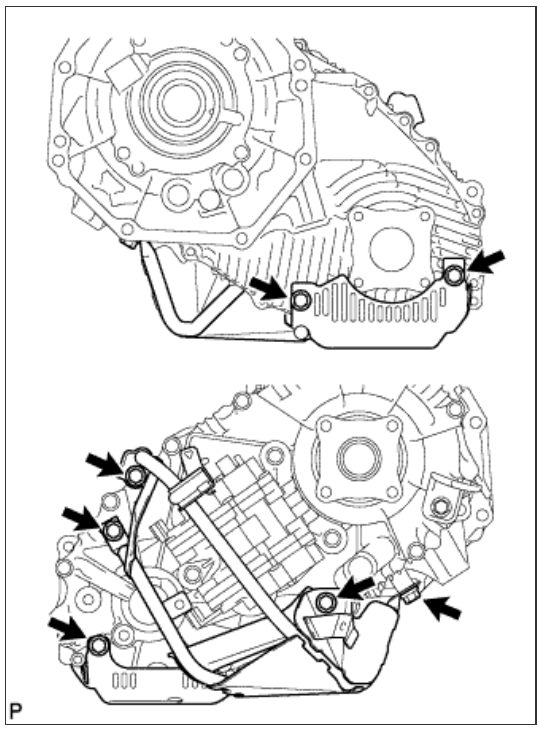
d. Install a new gasket to the filler plug and then install the plug.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



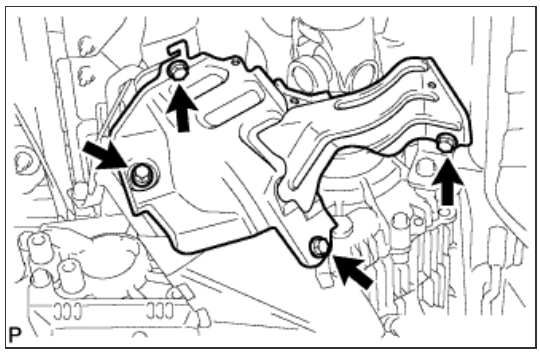
e. Install the lower transfer case protector with the 7 bolts.

Torque:
14 N*m{ 139 kgf*cm , 10 ft.*lbf }



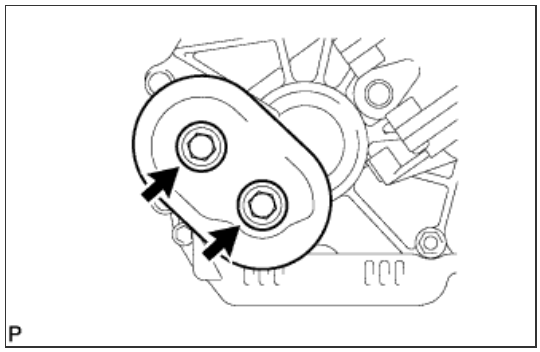
f. Install the transfer heat insulator with the 4 bolts.

Torque:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }



g. Install the transfer dynamic damper with the 2 bolts.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



4. CHECK FOR TRANSFER OIL LEAK

for Preparation Click here

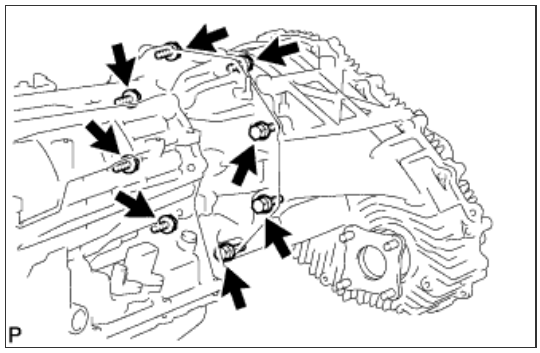
1. INSTALL TRANSFER ASSEMBLY

a. Install the transfer with the 8 bolts.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }

NOTICE:

Take care not to damage the adaptor oil seal with the transfer input shaft spline.



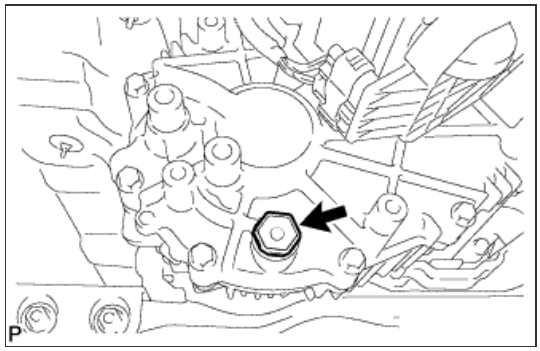
2. INSTALL AUTOMATIC TRANSMISSION WITH TRANSFER ASSEMBLY

(Click here)

3. ADD TRANSFER OIL

a. Install a new gasket to the drain plug and then install the plug.

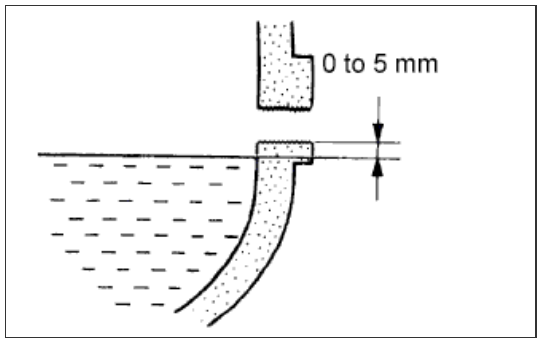
Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



b. Add oil so that the oil level is between 0 to 5.0 mm (0 to 0.197 in.) from the bottom lip of the filler plug hole.

NOTICE:

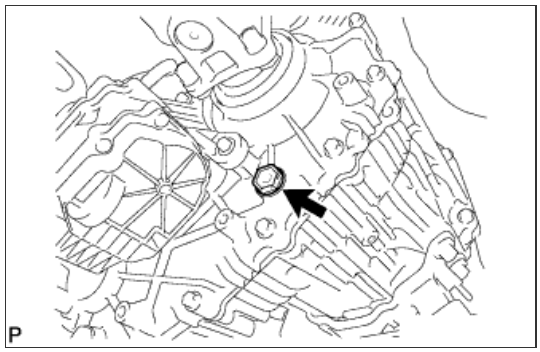
- **Add oil slowly.**
- **Add oil a little at a time, waiting several minutes between each addition of oil.**



c. Wait approximately 5 minutes and check that the oil level has not changed.

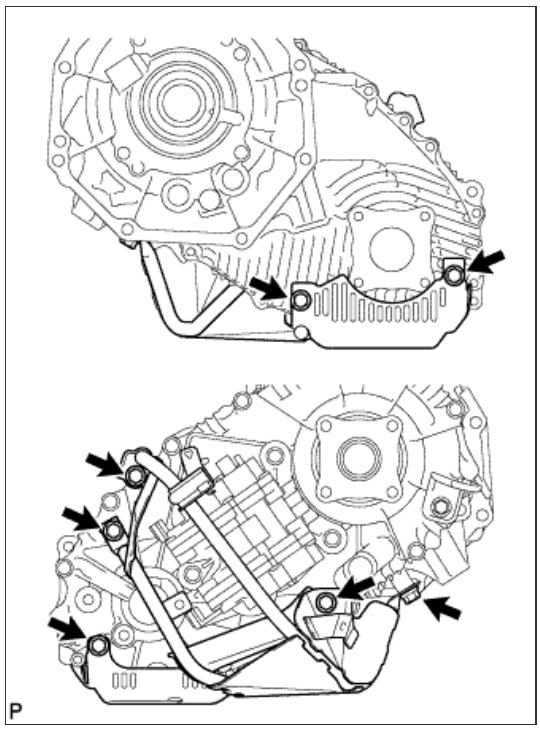
d. Install a new gasket to the filler plug and then install the plug.

Torque:
37 N*m{ 377 kgf*cm , 27 ft.*lbf }



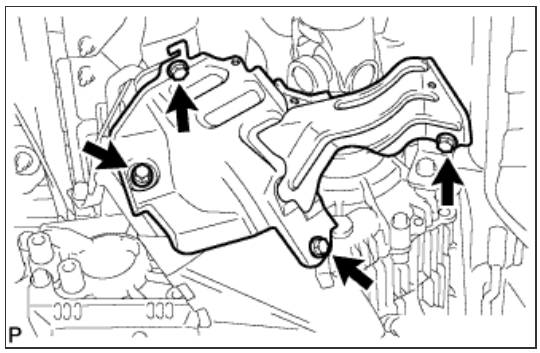
e. Install the lower transfer case protector with the 7 bolts.

Torque:
14 N*m{ 139 kgf*cm , 10 ft.*lbf }



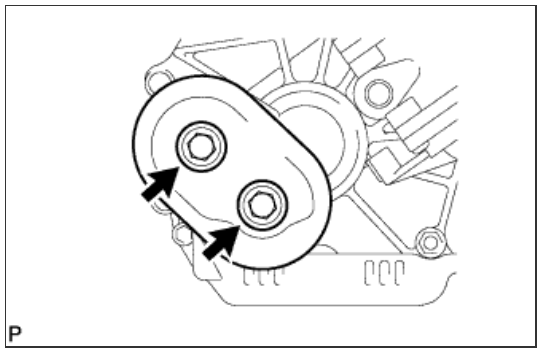
f. Install the transfer heat insulator with the 4 bolts.

Torque:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }



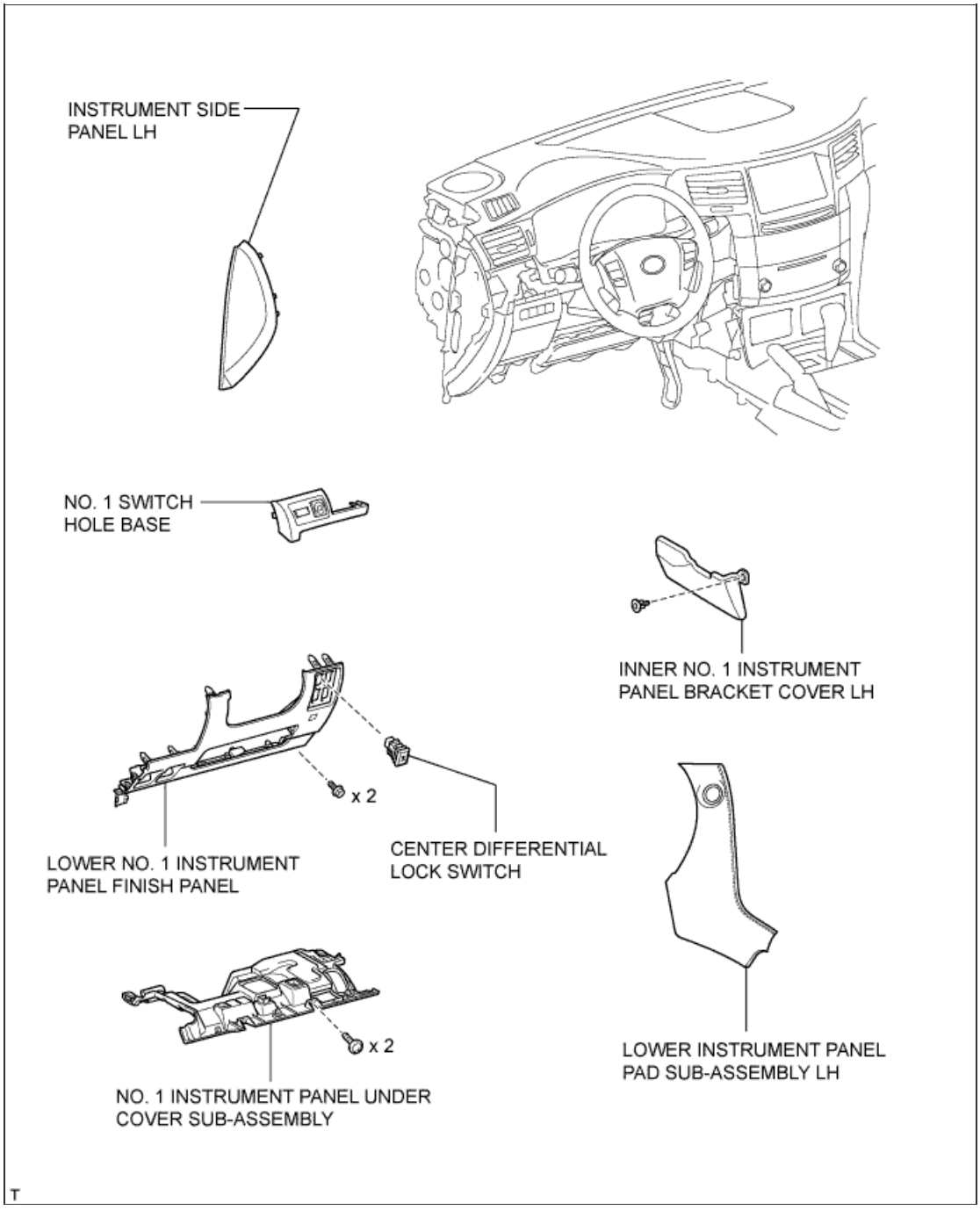
g. Install the transfer dynamic damper with the 2 bolts.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



4. CHECK FOR TRANSFER OIL LEAK

for Preparation Click here

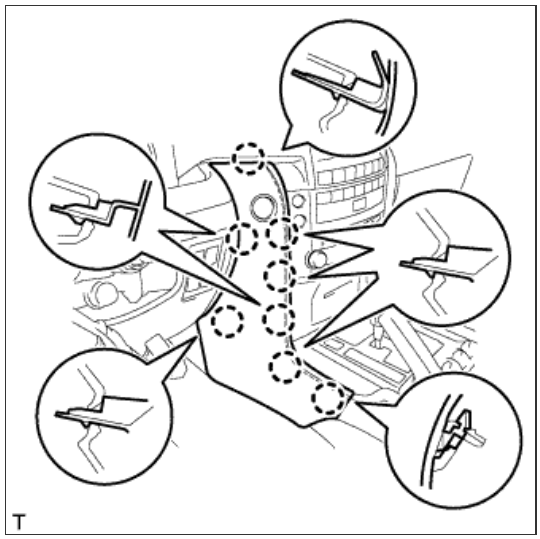


for Preparation Click here

1. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Detach the 8 claws.

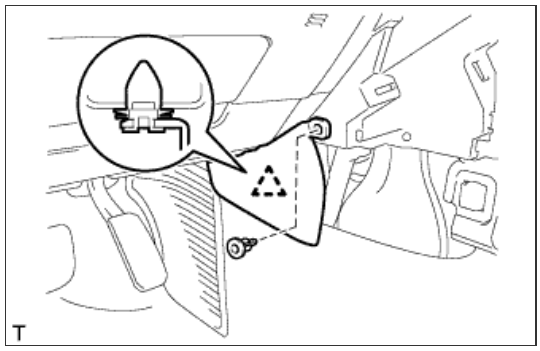
b. Disconnect the connector and remove the panel pad.



2. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER LH

a. Remove the clip.

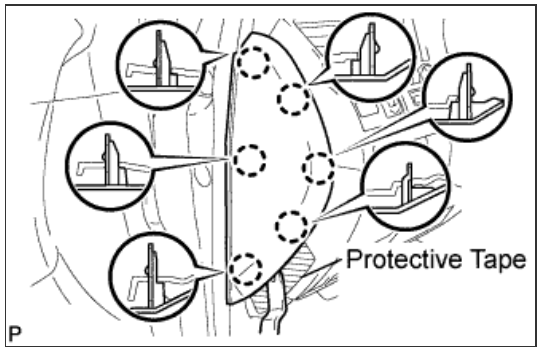
b. Detach the clip and remove the cover.



3. REMOVE INSTRUMENT SIDE PANEL LH

a. Place protective tape as shown in the illustration.

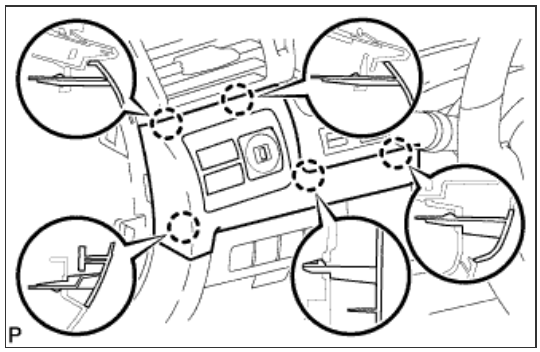
b. Using a moulding remover, detach the 6 claws and remove the side panel.



4. REMOVE NO. 1 SWITCH HOLE BASE

a. Detach the 5 claws.

b. Disconnect the connectors and remove the switch hole base.

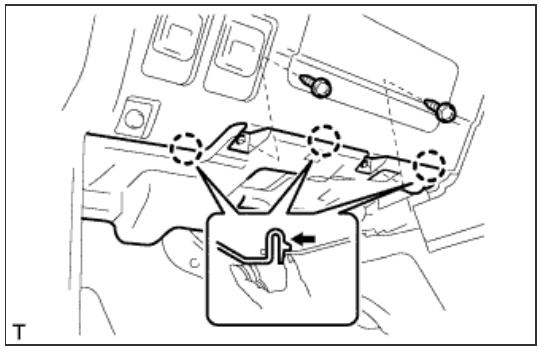


5. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

a. Remove the 2 screws.

b. Detach the 3 claws.

c. Remove the under cover and disconnect the connectors.

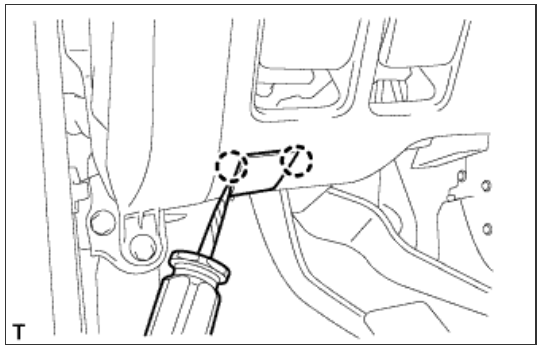


6. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

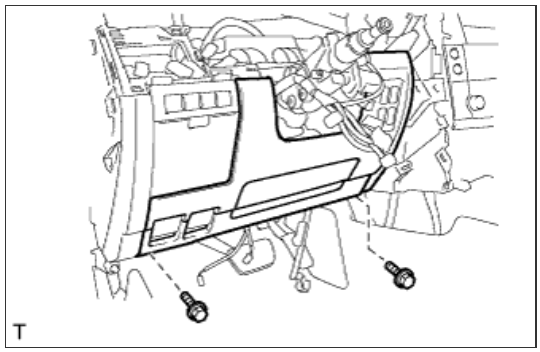
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

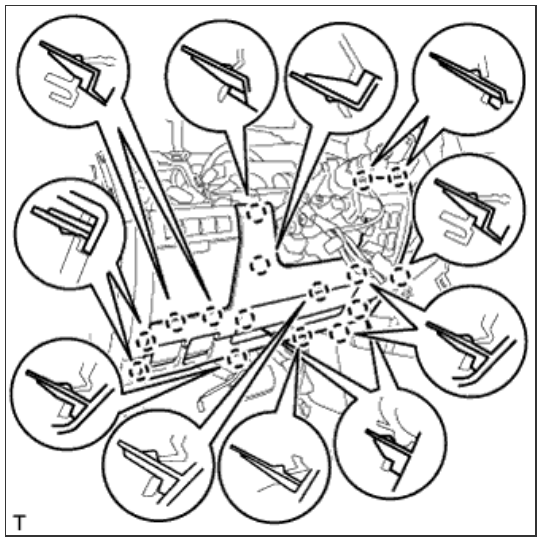
Tape the screwdriver tip before use.



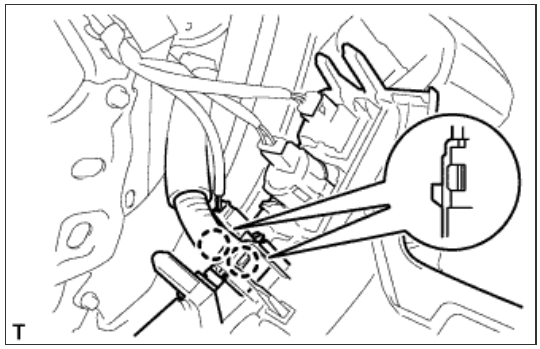
b. Remove the 2 bolts.



c. Detach the 16 claws.

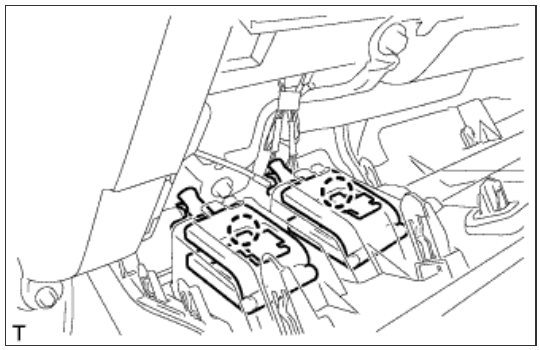


d. Detach the 2 claws and remove the sensor.



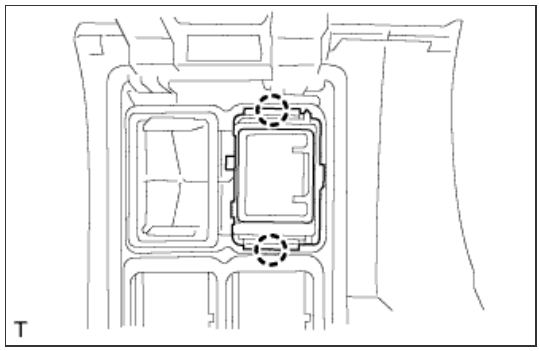
e. Detach the 2 claws and disconnect the 2 control cables.

f. Remove the finish panel and then disconnect the connectors.



7. REMOVE CENTER DIFFERENTIAL LOCK SWITCH

a. Detach the 2 claws and remove the switch.



for Preparation Click here

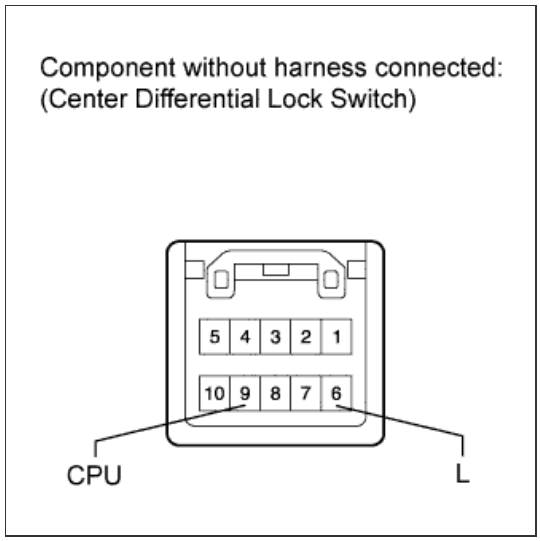
1. INSPECT CENTER DIFFERENTIAL LOCK SWITCH

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
6 (L) - 9 (CPU)	Switch pressed and held	Below 1 Ω
	Switch not pressed	100 kΩ or higher

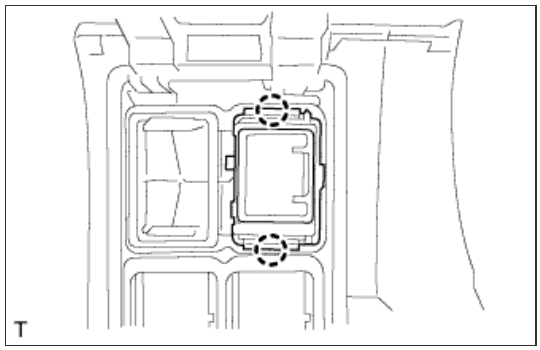
If the result is not as specified, replace the center differential lock switch.



for Preparation Click here

1. INSTALL CENTER DIFFERENTIAL LOCK SWITCH

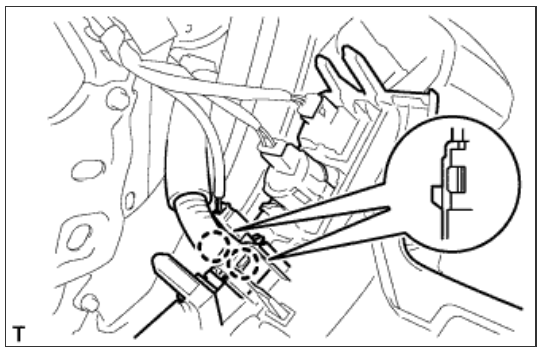
a. Attach the 2 claws to install the switch.



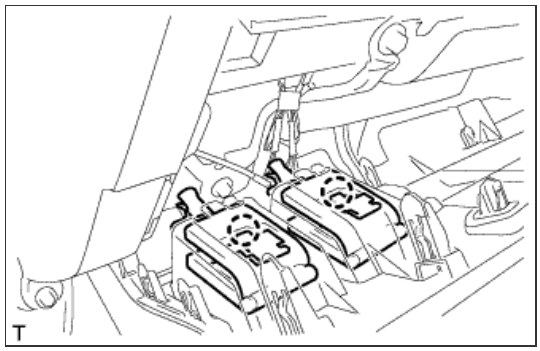
2. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

a. Connect the connectors.

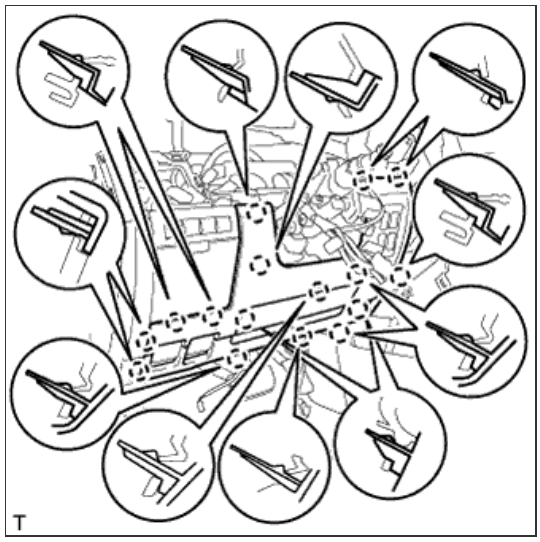
b. Attach the 2 claws to install the sensor.



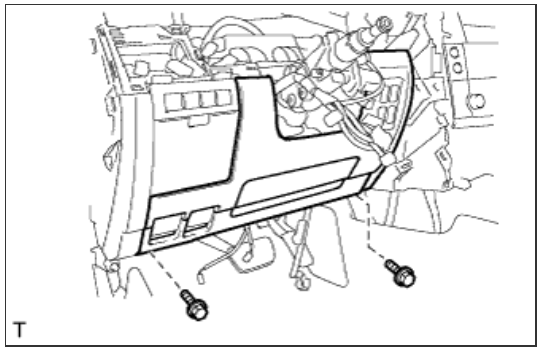
c. Attach the 2 claws to connect the 2 control cables.



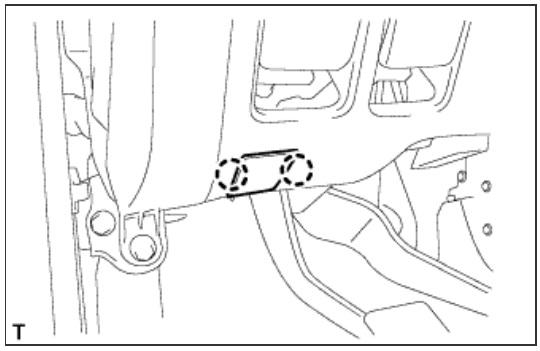
d. Attach the 16 claws to install the finish panel.



e. Install the 2 bolts.



f. Attach the 2 claws to close the hole cover.

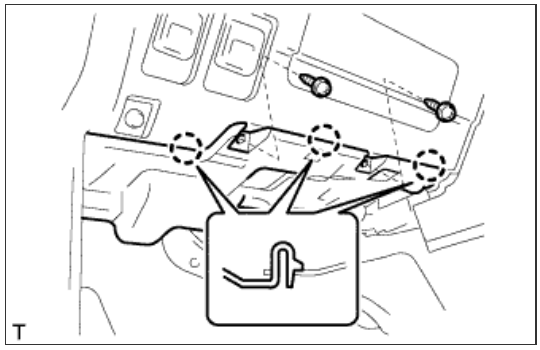


3. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

a. Connect the connectors.

b. Attach the 3 claws to install the under cover.

c. Install the 2 screws.

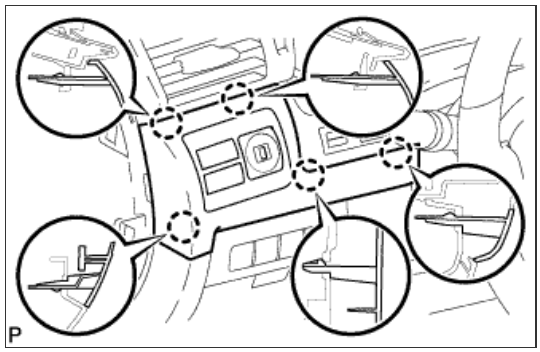


4. INSTALL NO. 1 SWITCH HOLE BASE

a. Connect the connectors.

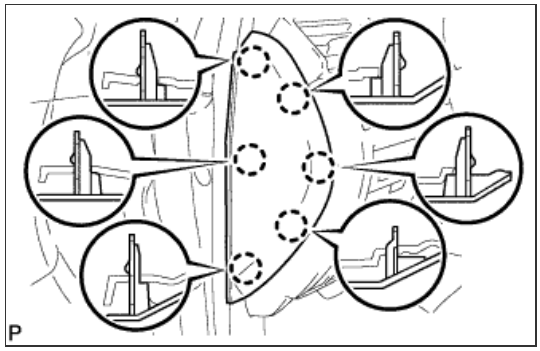
a. Connect the connectors.

b. Attach the 5 claws to install the switch hole base.



5. INSTALL INSTRUMENT SIDE PANEL LH

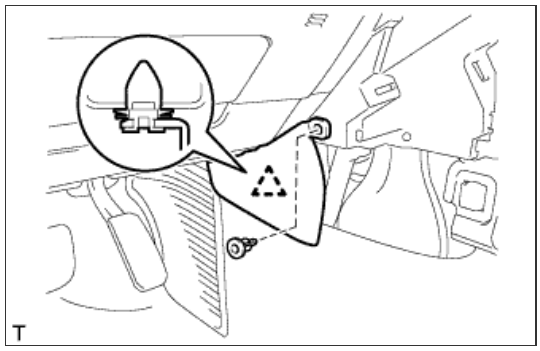
a. Attach the 6 claws to install the side panel.



6. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER LH

a. Attach the clip to install the cover.

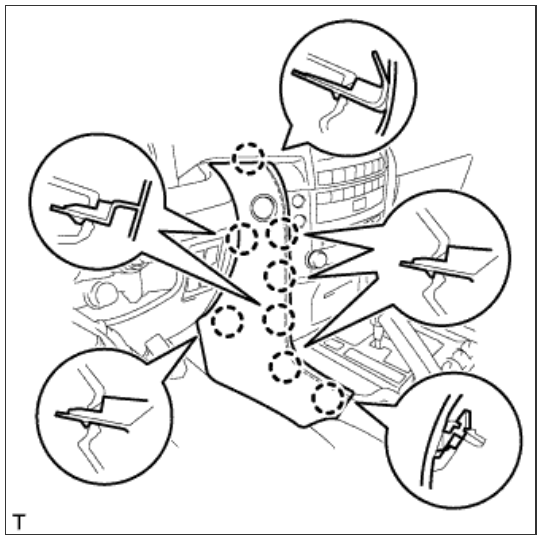
b. Install the clip.



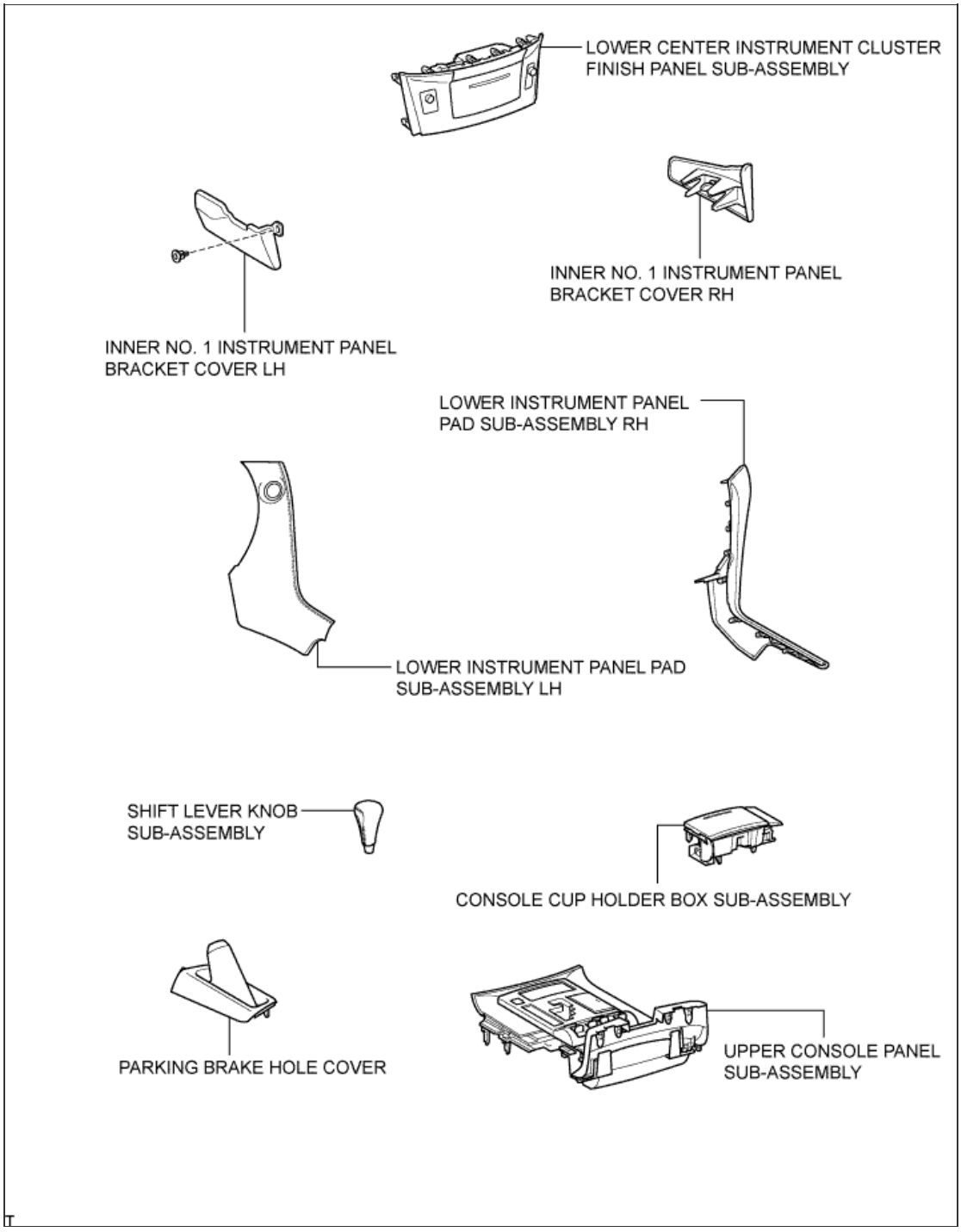
7. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

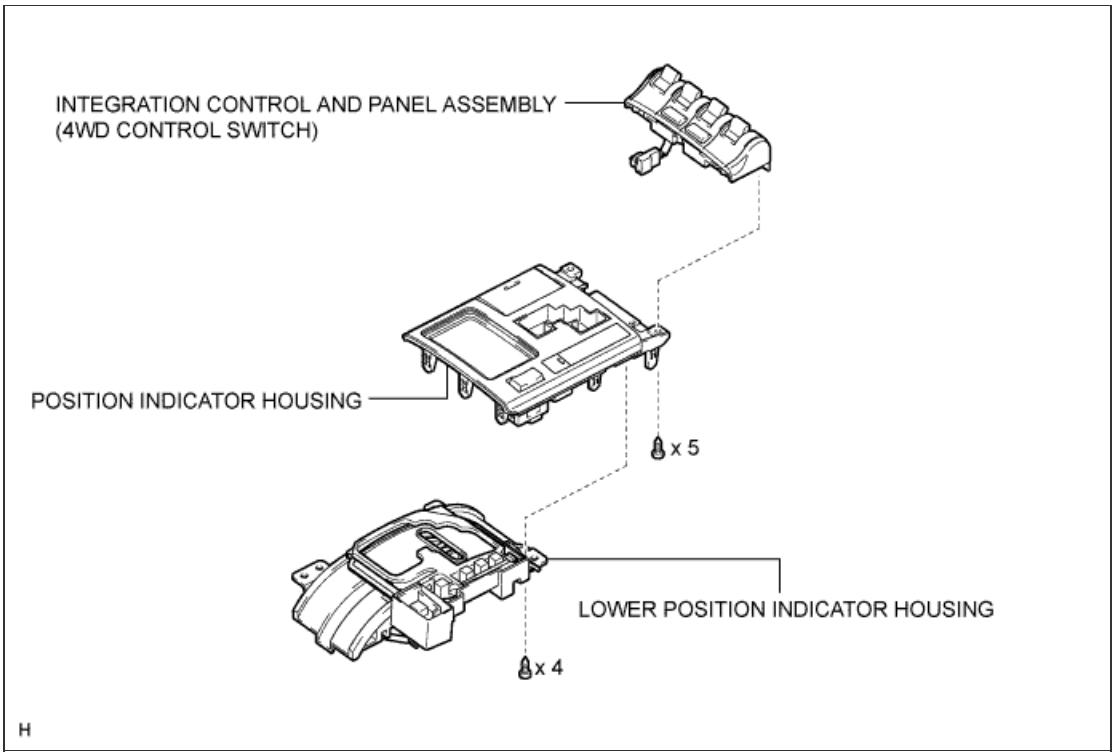
a. Connect the connector.

b. Attach the 8 claws to install the panel pad.


T

for Preparation Click here




INTEGRATION CONTROL AND PANEL ASSEMBLY
(4WD CONTROL SWITCH)
POSITION INDICATOR HOUSING
x 5
LOWER POSITION INDICATOR HOUSING
x 4
H

for Preparation Click here

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

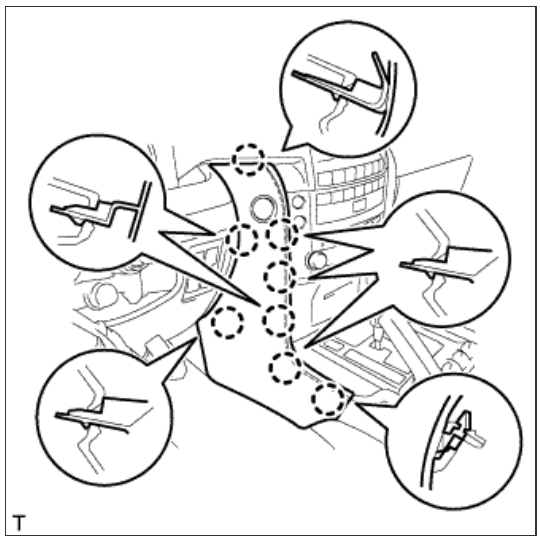
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

2. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Detach the 8 claws.

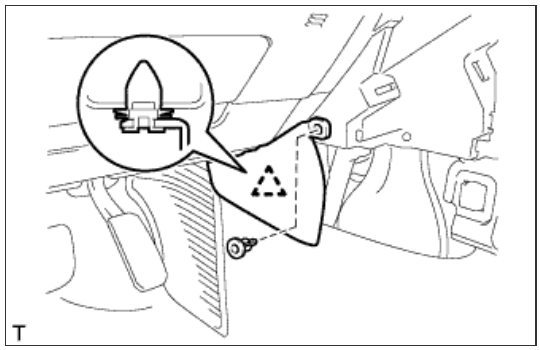
b. Disconnect the connector and remove the panel pad.



3. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER LH

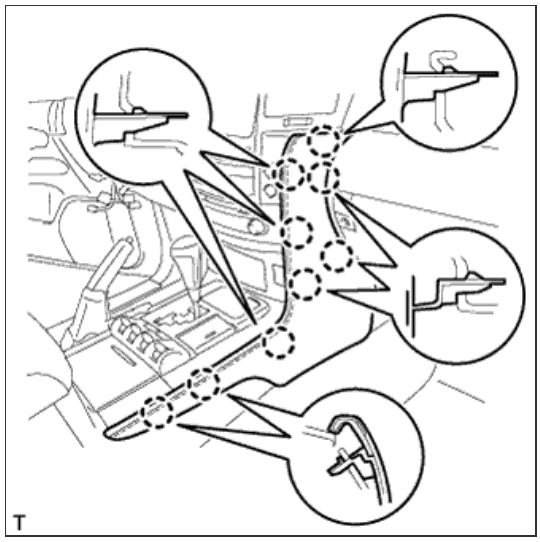
a. Remove the clip.

b. Detach the clip and remove the cover.



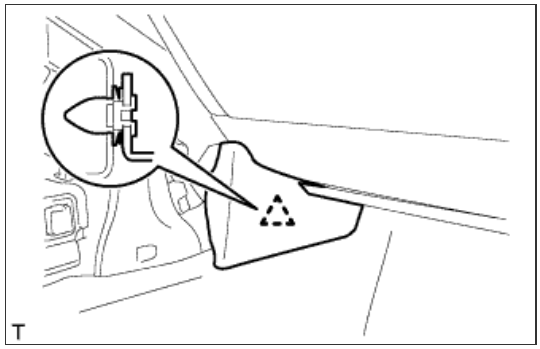
4. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH

a. Detach the 9 claws and remove the panel pad.



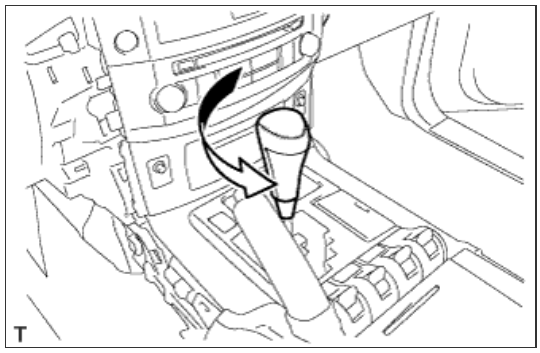
5. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH

a. Detach the clip and remove the cover.



6. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY

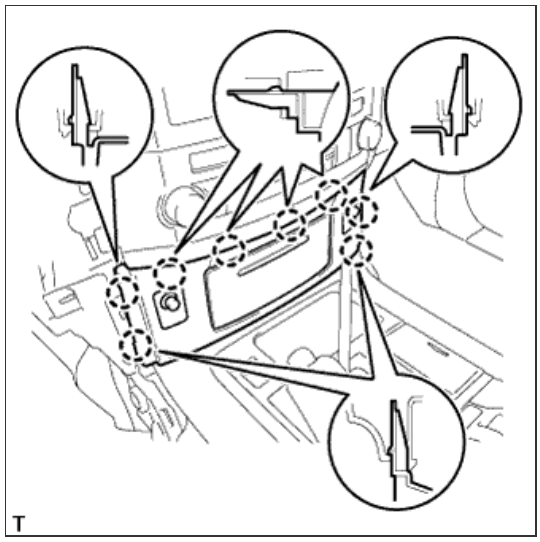
a. Twist the shift lever knob in the direction indicated by the arrow and remove it.



7. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

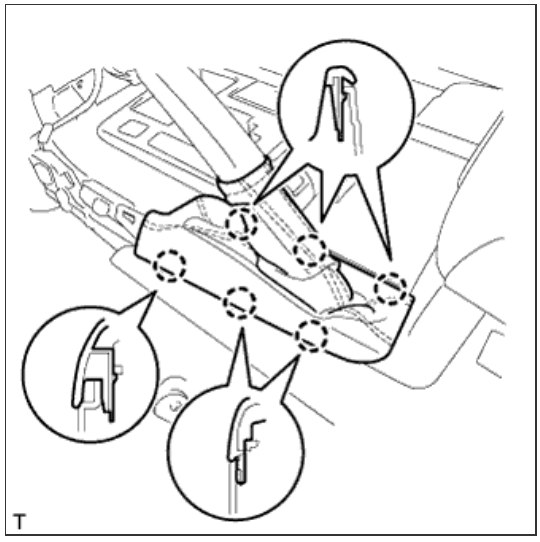
a. Detach the 8 claws.

b. Disconnect the connectors and remove the panel.



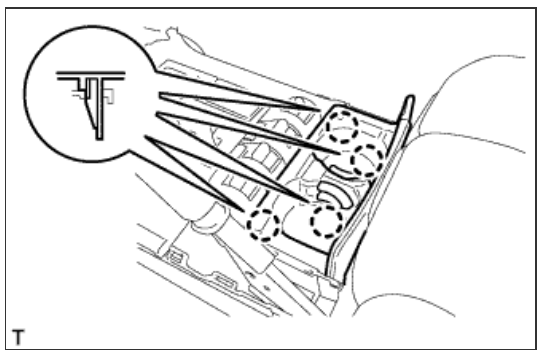
8. REMOVE PARKING BRAKE HOLE COVER

a. Detach the 6 claws and remove the cover.



9. REMOVE CONSOLE CUP HOLDER BOX SUB-ASSEMBLY

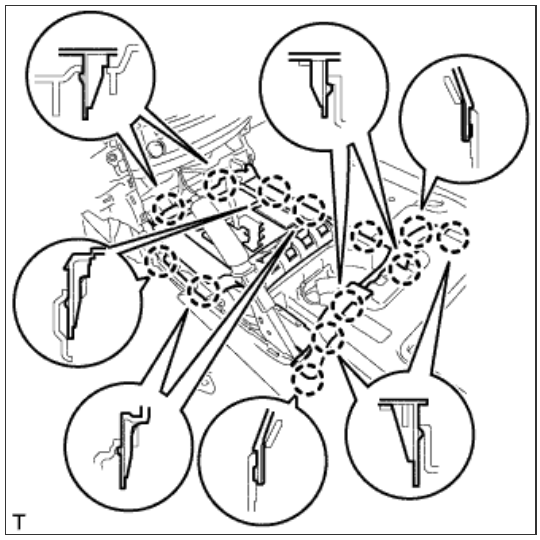
a. Detach the 4 claws and remove the box.



10. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY

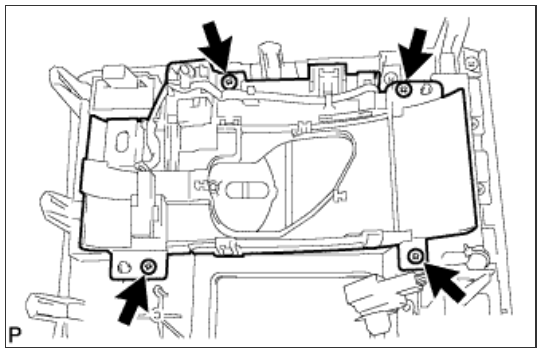
a. Detach the 13 claws.

b. Disconnect the connectors and remove the console panel.



11. REMOVE LOWER POSITION INDICATOR HOUSING

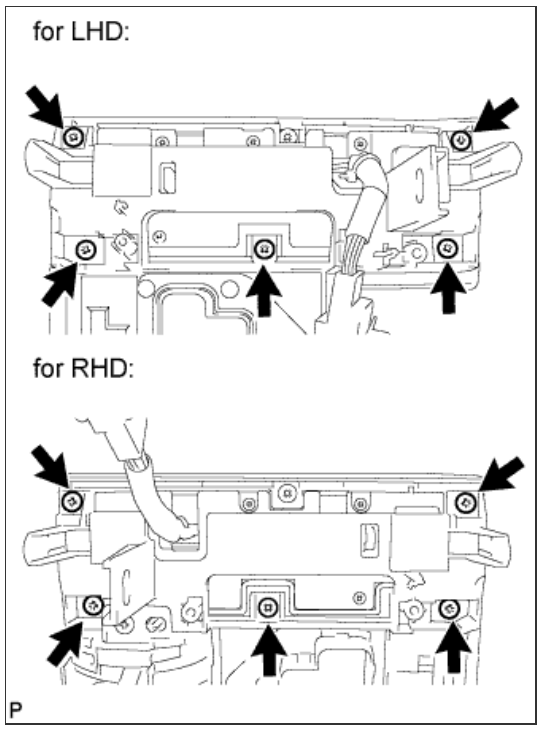
a. Remove the 4 screws and lower position indicator housing from the position indicator housing.



12. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY (4WD CONTROL SWITCH)

a. Disconnect the connector.

b. Remove the 5 screws and control panel from the upper console panel.



for Preparation Click here

1. PRECAUTION

NOTICE:

After turning the engine switch off, waiting time may be required before disconnecting the cable from the negative (-) battery terminal. Therefore, make sure to read the disconnecting the cable from the negative (-) battery terminal notice before proceeding with work (Click here).

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

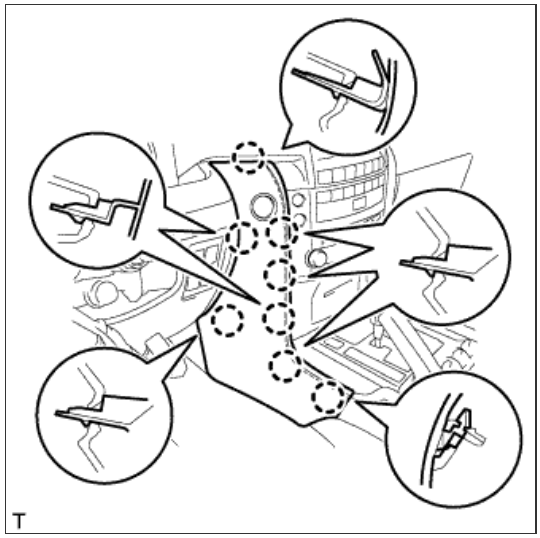
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

3. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Detach the 8 claws.

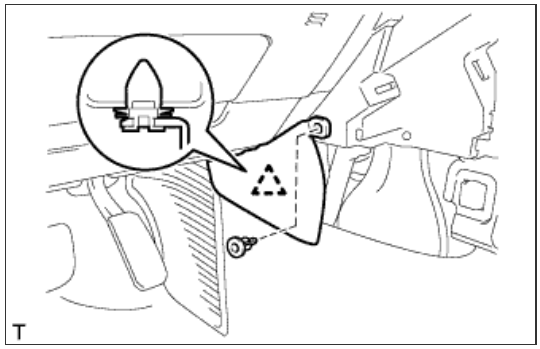
b. Disconnect the connector and remove the panel pad.



4. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER LH

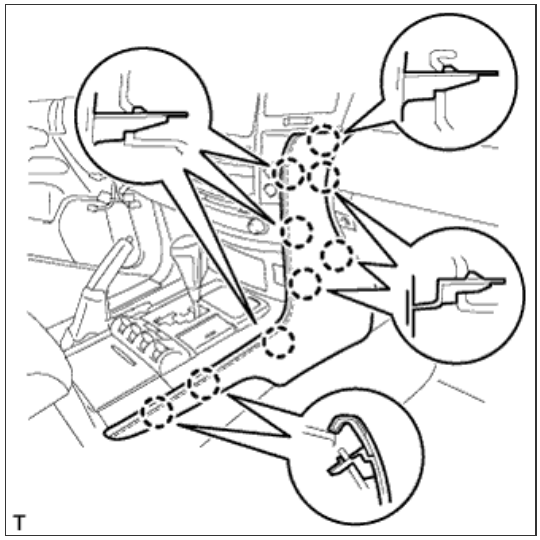
a. Remove the clip.

b. Detach the clip and remove the cover.



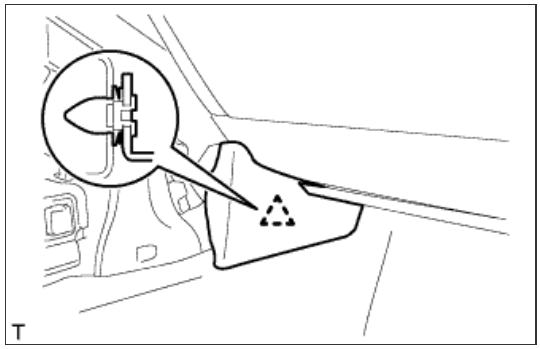
5. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH

a. Detach the 9 claws and remove the panel pad.



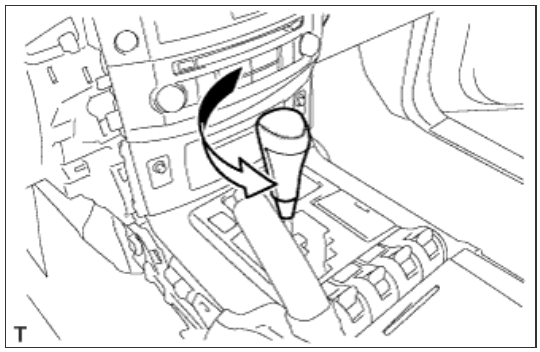
6. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH

a. Detach the clip and remove the cover.



7. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY

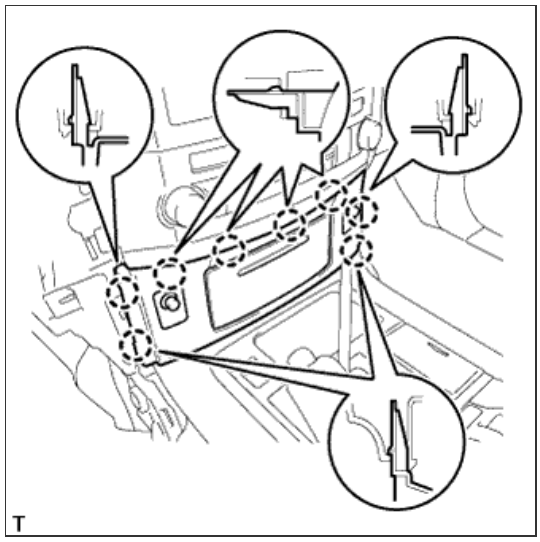
a. Twist the shift lever knob in the direction indicated by the arrow and remove it.



8. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

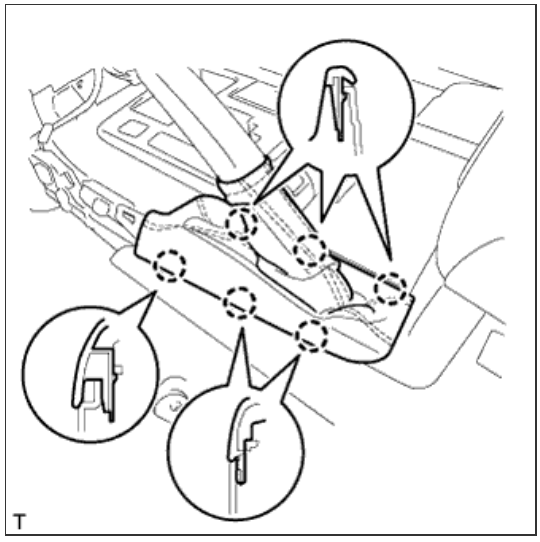
a. Detach the 8 claws.

b. Disconnect the connectors and remove the panel.



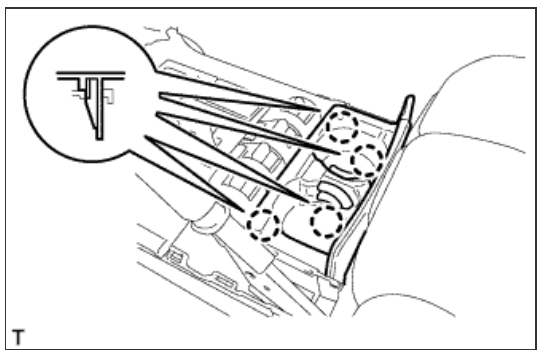
9. REMOVE PARKING BRAKE HOLE COVER

a. Detach the 6 claws and remove the cover.



10. REMOVE CONSOLE CUP HOLDER BOX SUB-ASSEMBLY

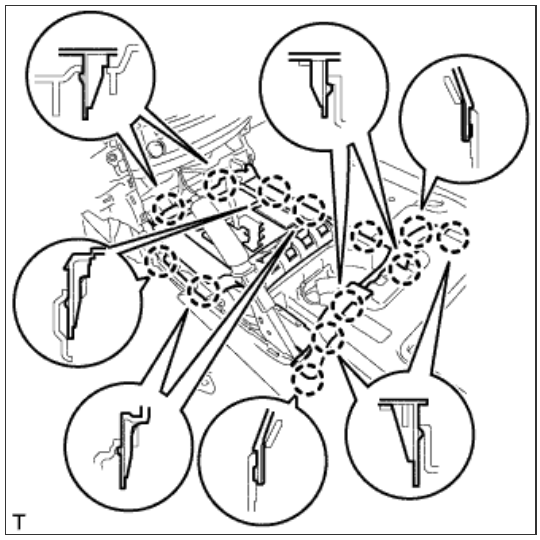
a. Detach the 4 claws and remove the box.



11. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY

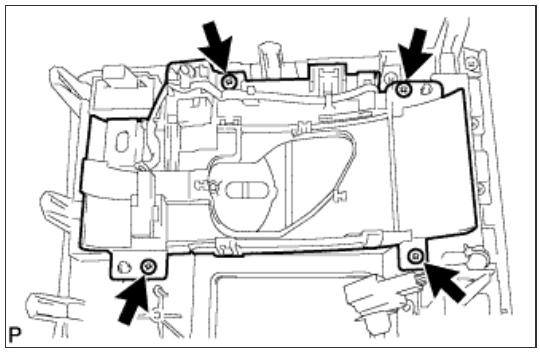
a. Detach the 13 claws.

b. Disconnect the connectors and remove the console panel.



12. REMOVE LOWER POSITION INDICATOR HOUSING

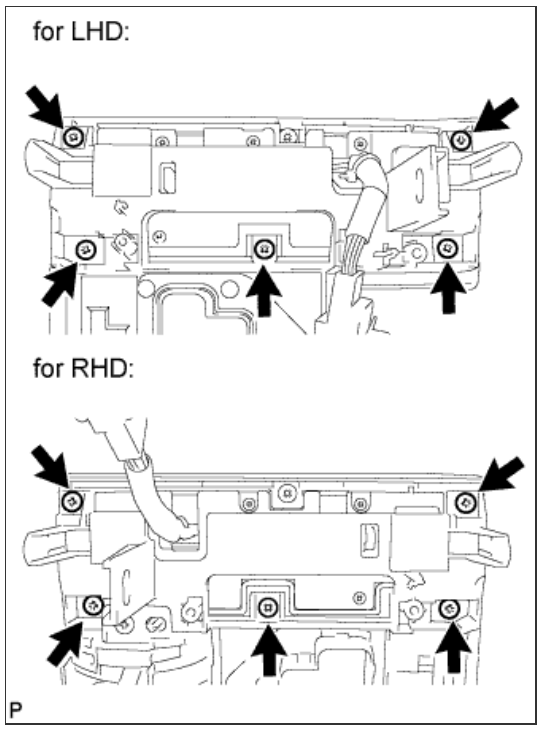
a. Remove the 4 screws and lower position indicator housing from the position indicator housing.



13. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY (4WD CONTROL SWITCH)

a. Disconnect the connector.

b. Remove the 5 screws and control panel from the upper console panel.



for Preparation Click here

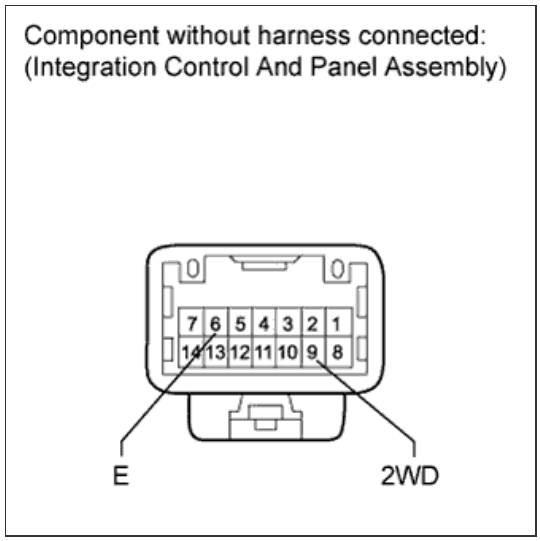
1. INSPECT INTEGRATION CONTROL AND PANEL ASSEMBLY (4WD CONTROL SWITCH)

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
9 (2WD) - 6 (E)	H4 position	100 kΩ or higher
	L4 position	Below 1 Ω

If the result is not as specified, replace the integration control and panel assembly.



for Preparation Click here

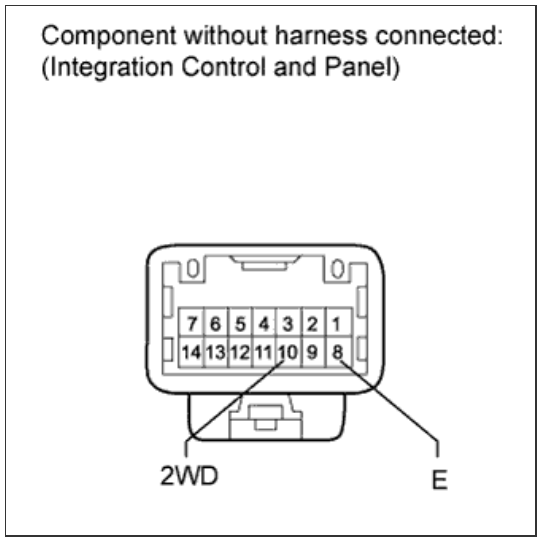
1. INSPECT INTEGRATION CONTROL AND PANEL ASSEMBLY (4WD CONTROL SWITCH)

a. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
10 (2WD) - 8 (E)	H4 position	100 kΩ or higher
	L4 position	Below 1 Ω

If the result is not as specified, replace the integration control and panel assembly.

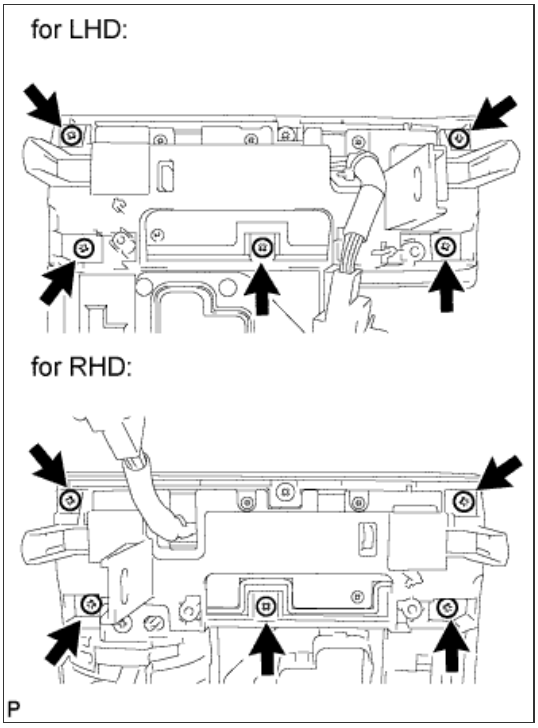


for Preparation Click here

1. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY (4WD CONTROL SWITCH)

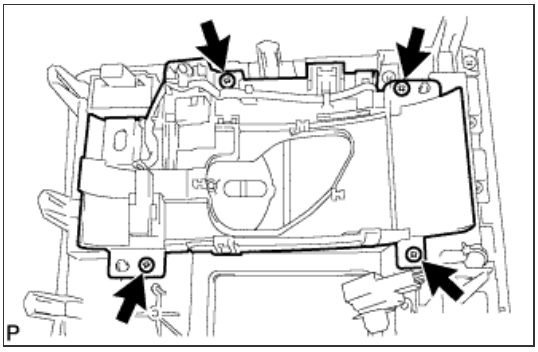
a. Install the control panel with the 5 screws.

b. Connect the connector.



2. INSTALL LOWER POSITION INDICATOR HOUSING

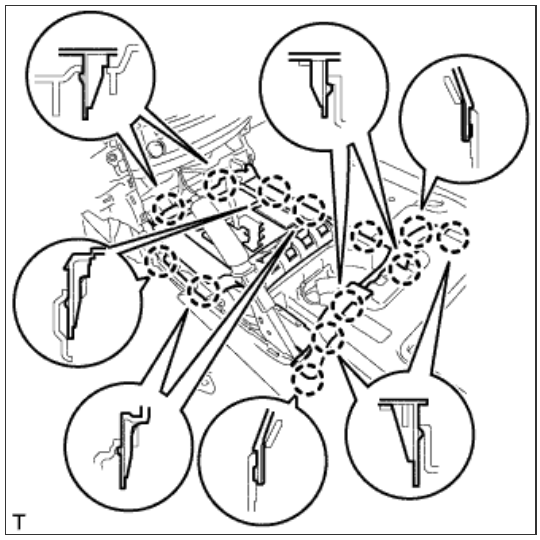
a. Install the lower position indicator housing to the position indicator housing with the 4 screws.



3. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY

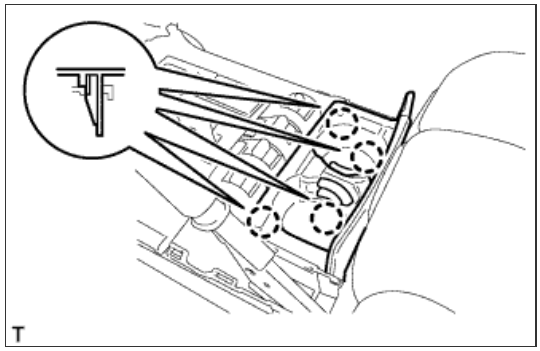
a. Connect the connectors.

b. Attach the 13 claws to install the console panel.



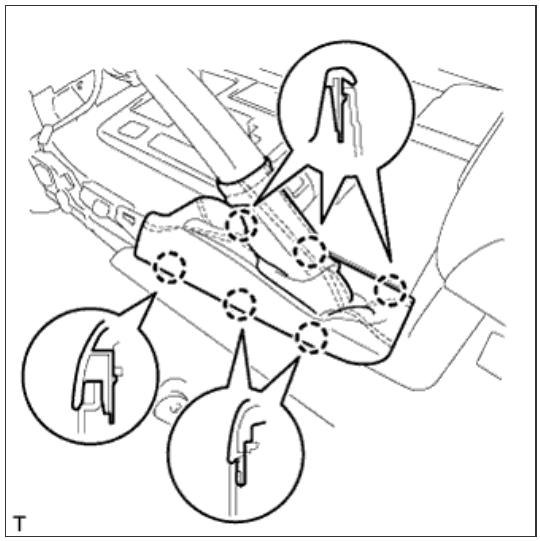
4. INSTALL CONSOLE CUP HOLDER BOX SUB-ASSEMBLY

a. Attach the 4 claws to install the box.



5. INSTALL PARKING BRAKE HOLE COVER

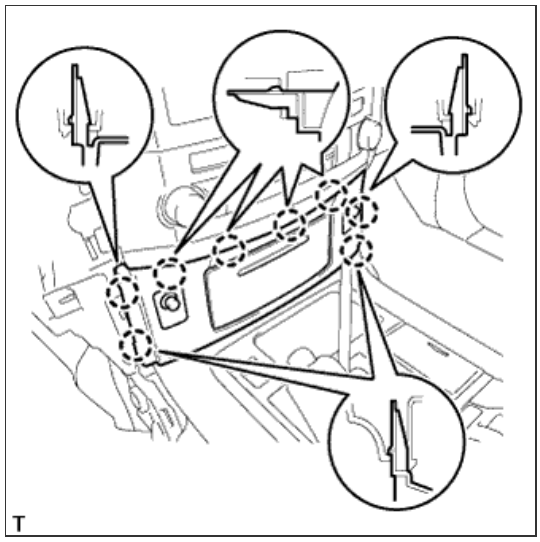
a. Attach the 6 claws to install the cover.



6. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

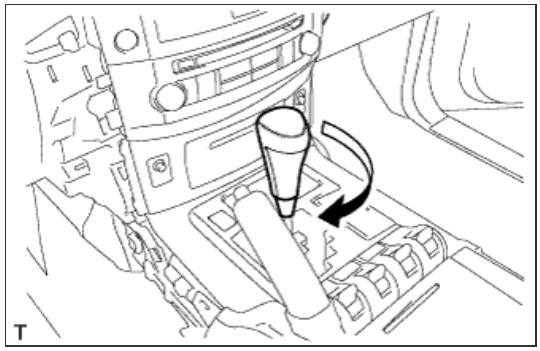
a. Connect the connectors.

b. Attach the 8 claws to install the panel.



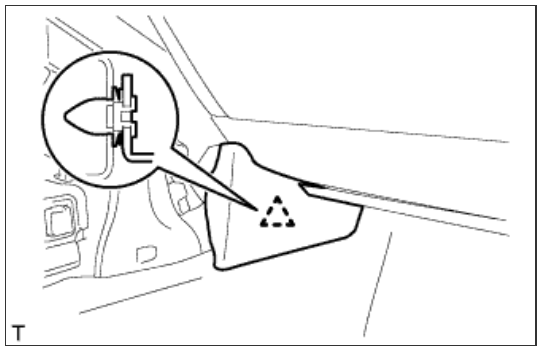
7. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY

a. Install the shift lever knob and twist it in the direction indicated by the arrow.



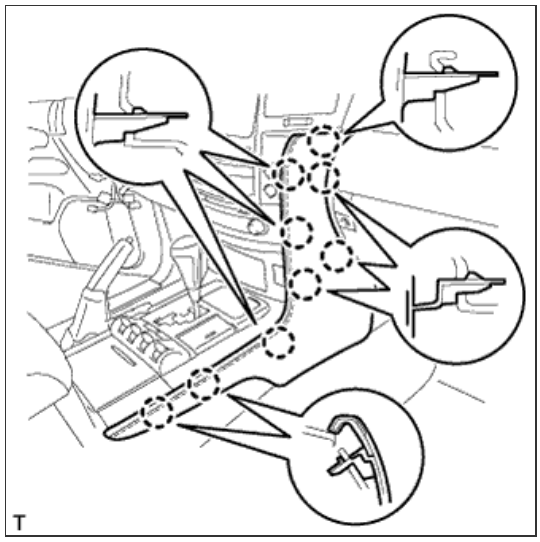
8. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH

a. Attach the clip to install the cover.



9. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH

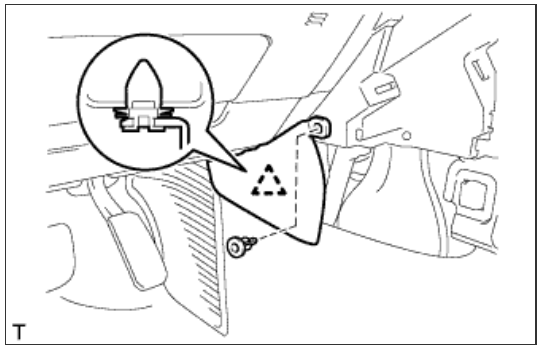
a. Attach the 9 claws to install the panel pad.



10. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER LH

a. Attach the clip to install the cover.

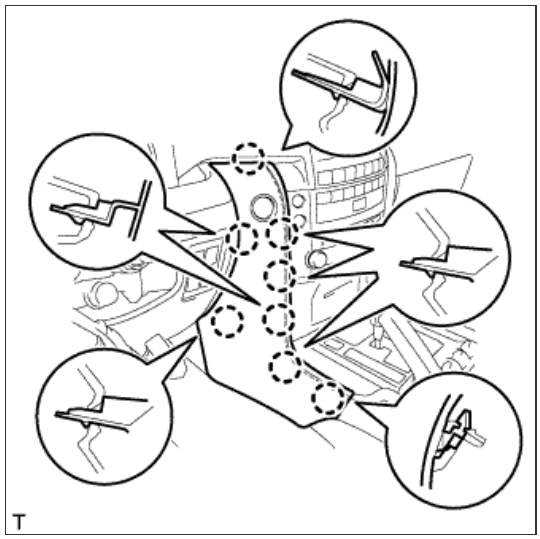
b. Install the clip.



11. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Connect the connector.

b. Attach the 8 claws to install the panel pad.



12. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

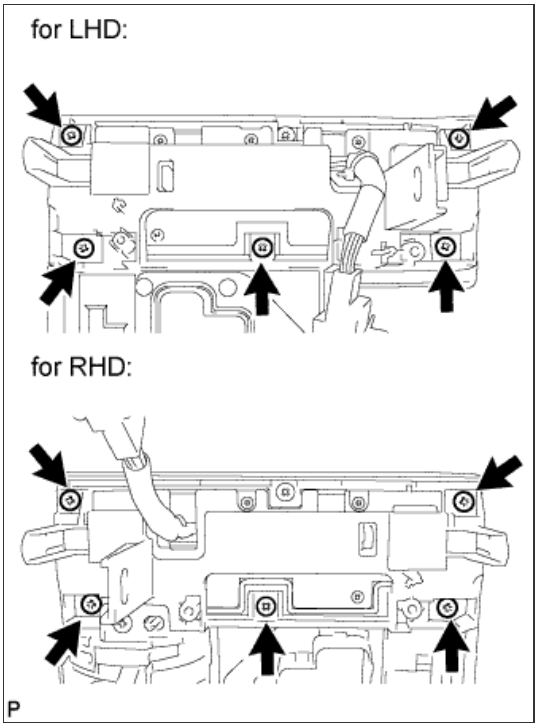
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here

1. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY (4WD CONTROL SWITCH)

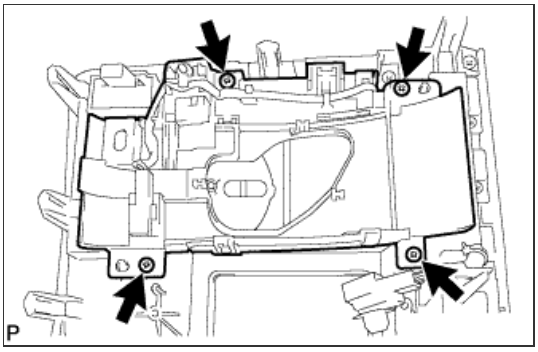
a. Install the control panel with the 5 screws.

b. Connect the connector.



2. INSTALL LOWER POSITION INDICATOR HOUSING

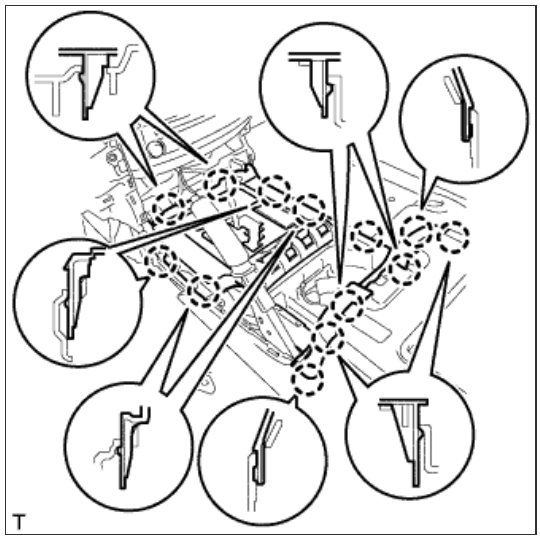
a. Install the lower position indicator housing to the position indicator housing with the 4 screws.



3. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY

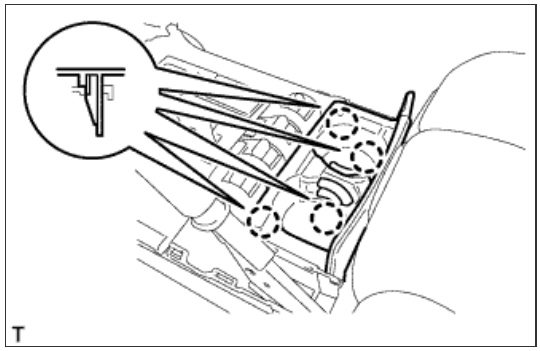
a. Connect the connectors.

b. Attach the 13 claws to install the console panel.



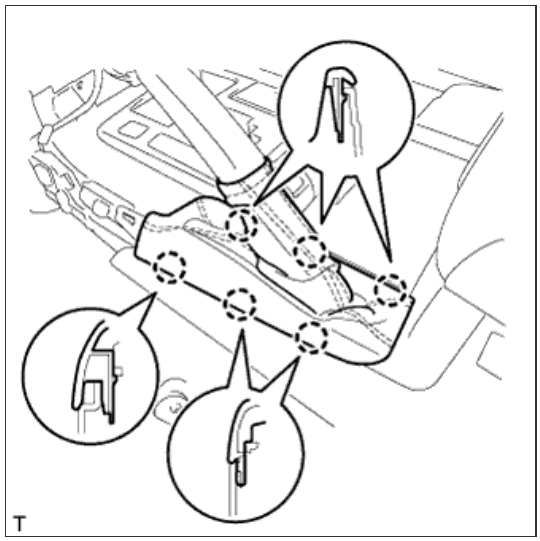
4. INSTALL CONSOLE CUP HOLDER BOX SUB-ASSEMBLY

a. Attach the 4 claws to install the box.



5. INSTALL PARKING BRAKE HOLE COVER

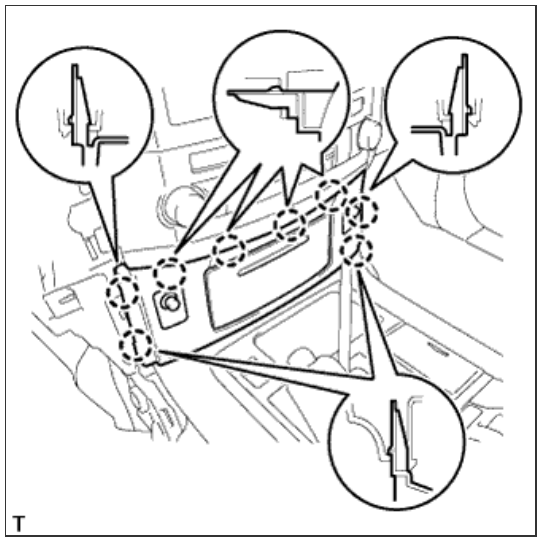
a. Attach the 6 claws to install the cover.



6. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

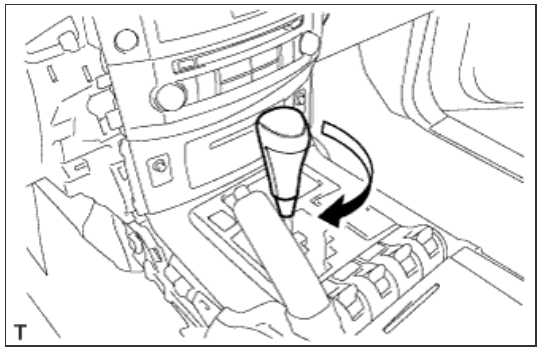
a. Connect the connectors.

b. Attach the 8 claws to install the panel.



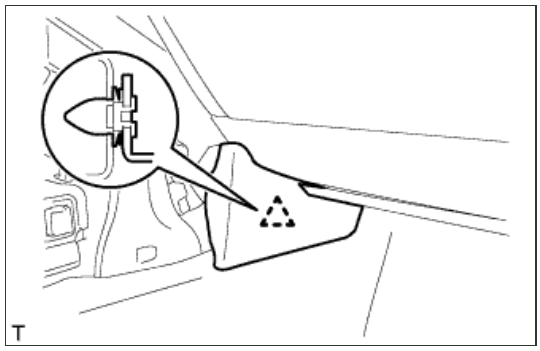
7. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY

a. Install the shift lever knob and twist it in the direction indicated by the arrow.



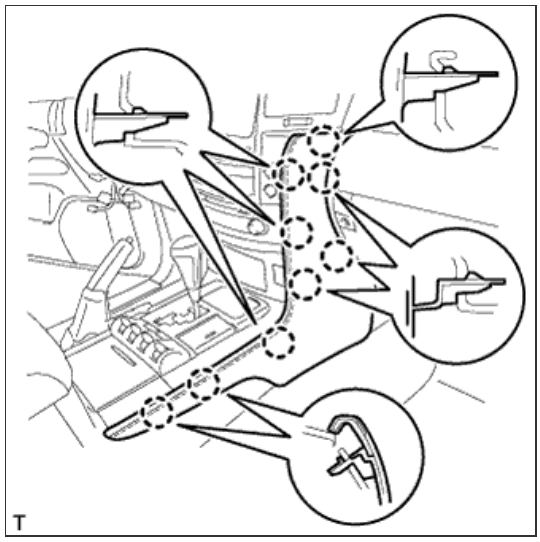
8. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH

a. Attach the clip to install the cover.



9. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH

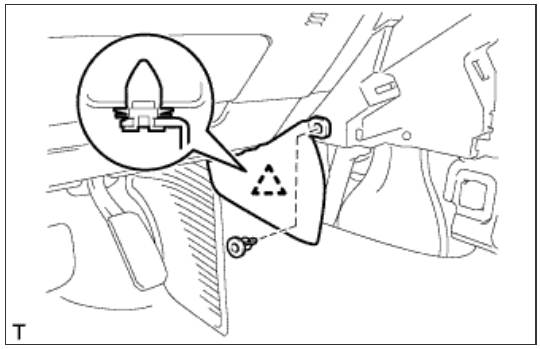
a. Attach the 9 claws to install the panel pad.



10. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER LH

a. Attach the clip to install the cover.

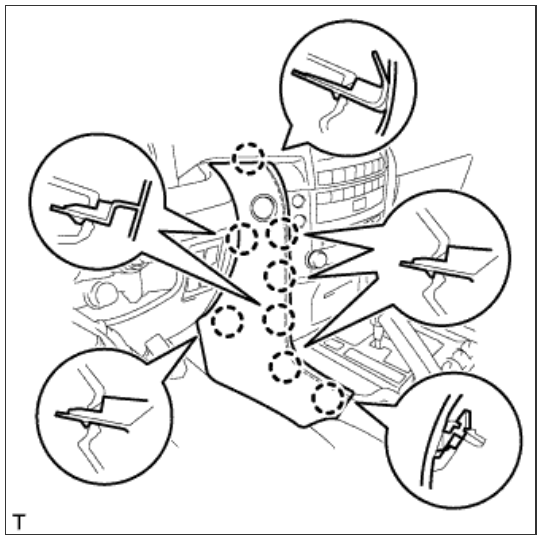
b. Install the clip.



11. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Connect the connector.

b. Attach the 8 claws to install the panel pad.

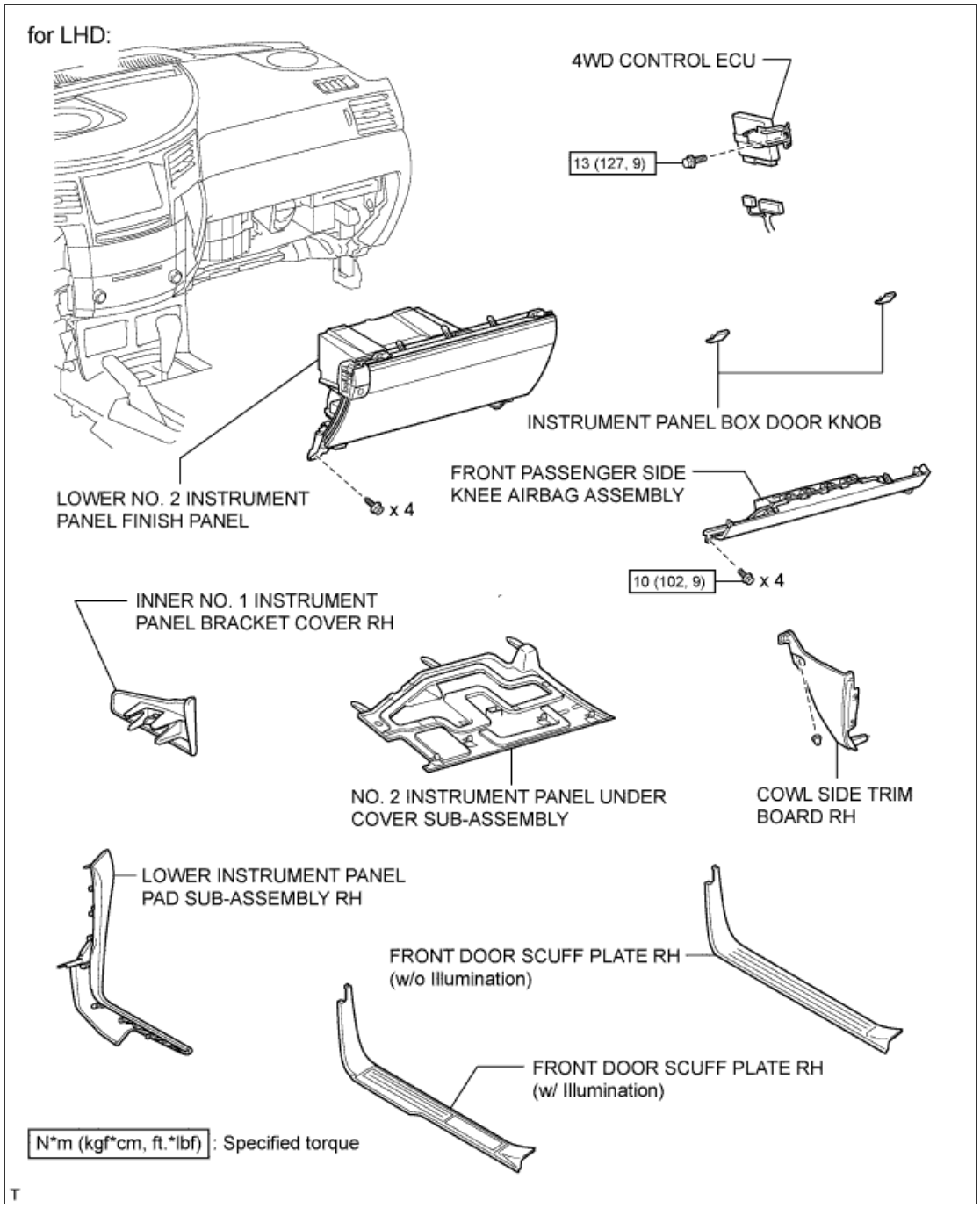


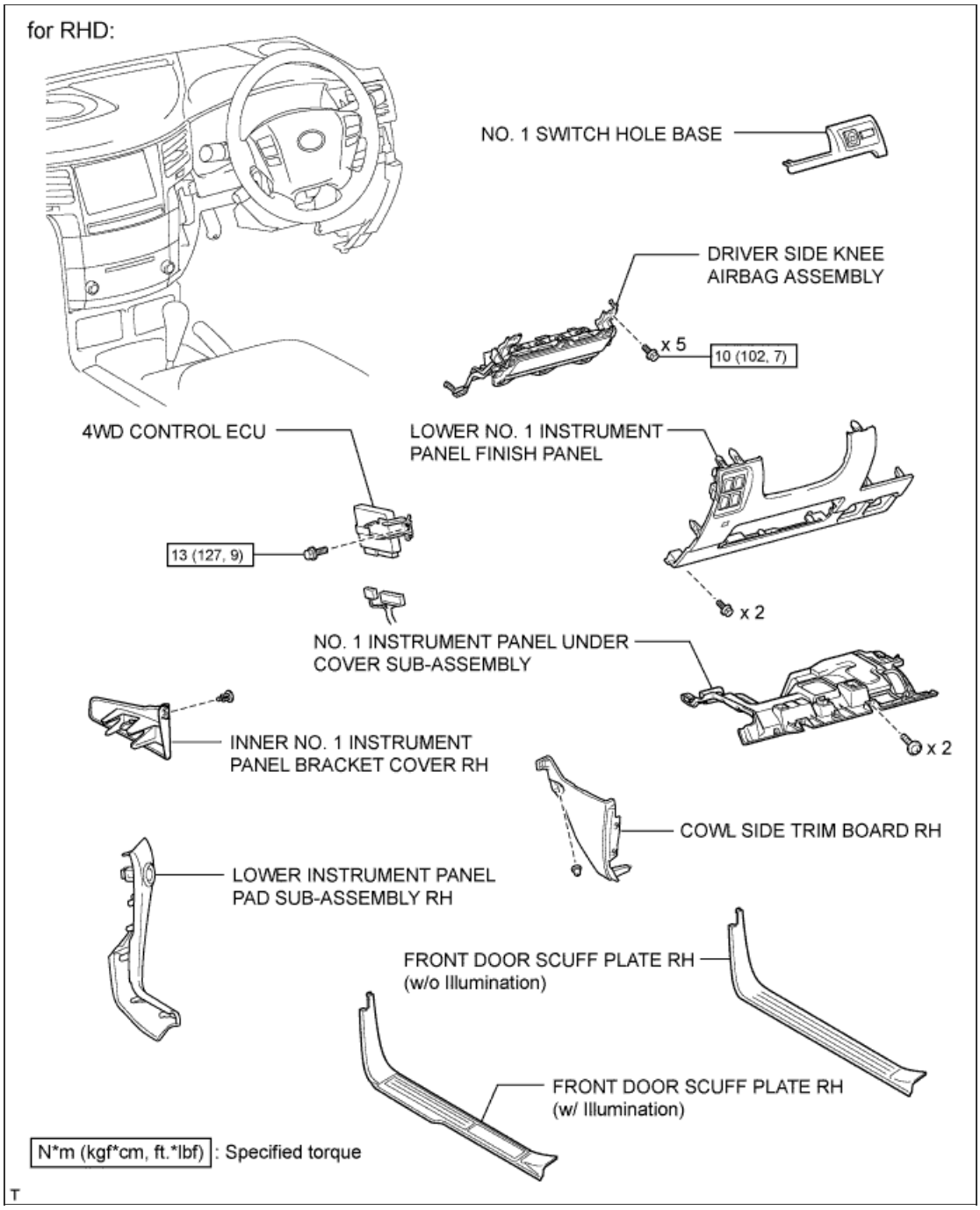
12. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here




for RHD:
NO. 1 SWITCH HOLE BASE
DRIVER SIDE KNEE AIRBAG ASSEMBLY
x 5
10 (102, 7)
4WD CONTROL ECU
13 (127, 9)
LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL
x 2
NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY
x 2
INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH
COWL SIDE TRIM BOARD RH
LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH
FRONT DOOR SCUFF PLATE RH (w/o Illumination)
FRONT DOOR SCUFF PLATE RH (w/ Illumination)
N*m (kgf*cm, ft.*lbf) : Specified torque
T

for Preparation Click here

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

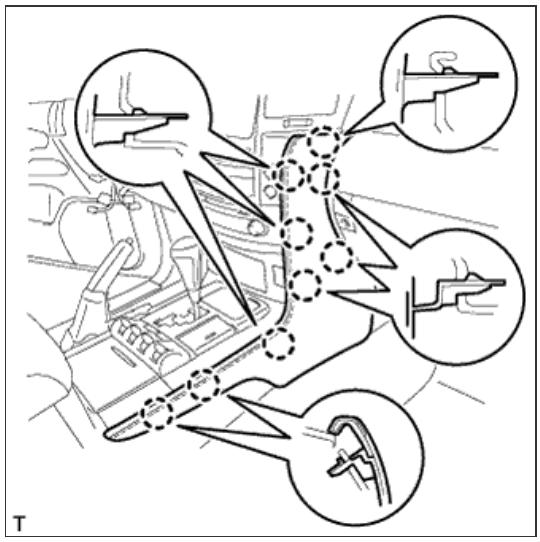
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

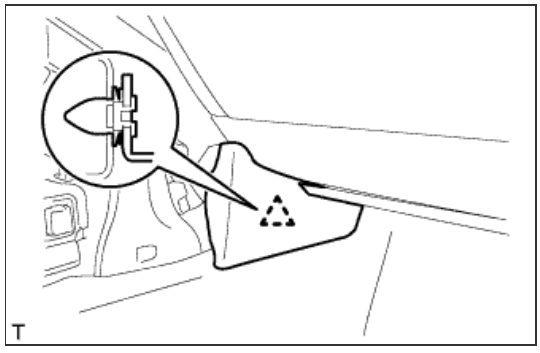
2. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH (for LHD)

a. Detach the 9 claws and remove the panel pad.



3. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH (for LHD)

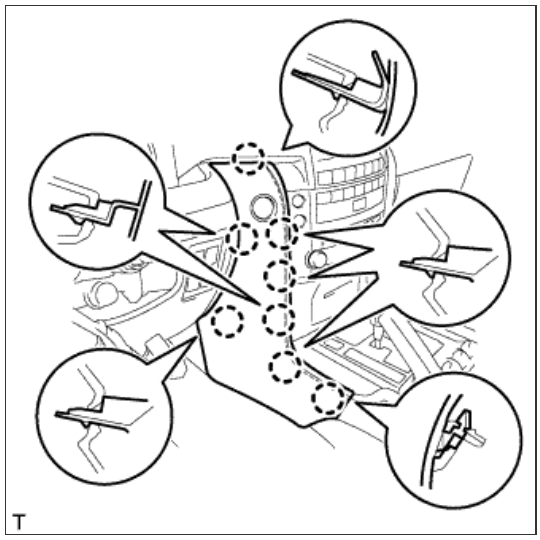
a. Detach the clip and remove the cover.



4. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH (for RHD)

a. Detach the 8 claws.

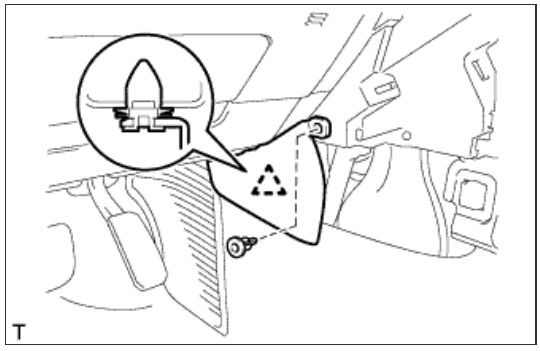
b. Disconnect the connector and remove the panel pad.



5. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH (for RHD)

a. Remove the clip.

b. Detach the clip and remove the cover.

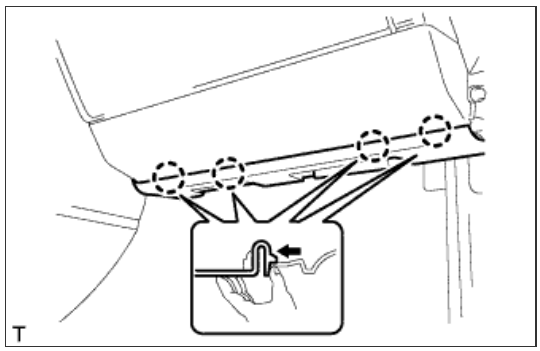


6. REMOVE FRONT DOOR SCUFF PLATE RH

7. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for LHD)

a. Detach the 4 claws.

b. Remove the under cover and disconnect the connector.

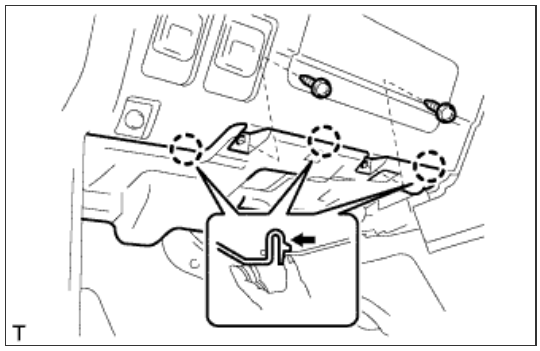


8. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for RHD)

a. Remove the 2 screws.

b. Detach the 3 claws.

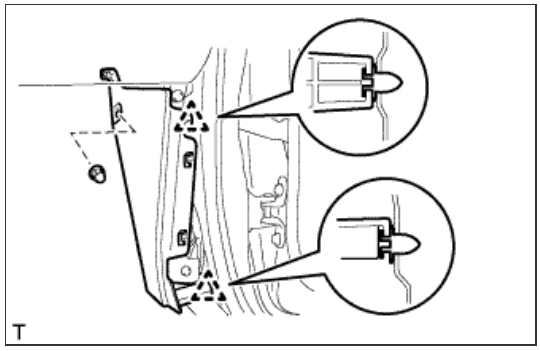
c. Remove the under cover and disconnect the connectors.



9. REMOVE COWL SIDE TRIM BOARD RH

a. Remove the cap nut.

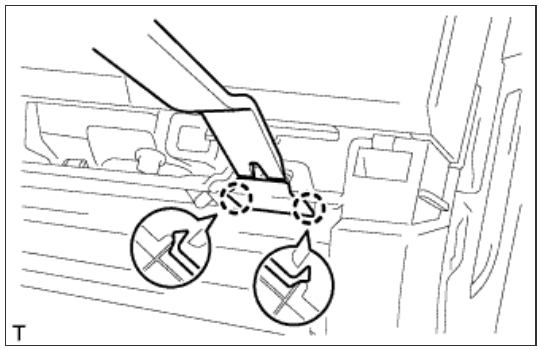
b. Detach the 2 clips and remove the trim board.



10. REMOVE FRONT PASSENGER SIDE KNEE AIRBAG ASSEMBLY (for LHD)

11. REMOVE INSTRUMENT PANEL BOX DOOR KNOB (for LHD)

a. Using a moulding remover, detach the 2 claws and remove the knob.

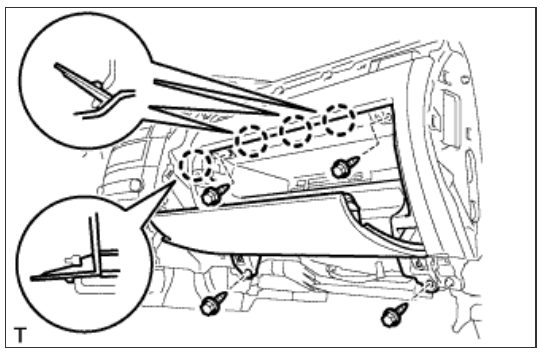


12. REMOVE LOWER NO. 2 INSTRUMENT PANEL FINISH PANEL (for LHD)

a. Remove the 4 bolts.

b. Detach the 4 claws.

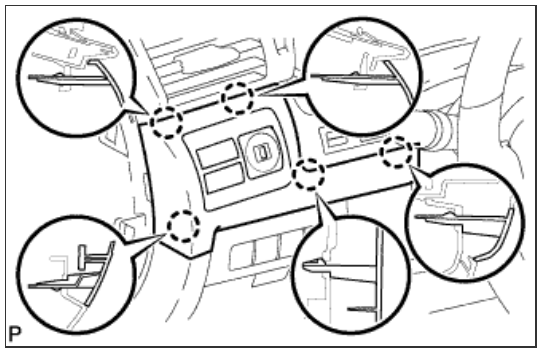
c. Remove the finish panel and then disconnect the connector.



13. REMOVE NO. 1 SWITCH HOLE BASE (for RHD)

a. Detach the 5 claws.

b. Disconnect the connectors and remove the switch hole base.

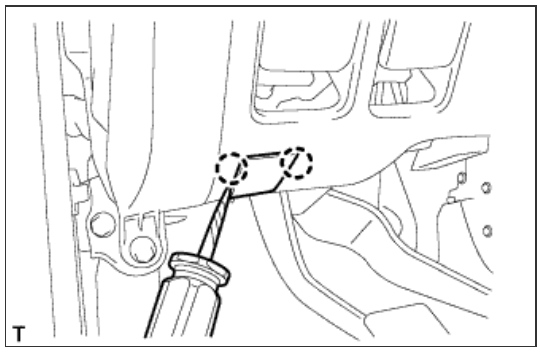


14. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL (for RHD)

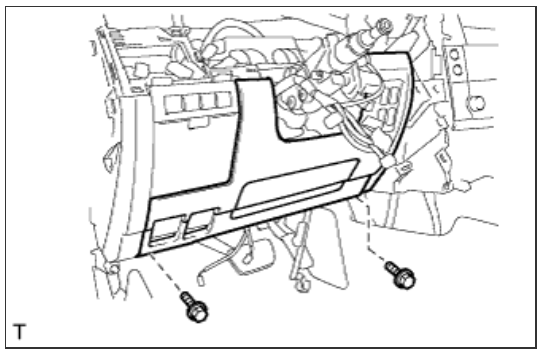
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

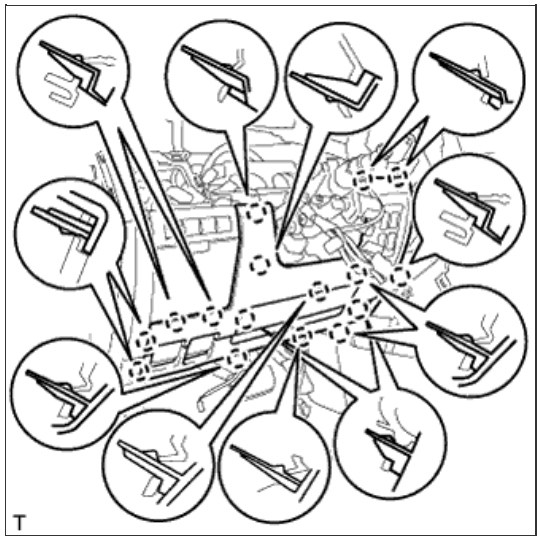
Tape the screwdriver tip before use.



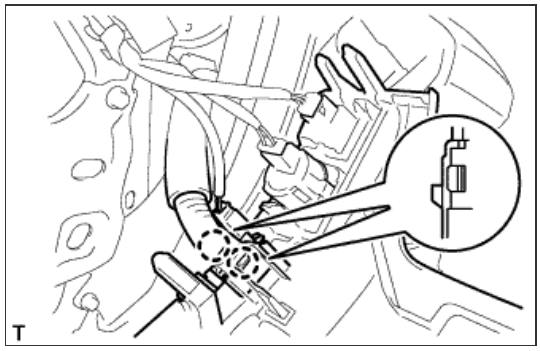
b. Remove the 2 bolts.



c. Detach the 16 claws.

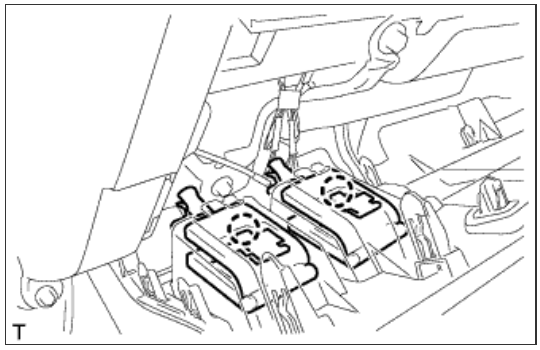


d. Detach the 2 claws and remove the sensor.



e. Detach the 2 claws and disconnect the 2 control cables.

f. Remove the finish panel and then disconnect the connectors.

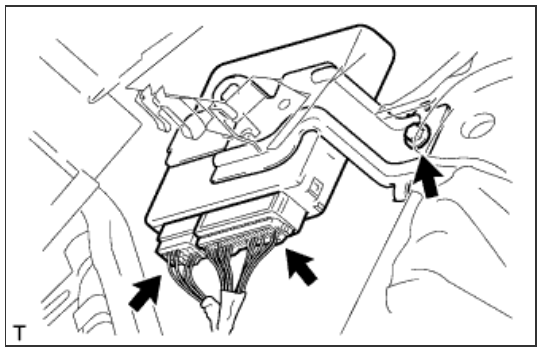


15. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (for RHD)

16. REMOVE 4WD CONTROL ECU

a. Disconnect the 2 ECU connectors.

b. Remove the bolt and ECU.



for Preparation Click here

1. PRECAUTION

NOTICE:

After turning the engine switch off, waiting time may be required before disconnecting the cable from the negative (-) battery terminal. Therefore, make sure to read the disconnecting the cable from the negative (-) battery terminal notice before proceeding with work (Click here).

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

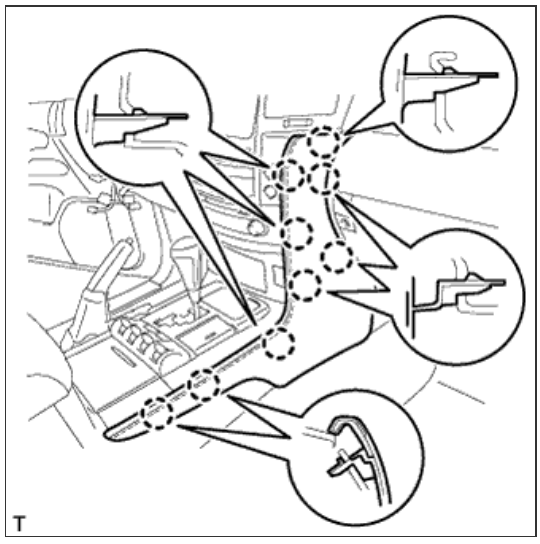
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

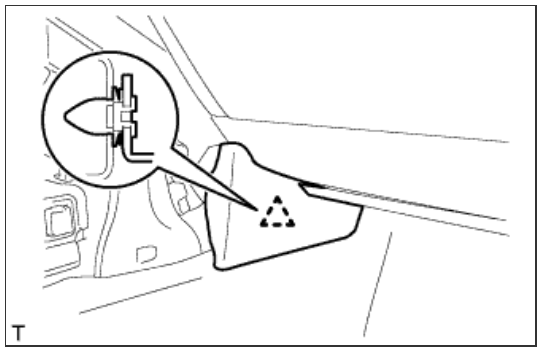
3. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH (for LHD)

a. Detach the 9 claws and remove the panel pad.



4. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH (for LHD)

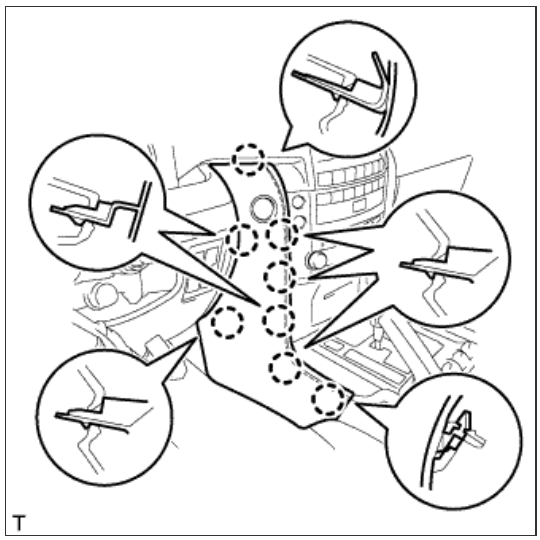
a. Detach the clip and remove the cover.



5. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH (for RHD)

a. Detach the 8 claws.

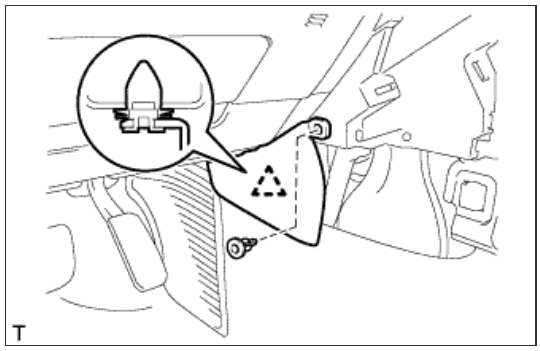
b. Disconnect the connector and remove the panel pad.



6. REMOVE INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH (for RHD)

a. Remove the clip.

b. Detach the clip and remove the cover.



7. REMOVE FRONT DOOR SCUFF PLATE RH

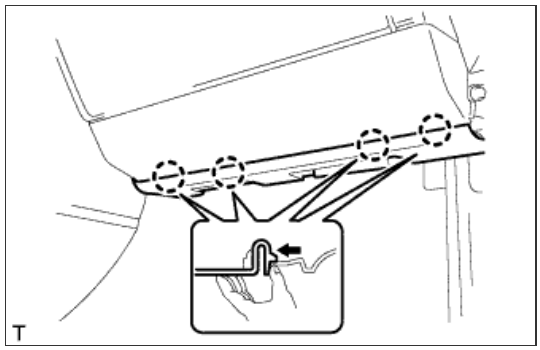
HINT:

Use the same procedures described for the LH side.

8. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for LHD)

a. Detach the 4 claws.

b. Remove the under cover and disconnect the connector.

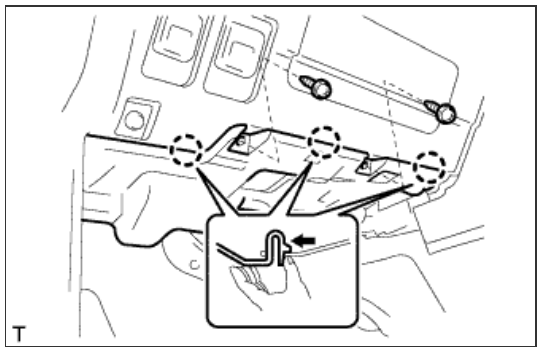


9. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for RHD)

a. Remove the 2 screws.

b. Detach the 3 claws.

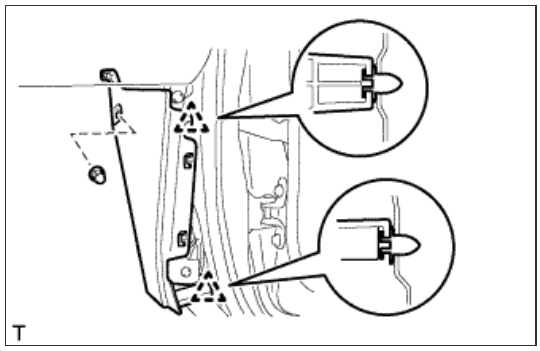
c. Remove the under cover and disconnect the connectors.



10. REMOVE COWL SIDE TRIM BOARD RH

a. Remove the cap nut.

b. Detach the 2 clips and remove the trim board.



11. REMOVE FRONT PASSENGER SIDE KNEE AIRBAG ASSEMBLY (for LHD)

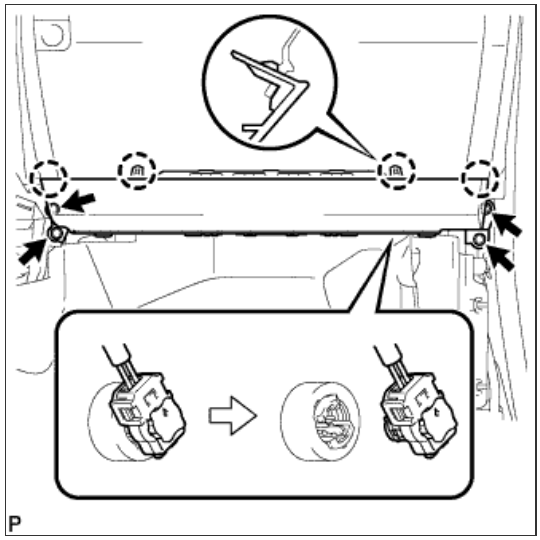
a. Remove the 4 bolts.

b. Detach the 4 claws and remove the front passenger side knee airbag.

c. Disconnect the connector.

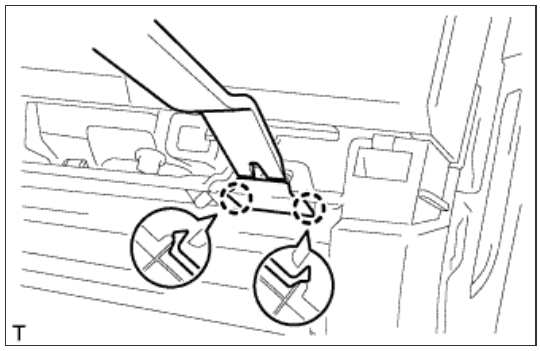
NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



12. REMOVE INSTRUMENT PANEL BOX DOOR KNOB (for LHD)

a. Using a moulding remover, detach the 2 claws and remove the knob.

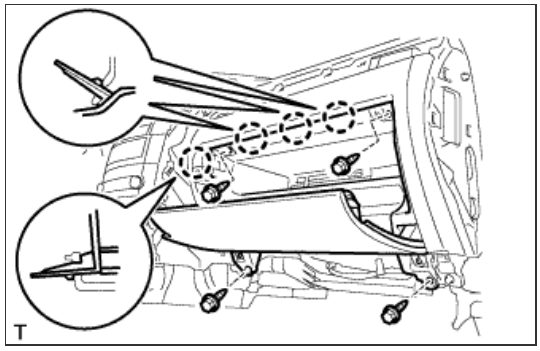


13. REMOVE LOWER NO. 2 INSTRUMENT PANEL FINISH PANEL (for LHD)

a. Remove the 4 bolts.

b. Detach the 4 claws.

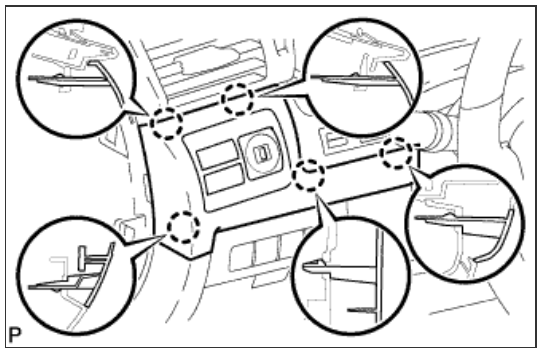
c. Remove the finish panel and then disconnect the connector.



14. REMOVE NO. 1 SWITCH HOLE BASE (for RHD)

a. Detach the 5 claws.

b. Disconnect the connectors and remove the switch hole base.

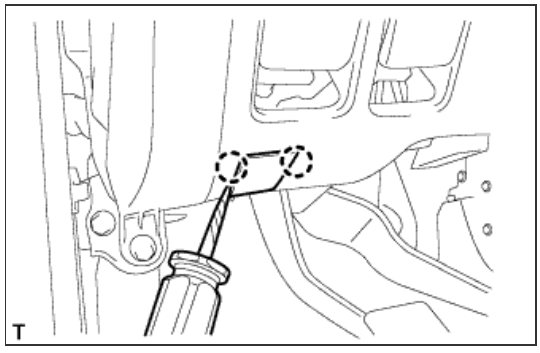


15. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL (for RHD)

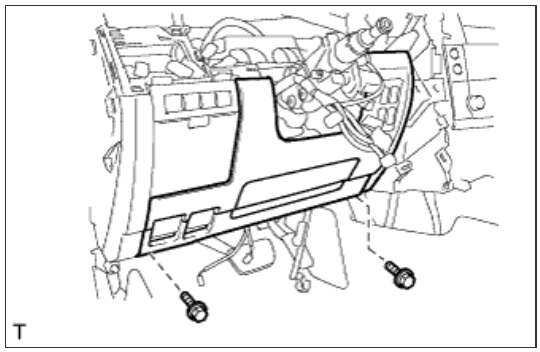
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

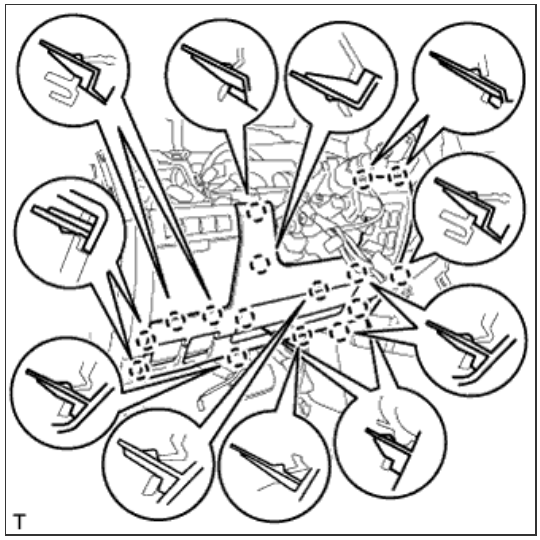
Tape the screwdriver tip before use.



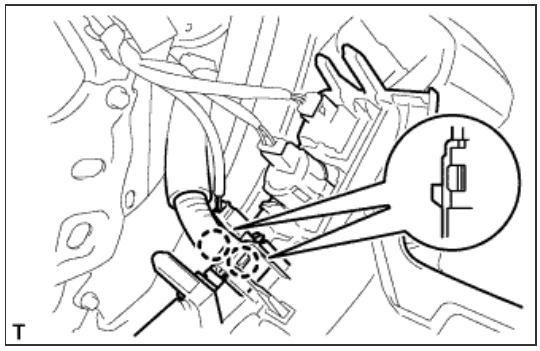
b. Remove the 2 bolts.



c. Detach the 16 claws.

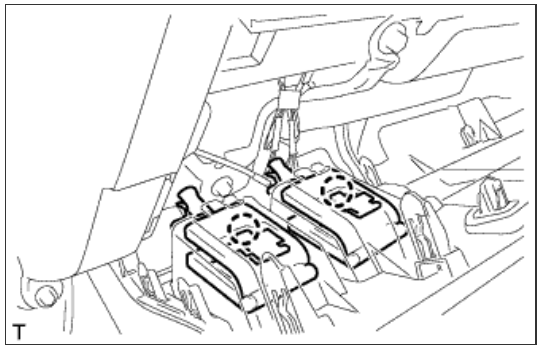


d. Detach the 2 claws and remove the sensor.



e. Detach the 2 claws and disconnect the 2 control cables.

f. Remove the finish panel and then disconnect the connectors.



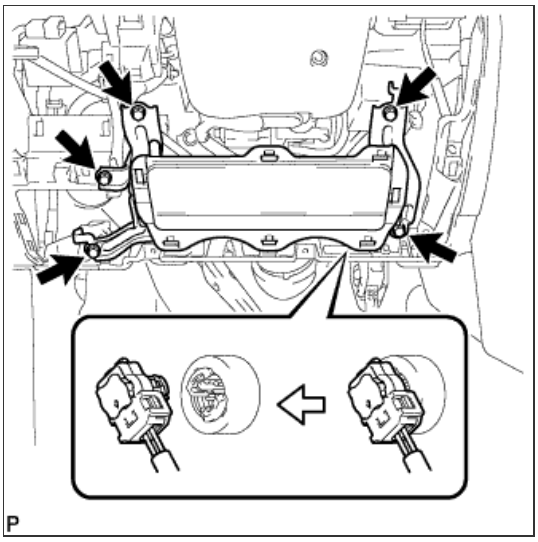
16. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (for RHD)

a. Remove the 5 bolts and driver side knee airbag.

b. Disconnect the connector.

NOTICE:

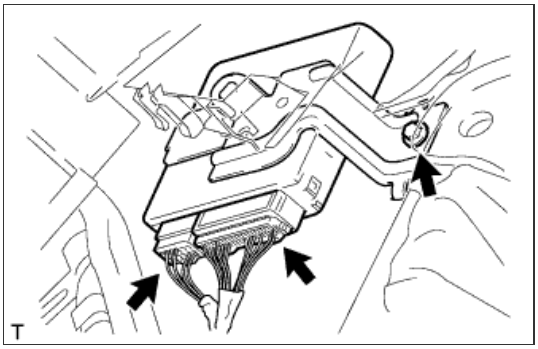
When handling the airbag connector, take care not to damage the airbag wire harness.



17. REMOVE 4WD CONTROL ECU

a. Disconnect the 2 ECU connectors.

b. Remove the bolt and ECU.



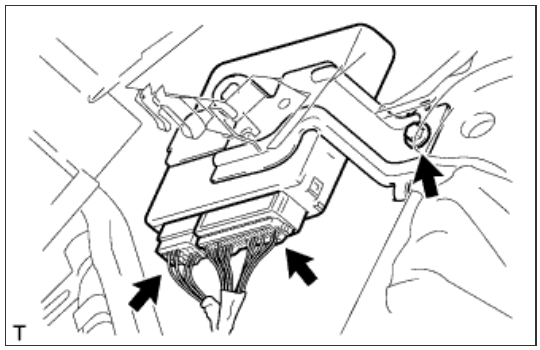
for Preparation Click here

1. INSTALL 4WD CONTROL ECU

a. Install the ECU with the bolt.

Torque:
13 N*m{ 127 kgf*cm , 9 ft.*lbf }

b. Connect the 2 ECU connectors.

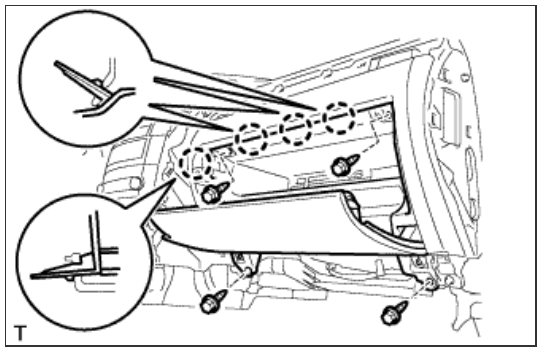


2. INSTALL LOWER NO. 2 INSTRUMENT PANEL FINISH PANEL (for LHD)

a. Connect the connector.

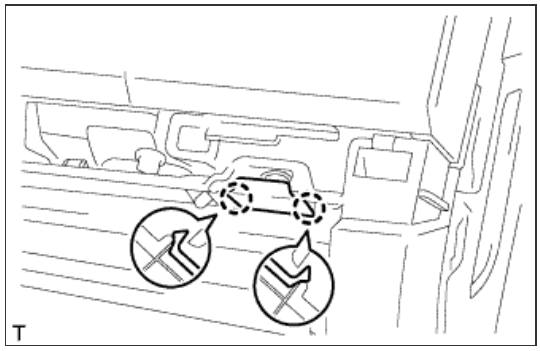
b. Attach the 4 claws to install the finish panel.

c. Install the 4 bolts.



3. INSTALL INSTRUMENT PANEL BOX DOOR KNOB (for LHD)

a. Attach the 2 claws to install the knob.



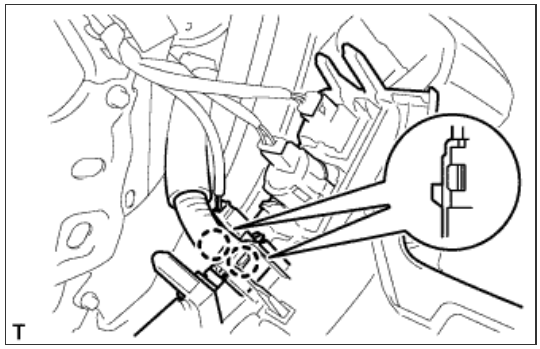
4. INSTALL FRONT PASSENGER SIDE KNEE AIRBAG ASSEMBLY (for LHD)

5. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (for RHD)

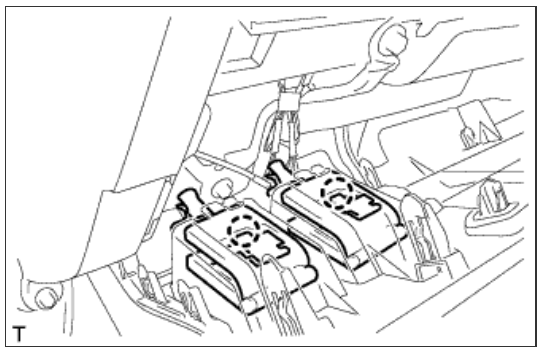
6. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL (for RHD)

a. Connect the connectors.

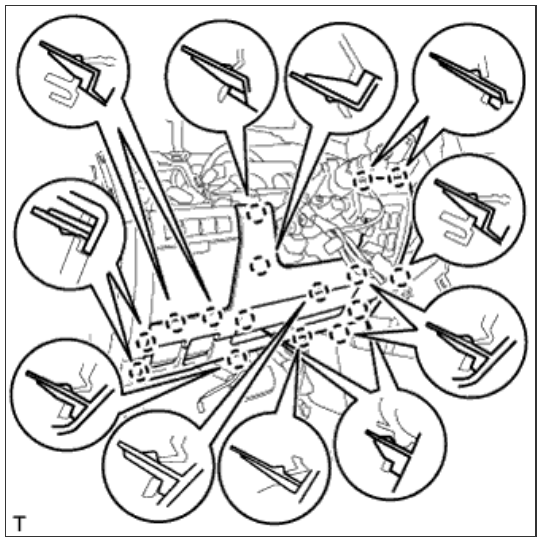
b. Attach the 2 claws to install the sensor.



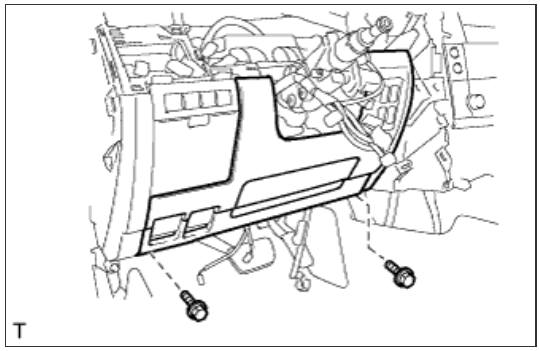
c. Attach the 2 claws to connect the 2 control cables.



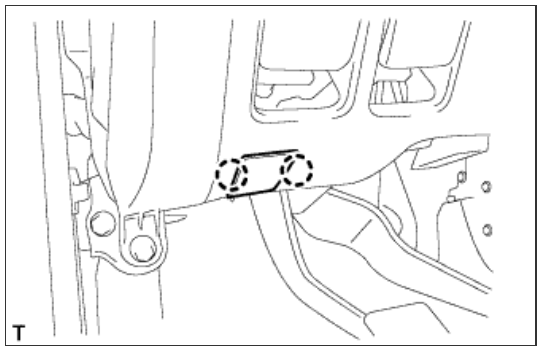
d. Attach the 16 claws to install the finish panel.



e. Install the 2 bolts.



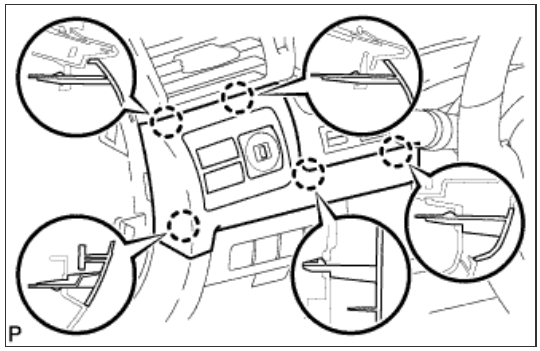
f. Attach the 2 claws to close the hole cover.



7. INSTALL NO. 1 SWITCH HOLE BASE (for RHD)

a. Connect the connectors.

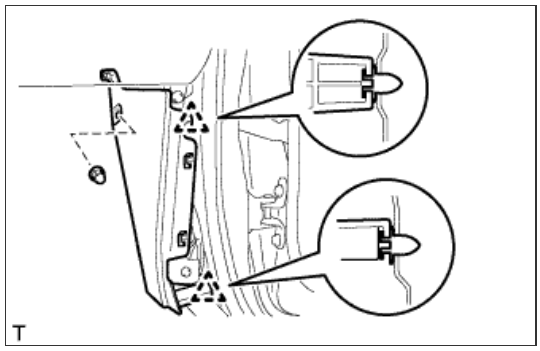
b. Attach the 5 claws to install the switch hole base.



8. INSTALL COWL SIDE TRIM BOARD RH

a. Attach the 2 clips to install the trim board.

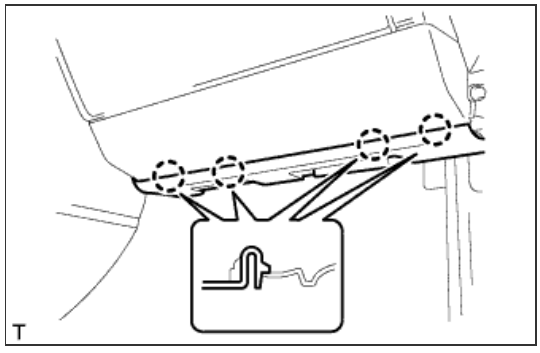
b. Install the cap nut.



9. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for LHD)

a. Connect the connector.

b. Attach the 4 claws to install the under cover.

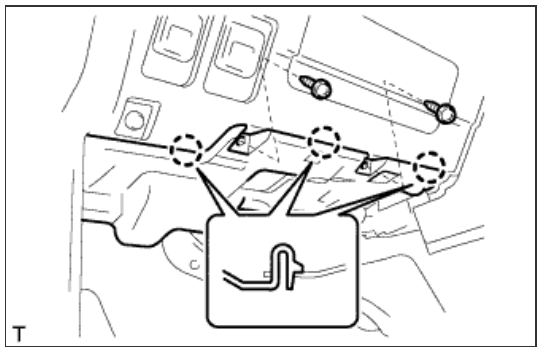


10. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for RHD)

a. Connect the connectors.

b. Attach the 3 claws to install the under cover.

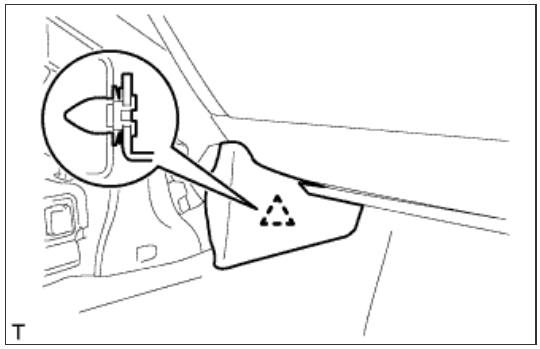
c. Install the 2 screws.



11. INSTALL FRONT DOOR SCUFF PLATE RH

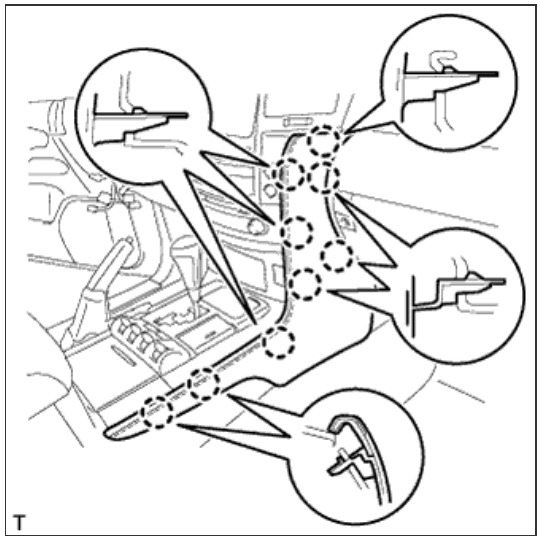
12. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH (for LHD)

a. Attach the clip to install the cover.



13. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH (for LHD)

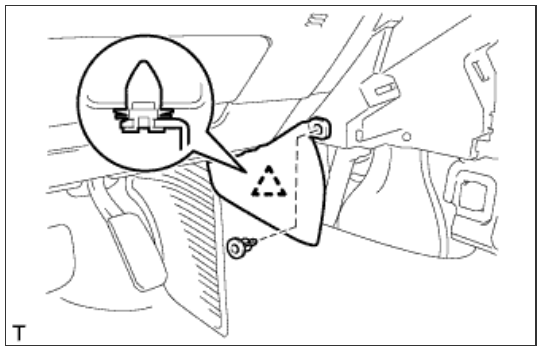
a. Attach the 9 claws to install the panel pad.



14. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH (for RHD)

a. Attach the clip to install the cover.

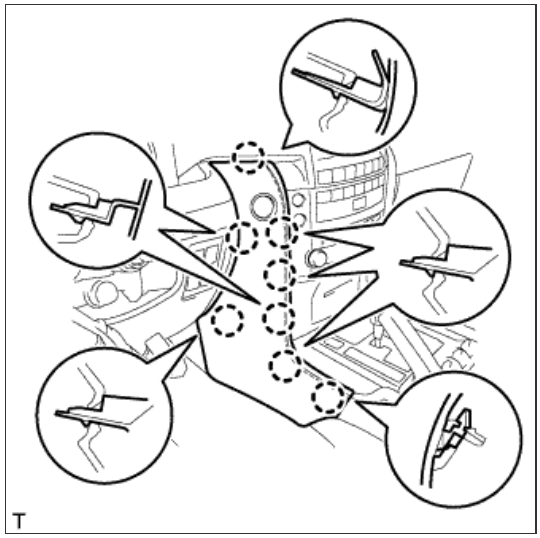
b. Install the clip.



15. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH (for RHD)

a. Connect the connector.

b. Attach the 8 claws to install the panel pad.



16. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

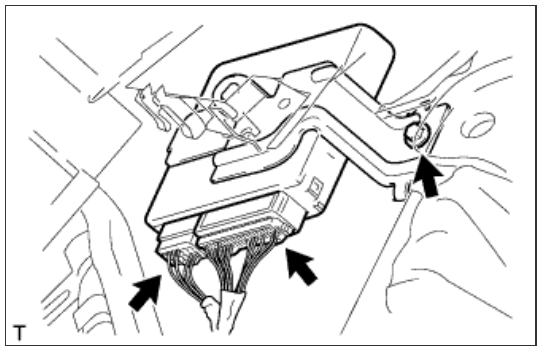
for Preparation Click here

1. INSTALL 4WD CONTROL ECU

a. Install the ECU with the bolt.

Torque:
13 N*m{ 127 kgf*cm , 9 ft.*lbf }

b. Connect the 2 ECU connectors.

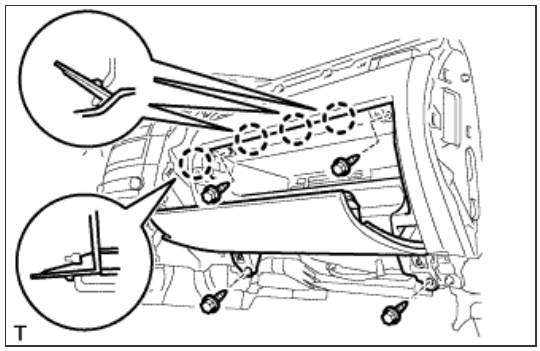


2. INSTALL LOWER NO. 2 INSTRUMENT PANEL FINISH PANEL (for LHD)

a. Connect the connector.

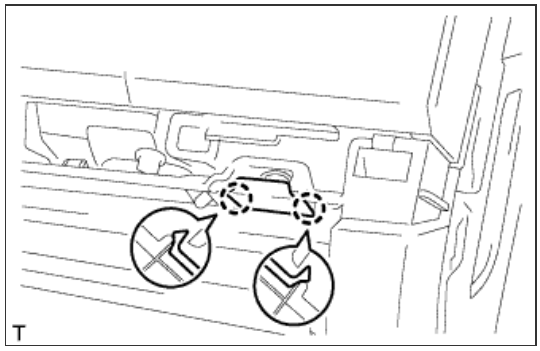
b. Attach the 4 claws to install the finish panel.

c. Install the 4 bolts.



3. INSTALL INSTRUMENT PANEL BOX DOOR KNOB (for LHD)

a. Attach the 2 claws to install the knob.



4. INSTALL FRONT PASSENGER SIDE KNEE AIRBAG ASSEMBLY (for LHD)

a. Connect the connector.

NOTICE:

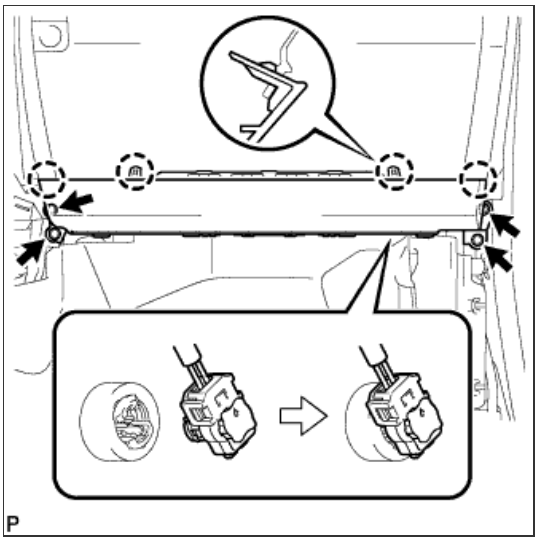
When handling the airbag connector, take care not to damage the airbag wire

harness.

b. Attach the 4 claws to install the front passenger side knee airbag.

c. Install the 4 bolts.

Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



5. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (for RHD)

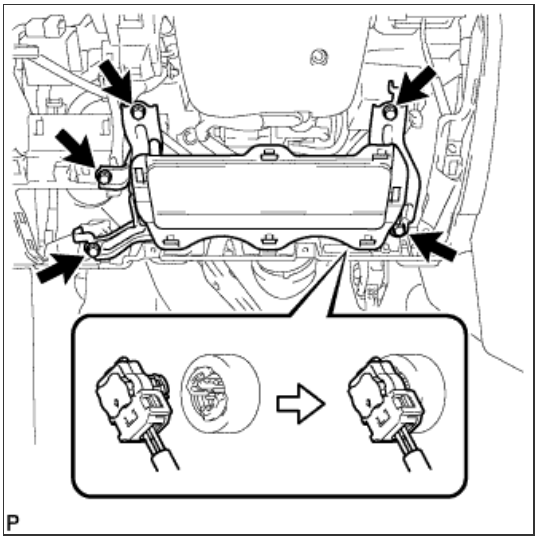
a. Connect the connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

b. Install the driver side knee airbag with the 5 bolts.

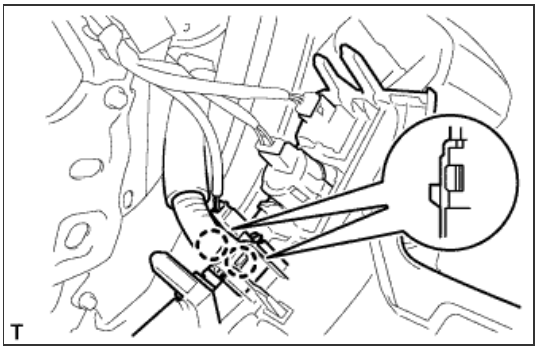
Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



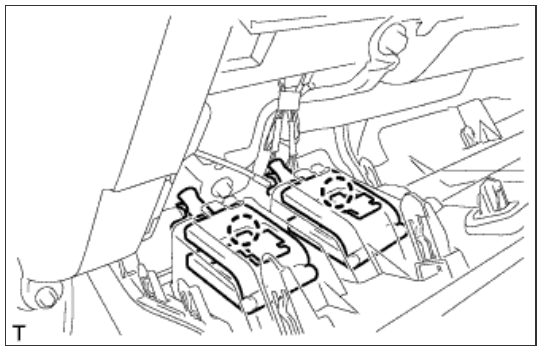
6. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL (for RHD)

a. Connect the connectors.

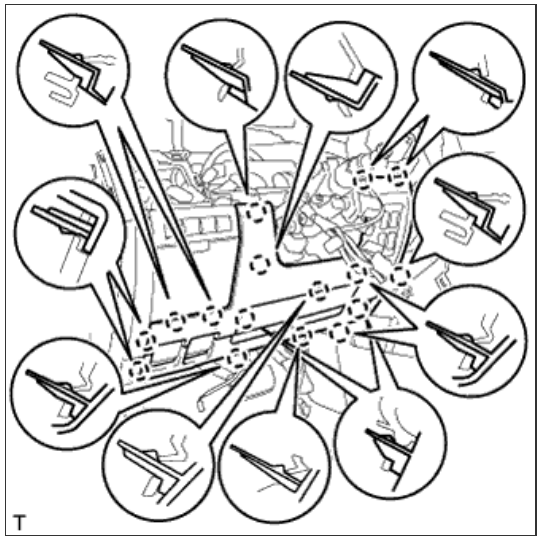
b. Attach the 2 claws to install the sensor.



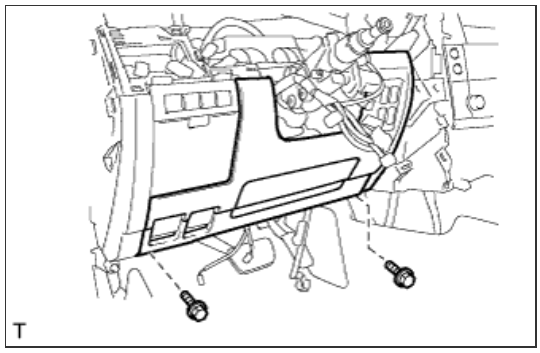
c. Attach the 2 claws to connect the 2 control cables.



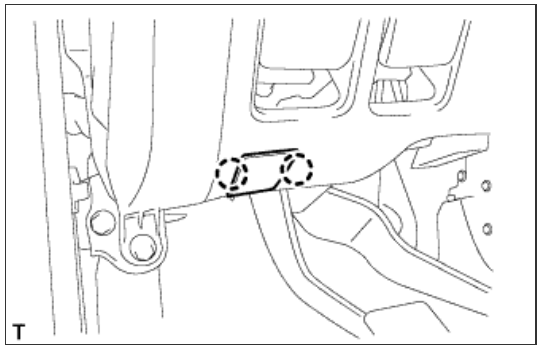
d. Attach the 16 claws to install the finish panel.



e. Install the 2 bolts.



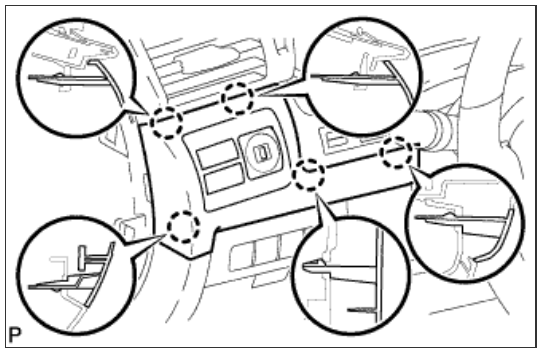
f. Attach the 2 claws to close the hole cover.



7. INSTALL NO. 1 SWITCH HOLE BASE (for RHD)

a. Connect the connectors.

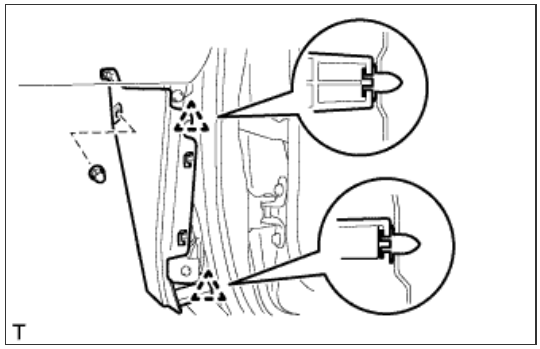
b. Attach the 5 claws to install the switch hole base.



8. INSTALL COWL SIDE TRIM BOARD RH

a. Attach the 2 clips to install the trim board.

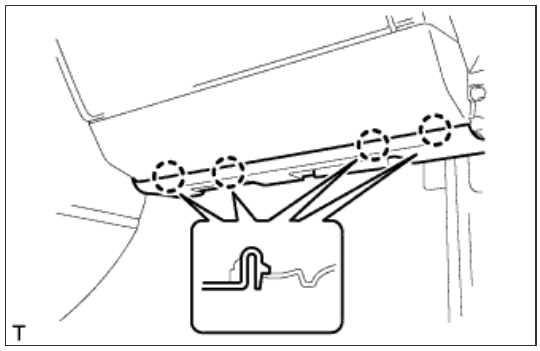
b. Install the cap nut.



9. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for LHD)

a. Connect the connector.

b. Attach the 4 claws to install the under cover.

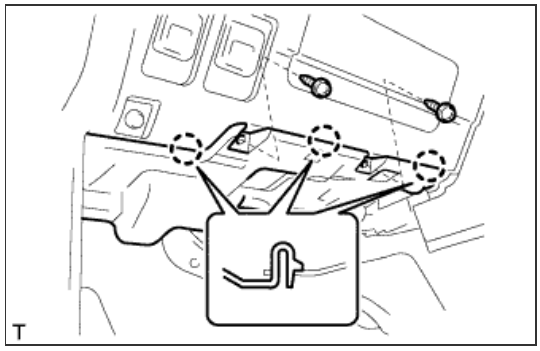


10. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for RHD)

a. Connect the connectors.

b. Attach the 3 claws to install the under cover.

c. Install the 2 screws.



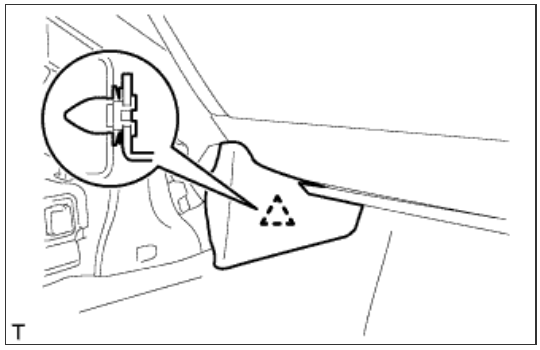
11. INSTALL FRONT DOOR SCUFF PLATE RH

HINT:

Use the same procedures described for the LH side.

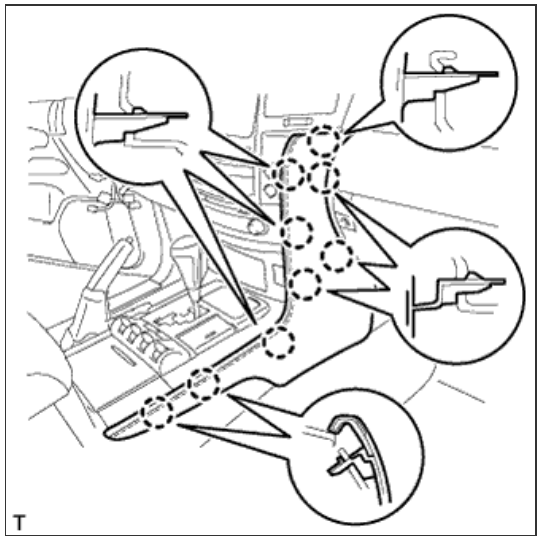
12. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH (for LHD)

a. Attach the clip to install the cover.



13. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH (for LHD)

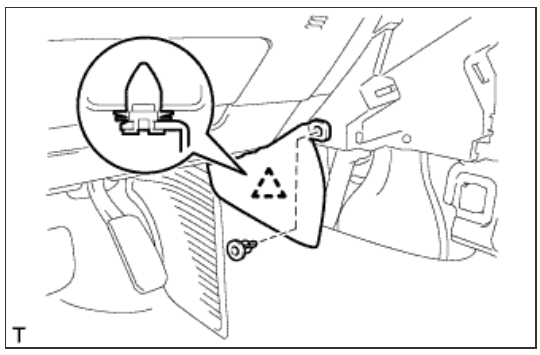
a. Attach the 9 claws to install the panel pad.



14. INSTALL INNER NO. 1 INSTRUMENT PANEL BRACKET COVER RH (for RHD)

a. Attach the clip to install the cover.

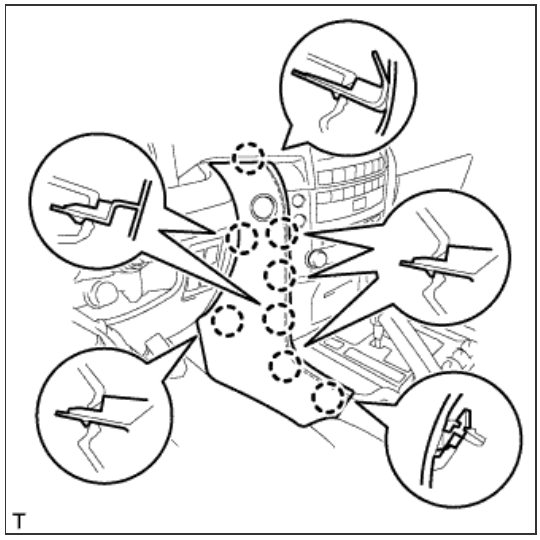
b. Install the clip.



15. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH (for RHD)

a. Connect the connector.

b. Attach the 8 claws to install the panel pad.



16. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here

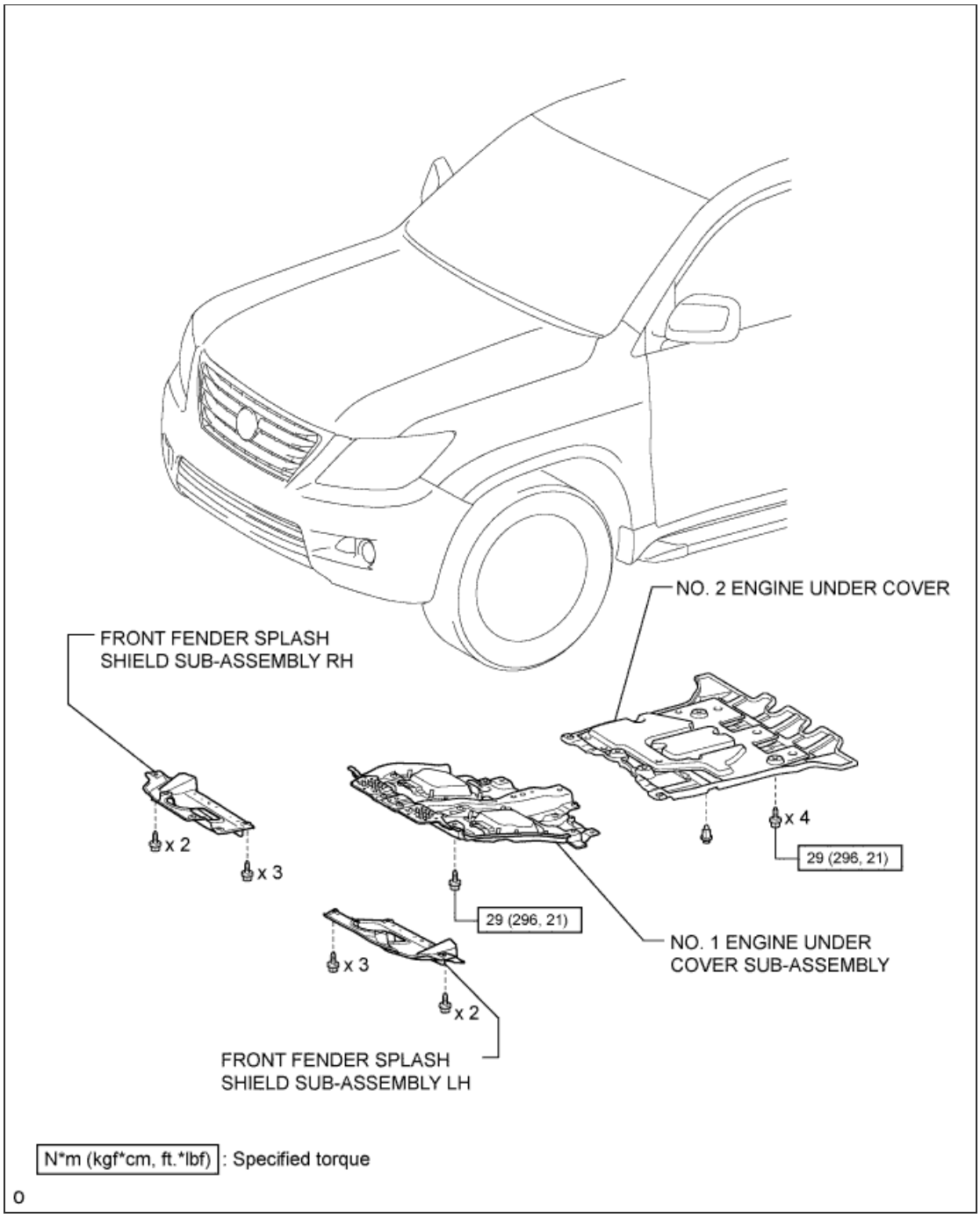
HINT:

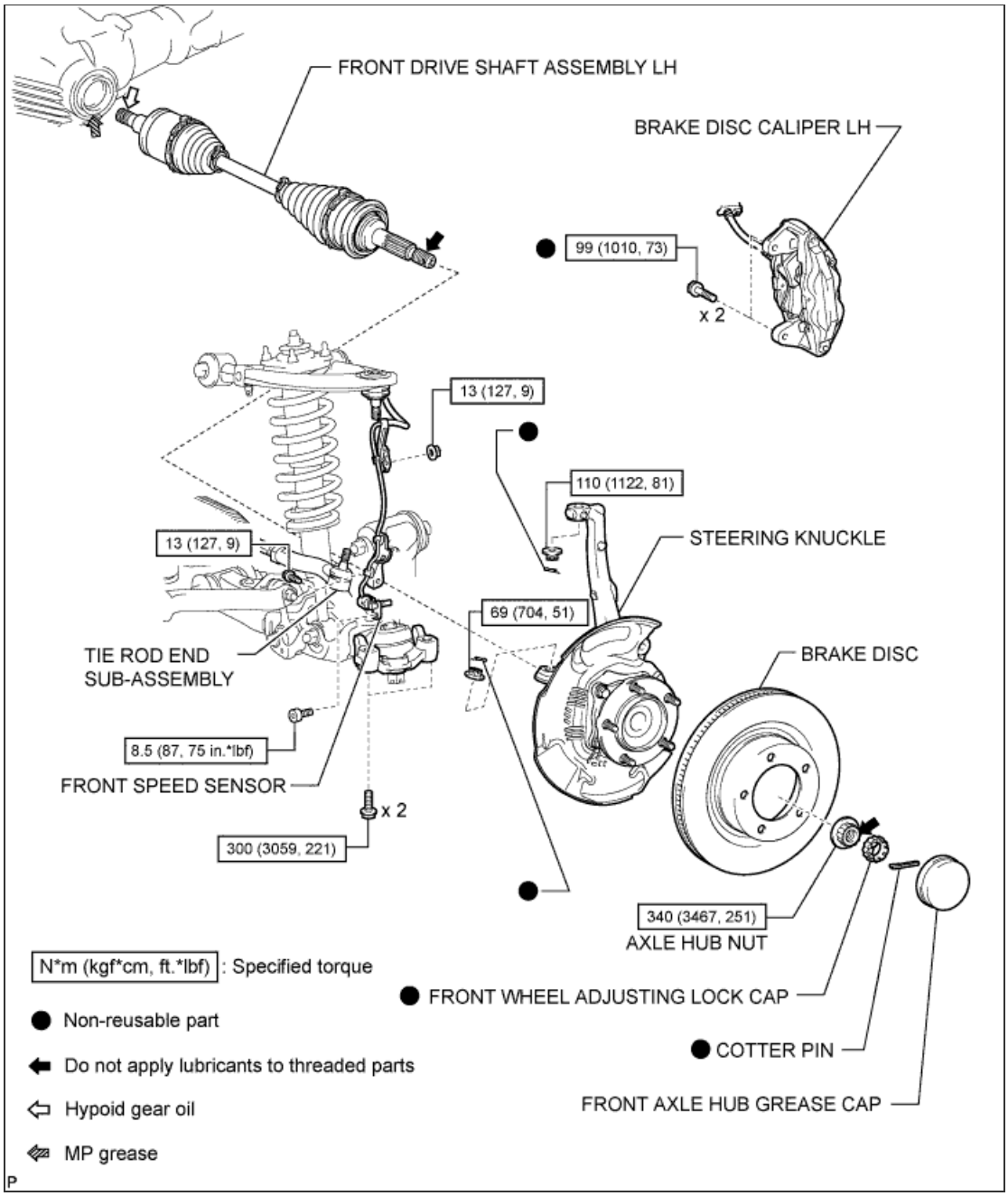
Use the table below to help determine the cause of the problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

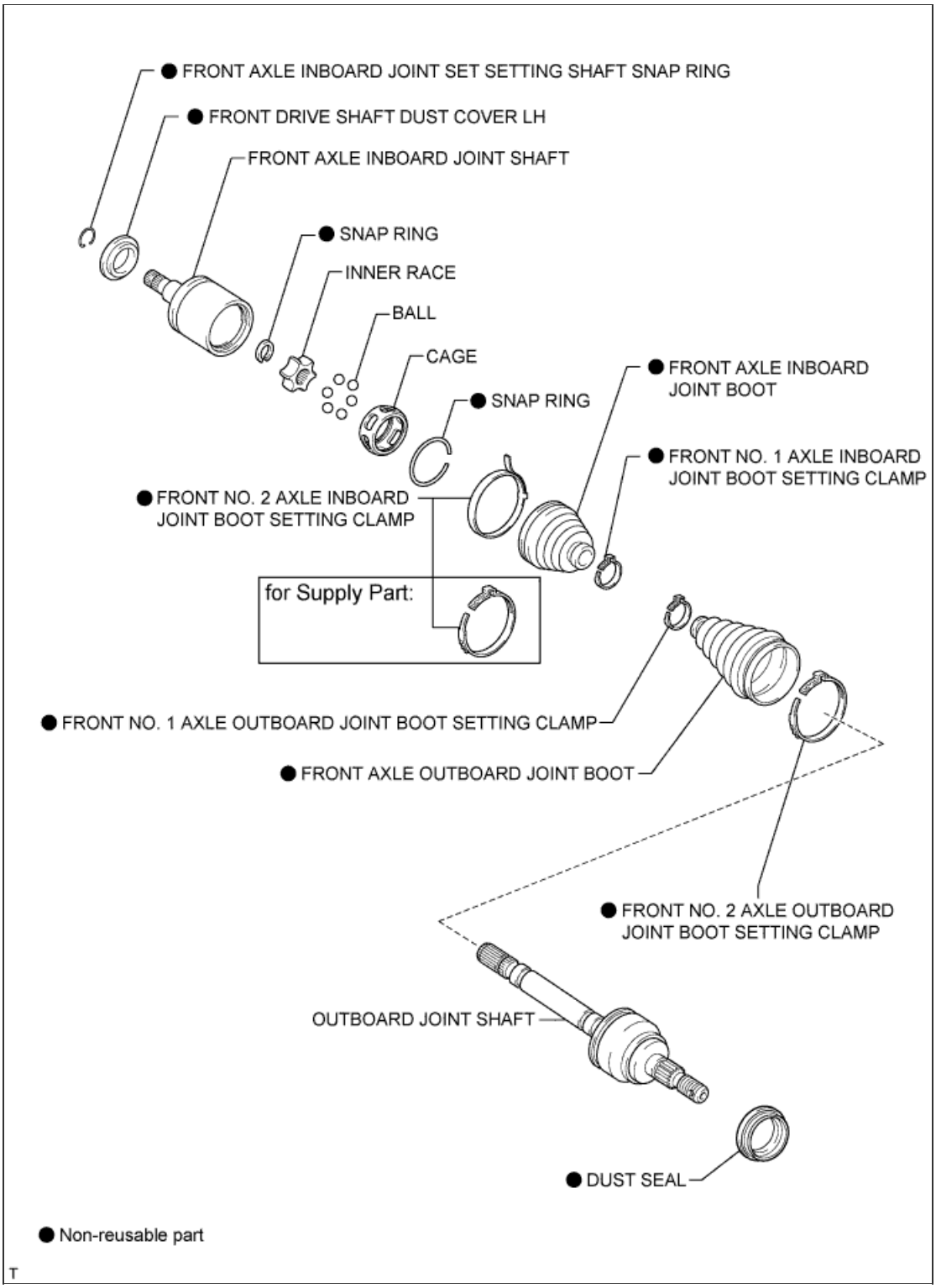
Drive Shaft System

Symptom	Suspected Area	See page
Front wheel shimmy	Front drive shaft (worn)	Click here

for Preparation Click here




FRONT DRIVE SHAFT ASSEMBLY LH
BRAKE DISC CALIPER LH
99 (1010, 73)
x 2
13 (127, 9)
110 (1122, 81)
STEERING KNUCKLE
13 (127, 9)
69 (704, 51)
TIE ROD END
SUB-ASSEMBLY
BRAKE DISC
8.5 (87, 75 in.*lbf)
FRONT SPEED SENSOR
x 2
300 (3059, 221)
340 (3467, 251)
AXLE HUB NUT
N*m (kgf*cm, ft.*lbf) : Specified torque
FRONT WHEEL ADJUSTING LOCK CAP
Non-reusable part
COTTER PIN
Do not apply lubricants to threaded parts
FRONT AXLE HUB GREASE CAP
Hypoid gear oil
MP grease
P


● FRONT AXLE INBOARD JOINT SET SETTING SHAFT SNAP RING
● FRONT DRIVE SHAFT DUST COVER LH
FRONT AXLE INBOARD JOINT SHAFT
● SNAP RING
INNER RACE
BALL
CAGE
● SNAP RING
● FRONT AXLE INBOARD JOINT BOOT
● FRONT NO. 1 AXLE INBOARD JOINT BOOT SETTING CLAMP
● FRONT NO. 2 AXLE INBOARD JOINT BOOT SETTING CLAMP
for Supply Part:
● FRONT NO. 1 AXLE OUTBOARD JOINT BOOT SETTING CLAMP
● FRONT AXLE OUTBOARD JOINT BOOT
● FRONT NO. 2 AXLE OUTBOARD JOINT BOOT SETTING CLAMP
OUTBOARD JOINT SHAFT
● DUST SEAL
● Non-reusable part

T

for Preparation Click here

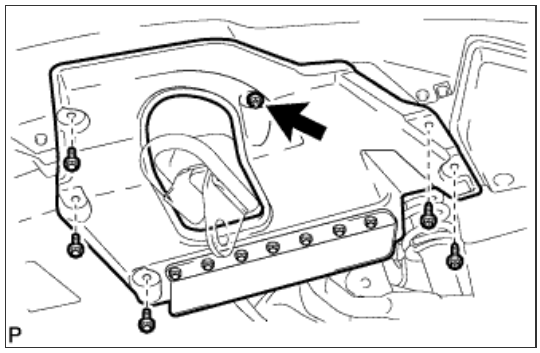
HINT:

- **Use the same procedures for the RH side and LH side.**
- **The procedures listed below are for the LH side.**

1. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Remove the 3 bolts and 2 screws.

b. Turn the clip indicated by the arrow in the illustration to remove the fender splash shield.



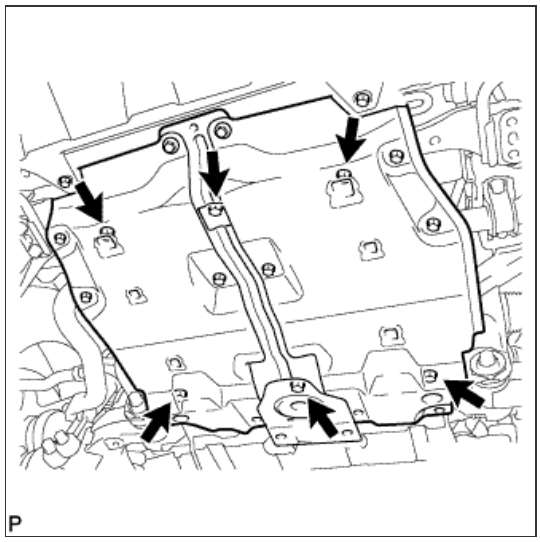
2. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

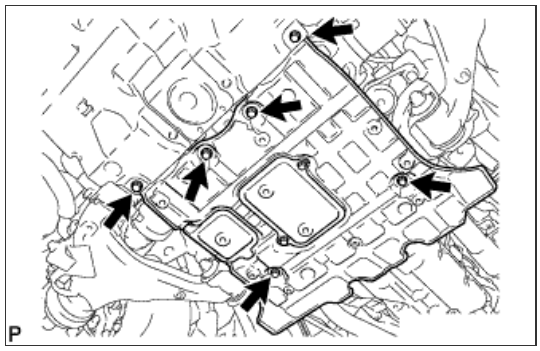
3. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY

a. Remove the 6 bolts and under cover.



4. REMOVE NO. 2 ENGINE UNDER COVER

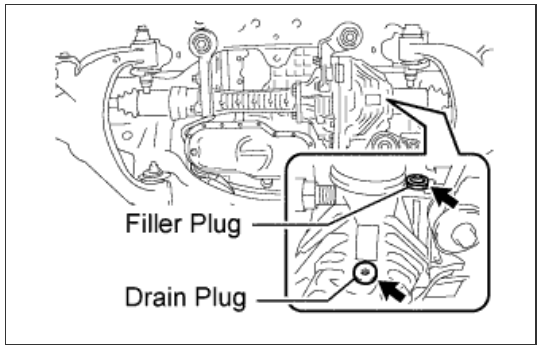
a. Remove the 6 bolts and under cover.



5. DRAIN DIFFERENTIAL OIL

a. Stop the vehicle on a level place.

b. Front Differential:



i. Remove the engine under cover (Click here).

ii. Using a 10 mm hexagon wrench, remove the filler plug and gasket.

iii. Using a 10 mm hexagon wrench, remove the drain plug and gasket, and drain the oil.

iv. Using a 10 mm hexagon wrench, install a new gasket and the drain plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

c. Rear Differential:

i. Remove the filler plug and gasket.

ii. Remove the drain plug and gasket, and drain the oil.

iii. Install a new gasket and the drain plug.

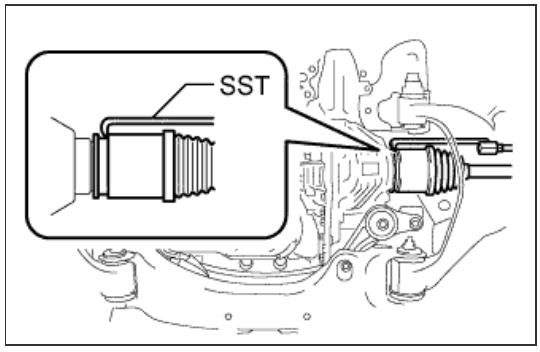
Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

6. REMOVE FRONT AXLE ASSEMBLY LH

a. Remove the front axle assembly (Click here).

7. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

a. Using SST, remove the drive shaft.



SST
09520-01010
09520-24010 (09520-32040)

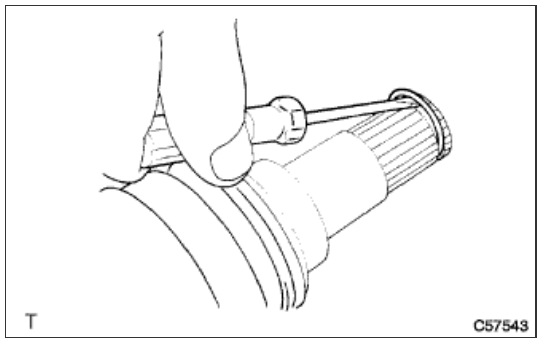
NOTICE:

- **Be careful not to damage the dust cover and oil seal.**
- **Move the drive shaft while keeping it level.**

for Preparation Click here

1. REMOVE FRONT AXLE INBOARD JOINT SET SETTING SHAFT SNAP RING

a. Using a screwdriver, remove the snap ring from the inboard joint shaft.



2. REMOVE FRONT NO. 2 AXLE INBOARD JOINT BOOT SETTING CLAMP

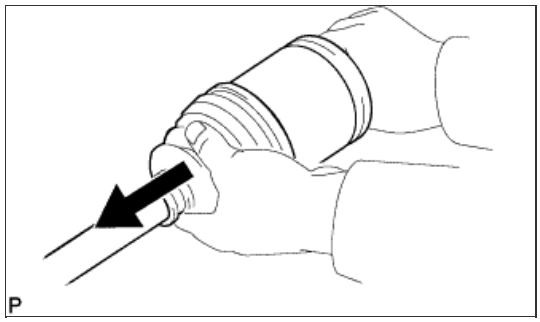
a. Using a side cutter, cut the inboard joint boot setting clamp and remove it.

3. REMOVE FRONT NO. 1 AXLE INBOARD JOINT BOOT SETTING CLAMP

a. Using a side cutter, cut the inboard joint boot setting clamp and remove it.

4. DISCONNECT FRONT AXLE INBOARD JOINT BOOT

a. Disconnect the inboard joint boot from the inboard joint shaft set.



5. REMOVE FRONT AXLE INBOARD JOINT SHAFT

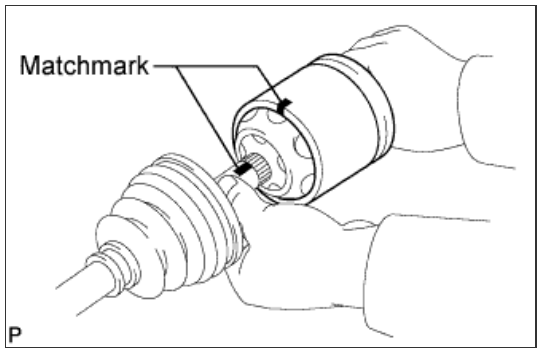
a. Place matchmarks on the inboard joint shaft and outboard joint shaft.

NOTICE:

Do not punch the marks.

b. Using a screwdriver, remove the snap ring from the inboard joint shaft.

c. Remove the inboard joint shaft from the outboard joint shaft.



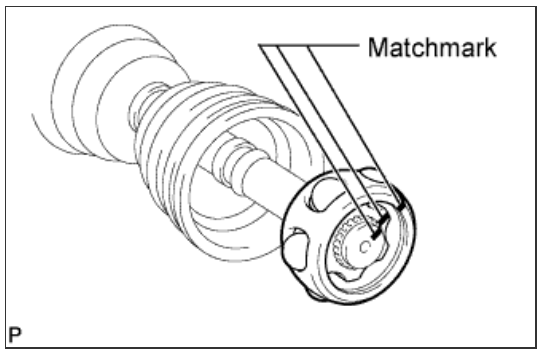
d. Place matchmarks on the outboard joint shaft, inner race and cage.

NOTICE:

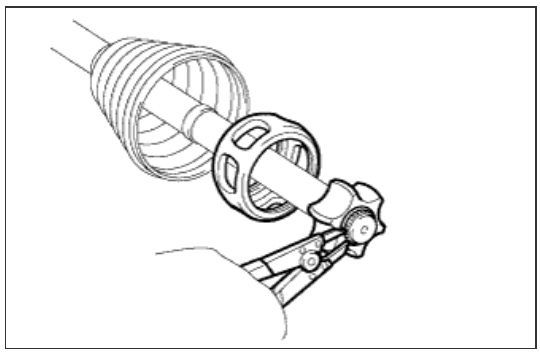
Do not punch the marks.

e. Remove the 6 balls.

f. Slide the cage to the outboard joint side.



g. Using a snap ring expander, remove the snap ring.

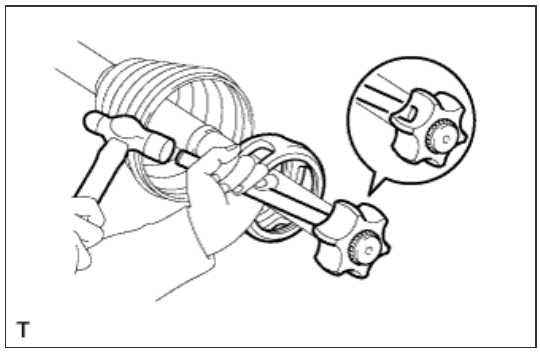


h. Using a brass bar and hammer, tap off the inner race.

NOTICE:

Be careful not to damage the inner race.

i. Remove the cage.



6. REMOVE FRONT AXLE INBOARD JOINT BOOT

a. Remove the inboard joint boot from the outboard joint shaft.

7. REMOVE FRONT NO. 1 AXLE OUTBOARD JOINT BOOT SETTING CLAMP

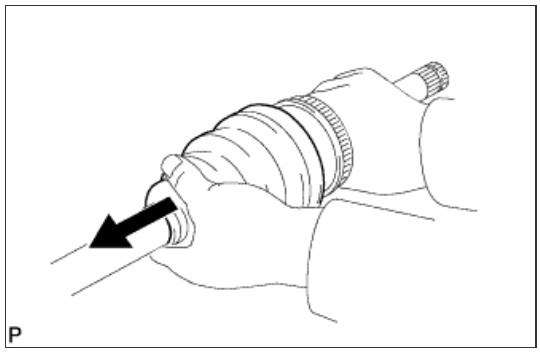
a. Using a side cutter, cut the outboard joint boot setting clamp and remove it.

8. REMOVE FRONT NO. 2 AXLE OUTBOARD JOINT BOOT SETTING CLAMP

a. Using a side cutter, cut the outboard joint boot setting clamp and remove it.

9. REMOVE FRONT AXLE OUTBOARD JOINT BOOT

a. Remove the outboard joint boot from the outboard joint shaft.



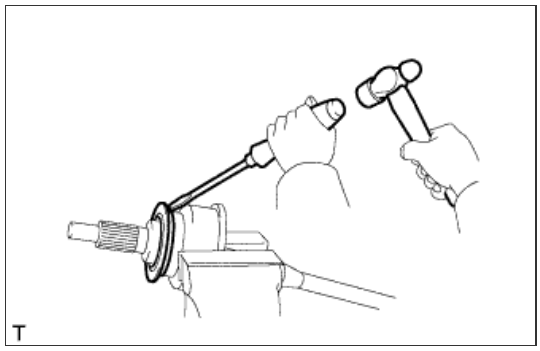
10. REMOVE DUST SEAL

a. Fix the outboard joint shaft assembly in a vise between aluminum plates.

NOTICE:

Do not overtighten the vise.

b. Using a screwdriver and a hammer, remove the dust seal.



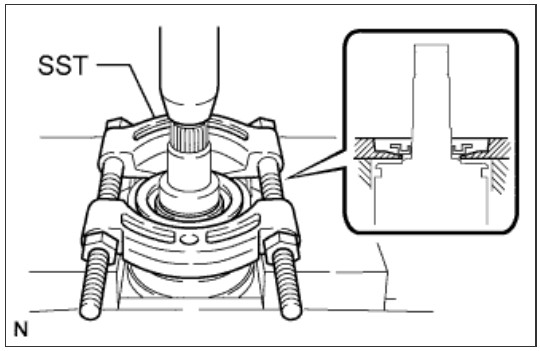
11. REMOVE FRONT DRIVE SHAFT DUST COVER LH

a. Using SST and a press, press out the dust cover.

SST
09950-00020

NOTICE:

Do not drop the inboard joint shaft.



for Preparation Click here

1. INSPECT FRONT DRIVE SHAFT ASSEMBLY

NOTICE:

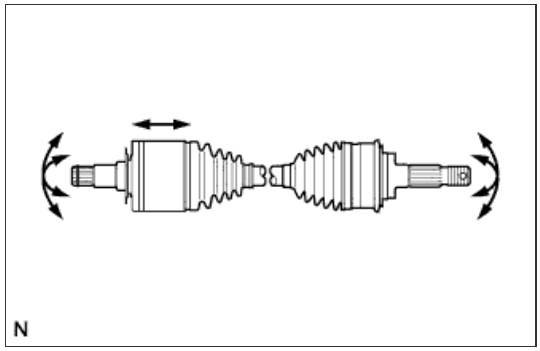
Move the drive shaft while keeping it level.

a. Check if there is excessive play in the outboard joint.

b. Check if the inboard joint shaft slides smoothly in the thrust direction.

c. Check if there is excessive play in the radial direction of the inboard joint shaft.

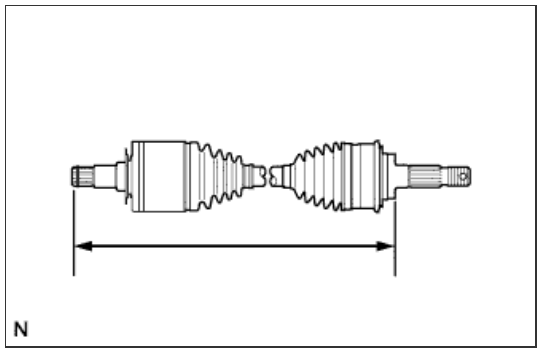
d. Check the boots for damage.



e. Check that the 2 boots are not stretched or contracted when the drive shaft is at standard length.

Standard drive shaft length:
583 mm (1.91 ft.)

If the boots are stretched or contracted, correct them.



for Preparation Click here

NOTICE:

Do not allow brake fluid, front differential oil, gasoline, or battery fluid to contact the drive shaft boots, as the boots may be damaged.

1. INSTALL FRONT DRIVE SHAFT DUST COVER LH

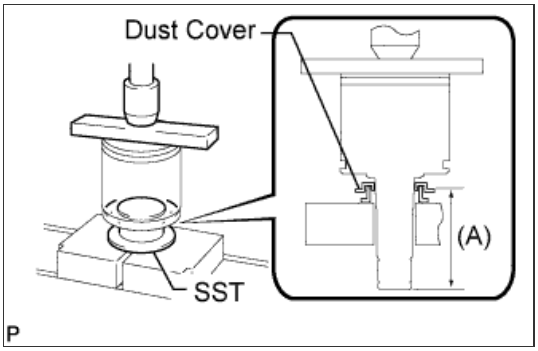
a. Using SST, a steel plate and press, press in a new dust cover.

SST
09316-20011

Standard length (A):
108.4 to 109.0 mm (4.27 to 4.29 in.)

NOTICE:

Be careful not to damage the dust cover.



2. INSTALL DUST SEAL

a. Using SST and a press, press in a new dust seal until it reaches the end of the outboard joint shaft assembly.

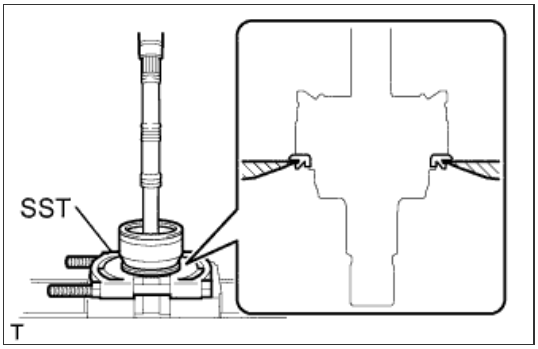
SST
09950-00020

NOTICE:

Be careful not to damage the dust seal.

HINT:

Place SST on a level surface.

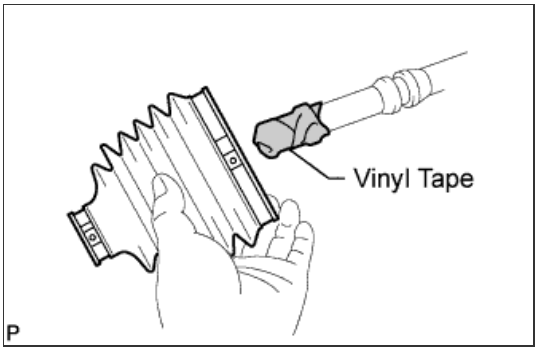


3. INSTALL FRONT AXLE OUTBOARD JOINT BOOT

a. Slide a new outboard joint boot onto the outboard joint shaft.

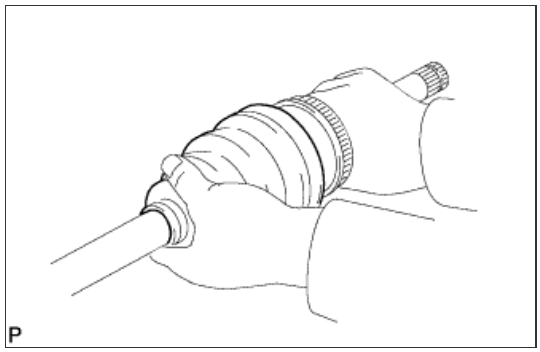
HINT:

Before installing the boot, wrap vinyl tape around the spline of the shaft to prevent damaging the boot.



b. Temporarily install the boot to the outboard joint shaft.

c. Attach a new front No. 1 axle outboard joint boot setting clamp onto the boot.

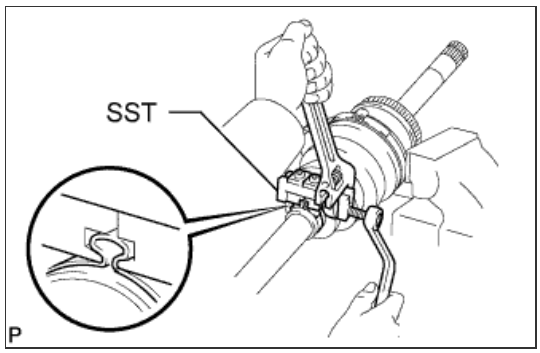


d. Using SST, pinch the clamp.

SST
09521-24010

NOTICE:

Do not overtighten SST.



e. Pack the outboard joint and boot with grease from a boot kit.

Standard grease capacity:
310 to 320 g (11.0 to 11.2 oz.)

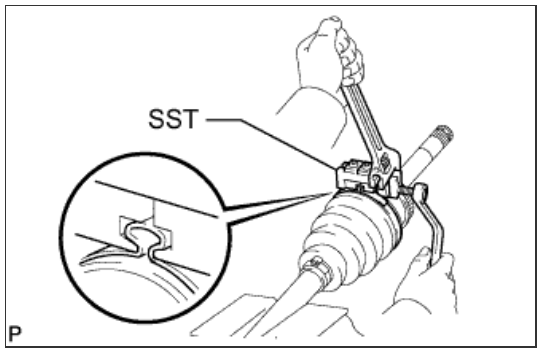
f. Attach a new front No. 2 axle outboard joint boot setting clamp onto the boot.

g. Using SST, pinch the clamp.

SST
09521-24010

NOTICE:

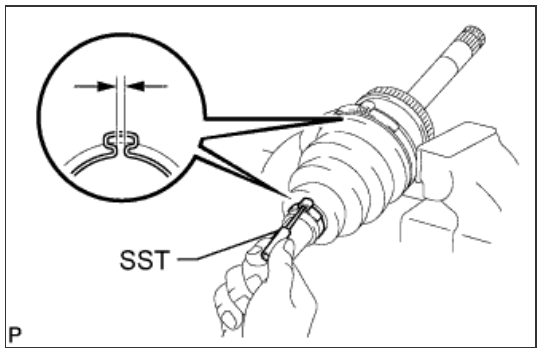
Do not overtighten SST.



h. Using SST, adjust the clearance of the clamps.

SST
09240-00020

Standard clearance:
1.5 mm (0.0591 in.)

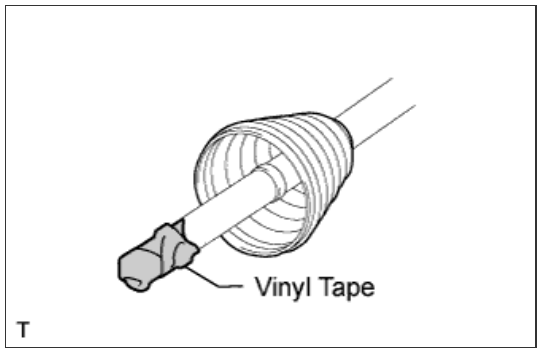


4. TEMPORARILY INSTALL FRONT AXLE INBOARD JOINT BOOT

a. Slide a new inboard joint boot onto the outboard joint shaft.

HINT:

Before installing the boot, wrap vinyl tape around the spline of the shaft to prevent damaging the boot.

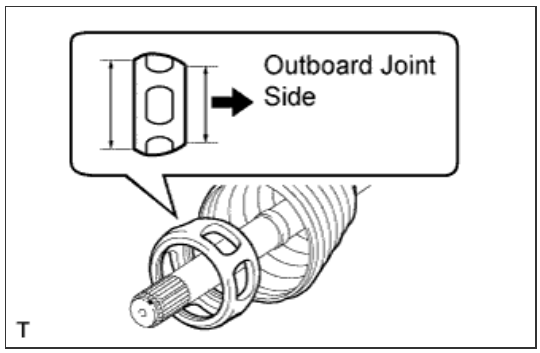


5. INSTALL FRONT AXLE INBOARD JOINT SHAFT

a. Install the cage to the outboard joint shaft.

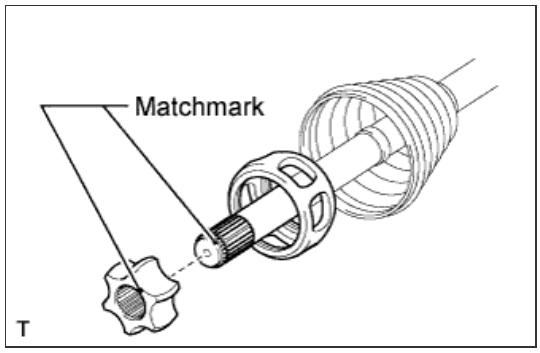
NOTICE:

Insert the cage with its smaller inner diameter side facing the outboard joint.

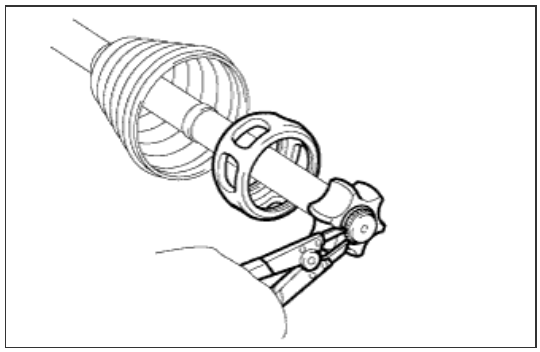


b. Align the matchmarks placed before removal.

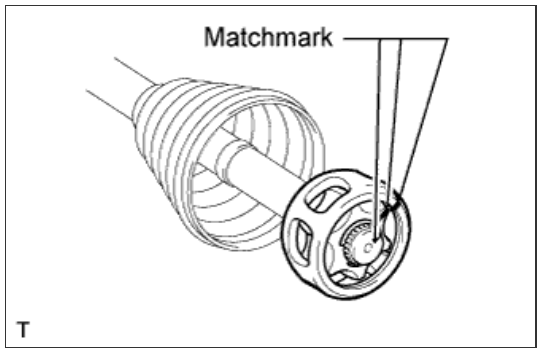
c. Install the inner race.



d. Using a snap ring expander, install a new snap ring.



e. Align the matchmarks placed before removal, and install the cage to the inner race.



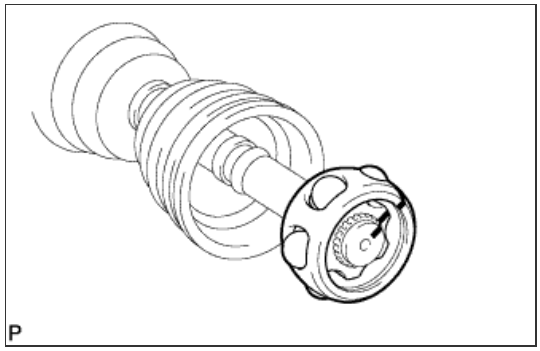
f. Install the 6 balls.

HINT:

Apply grease onto the balls to keep them from falling out.

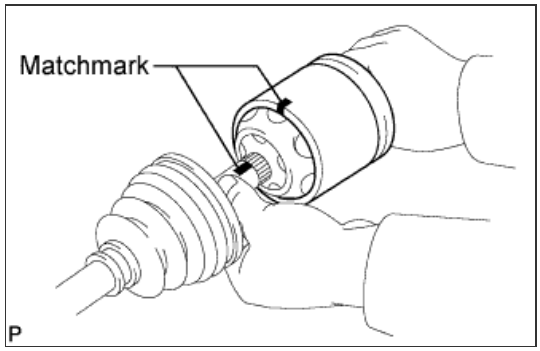
g. Pack the inboard joint shaft and boot with grease from a boot kit.

Standard grease capacity:
314 to 324 g (11.1 to 11.4 oz.)



h. Align the matchmarks placed before removal, and install the inboard joint shaft to the outboard joint shaft.

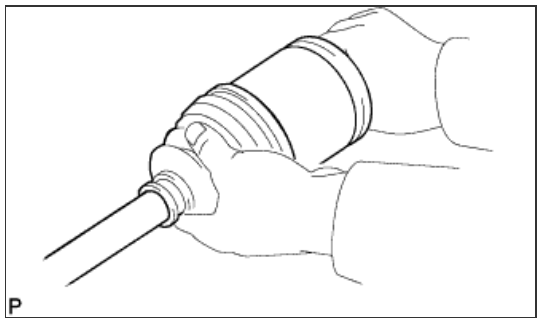
i. Install a new snap ring.



j. Temporarily install the boot to the inboard joint shaft.

HINT:

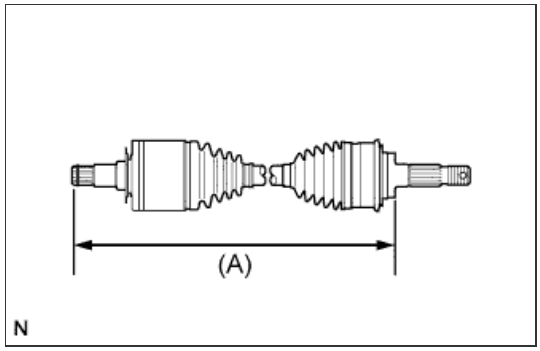
Make sure that the boot is on the shaft groove.



k. Check that the 2 boots are not stretched or contracted when the drive shaft is at standard length.

Standard drive shaft length (A):
583 mm (1.91 ft.)

If the boots are stretched or contracted, correct them.

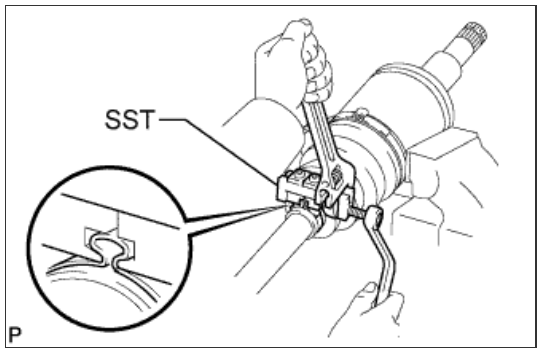


l. Using SST, attach a new front No. 1 axle inboard joint boot setting clamp onto the boot.

SST
09521-24010

NOTICE:

Do not overtighten SST.

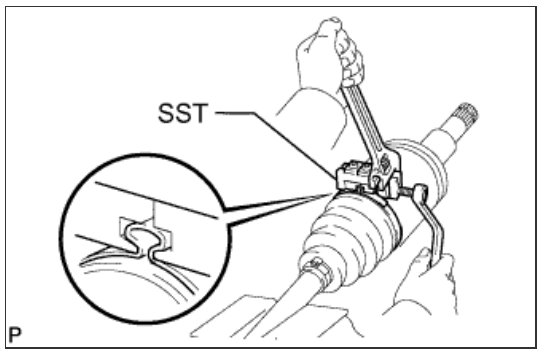


m. Using SST, attach a new front No. 2 axle inboard joint boot setting clamp onto the boot.

SST
09521-24010

NOTICE:

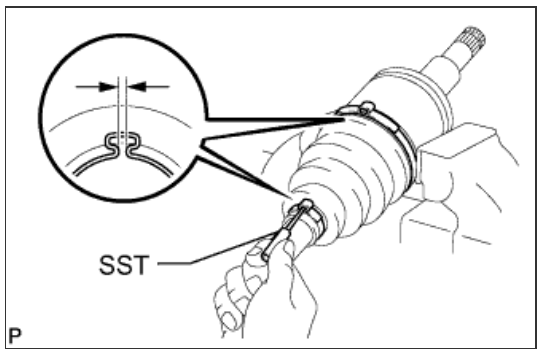
Do not overtighten SST.



n. Using SST, adjust the clearance of the clamps.

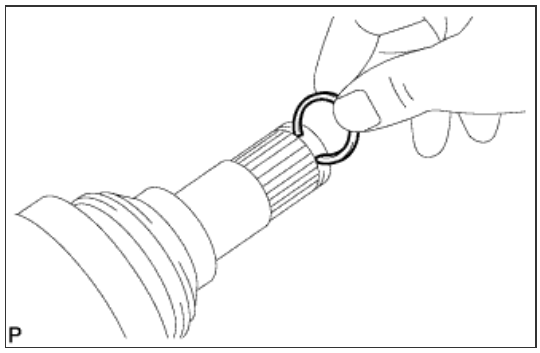
SST
09240-00020

Standard clearance:
1.5 mm (0.0591 in.)



6. INSTALL FRONT AXLE INBOARD JOINT SET SETTING SHAFT SNAP RING

a. Install a new snap ring to the inboard joint shaft.



7. INSPECT FRONT DRIVE SHAFT ASSEMBLY

NOTICE:

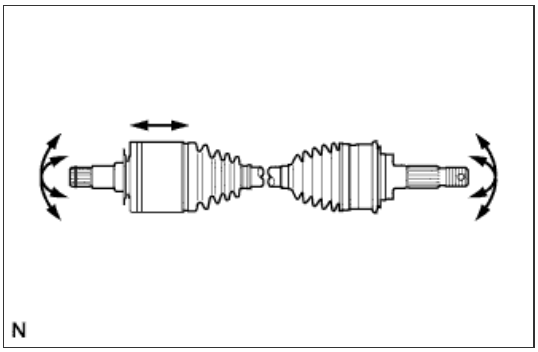
Move the drive shaft while keeping it level.

a. Check if there is excessive play in the outboard joint.

b. Check if the inboard joint shaft slides smoothly in the thrust direction.

c. Check if there is excessive play in the radial direction of the inboard joint shaft.

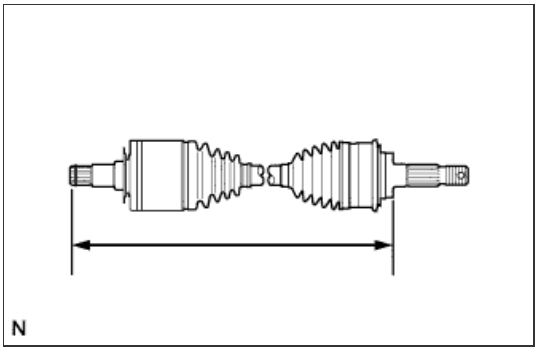
d. Check the boots for damage.



e. Check that the 2 boots are not stretched or contracted when the drive shaft is at standard length.

Standard drive shaft length:
583 mm (1.91 ft.)

If the boots are stretched or contracted, correct them.



for Preparation Click here

1. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

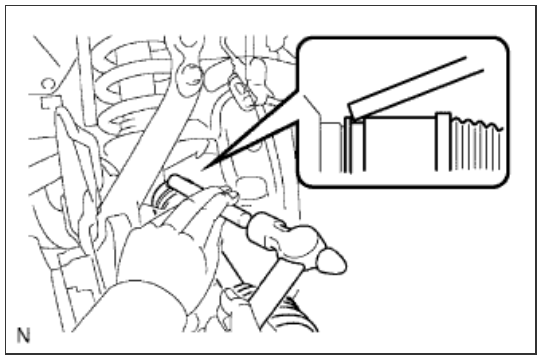
a. Coat the lip of the differential oil seal with MP grease.

HINT:

Inspect the oil seal for wear or damage.

b. Coat the spline of the inboard joint shaft assembly with hypoid gear oil.

c. Align the shaft splines and install the drive shaft with a brass bar and hammer.



NOTICE:

- **Set the snap ring with the opening side facing downward.**
- **Be careful not to damage the oil seal, boot and dust cover.**
- **If the outboard joint shaft is new, remove the anti-rust oil on the screw end with non-residue solvent.**

HINT:

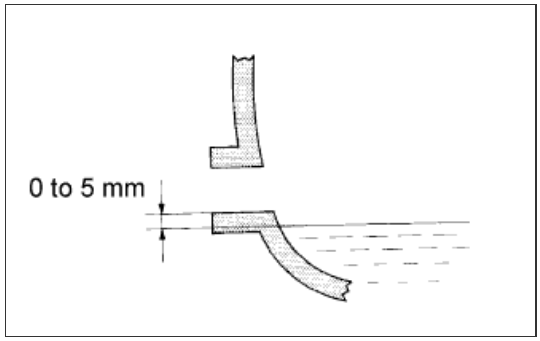
Whether the inboard joint shaft is in contact with the pinion shaft or not can be confirmed from the sound or feeling when driving it.

2. INSTALL FRONT AXLE ASSEMBLY LH

a. Install the front axle assembly (Click here).

3. ADD DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.



NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)

b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

ii. Install the engine under cover (Click here).

c. Rear Differential:

i. Install a new gasket and the filler plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

4. CHECK SPEED SENSOR SIGNAL

a. Check the speed sensor signal (Click here).

5. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

a. Inspect and adjust the front wheel alignment (Click here).

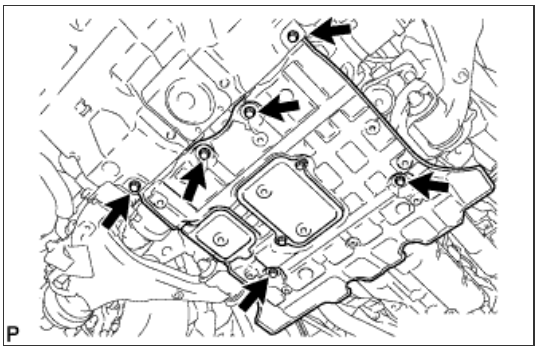
6. ADJUST HEADLIGHT ASSEMBLY

a. Adjust the headlight assembly (Click here).

7. INSTALL NO. 2 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

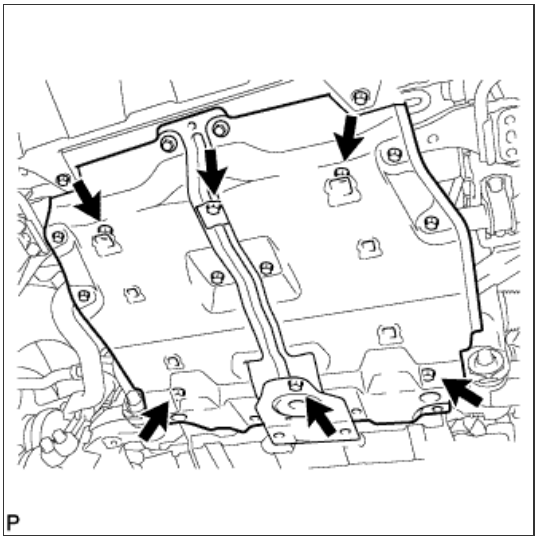
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



8. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY

a. Install the under cover with the 6 bolts.

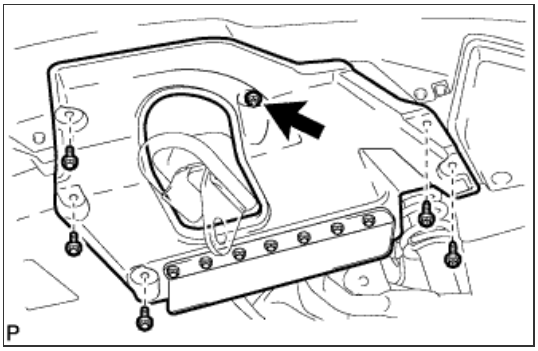
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



9. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Push in the clip indicated by the arrow in the illustration to install the fender splash shield.

b. Install the 3 bolts and 2 screws.



10. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

for Preparation Click here

1. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

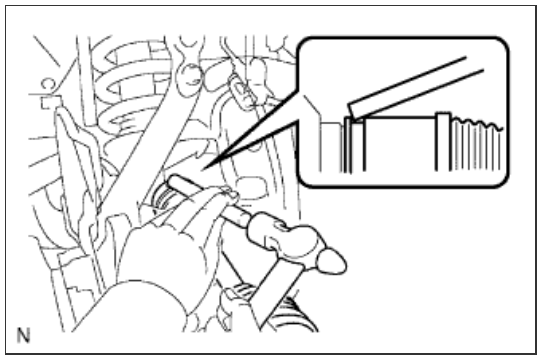
a. Coat the lip of the differential oil seal with MP grease.

HINT:

Inspect the oil seal for wear or damage.

b. Coat the spline of the inboard joint shaft assembly with hypoid gear oil.

c. Align the shaft splines and install the drive shaft with a brass bar and hammer.



NOTICE:

- **Set the snap ring with the opening side facing downward.**
- **Be careful not to damage the oil seal, boot and dust cover.**
- **If the outboard joint shaft is new, remove the anti-rust oil on the screw end with non-residue solvent.**

HINT:

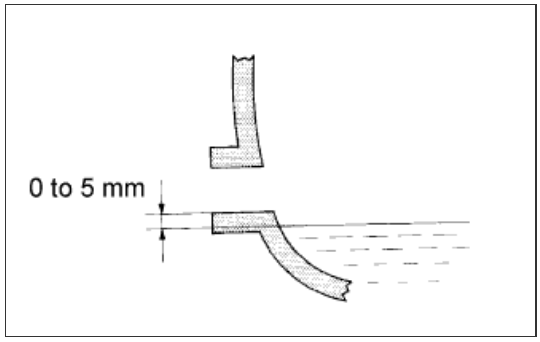
Whether the inboard joint shaft is in contact with the pinion shaft or not can be confirmed from the sound or feeling when driving it.

2. INSTALL FRONT AXLE ASSEMBLY LH

(Click here)

3. ADD DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.



NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)

b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

ii. Install the engine under cover (Click here).

c. Rear Differential:

i. Install a new gasket and the filler plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

4. CHECK SPEED SENSOR SIGNAL

(Click here)

5. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

(Click here)

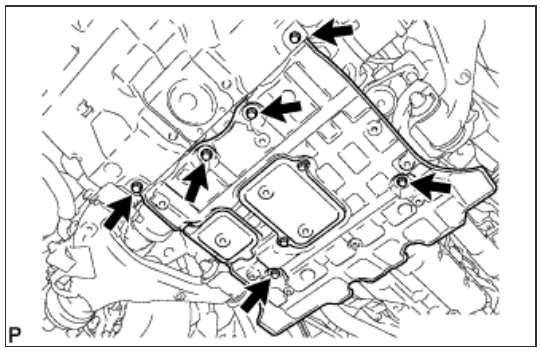
6. ADJUST HEADLIGHT ASSEMBLY

(Click here)

7. INSTALL NO. 2 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

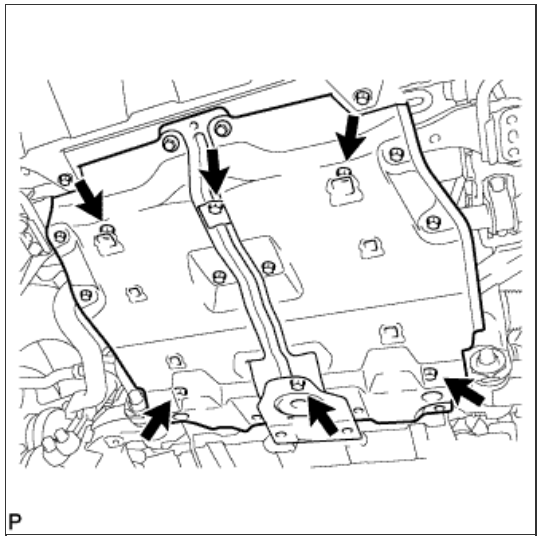
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



8. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY

a. Install the under cover with the 6 bolts.

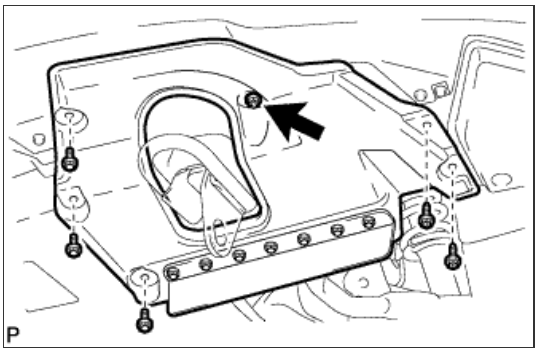
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



9. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Push in the clip indicated by the arrow in the illustration to install the fender splash shield.

b. Install the 3 bolts and 2 screws.



10. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

for Preparation Click here

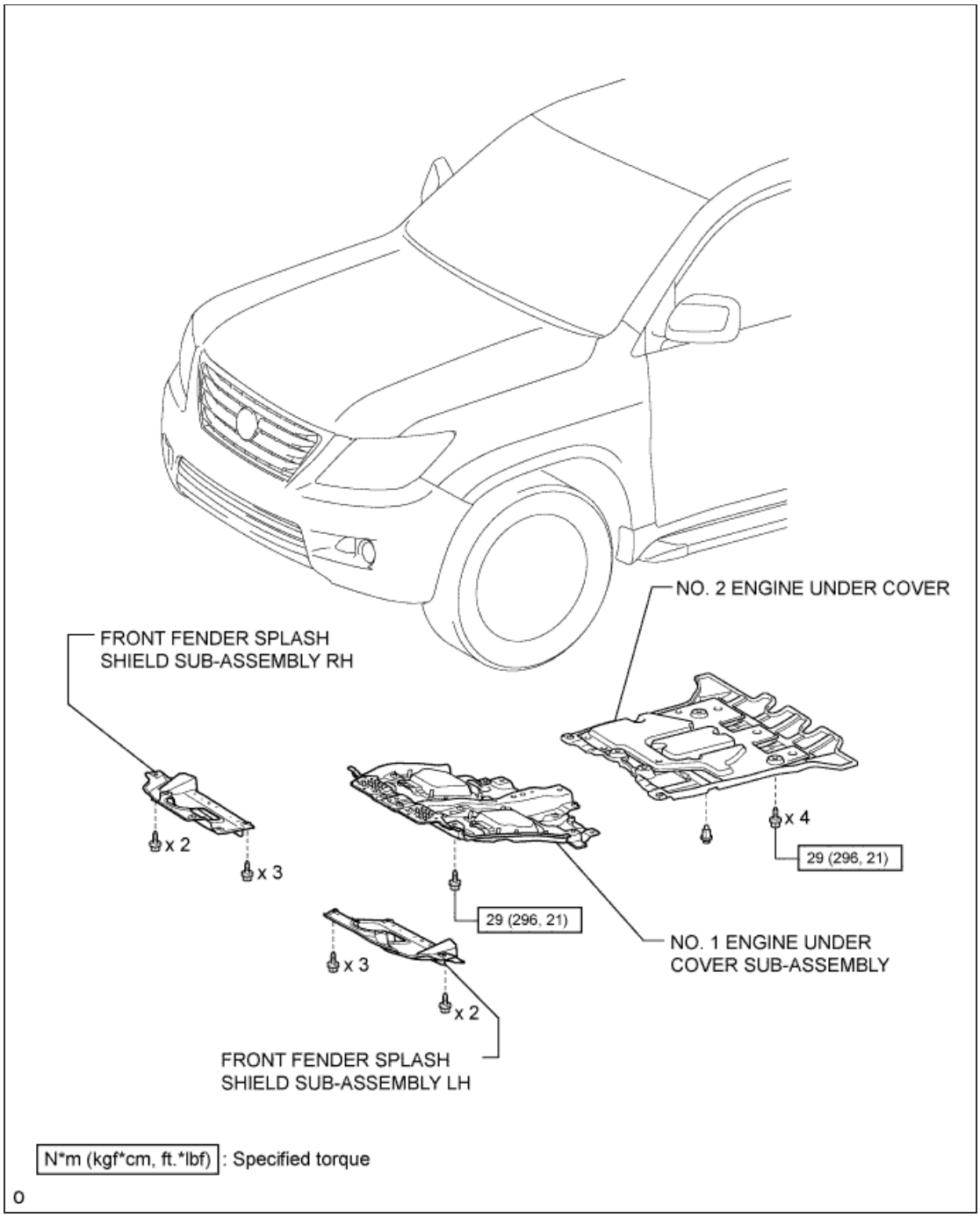
HINT:

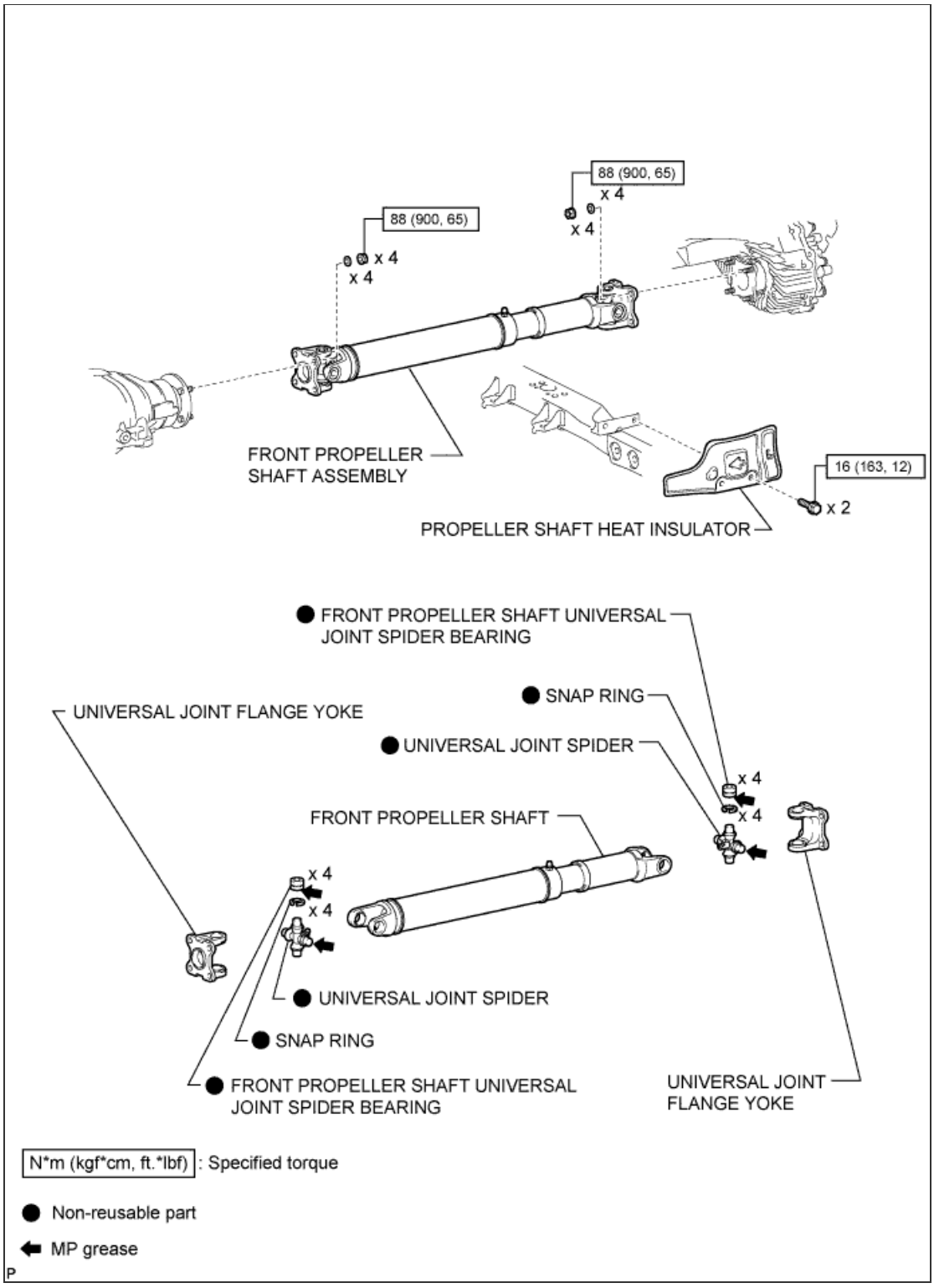
Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Propeller Shaft System

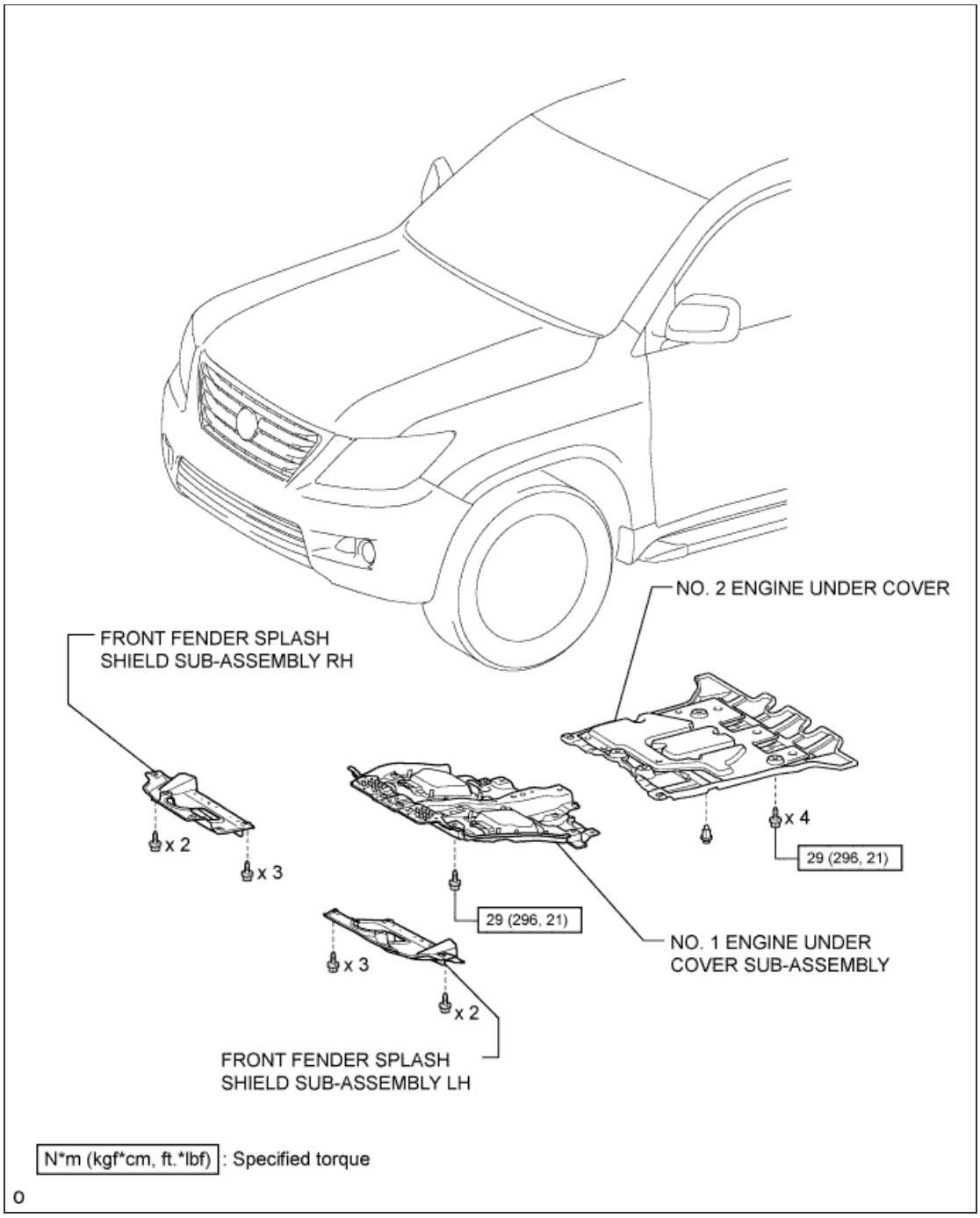
Symptom	Suspected Area	See page
Noise and Vibration from the front propeller shaft	Front propeller shaft	Click here
Noise and Vibration from the rear propeller shaft	Rear propeller shaft	Click here

for Preparation Click here

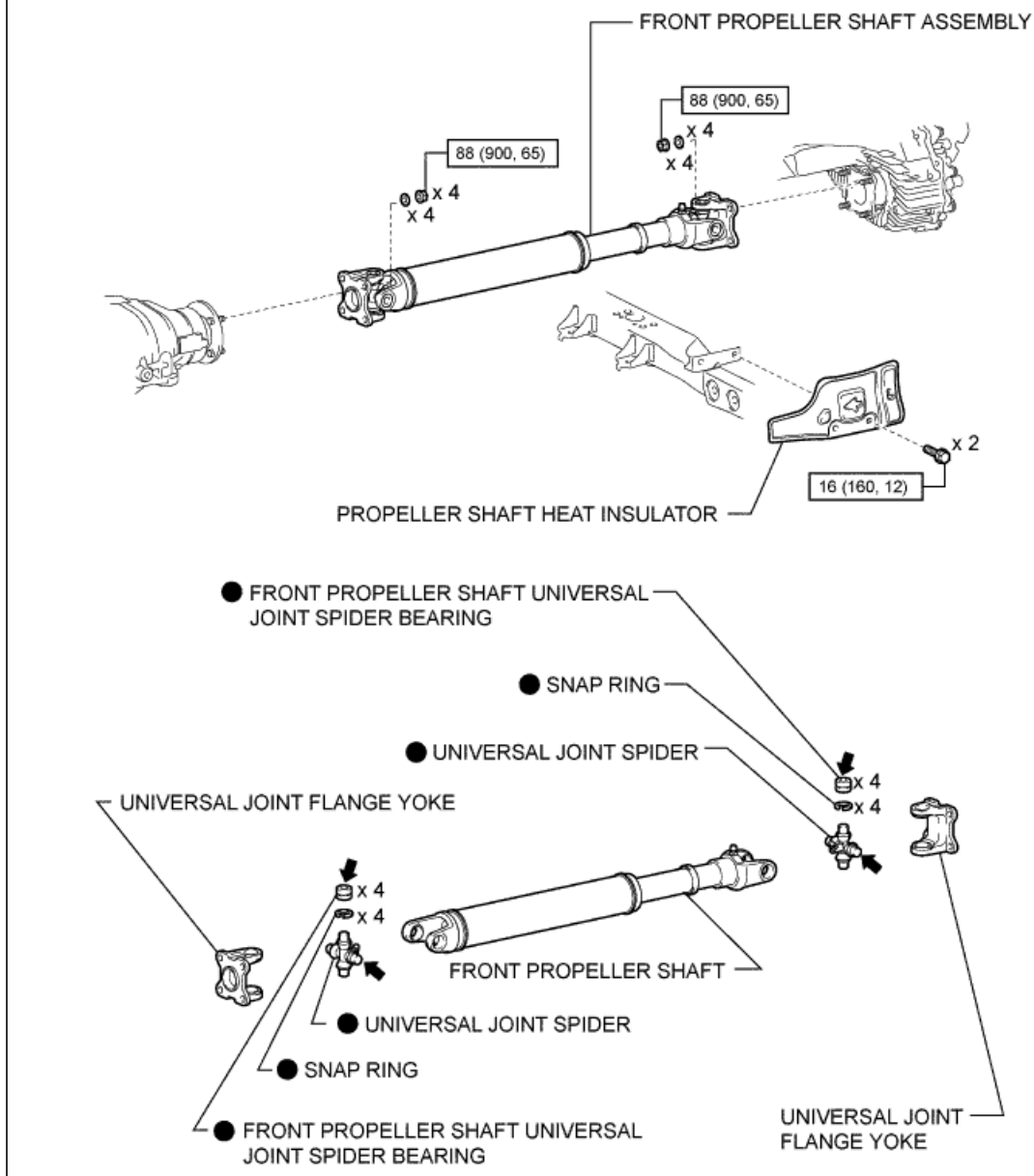



88 (900, 65)
x 4
88 (900, 65)
x 4
x 4
FRONT PROPELLER SHAFT ASSEMBLY
16 (163, 12)
x 2
PROPELLER SHAFT HEAT INSULATOR
FRONT PROPELLER SHAFT UNIVERSAL JOINT SPIDER BEARING
SNAP RING
UNIVERSAL JOINT FLANGE YOKE
UNIVERSAL JOINT SPIDER
x 4
x 4
FRONT PROPELLER SHAFT
x 4
x 4
UNIVERSAL JOINT SPIDER
SNAP RING
FRONT PROPELLER SHAFT UNIVERSAL JOINT SPIDER BEARING
UNIVERSAL JOINT FLANGE YOKE
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
MP grease
P

for Preparation Click here



w/o CENTER GREASE FITTING TYPE :

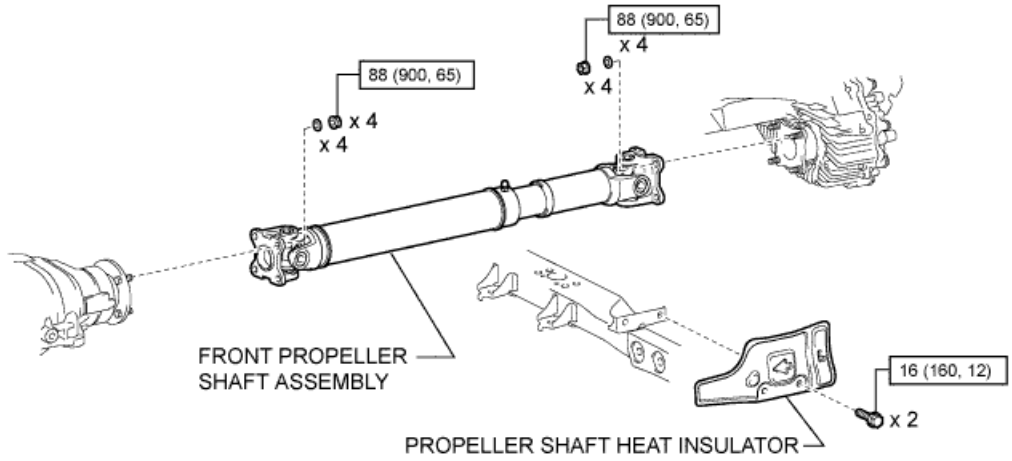


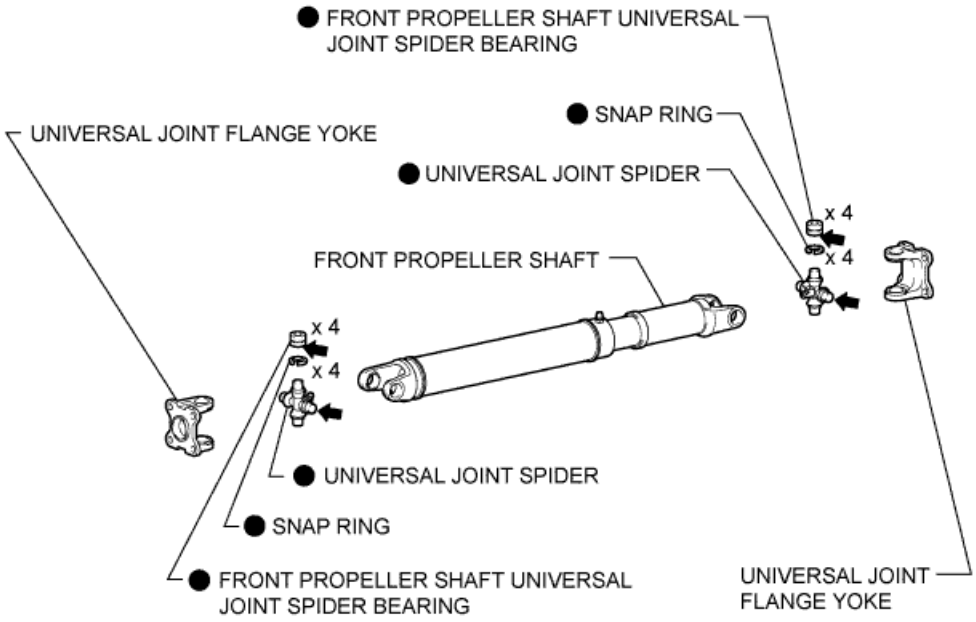
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ MP grease

w/ CENTER GREASE FITTING TYPE:





N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ MP grease

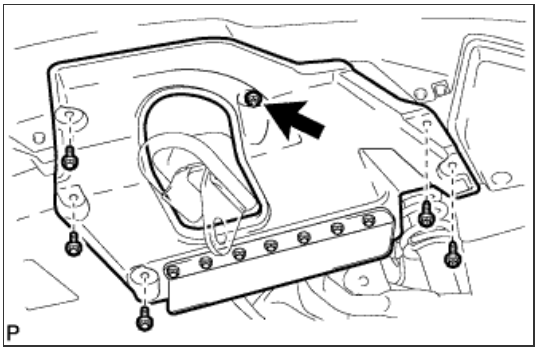
P

for Preparation Click here

1. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Remove the 3 bolts and 2 screws.

b. Turn the clip indicated by the arrow in the illustration to remove the fender splash shield.



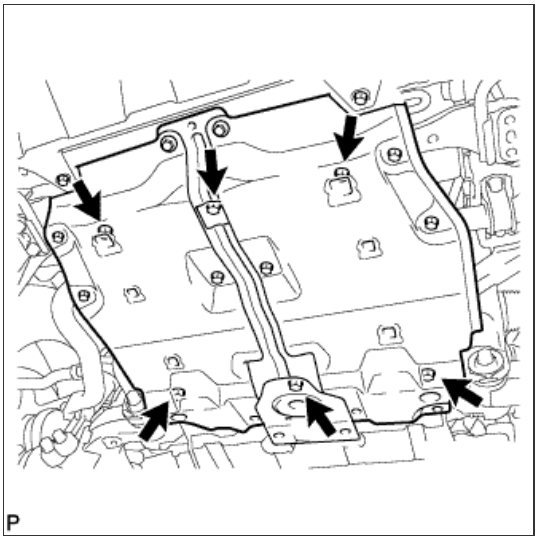
2. REMOVE FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

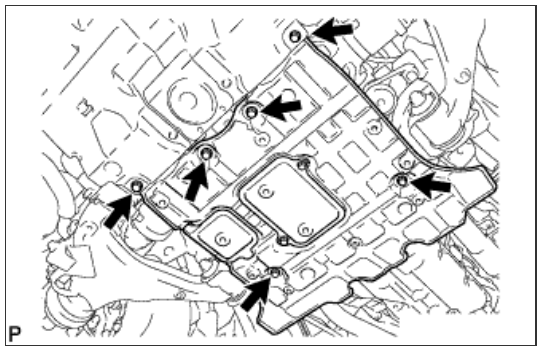
3. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY

a. Remove the 6 bolts and under cover.



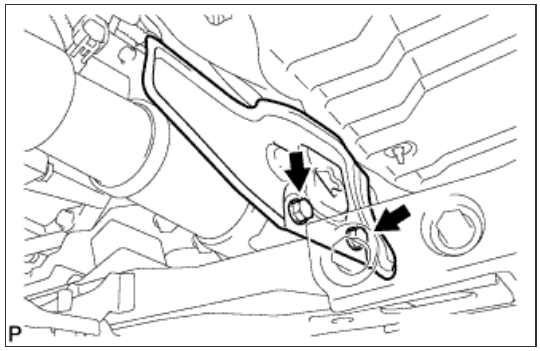
4. REMOVE NO. 2 ENGINE UNDER COVER

a. Remove the 6 bolts and under cover.



5. REMOVE PROPELLER SHAFT HEAT INSULATOR

a. Remove the 2 bolts and insulator.

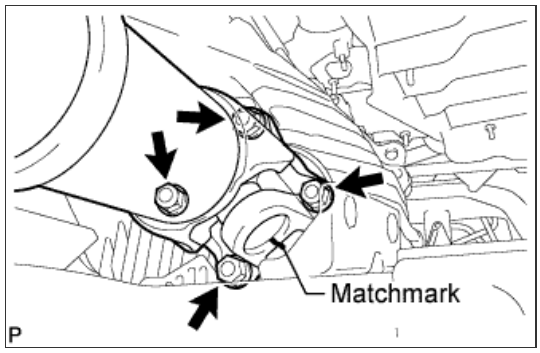


6. REMOVE FRONT PROPELLER SHAFT ASSEMBLY

a. for Transfer Side:

i. Place matchmarks on the propeller shaft flange and transfer flange.

ii. Remove the 4 nuts and 4 washers.

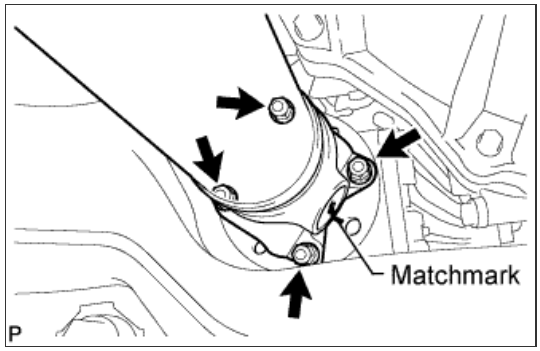


b. for Differential Side:

i. Place matchmarks on the propeller shaft flange and differential flange.

ii. Remove the 4 nuts and 4 washers.

c. Remove the front propeller shaft.



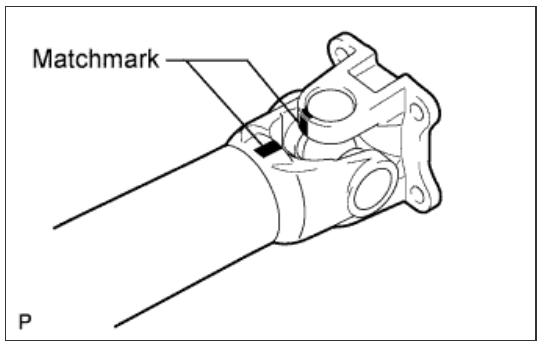
for Preparation Click here

NOTICE:

Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

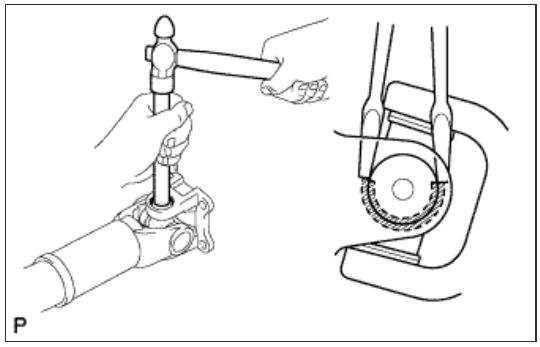
1. REMOVE FRONT PROPELLER SHAFT UNIVERSAL JOINT SPIDER ASSEMBLY

a. Place matchmarks on the flange yoke and sleeve yoke or propeller shaft.



b. Using a brass bar and hammer, slightly tap in the spider bearing outer races.

c. Using 2 screwdrivers, remove the 4 snap rings from the grooves.

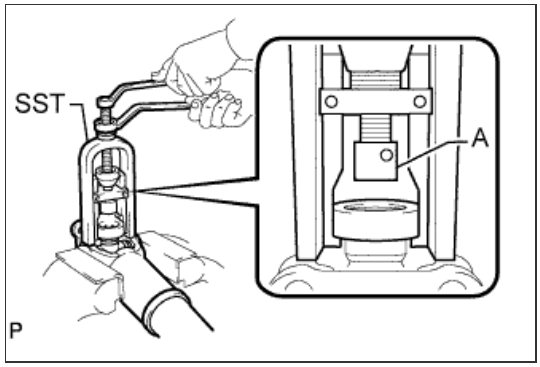


d. Using SST, push out the bearing from the flange.

SST
09332-25010

HINT:

Before installing SST, sufficiently raise the part labeled A. If part A is too low, SST may be difficult to install.

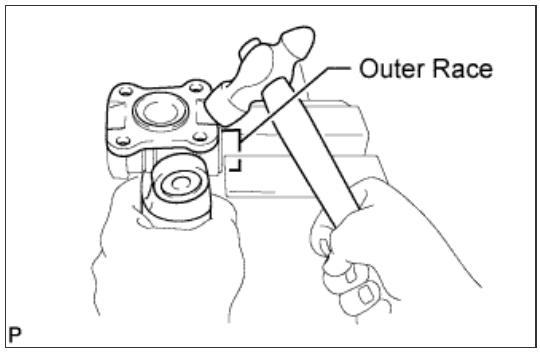


e. Clamp the bearing outer race in a vise and tap off the flange with a hammer.

HINT:

Remove the bearing on the opposite side using the same procedure.

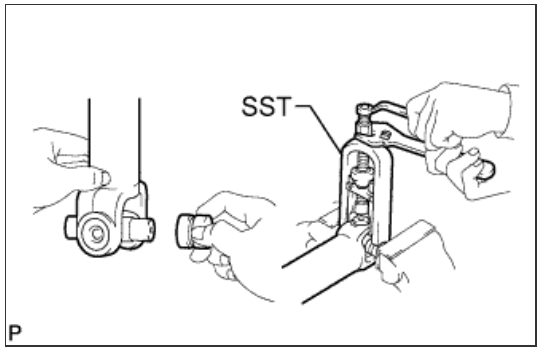
f. Remove the flange yoke from the sleeve yoke (or propeller shaft).



g. Install the 2 removed bearing outer races to the spider.

h. Using SST, push out the bearing from the yoke.

SST
09332-25010



i. Clamp the outer bearing race in a vise and tap off the yoke with a hammer.

HINT:

Remove the bearing on the opposite side using the same procedure.

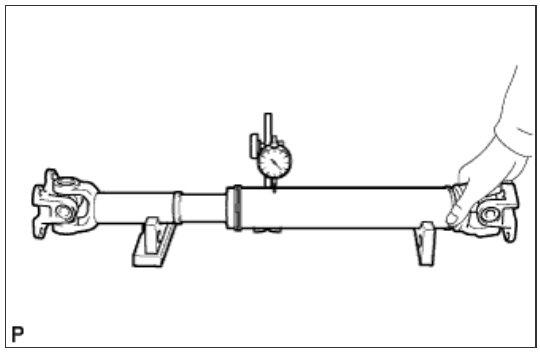
for Preparation Click here

1. INSPECT FRONT PROPELLER SHAFT ASSEMBLY

a. Using a dial indicator, measure the propeller shaft runout.

Maximum runout:
0.8 mm (0.031 in.)

If the shaft runout is more than the maximum, replace the shaft.



2. INSPECT SPIDER BEARING

NOTICE:

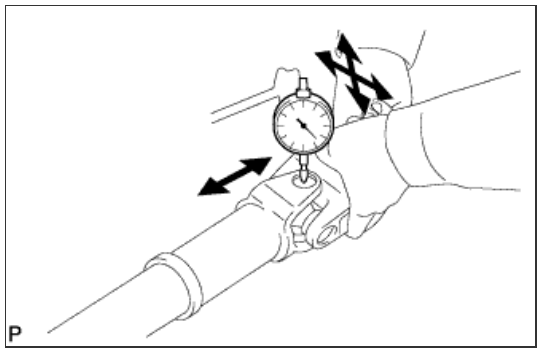
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

a. Check the spider bearings for wear or damage.

b. Check the spider bearing axial play by turning the yoke while holding the shaft tightly.

Maximum bearing axial play:
0 mm (0 in.)

If the axial play is more than the maximum, replace the spider bearing.



for Preparation Click here

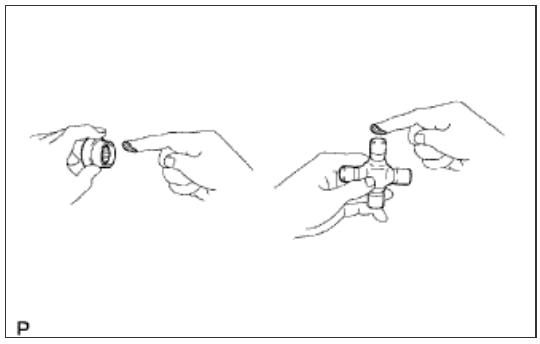
1. INSTALL FRONT PROPELLER SHAFT UNIVERSAL JOINT SPIDER ASSEMBLY

a. Apply MP grease to a new spider and a new bearings.

NOTICE:

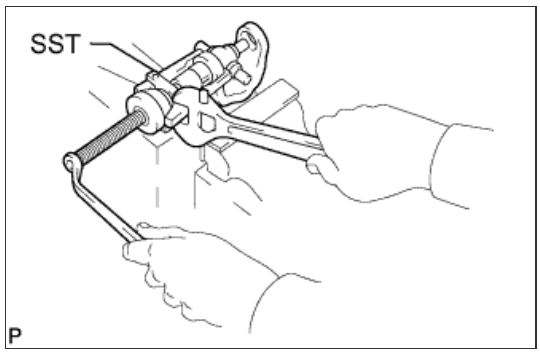
Be careful not to apply too much grease.

b. Fit the spider into the flange yoke.



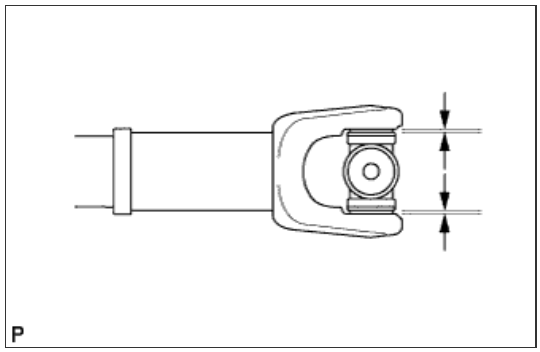
c. Using SST, install the bearings on the spider.

SST
09332-25010



d. Using SST, adjust both bearings so that the snap ring grooves are at maximum and equal in width.

SST
09332-25010



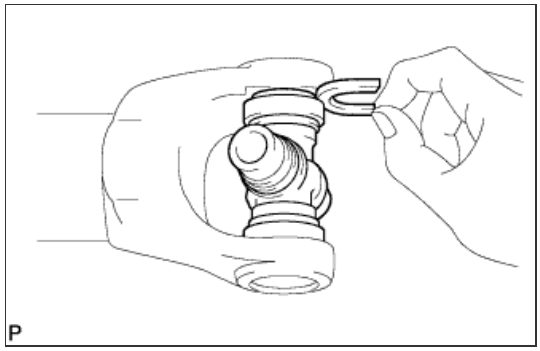
e. Install 2 new snap rings of equal thickness which will allow 0 mm (0 in.) of axial play.

HINT:

Do not reuse the snap rings.

Standard Snap Ring Thickness :

Color	Mark	Specified Condition
-	J	2.18 to 2.20 mm (0.0858 to 0.0866 in.)
-	K	2.20 to 2.22 mm (0.0866 to 0.0874 in.)
-	F	2.22 to 2.24 mm (0.0874 to 0.0882



		in.)
-	G	2.24 to 2.26 mm (0.0882 to 0.0890 in.)
-	H	2.26 to 2.28 mm (0.0890 to 0.0898 in.)
-	1	2.28 to 2.30 mm (0.0898 to 0.0906 in.)
-	2	2.30 to 2.32 mm (0.0906 to 0.0913 in.)
-	-	2.32 to 2.34 mm (0.0913 to 0.0921 in.)
Brown	-	2.34 to 2.36 mm (0.0921 to 0.0929 in.)
Blue	-	2.36 to 2.38 mm (0.0929 to 0.0937 in.)
-	6	2.38 to 2.40 mm (0.0937 to 0.0945 in.)
-	7	2.40 to 2.42 mm (0.0945 to 0.0953 in.)
-	8	2.42 to 2.44 mm (0.0953 to 0.0961 in.)
-	九	2.44 to 2.46 mm (0.0961 to 0.0969 in.)
-	10	2.46 to 2.48 mm (0.0969 to 0.0976 in.)
-	A	2.48 to 2.50 mm (0.0976 to 0.0984 in.)
-	B	2.50 to 2.52 mm (0.0984 to 0.0992 in.)
-	C	2.52 to 2.54 mm (0.0992 to 0.1000 in.)
-	D	2.54 to 2.56 mm (0.1000 to 0.1008 in.)
-	E	2.56 to 2.58 mm (0.1008 to 0.1016 in.)

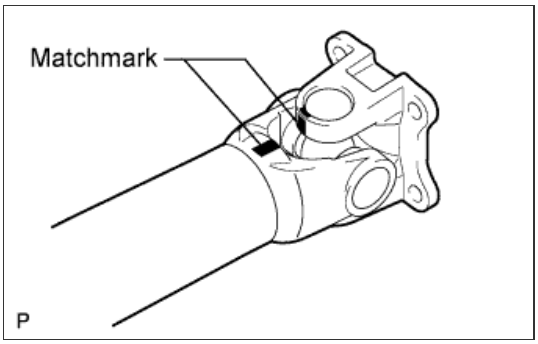
f. Using a hammer, tap the yoke until there is no clearance between the bearing outer race and snap ring.

g. Align the matchmarks on the propeller shaft and flange yoke or flange yoke and sleeve yoke.

h. Install the flange yoke to the sleeve yoke or propeller shaft.

HINT:

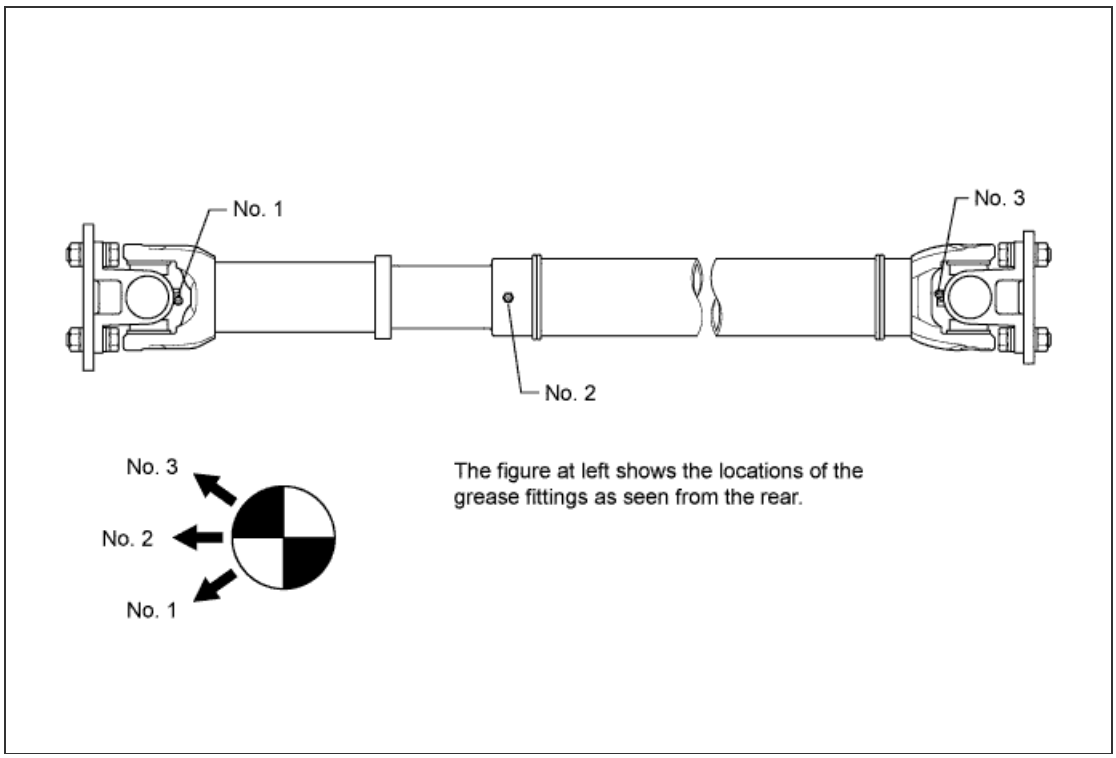
Install 2 new spider bearings and snap rings on the flange yoke side using the procedure described above.



2. INSPECT PROPELLER SHAFT GREASE FITTING DIRECTION

HINT:

When replacing a spider bearing, be sure that the grease fitting hole is facing the direction shown in the illustration.



3. INSPECT SPIDER BEARING

NOTICE:

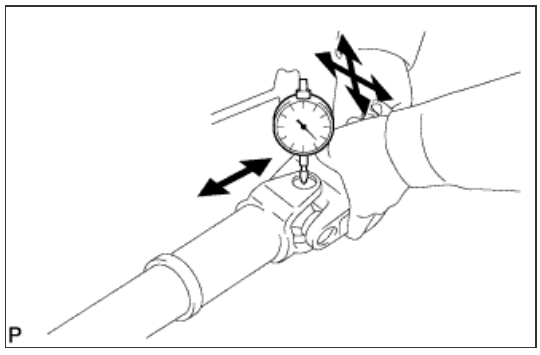
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

a. Check the spider bearings for wear or damage.

b. Check the spider bearing axial play by turning the yoke while holding the shaft tightly.

Maximum bearing axial play:
0 mm (0 in.)

If the axial play is more than the maximum, replace the spider bearing.



for Preparation Click here

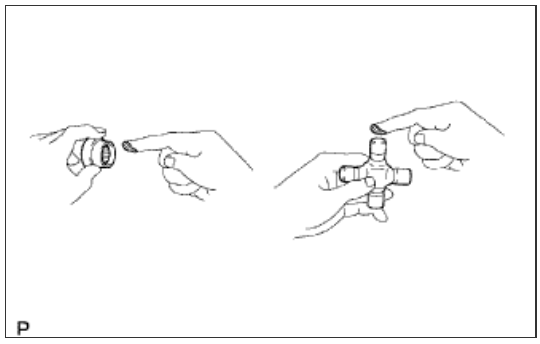
1. INSTALL FRONT PROPELLER SHAFT UNIVERSAL JOINT SPIDER ASSEMBLY

a. Apply MP grease to a new spider and a new bearings.

NOTICE:

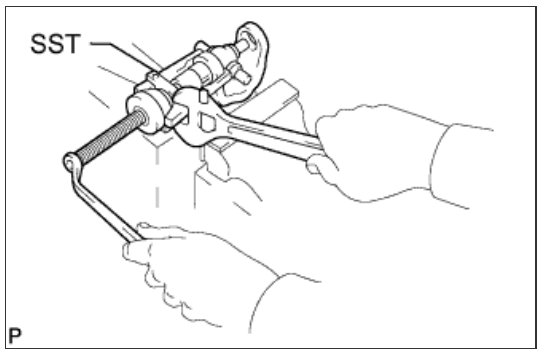
Be careful not to apply too much grease.

b. Fit the spider into the flange yoke.



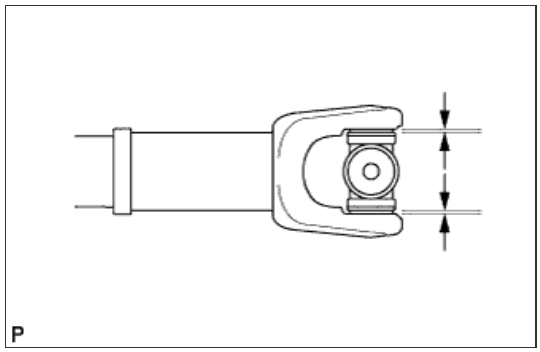
c. Using SST, install the bearings on the spider.

SST
09332-25010



d. Using SST, adjust both bearings so that the snap ring grooves are at maximum and equal in width.

SST
09332-25010



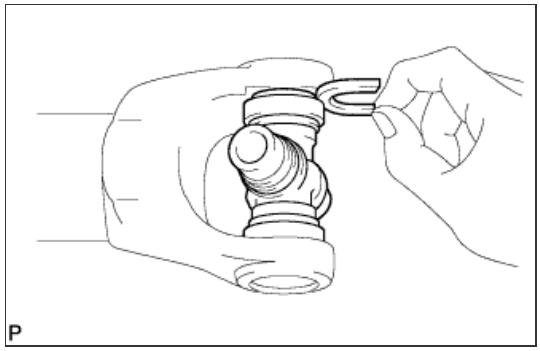
e. Install 2 new snap rings of equal thickness which will allow 0 mm (0 in.) of axial play.

HINT:

Do not reuse the snap rings.

Standard Snap Ring Thickness :

Color	Mark	Specified Condition
-	J	2.18 to 2.20 mm (0.0858 to 0.0866 in.)
-	K	2.20 to 2.22 mm (0.0866 to 0.0874 in.)
-	F	2.22 to 2.24 mm (0.0874 to 0.0882



		in.)
-	G	2.24 to 2.26 mm (0.0882 to 0.0890 in.)
-	H	2.26 to 2.28 mm (0.0890 to 0.0898 in.)
-	1	2.28 to 2.30 mm (0.0898 to 0.0906 in.)
-	2	2.30 to 2.32 mm (0.0906 to 0.0913 in.)
-	-	2.32 to 2.34 mm (0.0913 to 0.0921 in.)
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-	8	2.42 to 2.44 mm (0.0953 to 0.0961 in.)
-	九	2.44 to 2.46 mm (0.0961 to 0.0969 in.)
-	10	2.46 to 2.48 mm (0.0969 to 0.0976 in.)
-	A	2.48 to 2.50 mm (0.0976 to 0.0984 in.)
-	B	2.50 to 2.52 mm (0.0984 to 0.0992 in.)
-	C	2.52 to 2.54 mm (0.0992 to 0.1000 in.)
-	D	2.54 to 2.56 mm (0.1000 to 0.1008 in.)
-	E	2.56 to 2.58 mm (0.1008 to 0.1016 in.)

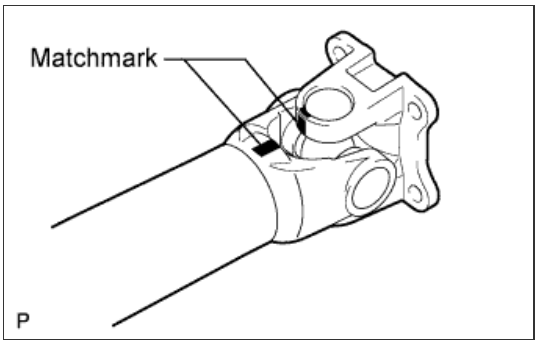
f. Using a hammer, tap the yoke until there is no clearance between the bearing outer race and snap ring.

g. Align the matchmarks on the propeller shaft and flange yoke or flange yoke and sleeve yoke.

h. Install the flange yoke to the sleeve yoke or propeller shaft.

HINT:

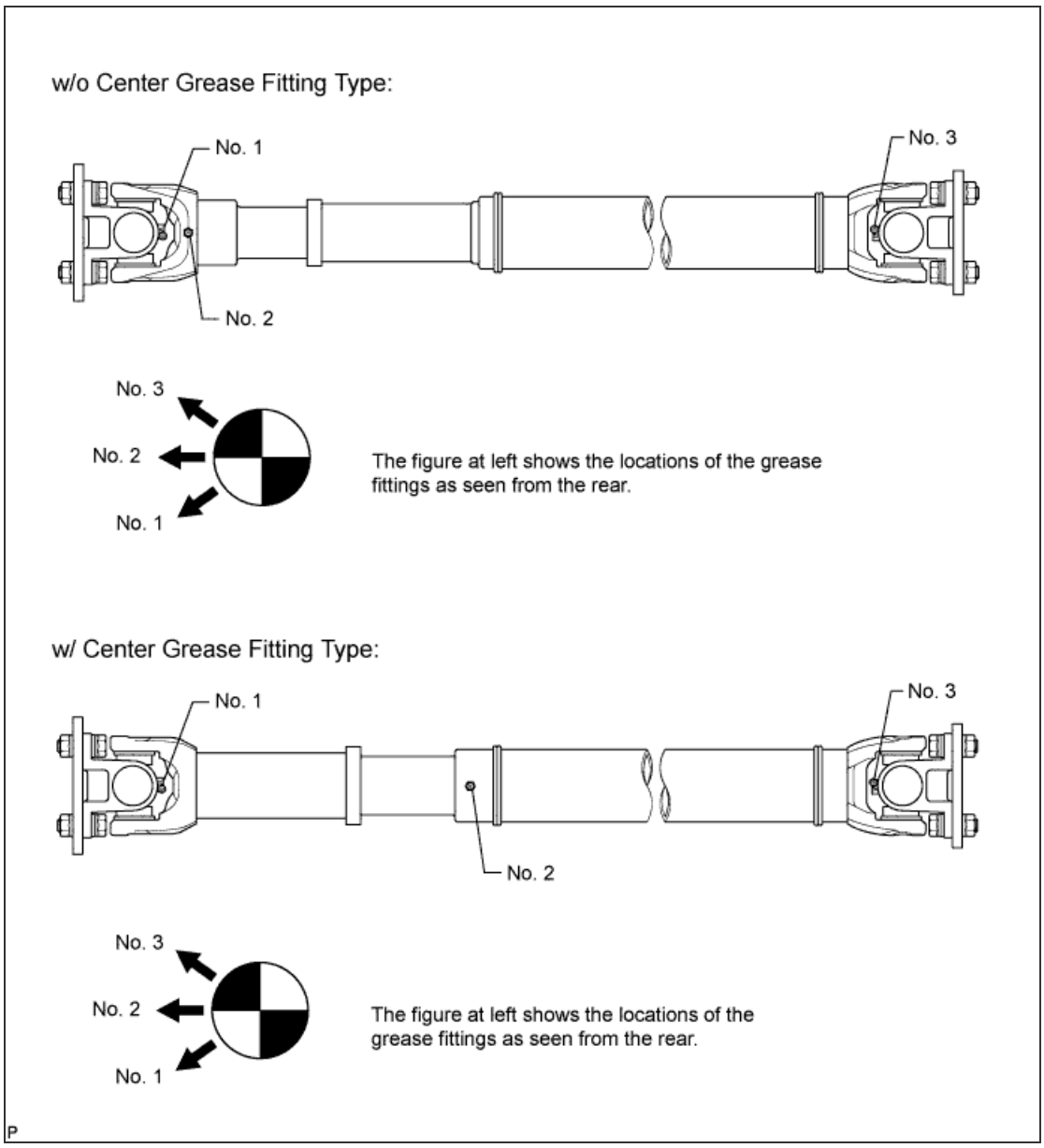
Install 2 new spider bearings and snap rings on the flange yoke side using the procedure described above.



2. INSPECT PROPELLER SHAFT GREASE FITTING DIRECTION

HINT:

When replacing a spider bearing, be sure that the grease fitting hole is facing the direction shown in the illustration.



3. INSPECT SPIDER BEARING

NOTICE:

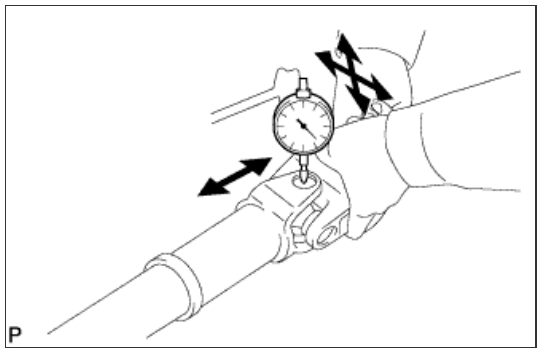
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

a. Check the spider bearings for wear or damage.

b. Check the spider bearing axial play by turning the yoke while holding the shaft tightly.

Maximum bearing axial play:
0 mm (0 in.)

If the axial play is more than the maximum, replace the spider bearing.



for Preparation Click here

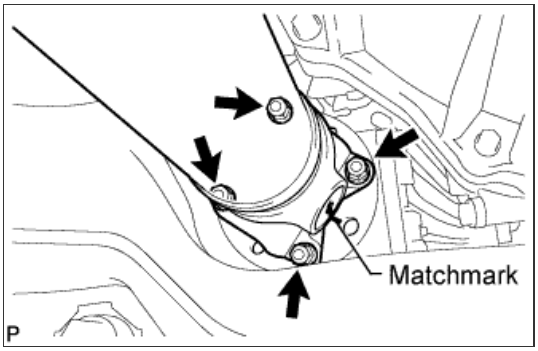
1. INSTALL FRONT PROPELLER SHAFT ASSEMBLY

a. for Differential Side:

i. Align the matchmarks on the yoke and differential flange.

ii. Connect the propeller shaft with the 4 washers and 4 nuts.

Torque:
88 N*m{ 900 kgf*cm , 65 ft.*lbf }

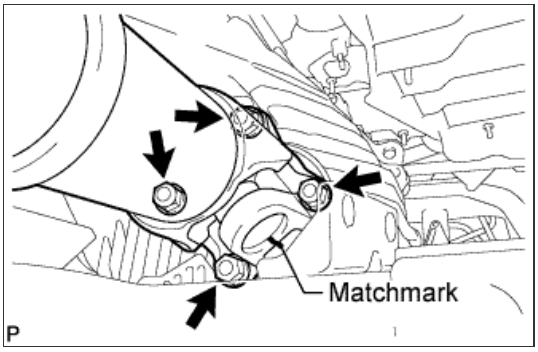


b. for Transfer Side:

i. Align the matchmarks on the yoke and transfer flange.

ii. Install the propeller shaft with the 4 washers and 4 nuts.

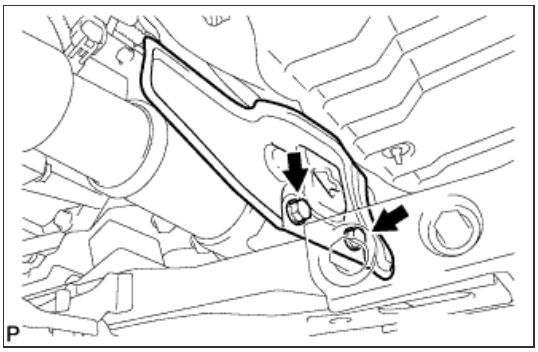
Torque:
88 N*m{ 900 kgf*cm , 65 ft.*lbf }



2. INSTALL PROPELLER SHAFT HEAT INSULATOR

a. Install the insulator with the 2 bolts.

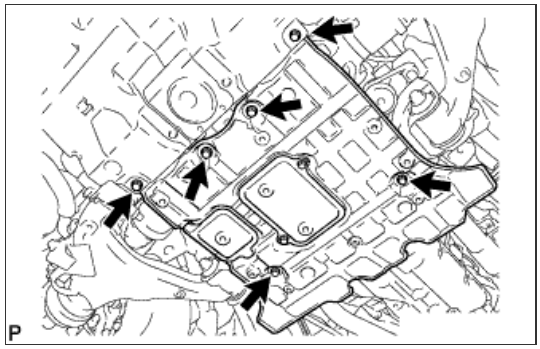
Torque:
16 N*m{ 163 kgf*cm , 12 ft.*lbf }



3. INSTALL NO. 2 ENGINE UNDER COVER

a. Install the under cover with the 6 bolts.

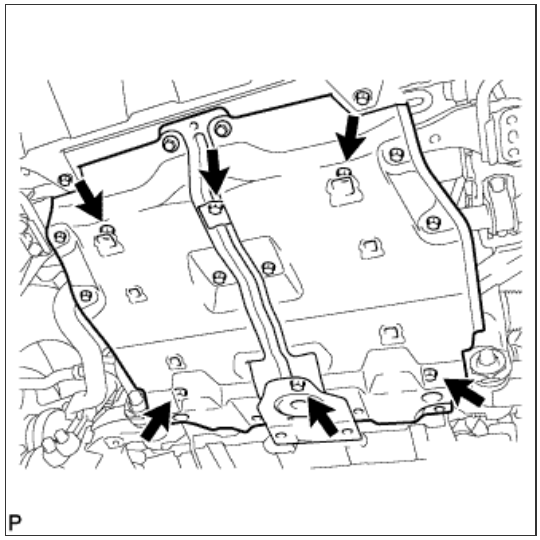
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



4. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY

a. Install the under cover with the 6 bolts.

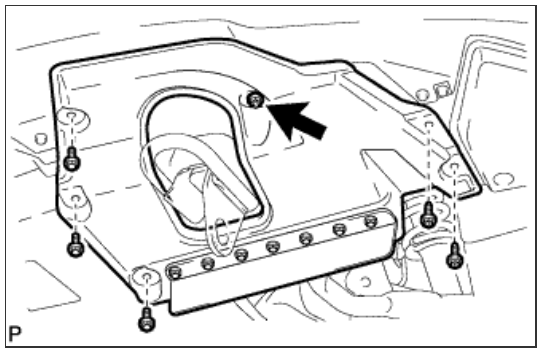
Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



5. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY LH

a. Push in the clip indicated by the arrow in the illustration to install the fender splash shield.

b. Install the 3 bolts and 2 screws.

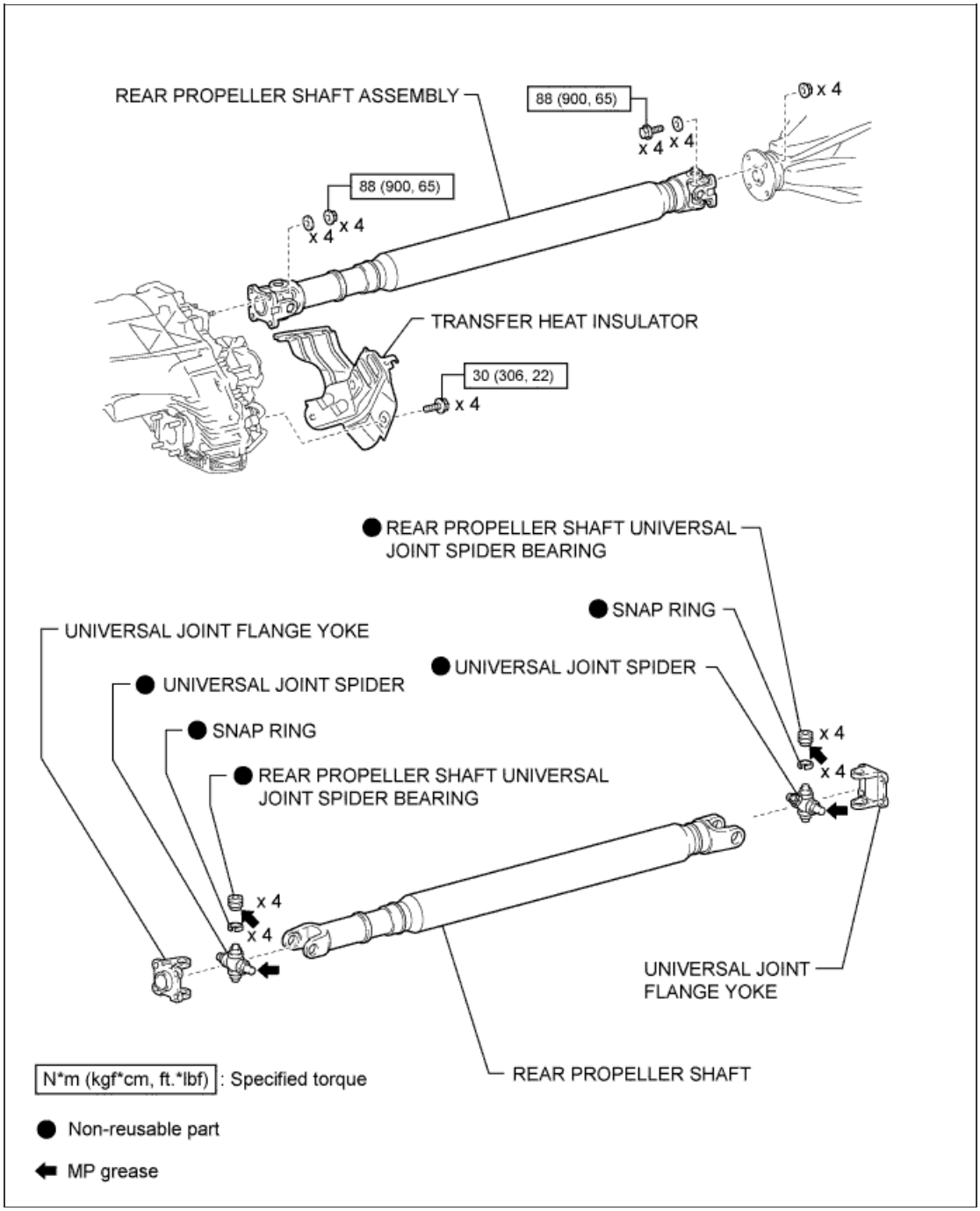


6. INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

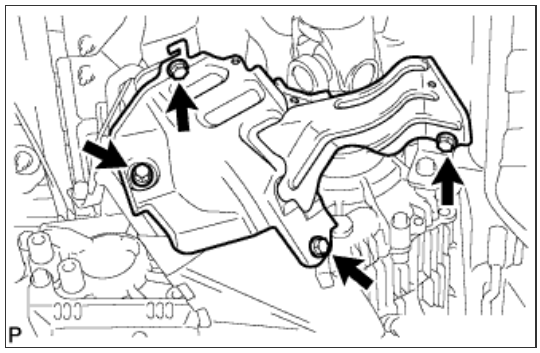
for Preparation Click here



for Preparation Click here

1. REMOVE TRANSFER HEAT INSULATOR

a. Remove the 4 bolts and insulator.

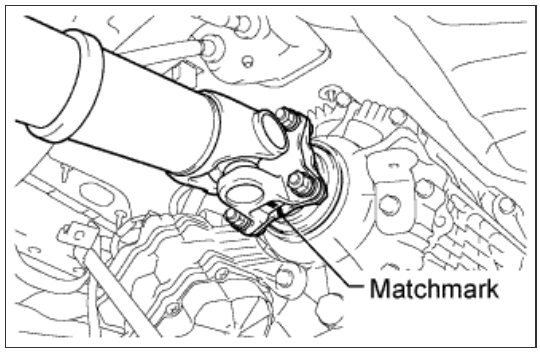


2. REMOVE REAR PROPELLER SHAFT ASSEMBLY

a. for Transfer Side:

i. Place matchmarks on the propeller shaft flange and transfer flange.

ii. Remove the 4 nuts and 4 washers.

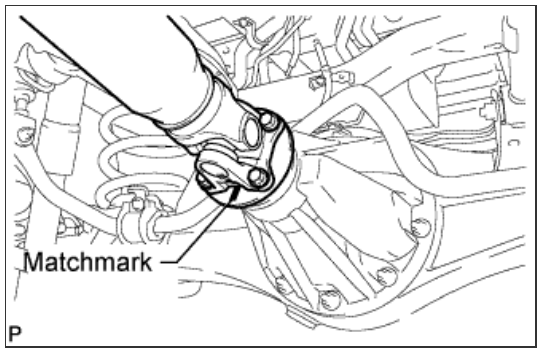


b. for Differential Side:

i. Place matchmarks on the propeller shaft flange and rear differential flange.

ii. Remove the 4 nuts, 4 bolts and 4 washers.

c. Remove the rear propeller shaft.



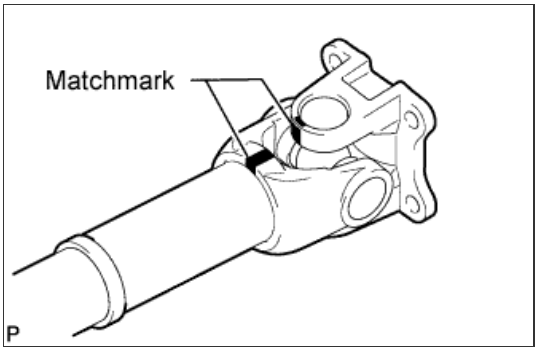
for Preparation Click here

NOTICE:

Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

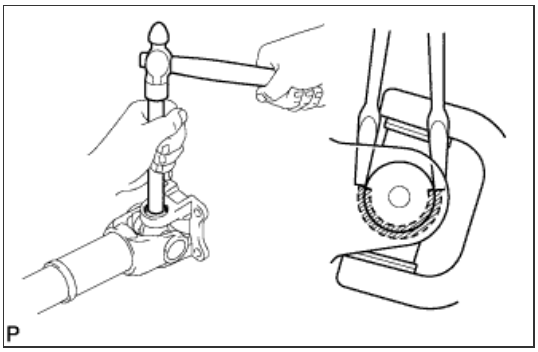
1. REMOVE REAR PROPELLER SHAFT UNIVERSAL JOINT SPIDER ASSEMBLY

a. Place matchmarks on the flange yoke and sleeve yoke or propeller shaft.



b. Using a brass bar and hammer, slightly tap in the spider bearing outer races.

c. Using 2 screwdrivers, remove the 4 snap rings from the grooves.

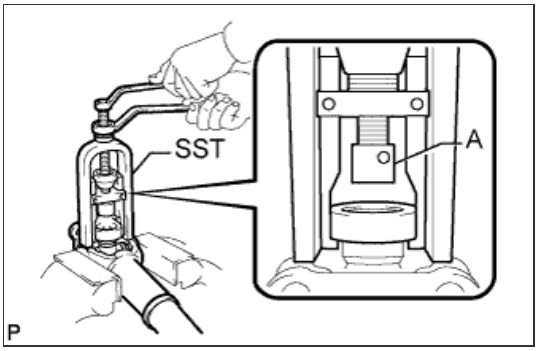


d. Using SST, push out the bearing from the flange.

SST
09332-25010

HINT:

Before installing SST, sufficiently raise the part labeled A. If part A is too low, SST may be difficult to install.



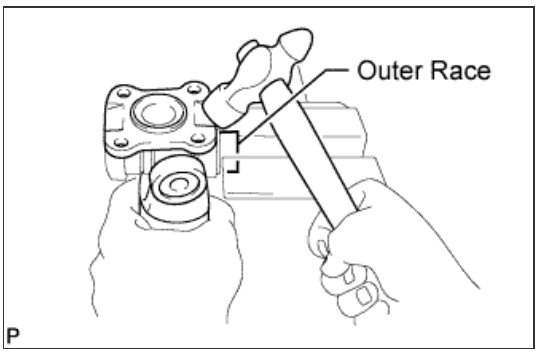
e. Clamp the bearing outer race in a vise and tap off the flange with a hammer.

HINT:

Remove the bearing on the opposite side using the same procedure.

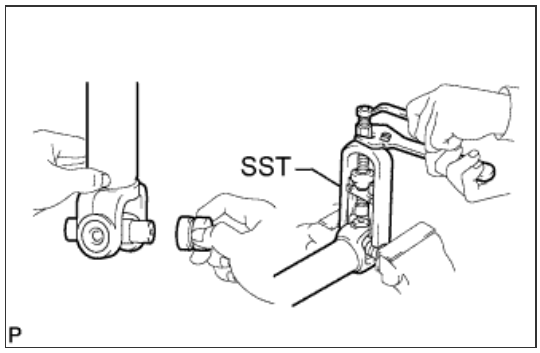
f. Remove the flange yoke from the sleeve yoke (or propeller shaft).

g. Install the 2 removed bearing outer races to the spider.



h. Using SST, push out the bearing from the yoke.

SST
09332-25010



i. Clamp the outer bearing race in a vise and tap off the yoke with a hammer.

HINT:

Remove the bearing on the opposite side using the same procedure.

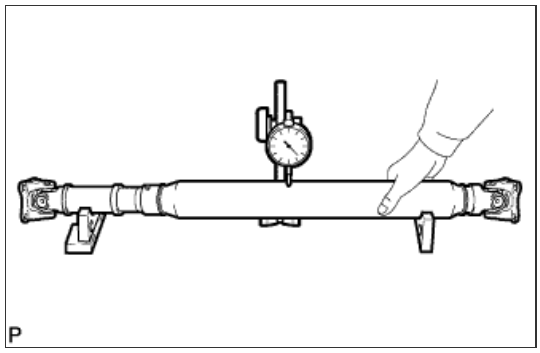
for Preparation Click here

1. INSPECT REAR PROPELLER SHAFT ASSEMBLY

a. Using a dial indicator, measure the propeller shaft runout.

Maximum runout:
0.8 mm (0.031 in.)

If the shaft runout is more than the maximum, replace the shaft.



2. INSPECT SPIDER BEARING

NOTICE:

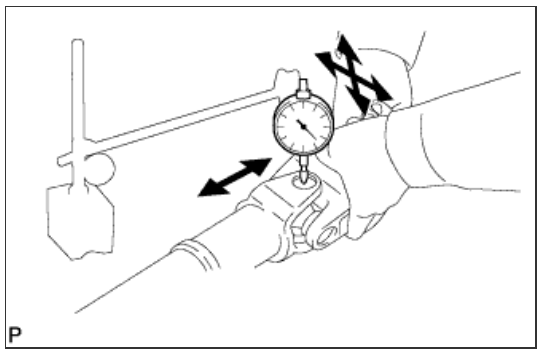
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

a. Check the spider bearings for wear or damage.

b. Check the axial play of each spider bearing by turning the yoke while holding the shaft tightly.

Maximum bearing axial play:
0 mm (0 in.)

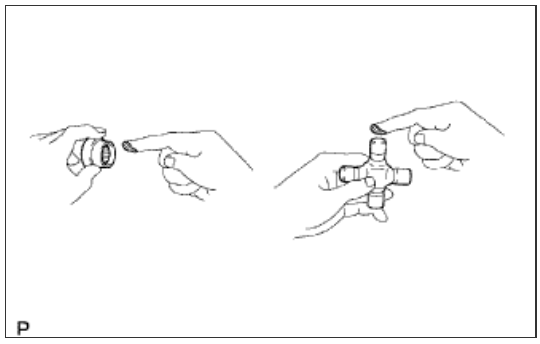
If the axial play is more than the maximum, replace the spider bearing.



for Preparation Click here

1. INSTALL REAR PROPELLER SHAFT UNIVERSAL JOINT SPIDER ASSEMBLY

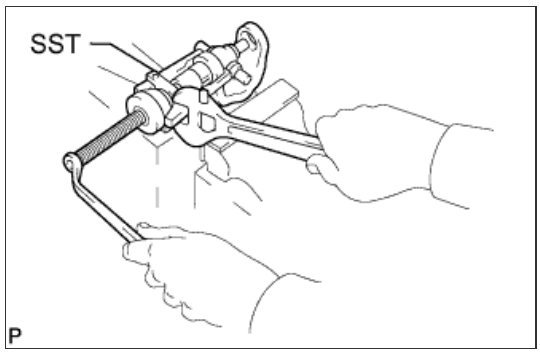
a. Apply MP grease to a new spider and new bearings.



b. Fit the spider into the flange yoke.

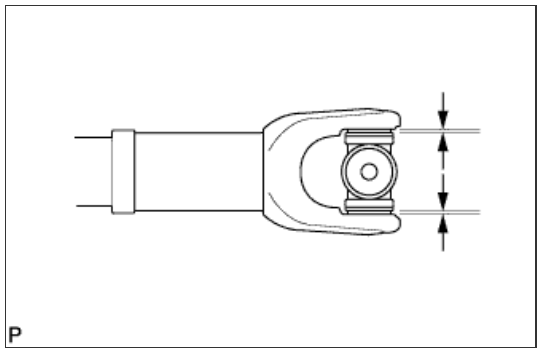
c. Using SST, install the bearings on the spider.

SST
09332-25010



d. Using SST, adjust both bearings so that the snap ring grooves are at maximum and equal in width.

SST
09332-25010



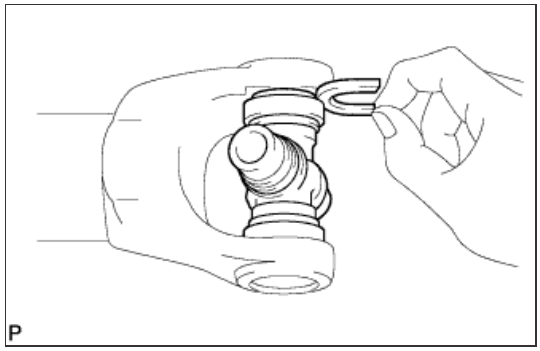
e. Install 2 new snap rings of equal thickness which will allow 0 mm (0 in.) of axial play.

HINT:

Do not reuse the snap rings.

Standard Snap Ring Thickness:

Color	Mark	Specified Condition
-	J	2.18 to 2.20 mm (0.0858 to 0.0866 in.)
-	K	2.20 to 2.22 mm (0.0866 to 0.0874 in.)
-	F	2.22 to 2.24 mm (0.0874 to 0.0882



		in.)
-	G	2.24 to 2.26 mm (0.0882 to 0.0890 in.)
-	H	2.26 to 2.28 mm (0.0890 to 0.0898 in.)
-	1	2.28 to 2.30 mm (0.0898 to 0.0906 in.)
-	2	2.30 to 2.32 mm (0.0906 to 0.0913 in.)
-	-	2.32 to 2.34 mm (0.0913 to 0.0921 in.)
Brown	-	2.34 to 2.36 mm (0.0921 to 0.0929 in.)
Blue	-	2.36 to 2.38 mm (0.0929 to 0.0937 in.)
-	6	2.38 to 2.40 mm (0.0937 to 0.0945 in.)
-	7	2.40 to 2.42 mm (0.0945 to 0.0953 in.)
-	8	2.42 to 2.44 mm (0.0953 to 0.0961 in.)
-	九	2.44 to 2.46 mm (0.0961 to 0.0969 in.)
-	10	2.46 to 2.48 mm (0.0969 to 0.0976 in.)
-	A	2.48 to 2.50 mm (0.0976 to 0.0984 in.)
-	B	2.50 to 2.52 mm (0.0984 to 0.0992 in.)
-	C	2.52 to 2.54 mm (0.0992 to 0.1000 in.)
-	D	2.54 to 2.56 mm (0.1000 to 0.1008 in.)
-	E	2.56 to 2.58 mm (0.1008 to 0.1016 in.)

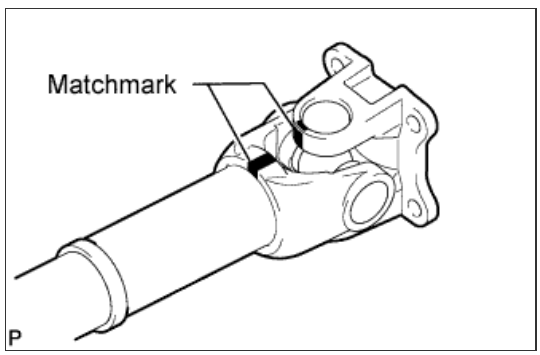
f. Using a hammer, tap the yoke until there is no clearance between the bearing outer race and snap ring.

g. Align the matchmarks on the propeller shaft and flange yoke or flange yoke and sleeve yoke.

h. Install the flange yoke to the sleeve yoke or propeller shaft.

HINT:

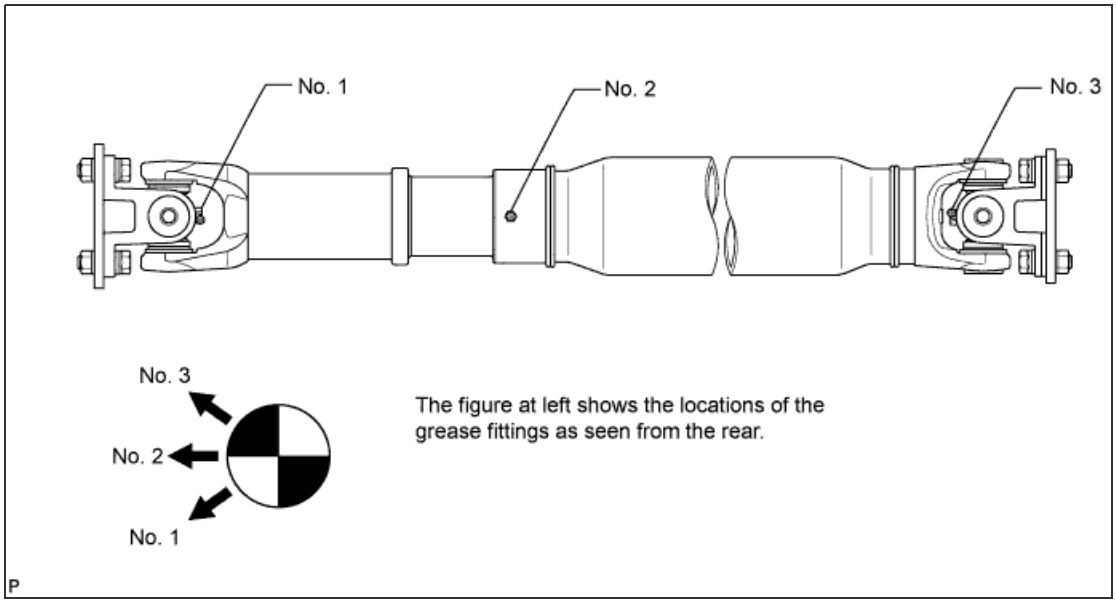
Install 2 new spider bearings and snap rings on the flange yoke side using the procedure described above.



2. INSPECT PROPELLER SHAFT GREASE FITTING DIRECTION

HINT:

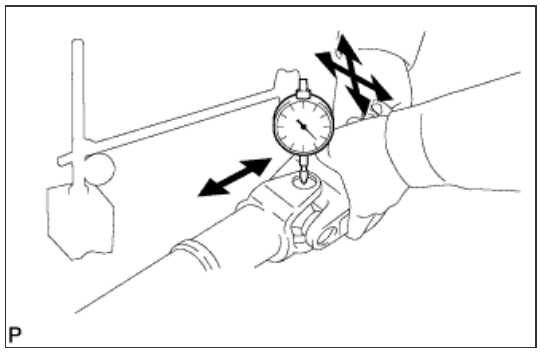
When replacing a spider bearing, be sure that the grease fitting hole is facing the direction shown in the illustration.



3. INSPECT SPIDER BEARING

NOTICE:

Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.



a. Check the spider bearings for wear or damage.

b. Check the axial play of each spider bearing by turning the yoke while holding the shaft tightly.

Maximum bearing axial play:
0 mm (0 in.)

If the axial play is more than the maximum, replace the spider bearing.

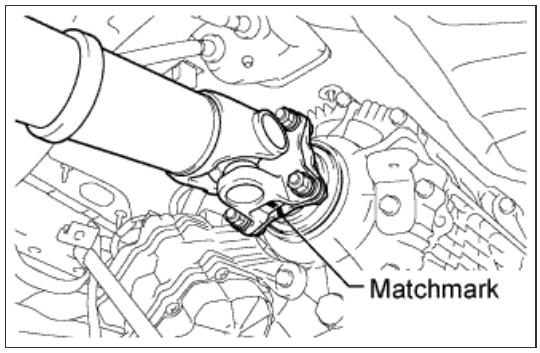
for Preparation Click here

1. INSTALL REAR PROPELLER SHAFT

a. Align the matchmarks on the propeller shaft flange and transfer flange.

b. Connect the propeller shaft with the 4 washers and 4 nuts.

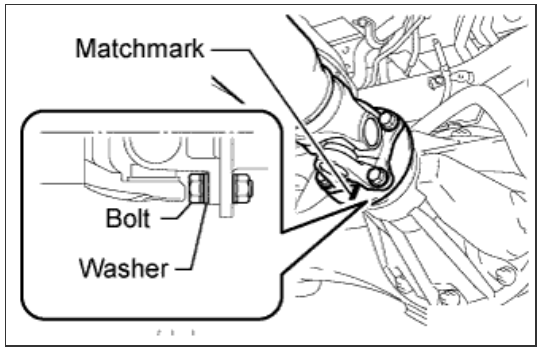
Torque:
88 N*m{ 900 kgf*cm , 65 ft.*lbf }



c. Align the matchmarks on the propeller shaft flange and differential flange.

d. Install the propeller shaft with the 4 bolts, 4 washers and 4 nuts.

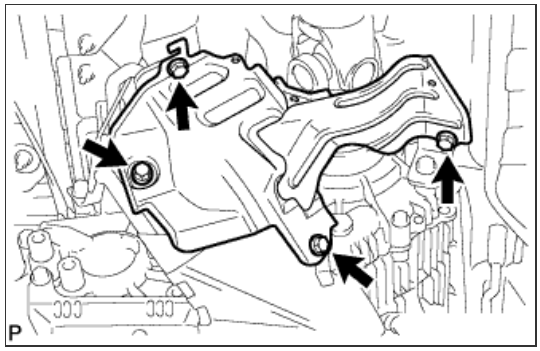
Torque:
88 N*m{ 900 kgf*cm , 65 ft.*lbf }



2. INSTALL TRANSFER HEAT INSULATOR

a. Install the insulator with the 4 bolts.

Torque:
30 N*m{ 306 kgf*cm , 22 ft.*lbf }



for Preparation Click here

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Axle System

Symptom	Suspected Area	See page
Vehicle unstable	Tire (Worn or improperly inflated)	Click here
	Wheel alignment (Incorrect)	Click here
	Steering linkage (Loosen or worn)	-
	Hub bearing (Worn)	Click here
	Steering gear (Out of adjustment or broken)	-
	Suspension parts (Worn)	-
Front wheel shimmy	Tire (Worn or improperly inflated)	Click here
	Wheel (Out of balance)	Click here
	Front shock absorber (Worn)	Click here
	Wheel alignment (Incorrect)	Click here
	Upper ball joint (Worn)	Click here
	Lower ball joint (Worn)	Click here
	Hub bearing (Worn)	Click here
	Steering linkage (Loose or worn)	-
Rear wheel shimmy	Tire (Worn or improperly inflated)	Click here
	Wheel (Out of balance)	Click here
	Rear shock absorber (Worn)	Click here
	Rear axle shaft (Worn)	Click here

for Preparation Click here

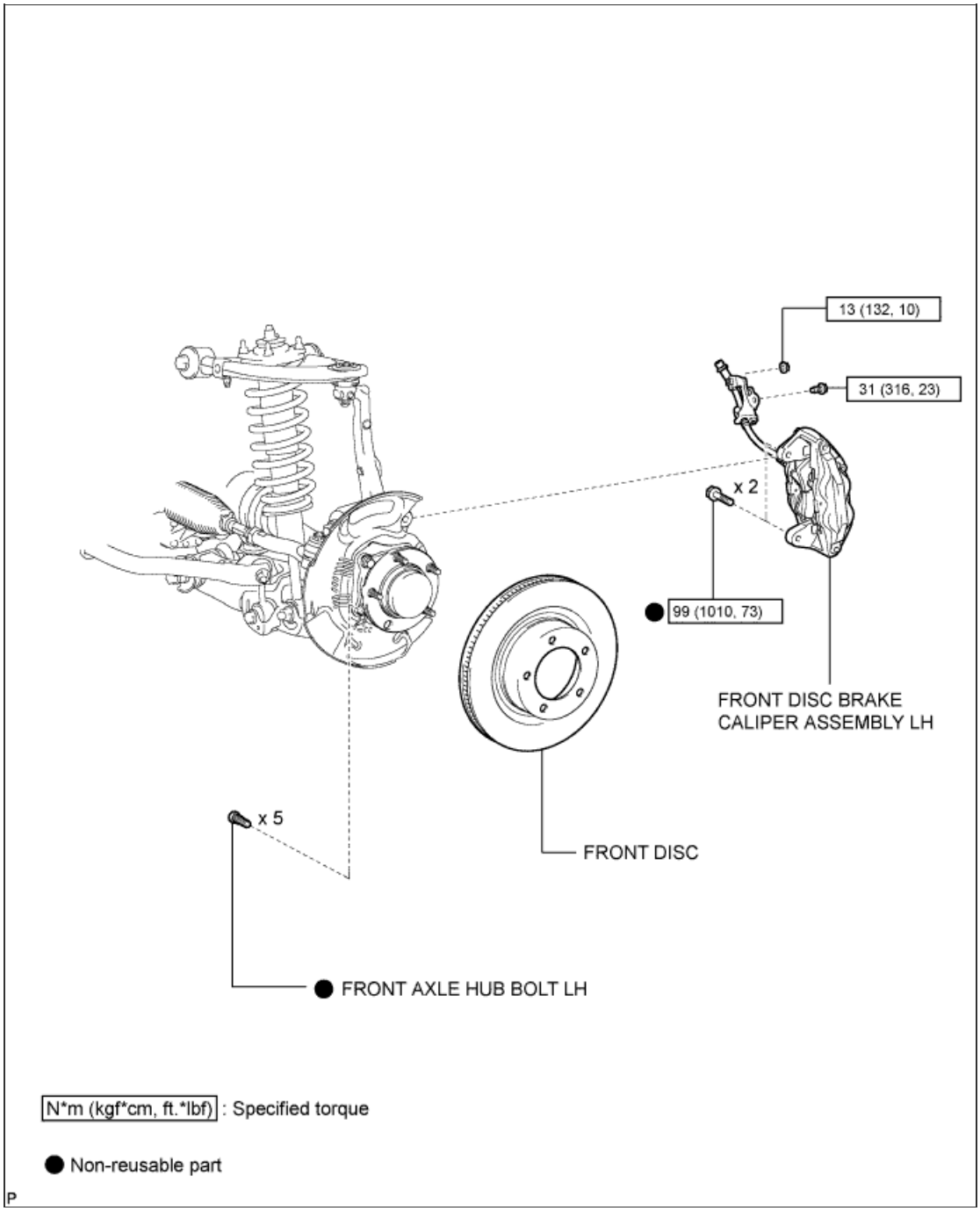
HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Axle System

Symptom	Suspected Area	See page
Vehicle unstable	Tire (Worn or improperly inflated)	Click here
	Wheel alignment (Incorrect)	Click here
	Steering linkage (Loosen or worn)	-
	Hub bearing (Worn)	Click here
	Steering gear (Out of adjustment or broken)	-
	Suspension parts (Worn)	-
Front wheel shimmy	Tire (Worn or improperly inflated)	Click here
	Wheel (Out of balance)	Click here
	Front shock absorber (Worn)	Click here
	Wheel alignment (Incorrect)	Click here
	Upper ball joint (Worn)	Click here
	Lower ball joint (Worn)	Click here
	Hub bearing (Worn)	Click here
	Steering linkage (Loose or worn)	-
Rear wheel shimmy	Tire (Worn or improperly inflated)	Click here
	Wheel (Out of balance)	Click here
	Rear shock absorber (Worn)	Click here
	Rear axle shaft (Worn)	Click here

for Preparation Click here



for Preparation Click here

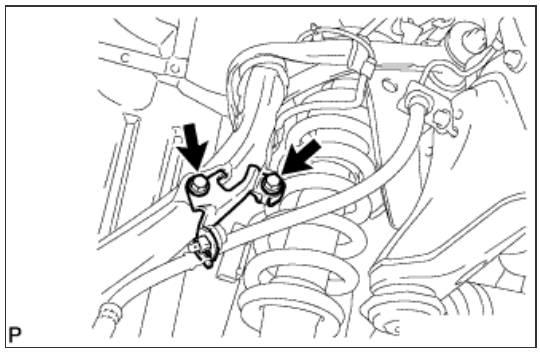
HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

1. REMOVE FRONT WHEEL

2. DISCONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

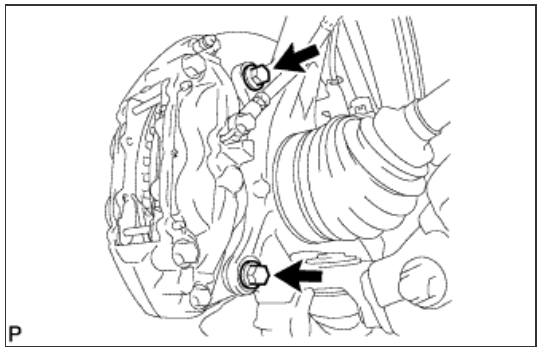
a. Remove the bolt and nut, and disconnect the brake tube bracket from the steering knuckle.



b. Remove the 2 bolts and disconnect the disc brake caliper from the steering knuckle.

NOTICE:

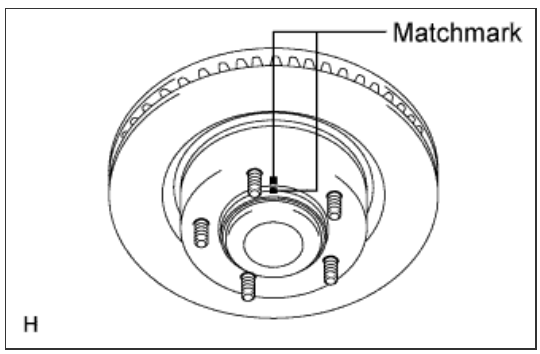
- **Do not disconnect the flexible hose from the disc brake caliper.**
- **Do not twist or bend the flexible hose.**



3. REMOVE FRONT DISC

a. Put matchmarks on the front disc and the axle hub if planning to reuse the disc.

b. Remove the front disc.



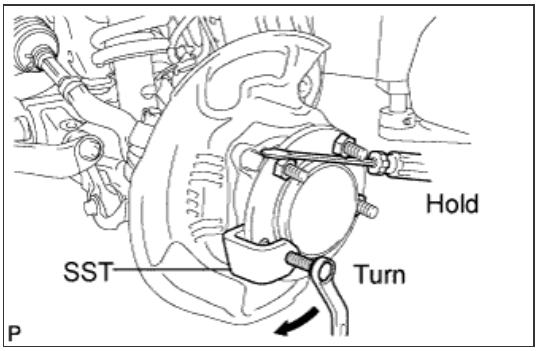
4. REMOVE FRONT AXLE HUB BOLT LH

a. Using SST and a screwdriver or equivalent to hold the axle hub, remove the front axle hub bolt.

SST
09650-17011

NOTICE:

Do not damage the threads of the hub bolt.



5. INSTALL FRONT AXLE HUB BOLT LH

a. Temporarily install a washer and hub nut to a new hub bolt as shown in the illustration.

NOTICE:

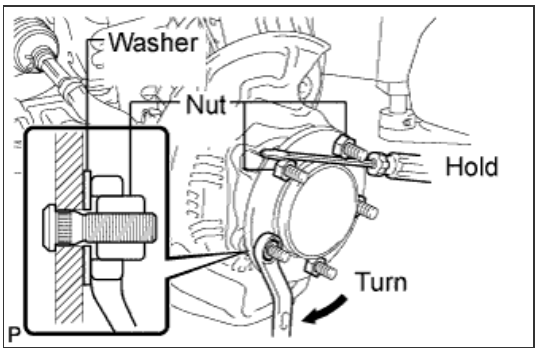
Install a hub nut to prevent damage to the hub bolt.

b. Using a screwdriver or equivalent to hold the hub, turn the hub nut until the bottom surface of the hub bolt head touches the axle hub.

c. Remove the washer and hub nut.

NOTICE:

Do not damage the threads of the hub bolt.



6. INSPECT FRONT AXLE HUB BEARING LOOSENESS

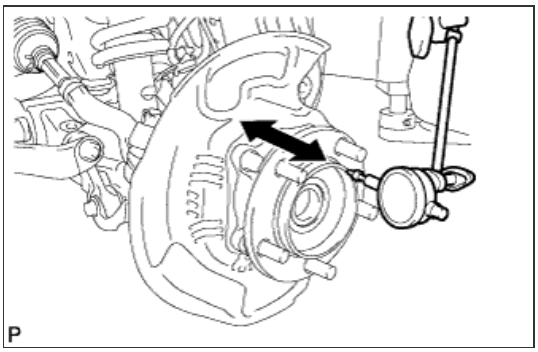
a. Using a dial indicator, measure the looseness near the center of the axle hub.

Maximum looseness:
0.05 mm (0.00197 in.)

NOTICE:

Ensure that the dial indicator is set at a right angle to the measurement surface.

If the looseness exceeds the maximum, replace the axle hub.



7. INSPECT FRONT AXLE HUB RUNOUT

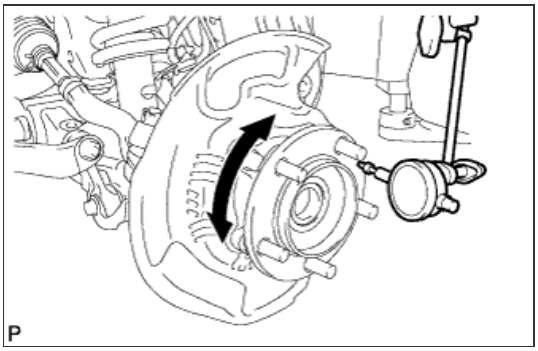
a. Using a dial indicator, measure the runout on the surface of the axle hub outside the hub bolt.

Maximum runout:
0.08 mm (0.00315 in.)

NOTICE:

Ensure that the dial indicator is set at a right angle to the measurement surface.

If the runout exceeds the maximum, replace the axle hub.

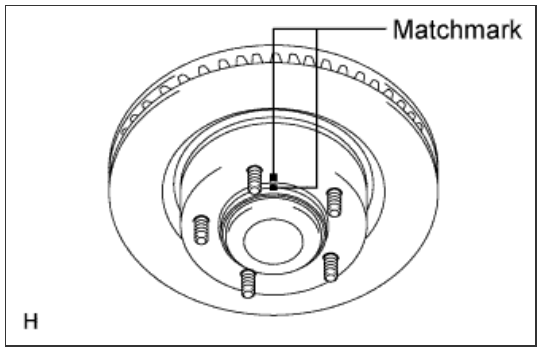


8. INSTALL FRONT DISC

a. Align the matchmarks, and then install the front disc.

HINT:

When replacing the front disc with a new one, select the installation position where the front disc has the minimum runout.



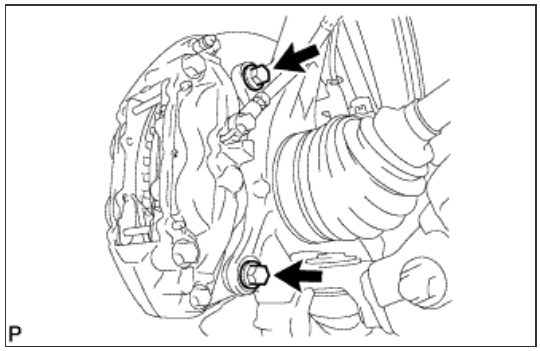
9. CONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

a. Connect the front disc brake caliper and install 2 new bolts.

Torque:
99 N*m{ 1010 kgf*cm , 73 ft.*lbf }

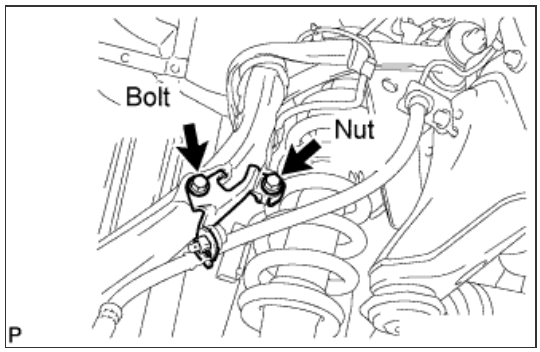
NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



b. Connect the brake tube bracket to the steering knuckle with the bolt and nut.

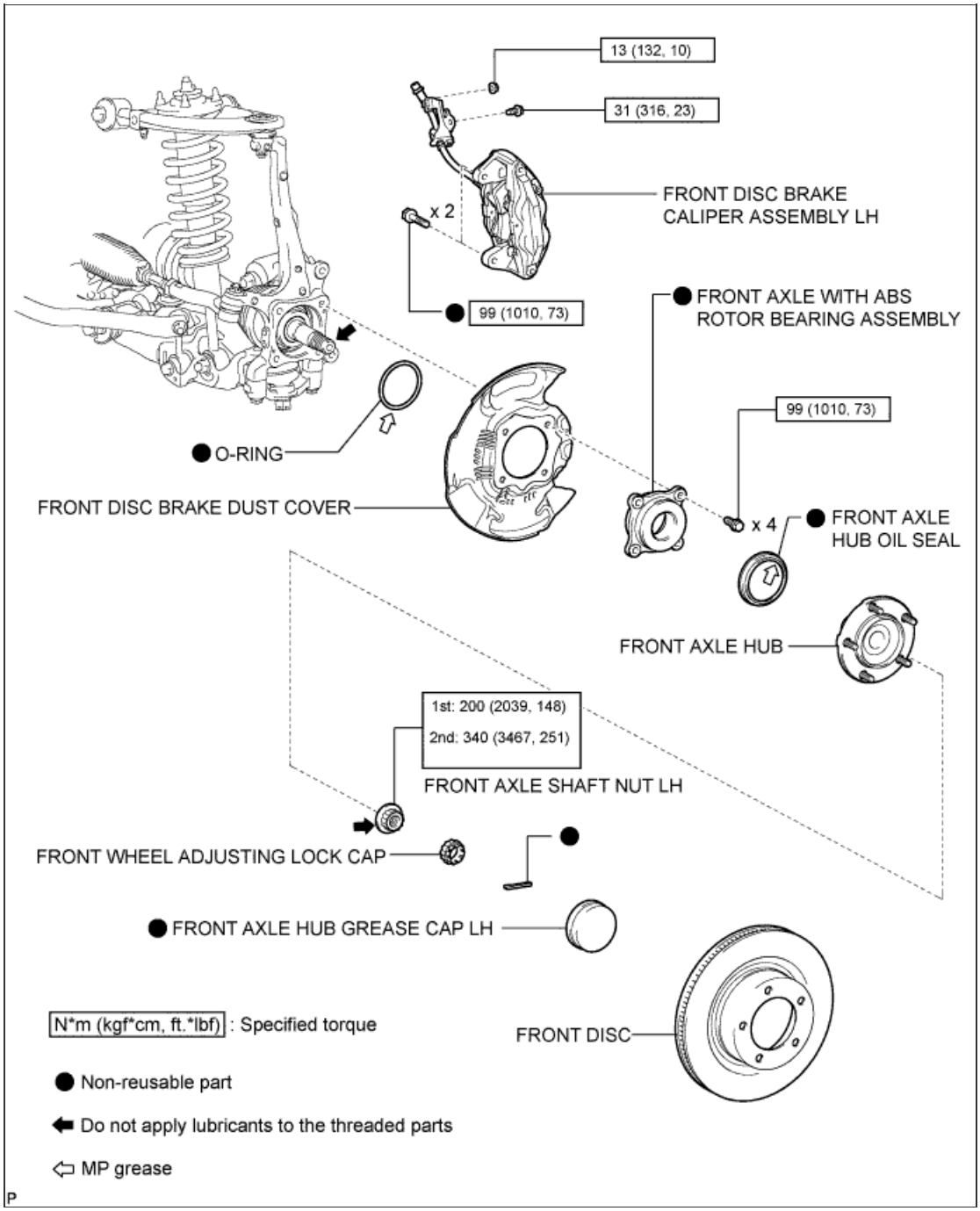
Torque:
for bolt:
31 N*m{ 316 kgf*cm , 23 ft.*lbf }
for nut:
13 N*m{ 132 kgf*cm , 10 ft.*lbf }



10. INSTALL FRONT WHEEL

Torque:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

for Preparation Click here

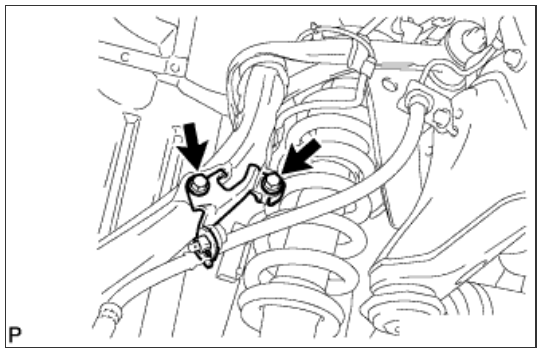


for Preparation Click here

1. REMOVE FRONT WHEEL

2. DISCONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

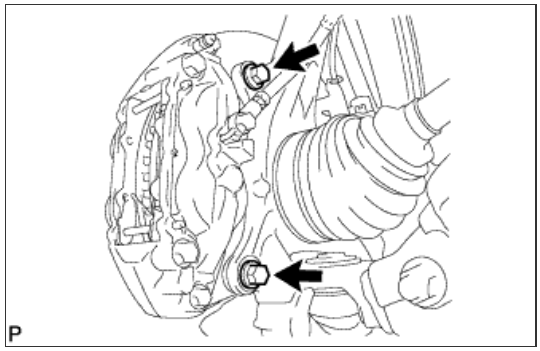
a. Remove the bolt and nut, and disconnect the brake tube bracket from the steering knuckle.



b. Remove the 2 bolts and disconnect the disc brake caliper from the steering knuckle.

NOTICE:

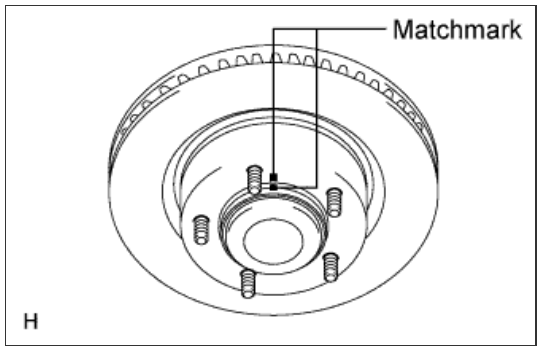
- **Do not disconnect the flexible hose from the disc brake caliper.**
- **Do not twist or bend the flexible hose.**



3. REMOVE FRONT DISC

a. Put matchmarks on the front disc and the axle hub if planning to reuse the disc.

b. Remove the front disc.

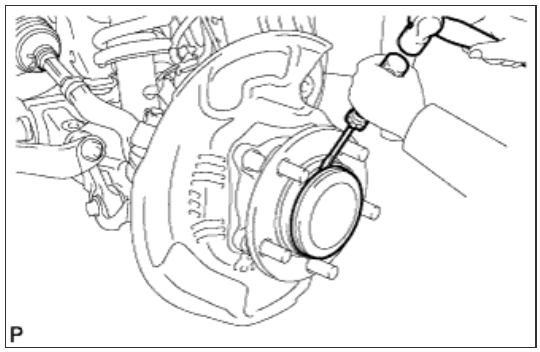


4. REMOVE FRONT AXLE HUB GREASE CAP LH

a. Using a screwdriver and hammer, remove the axle hub grease cap.

NOTICE:

Do not damage the axle hub.



5. INSPECT FRONT AXLE HUB BEARING LOOSENESS

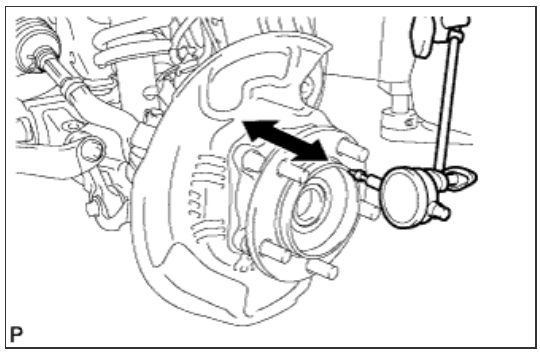
a. Using a dial indicator, measure the looseness near the center of the axle hub.

Maximum looseness:
0.05 mm (0.00197 in.)

NOTICE:

Ensure that the dial indicator is set at a right angle to the measurement surface.

If the looseness exceeds the maximum, replace the axle hub.



6. INSPECT FRONT AXLE HUB RUNOUT

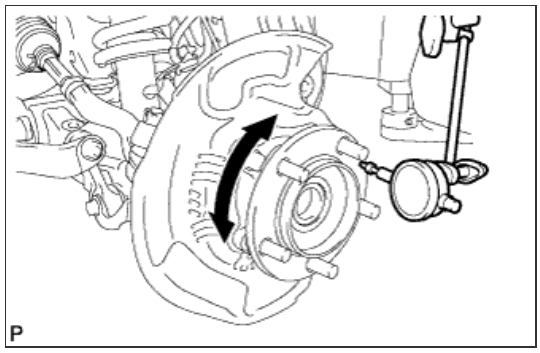
a. Using a dial indicator, measure the runout on the surface of the axle hub outside the hub bolt.

Maximum runout:
0.08 mm (0.00315 in.)

NOTICE:

Ensure that the dial indicator is set at a right angle to the measurement surface.

If the runout exceeds the maximum, replace the axle hub.



7. INSTALL FRONT AXLE HUB GREASE CAP LH

a. Install the axle hub grease cap.

NOTICE:

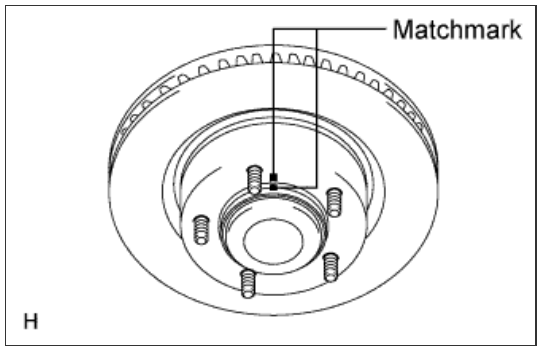
Make sure to securely fit the grease cap to the axle hub.

8. INSTALL FRONT DISC

a. Align the matchmarks, and then install the front disc.

HINT:

When replacing the front disc with a new one, select the installation position where the front disc has the minimum runout.



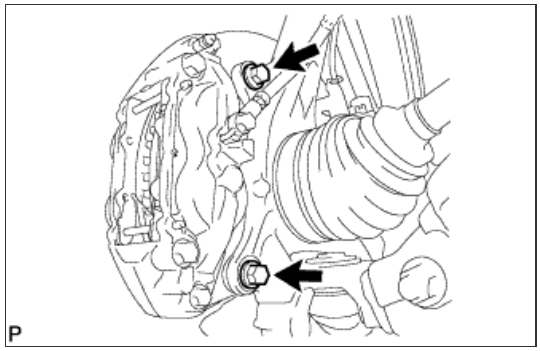
9. CONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

a. Connect the front disc brake caliper and install 2 new bolts.

Torque:
99 N*m{ 1010 kgf*cm , 73 ft.*lbf }

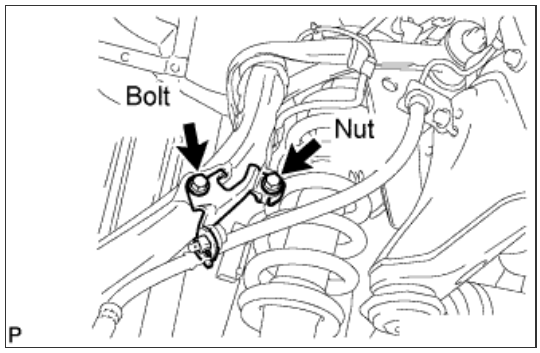
NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



b. Connect the brake tube bracket to the steering knuckle with the bolt and nut.

Torque:
for bolt:
31 N*m{ 316 kgf*cm , 23 ft.*lbf }
for nut:
13 N*m{ 132 kgf*cm , 10 ft.*lbf }



10. INSTALL FRONT WHEEL

Torque:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

for Preparation Click here

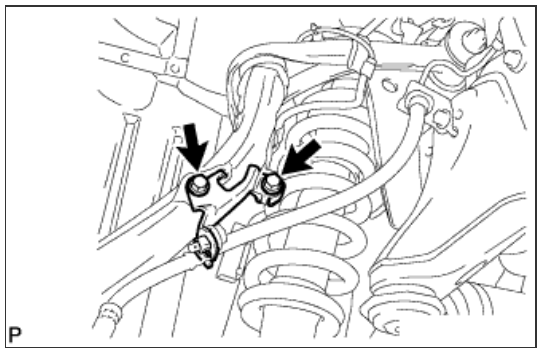
HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

1. REMOVE FRONT WHEEL

2. DISCONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

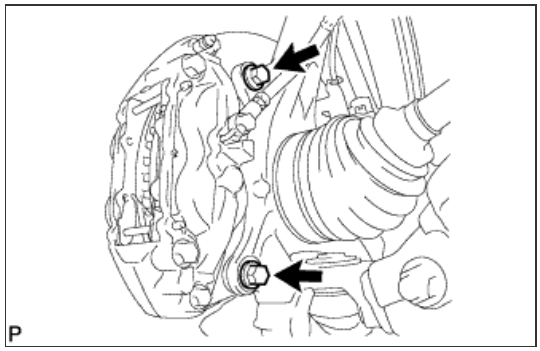
a. Remove the bolt and nut, and disconnect the brake tube bracket from the steering knuckle.



b. Remove the 2 bolts and disconnect the disc brake caliper from the steering knuckle.

NOTICE:

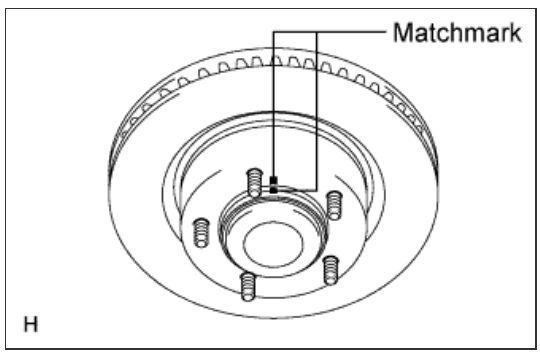
- **Do not disconnect the flexible hose from the disc brake caliper.**
- **Do not twist or bend the flexible hose.**



3. REMOVE FRONT DISC

a. Put matchmarks on the front disc and the axle hub if planning to reuse the disc.

b. Remove the front disc.

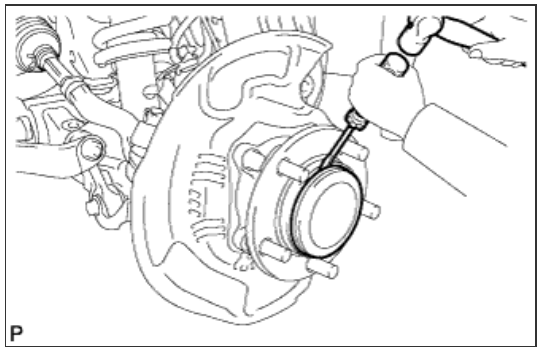


4. REMOVE FRONT AXLE HUB GREASE CAP LH

a. Using a screwdriver and hammer, remove the axle hub grease cap.

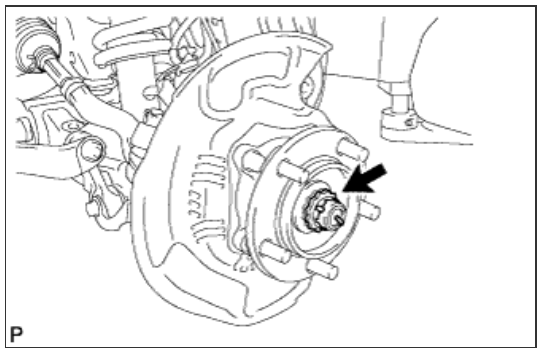
NOTICE:

Do not damage the axle hub.

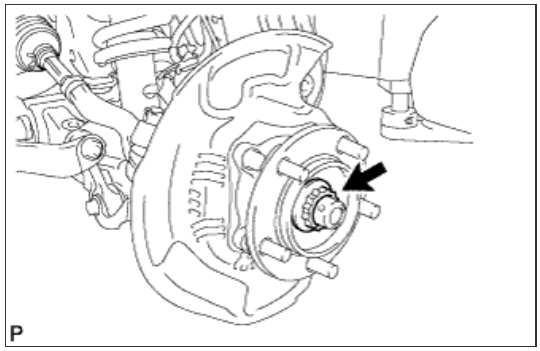


5. REMOVE FRONT AXLE SHAFT NUT LH

a. Remove the cotter pin and adjusting lock cap.

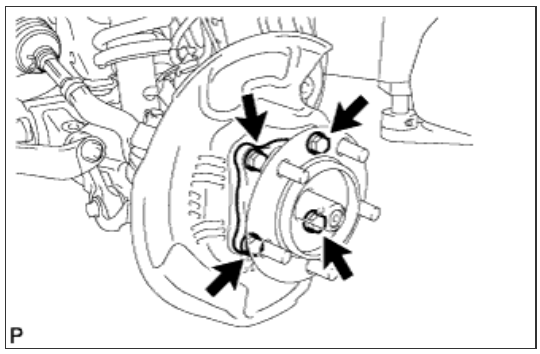


b. Using a 39 mm socket wrench, remove the axle hub nut.



6. REMOVE FRONT AXLE HUB SUB-ASSEMBLY LH

a. Remove the 4 bolts.

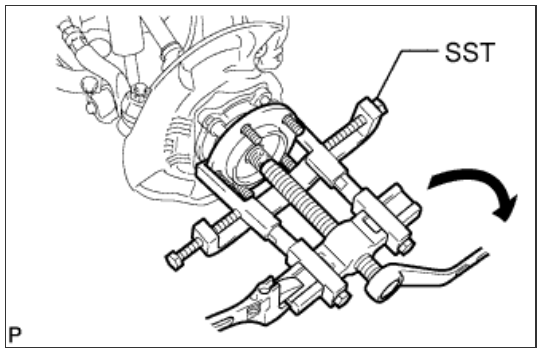


b. Using SST, remove the front axle hub together with the dust cover.

SST

09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011)

c. Remove the O-ring.



for Preparation Click here

NOTICE:

Do not allow foreign matter, etc. to contact the ABS rotor bearing.

1. REMOVE FRONT AXLE WITH ABS ROTOR BEARING ASSEMBLY

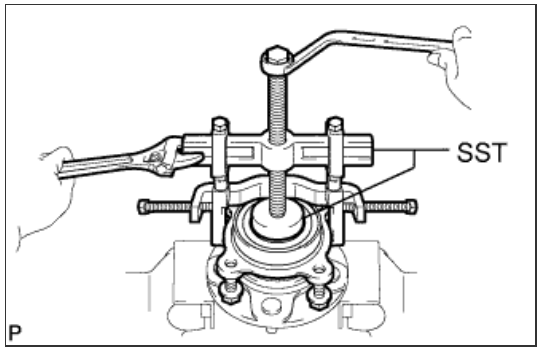
a. Gently fix the front axle hub in a vise.

NOTICE:

Do not damage the threads of the hub bolts.

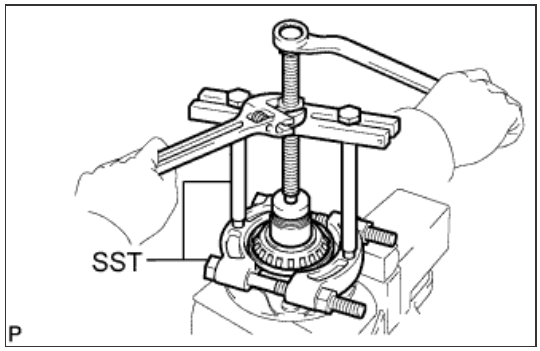
b. Using SST, remove the bearing.

SST
09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011)
09950-60010 (09951-00550)



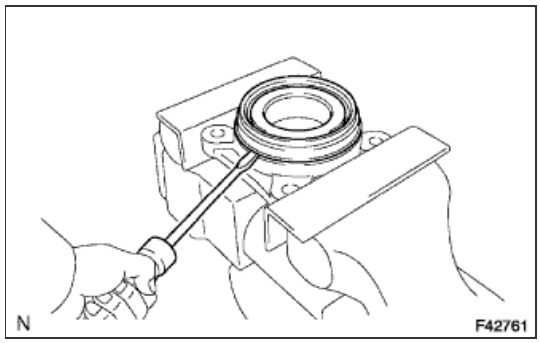
c. If part of the bearing remains in the front axle hub, use SST to remove it.

SST
09950-00020
09950-00030



2. REMOVE FRONT AXLE HUB OIL SEAL

a. Using a screwdriver, pry off the oil seal.



for Preparation Click here

NOTICE:

Do not allow foreign matter, etc. to contact the ABS rotor bearing.

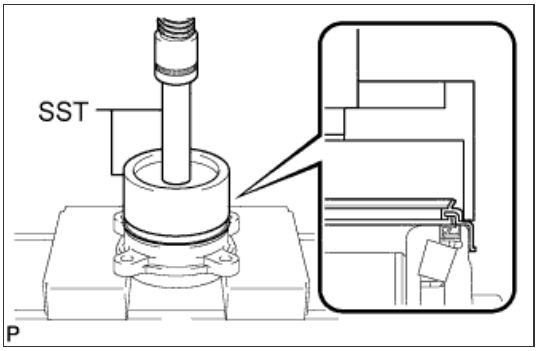
1. INSTALL FRONT AXLE HUB OIL SEAL

a. Using SST and a press, press in a new oil seal.

SST
09608-36010
09950-70010 (09951-07100)

NOTICE:

Do not damage the oil seal.



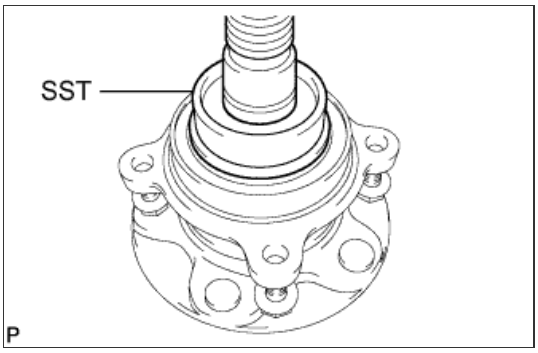
2. INSTALL FRONT AXLE WITH ABS ROTOR BEARING ASSEMBLY

a. Using SST and a press, press in a new bearing.

SST
09608-32010

NOTICE:

- **Insert 4 bolts into the bearing before installing the axle hub.**
- **Make sure to securely fit the bearing to the axle hub.**



for Preparation Click here

HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

1. INSTALL FRONT AXLE HUB SUB-ASSEMBLY LH

a. Apply MP grease to a new O-ring.

b. Install the O-ring to the axle hub.

NOTICE:

Do not damage the O-ring.

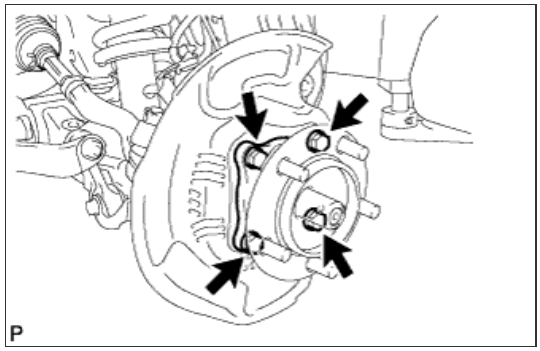
c. Connect the front drive shaft to the front axle hub.

NOTICE:

Be careful not to damage the front drive shaft boot.

d. Install the dust cover and axle hub to the steering knuckle with the 4 bolts.

Torque:
99 N*m{ 1010 kgf*cm , 73 ft.*lbf }

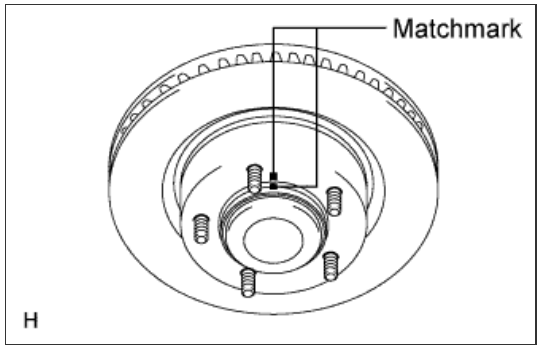


2. INSTALL FRONT DISC

a. Align the matchmarks, and then install the front disc.

HINT:

When replacing the front disc with a new one, select the installation position where the front disc has the minimum runout.



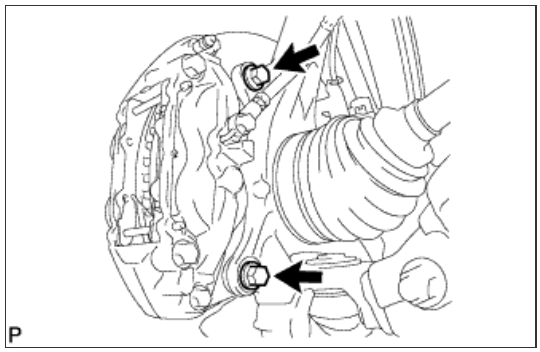
3. CONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

a. Connect the front disc brake caliper and install 2 new bolts.

Torque:
99 N*m{ 1010 kgf*cm , 73 ft.*lbf }

NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



4. INSTALL FRONT AXLE SHAFT NUT LH

a. Clean the threaded parts on the drive shaft and axle shaft nut using a non-residue solvent.

NOTICE:

- **Be sure to perform this work for a new drive shaft.**
- **Keep the threaded parts free of oil and foreign objects.**

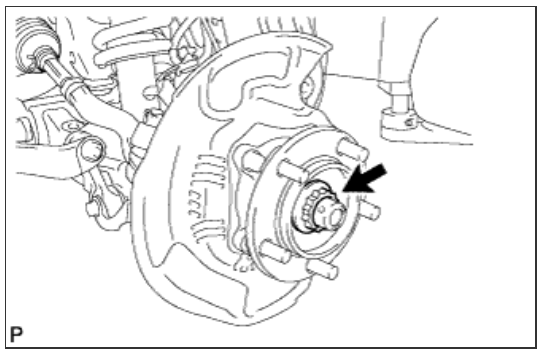
b. Using a 39 mm socket wrench, install the axle shaft nut.

Torque:
200 N*m{ 2039 kgf*cm , 148 ft.*lbf }

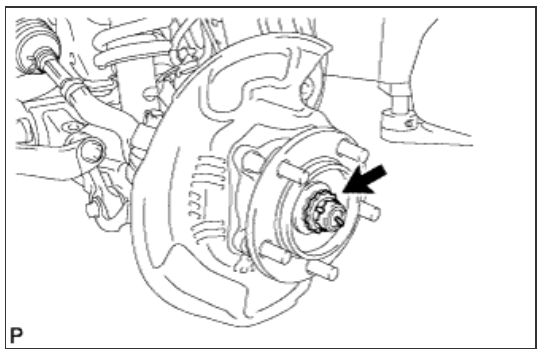
c. Using a 39 mm socket wrench, loosen the axle shaft nut.

d. Using a 39 mm socket wrench, retighten the axle shaft nut.

Torque:
340 N*m{ 3467 kgf*cm , 251 ft.*lbf }



e. Install the front wheel adjusting lock cap and a new cotter pin.

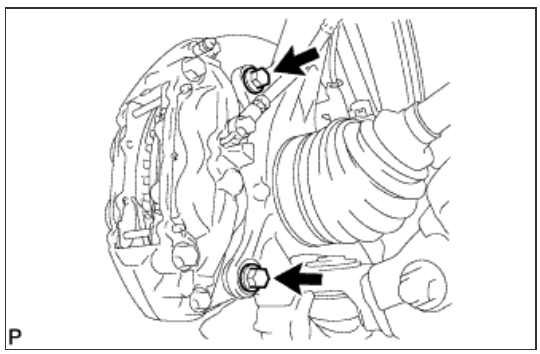


5. DISCONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

a. Remove the 2 bolts and disconnect the disc brake caliper from the steering knuckle.

NOTICE:

- **Do not disconnect the flexible hose from the disc brake caliper.**
- **Do not twist or bend the flexible hose.**

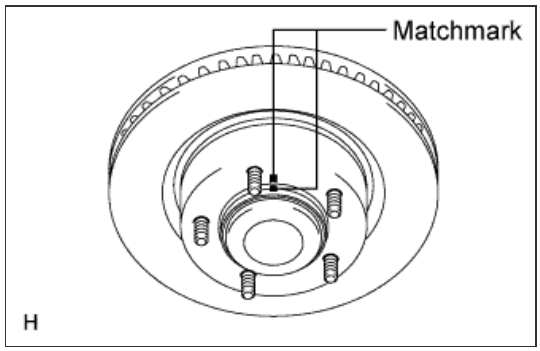


6. REMOVE FRONT DISC

a. Align the matchmarks, and then install the front disc.

HINT:

When replacing the front disc with a new one, select the installation position where the front disc has the minimum runout.



7. INSPECT FRONT AXLE HUB

a. Inspect the front axle hub (Click here).

8. INSTALL FRONT AXLE HUB GREASE CAP LH

a. Install the axle hub grease cap.

NOTICE:

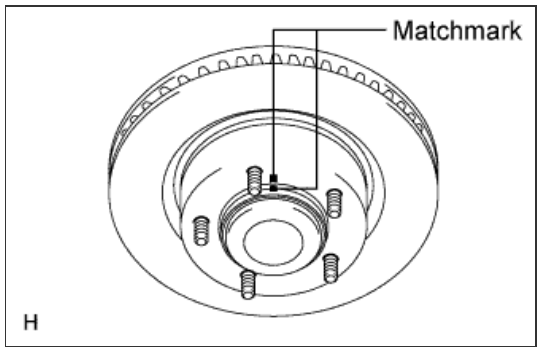
Make sure to securely fit the grease cap to the axle hub.

9. INSTALL FRONT DISC

a. Align the matchmarks, and then install the front disc.

HINT:

When replacing the front disc with a new one, select the installation position where the front disc has the minimum runout.



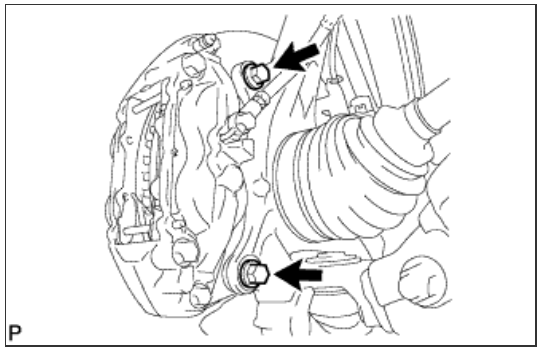
10. CONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

a. Connect the front disc brake caliper and install 2 new bolts.

Torque:
99 N*m{ 1010 kgf*cm , 73 ft.*lbf }

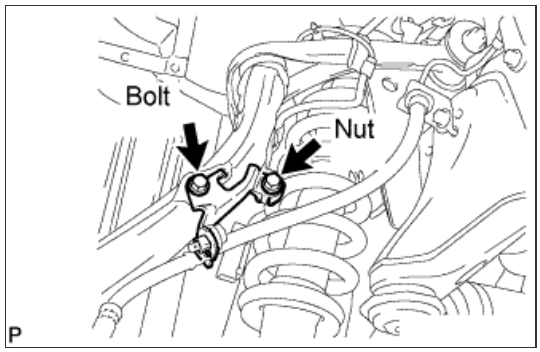
NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



b. Connect the brake tube bracket to the steering knuckle with the bolt and nut.

Torque:
for bolt:
31 N*m{ 316 kgf*cm , 23 ft.*lbf }
for nut:
13 N*m{ 132 kgf*cm , 10 ft.*lbf }



11. INSTALL FRONT WHEEL

Torque:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

12. CHECK SPEED SENSOR SIGNAL

a. Check the speed sensor signal (Click here).

for Preparation Click here

HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

1. INSTALL FRONT AXLE HUB SUB-ASSEMBLY LH

a. Apply MP grease to a new O-ring.

b. Install the O-ring to the axle hub.

NOTICE:

Do not damage the O-ring.

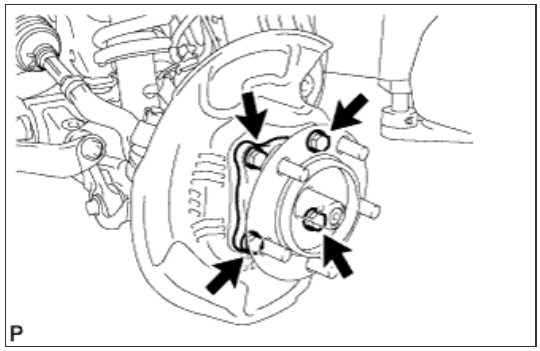
c. Connect the front drive shaft to the front axle hub.

NOTICE:

Be careful not to damage the front drive shaft boot.

d. Install the dust cover and axle hub to the steering knuckle with the 4 bolts.

Torque:
99 N*m{ 1010 kgf*cm , 73 ft.*lbf }

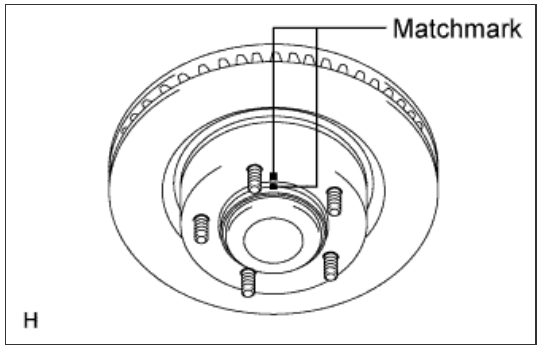


2. INSTALL FRONT DISC

a. Align the matchmarks, and then install the front disc.

HINT:

When replacing the front disc with a new one, select the installation position where the front disc has the minimum runout.



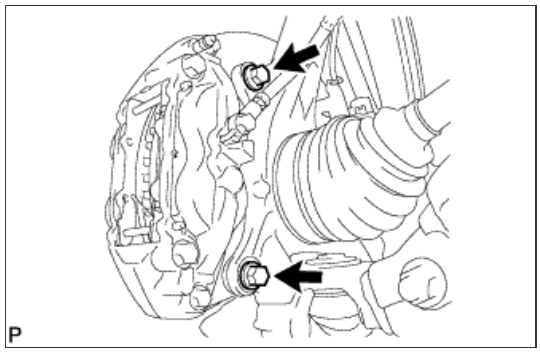
3. CONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

a. Connect the front disc brake caliper and install 2 new bolts.

Torque:
99 N*m{ 1010 kgf*cm , 73 ft.*lbf }

NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



4. INSTALL FRONT AXLE SHAFT NUT LH

a. Clean the threaded parts on the drive shaft and axle shaft nut using a non-residue solvent.

NOTICE:

- **Be sure to perform this work for a new drive shaft.**
- **Keep the threaded parts free of oil and foreign objects.**

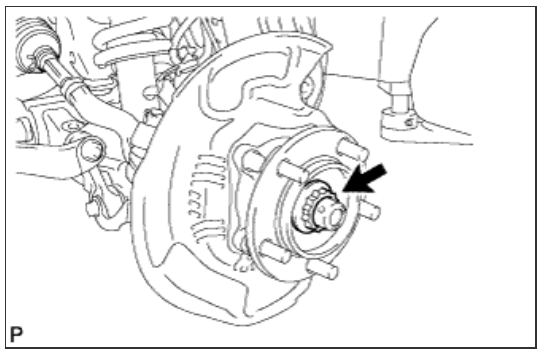
b. Using a 39 mm socket wrench, install the axle shaft nut.

Torque:
200 N*m{ 2039 kgf*cm , 148 ft.*lbf }

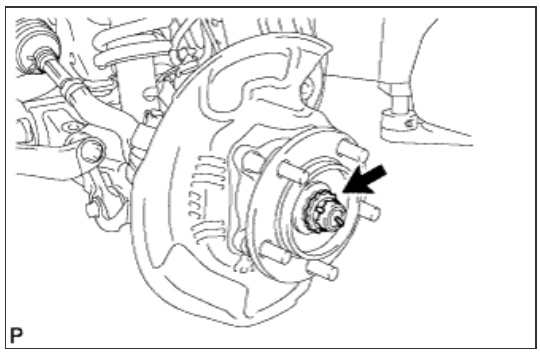
c. Using a 39 mm socket wrench, loosen the axle shaft nut.

d. Using a 39 mm socket wrench, retighten the axle shaft nut.

Torque:
340 N*m{ 3467 kgf*cm , 251 ft.*lbf }



e. Install the front wheel adjusting lock cap and a new cotter pin.

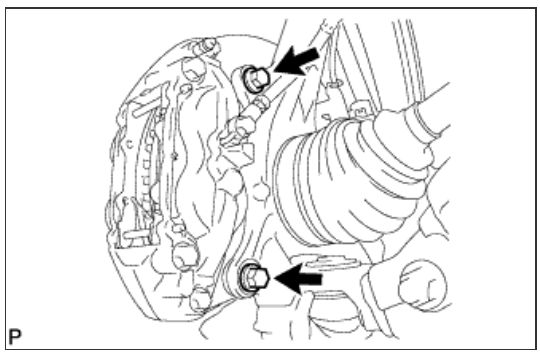


5. DISCONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

a. Remove the 2 bolts and disconnect the disc brake caliper from the steering knuckle.

NOTICE:

- **Do not disconnect the flexible hose from the disc brake caliper.**
- **Do not twist or bend the flexible hose.**

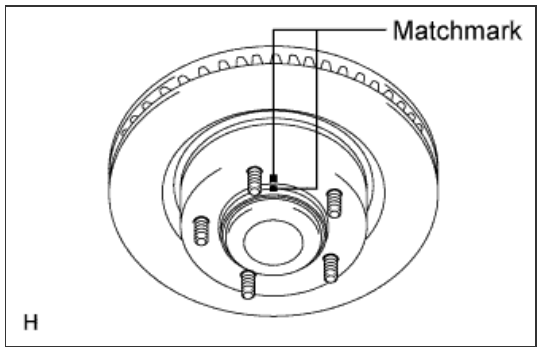


6. REMOVE FRONT DISC

a. Align the matchmarks, and then install the front disc.

HINT:

When replacing the front disc with a new one, select the installation position where the front disc has the minimum runout.



7. INSPECT FRONT AXLE HUB

a. Inspect the front axle hub (Click here).

8. INSTALL FRONT AXLE HUB GREASE CAP LH

a. Install the axle hub grease cap.

NOTICE:

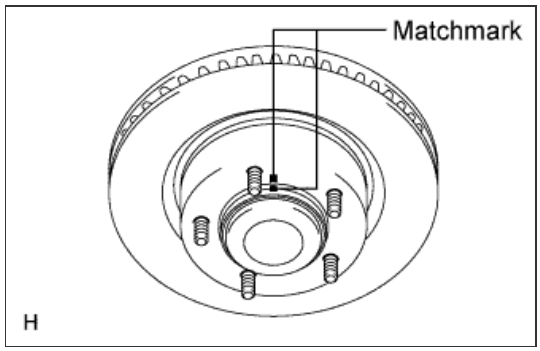
Make sure to securely fit the grease cap to the axle hub.

9. INSTALL FRONT DISC

a. Align the matchmarks, and then install the front disc.

HINT:

When replacing the front disc with a new one, select the installation position where the front disc has the minimum runout.



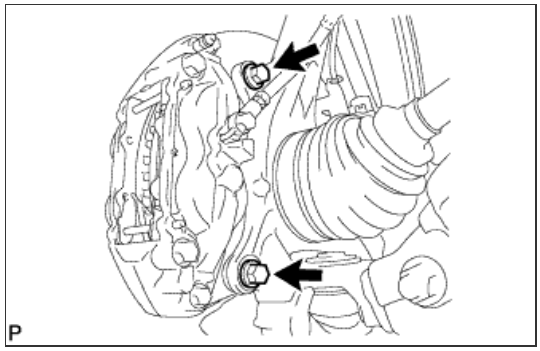
10. CONNECT FRONT DISC BRAKE CALIPER ASSEMBLY LH

a. Connect the front disc brake caliper and install 2 new bolts.

Torque:
99 N*m{ 1010 kgf*cm , 73 ft.*lbf }

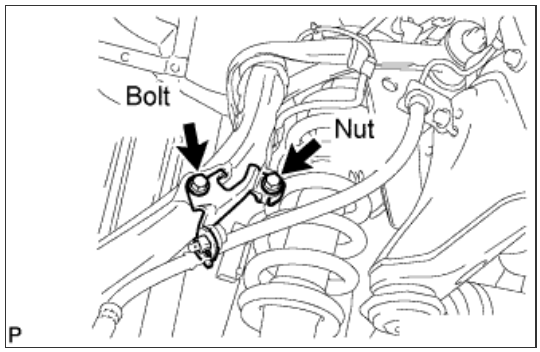
NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



b. Connect the brake tube bracket to the steering knuckle with the bolt and nut.

Torque:
for bolt:
31 N*m{ 316 kgf*cm , 23 ft.*lbf }
for nut:
13 N*m{ 132 kgf*cm , 10 ft.*lbf }



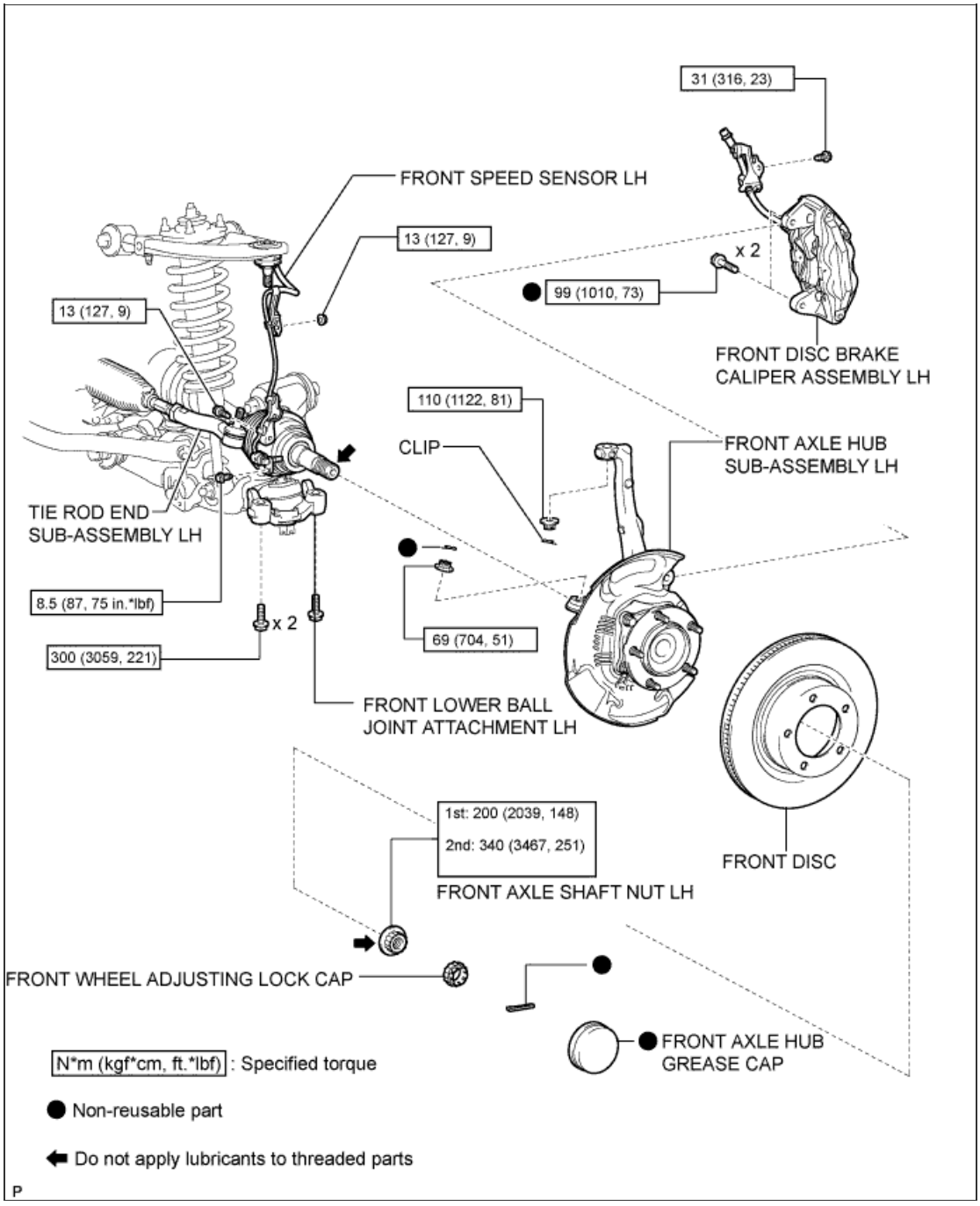
11. INSTALL FRONT WHEEL

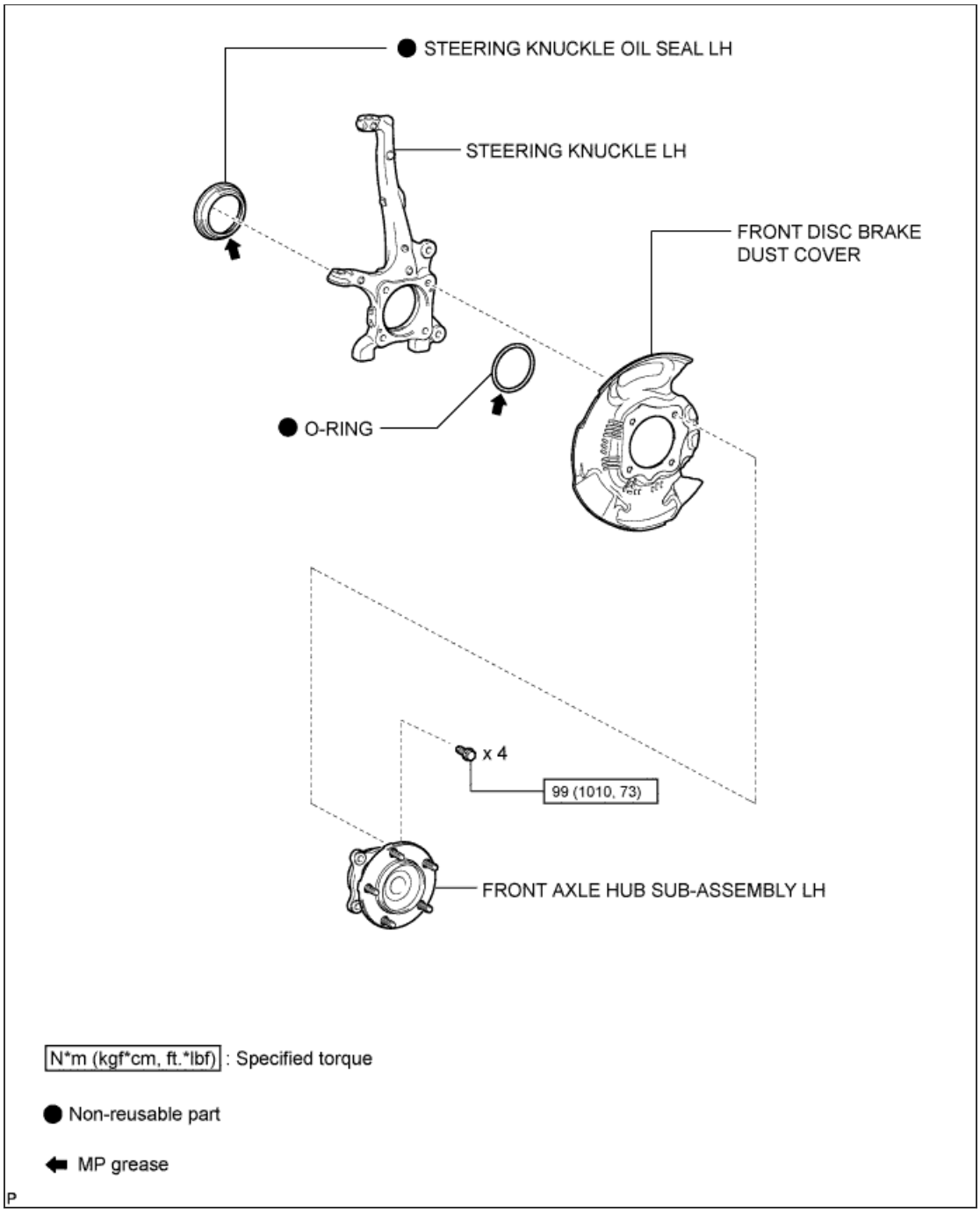
Torque:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

12. CHECK SPEED SENSOR SIGNAL

a. Check the speed sensor signal (Click here).

for Preparation Click here




STEERING KNUCKLE OIL SEAL LH
STEERING KNUCKLE LH
FRONT DISC BRAKE DUST COVER
O-RING
x 4
99 (1010, 73)
FRONT AXLE HUB SUB-ASSEMBLY LH
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
MP grease
P

for Preparation Click here

HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

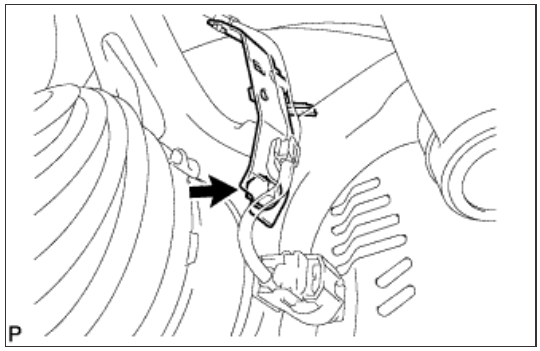
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

NOTICE:
w/ Navigation System:

After the engine switch is turned off, the HDD navigation system requires approximately 6 minutes to record various types of memory and settings. As a result, after turning the engine switch off, wait 6 minutes or more before disconnecting the cable from the negative (-) battery terminal.

2. DISCONNECT FRONT SPEED SENSOR LH

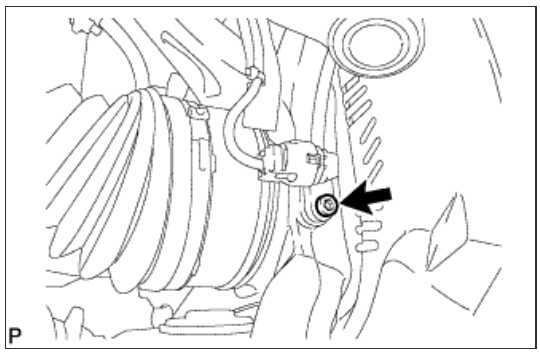
a. Remove the bolt, skid control sensor clamp and sensor wire.



b. Using a 5 mm hexagon socket, remove the bolt and speed sensor from the knuckle.

c. **NOTICE:**

Pull out the sensor while trying as much as possible not to rotate it.



3. REMOVE FRONT AXLE HUB SUB-ASSEMBLY LH

a. Remove the front axle hub (Click here).

4. DISCONNECT TIE ROD END SUB-ASSEMBLY LH

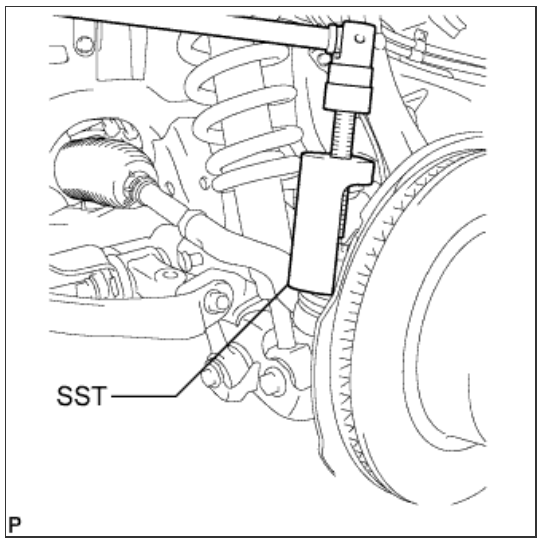
a. Remove the cotter pin and nut.

b. Using SST, disconnect the tie rod end LH from the steering knuckle.

SST
09610-20012

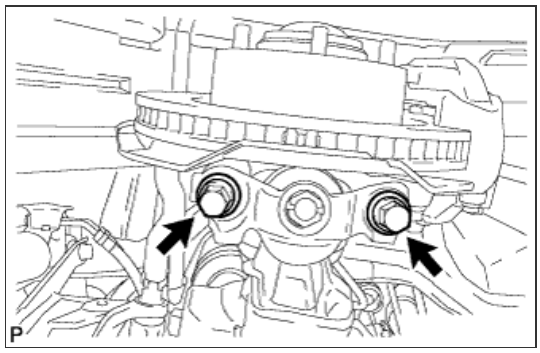
NOTICE:

- **Do not damage the front disc brake dust cover.**
- **Do not damage the ball joint dust cover.**
- **Do not damage the steering knuckle.**



5. DISCONNECT FRONT LOWER BALL JOINT ATTACHMENT LH

a. Remove the 2 bolts and disconnect the attachment from the steering knuckle.



6. REMOVE STEERING KNUCKLE LH

a. Support the front suspension lower arm LH with a jack.

b. Remove the clip and nut.

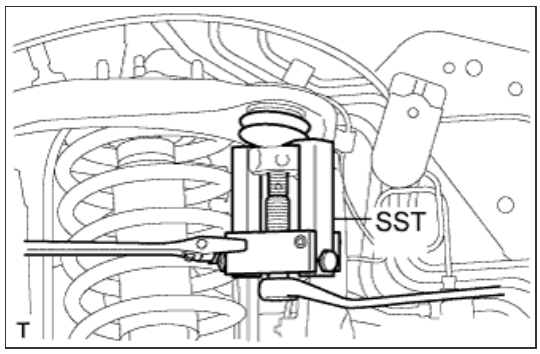
c. Using SST, disconnect the upper ball joint from the steering knuckle.

SST
09628-62011

NOTICE:

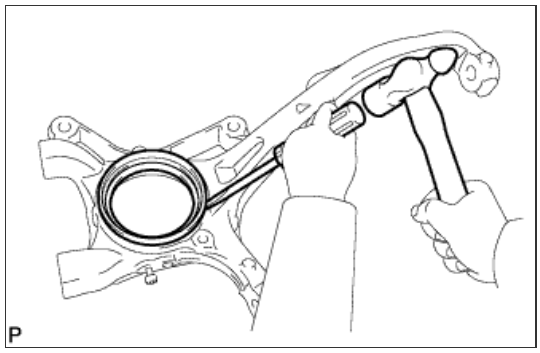
Do not damage the ball joint dust cover.

d. Remove the steering knuckle.



7. REMOVE STEERING KNUCKLE OIL SEAL LH

a. Using a screwdriver and hammer, tap out the oil seal.


P

for Preparation Click here

HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

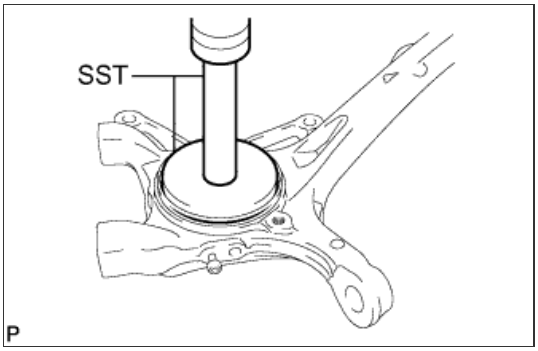
1. INSTALL STEERING KNUCKLE OIL SEAL LH

a. Using SST and a press, press in a new oil seal.

SST
09950-60020 (09951-01030)
09950-70010 (09951-07100)

NOTICE:

- **The oil seal is a non-reusable part.**
- **Do not damage the steering knuckle oil seal.**



2. INSTALL STEERING KNUCKLE LH

a. Install the steering knuckle to the front suspension upper arm with the nut.

Torque:
110 N*m{ 1122 kgf*cm , 81 ft.*lbf }

b. Install a new clip.

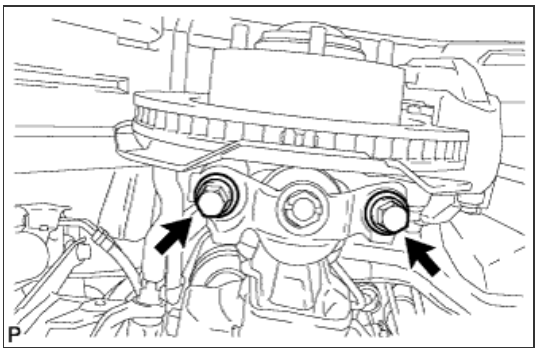
HINT:

If the holes for the clip are not aligned, tighten the nut up to another 60°.

3. CONNECT FRONT LOWER BALL JOINT ATTACHMENT LH

a. Connect the attachment to the steering knuckle with the 2 bolts.

Torque:
300 N*m{ 3059 kgf*cm , 221 ft.*lbf }



4. CONNECT TIE ROD END SUB-ASSEMBLY LH

a. Connect the tie rod end LH to the steering knuckle with the nut.

Torque:
69 N*m{ 704 kgf*cm , 51 ft.*lbf }

b. Install a new cotter pin.

HINT:

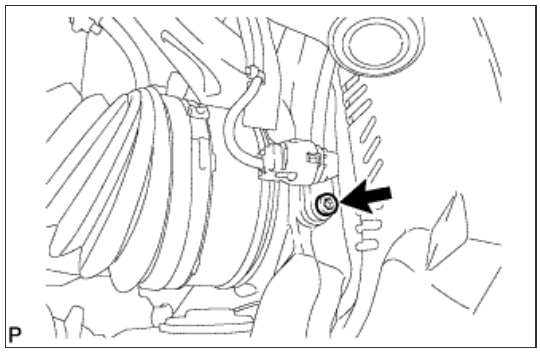
If the holes for the cotter pin are not aligned, tighten the nut up to another 60°.

5. INSTALL FRONT AXLE HUB SUB-ASSEMBLY LH

a. Install the front axle hub (Click here).

6. CONNECT FRONT SPEED SENSOR LH

a. Using a 5 mm hexagon socket, install the speed sensor with the bolt.

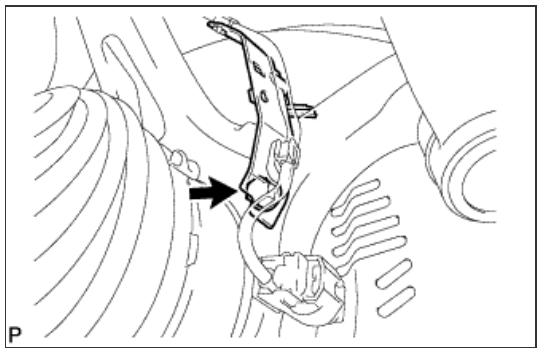


Torque:
8.5 N*m{ 87 kgf*cm , 75 in.*lbf }

NOTICE:

- **Make sure there are no pieces of iron or other foreign matter attached to the sensor tip.**
- **While inserting the speed sensor into the knuckle hole, do not strike or damage the sensor tip.**
- **After installing the speed sensor, make sure there is no clearance or foreign matter between the sensor stay part and the knuckle.**
- **Make sure there is no foreign matter attached to the magnetic rotor.**

b. Install the skid control sensor clamp and sensor wire with the bolt.



Torque:
13 N*m{ 127 kgf*cm , 9 ft.*lbf }

7. INSTALL FRONT WHEEL

Torque:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

8. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

9. CHECK SPEED SENSOR SIGNAL

a. Check the speed sensor signal (Click here).

10. CHECK SRS WARNING LIGHT

a. Check the SRS warning light (Click here).

11. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

a. Inspect and adjust the front wheel alignment (Click here).

12. ADJUST HEADLIGHT ASSEMBLY

a. Adjust the headlight assembly (Click here).

for Preparation Click here

HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

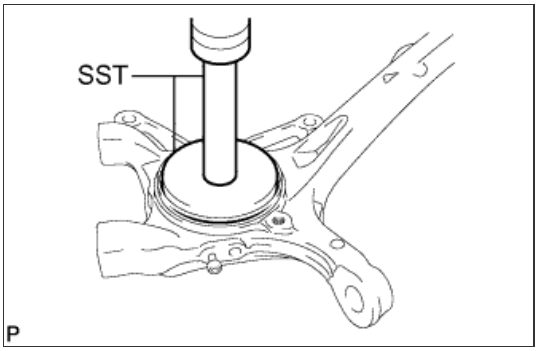
1. INSTALL STEERING KNUCKLE OIL SEAL LH

a. Using SST and a press, press in a new oil seal.

SST
09950-60020 (09951-01030)
09950-70010 (09951-07100)

NOTICE:

- **The oil seal is a non-reusable part.**
- **Do not damage the steering knuckle oil seal.**



2. INSTALL STEERING KNUCKLE LH

a. Install the steering knuckle to the front suspension upper arm with the nut.

Torque:
110 N*m{ 1122 kgf*cm , 81 ft.*lbf }

b. Install a new clip.

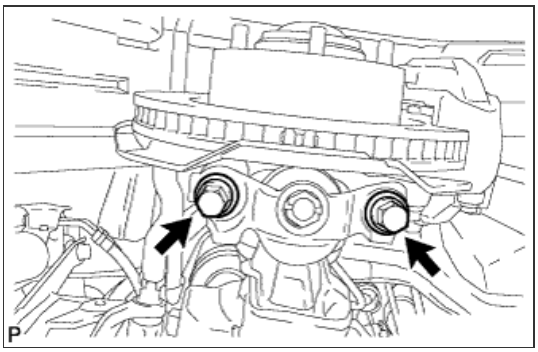
HINT:

If the holes for the clip are not aligned, tighten the nut up to another 60°.

3. CONNECT FRONT LOWER BALL JOINT ATTACHMENT LH

a. Connect the attachment to the steering knuckle with the 2 bolts.

Torque:
300 N*m{ 3059 kgf*cm , 221 ft.*lbf }



4. CONNECT TIE ROD END SUB-ASSEMBLY LH

a. Connect the tie rod end LH to the steering knuckle with the nut.

Torque:
69 N*m{ 704 kgf*cm , 51 ft.*lbf }

b. Install a new cotter pin.

HINT:

If the holes for the cotter pin are not aligned, tighten the nut up to another 60°.

5. INSTALL FRONT AXLE HUB SUB-ASSEMBLY LH

(Click here)

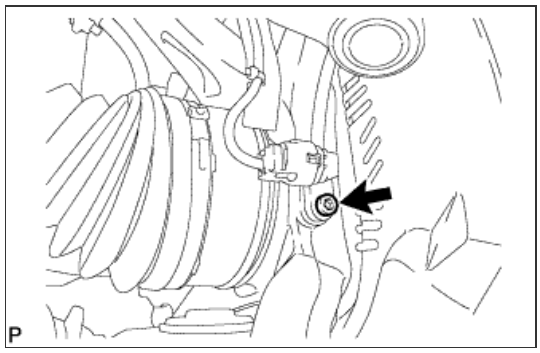
6. CONNECT FRONT SPEED SENSOR LH

a. Using a 5 mm hexagon socket, install the speed sensor with the bolt.

Torque:
8.5 N*m{ 87 kgf*cm , 75 in.*lbf }

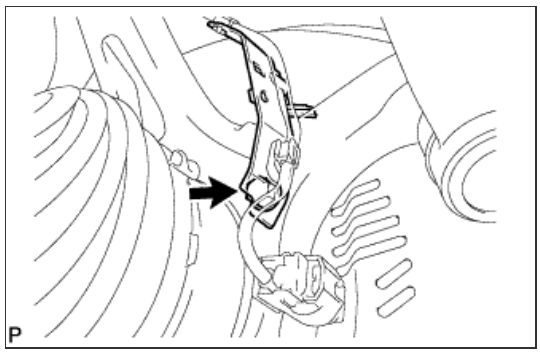
NOTICE:

- **Make sure there are no pieces of iron or other foreign matter attached to the sensor tip.**
- **While inserting the speed sensor into the knuckle hole, do not strike or damage the sensor tip.**
- **After installing the speed sensor, make sure there is no clearance or foreign matter between the sensor stay part and the knuckle.**
- **Make sure there is no foreign matter attached to the magnetic rotor.**



b. Install the skid control sensor clamp and sensor wire with the bolt.

Torque:
13 N*m{ 127 kgf*cm , 9 ft.*lbf }



7. INSTALL FRONT WHEEL

Torque:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

8. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

9. CHECK SPEED SENSOR SIGNAL

(Click here)

10. CHECK SRS WARNING LIGHT

(Click here)

11. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

(Click here)

12. ADJUST HEADLIGHT ASSEMBLY

(Click here)

for Preparation Click here

HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

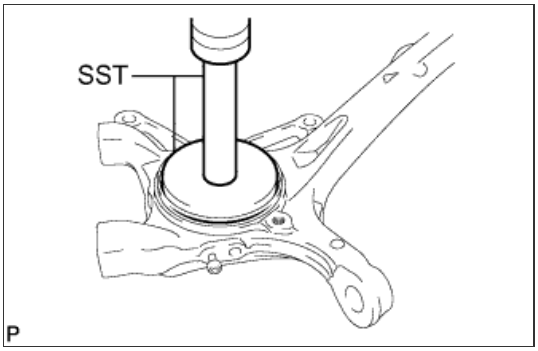
1. INSTALL STEERING KNUCKLE OIL SEAL LH

a. Using SST and a press, press in a new oil seal.

SST
09950-60020 (09951-01030)
09950-70010 (09951-07100)

NOTICE:

- **The oil seal is a non-reusable part.**
- **Do not damage the steering knuckle oil seal.**



2. INSTALL STEERING KNUCKLE LH

a. Install the steering knuckle to the front suspension upper arm with the nut.

Torque:
110 N*m{ 1122 kgf*cm , 81 ft.*lbf }

b. Install a new clip.

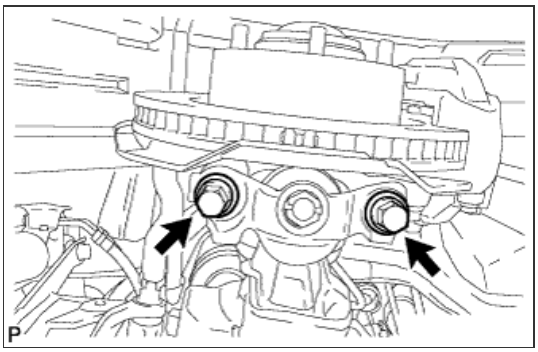
HINT:

If the holes for the clip are not aligned, tighten the nut up to another 60°.

3. CONNECT FRONT LOWER BALL JOINT ATTACHMENT LH

a. Connect the attachment to the steering knuckle with the 2 bolts.

Torque:
300 N*m{ 3059 kgf*cm , 221 ft.*lbf }



4. CONNECT TIE ROD END SUB-ASSEMBLY LH

a. Connect the tie rod end LH to the steering knuckle with the nut.

Torque:
69 N*m{ 704 kgf*cm , 51 ft.*lbf }

b. Install a new cotter pin.

HINT:

If the holes for the cotter pin are not aligned, tighten the nut up to another 60°.

5. INSTALL FRONT AXLE HUB SUB-ASSEMBLY LH

(Click here)

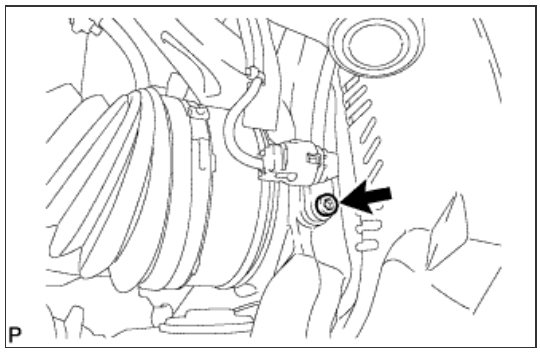
6. CONNECT FRONT SPEED SENSOR LH

a. Using a 5 mm hexagon socket, install the speed sensor with the bolt.

Torque:
8.5 N*m{ 87 kgf*cm , 75 in.*lbf }

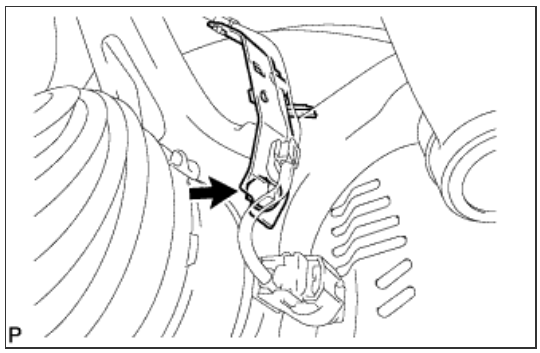
NOTICE:

- **Make sure there are no pieces of iron or other foreign matter attached to the sensor tip.**
- **While inserting the speed sensor into the knuckle hole, do not strike or damage the sensor tip.**
- **After installing the speed sensor, make sure there is no clearance or foreign matter between the sensor stay part and the knuckle.**
- **Make sure there is no foreign matter attached to the magnetic rotor.**



b. Install the skid control sensor clamp and sensor wire with the bolt.

Torque:
13 N*m{ 127 kgf*cm , 9 ft.*lbf }



7. INSTALL FRONT WHEEL

Torque:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

8. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

9. CHECK SPEED SENSOR SIGNAL

(Click here)

10. CHECK SRS WARNING LIGHT

(Click here)

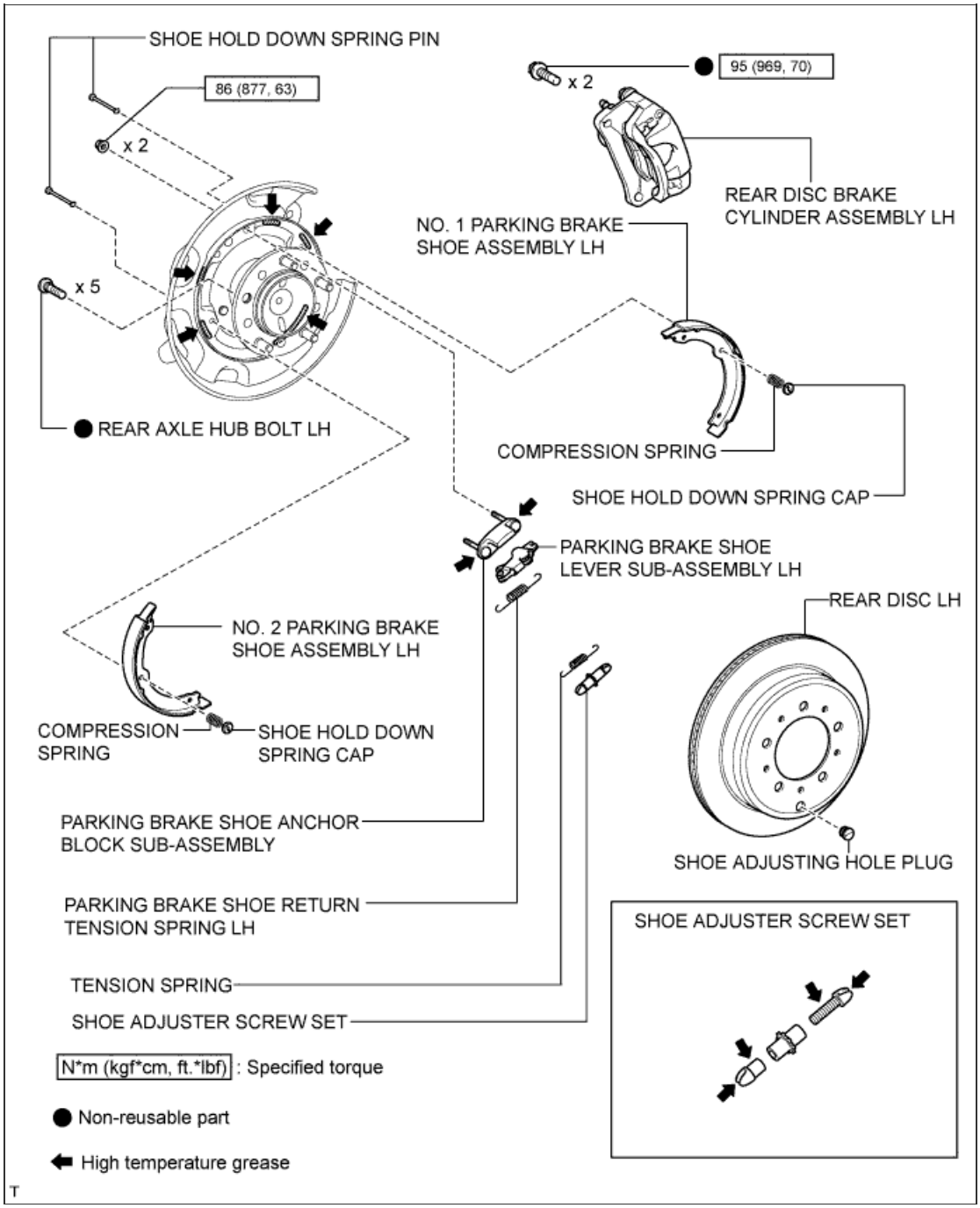
11. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

(Click here)

12. ADJUST HEADLIGHT ASSEMBLY

(Click here)

for Preparation [Click here]



for Preparation Click here

HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

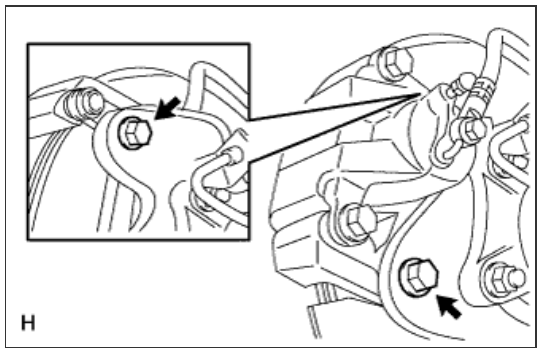
1. REMOVE REAR WHEEL LH

2. DISCONNECT REAR DISC BRAKE CYLINDER ASSEMBLY LH

a. Remove the 2 bolts and disconnect the rear disc brake cylinder.

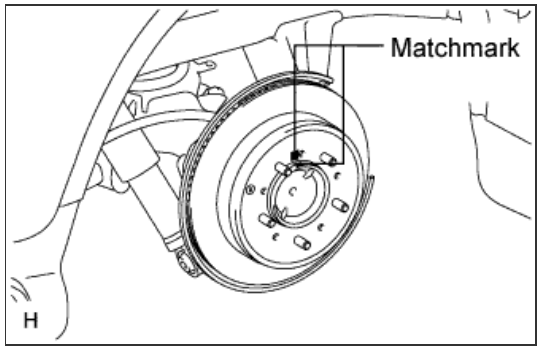
NOTICE:

- **Do not twist or bend the flexible hose.**
- **Do not disconnect the flexible hose from the disc brake cylinder.**

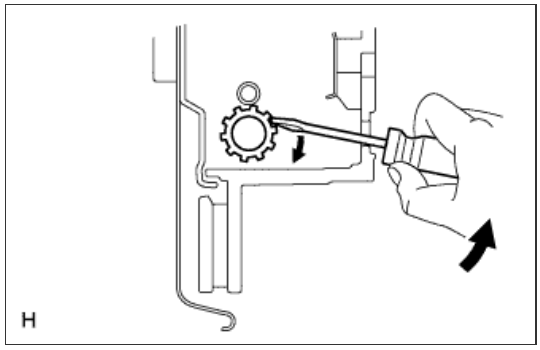


3. REMOVE REAR DISC LH

a. Put matchmarks on the rear disc and axle hub if planning to reuse the disc.



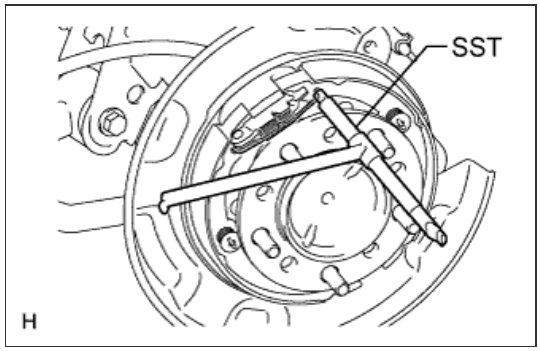
b. Turn the shoe adjuster as shown in the illustration until the disc turns freely, and then remove the disc.



4. REMOVE PARKING BRAKE SHOE RETURN TENSION SPRING LH

a. Using SST, remove the return spring.

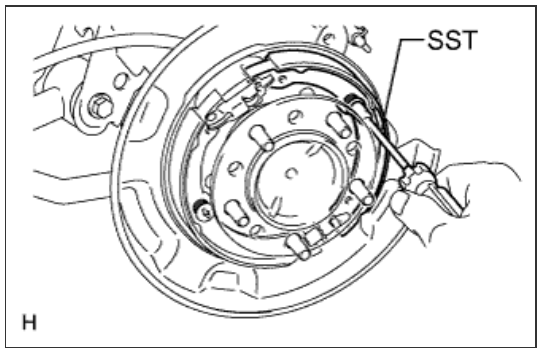
SST
09703-30011



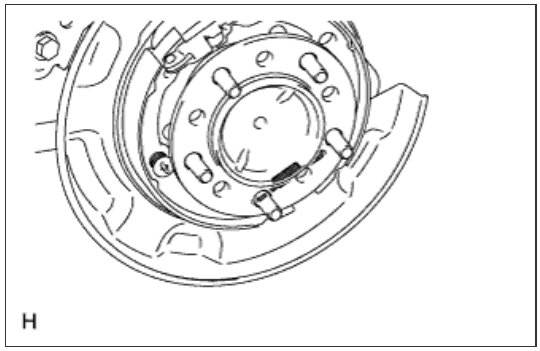
5. REMOVE NO. 1 PARKING BRAKE SHOE ASSEMBLY LH

a. Using SST, remove the shoe hold down spring cup, compression spring and shoe hold down spring pin.

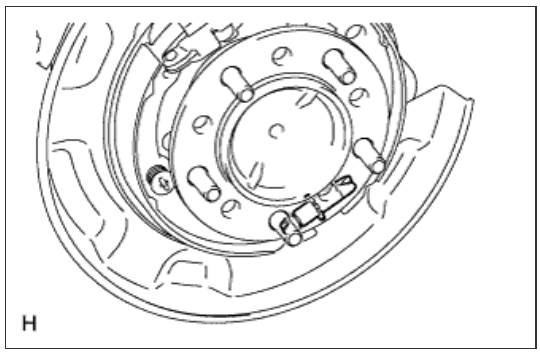
SST
09718-00011



b. Disconnect the tension spring from the No. 1 parking brake shoe.



c. Remove the No. 1 parking brake shoe and shoe adjuster screw set.

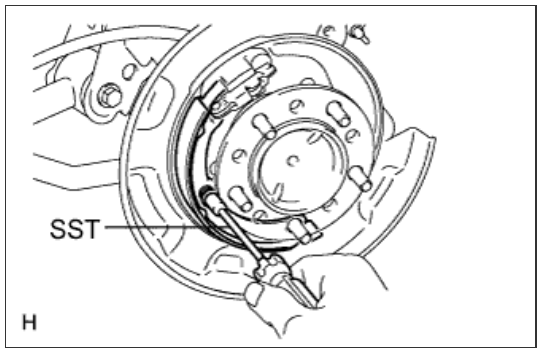


6. REMOVE NO. 2 PARKING BRAKE SHOE ASSEMBLY LH

a. Using SST, remove the shoe hold down spring cup, compression spring and shoe hold down spring pin.

SST
09718-00011

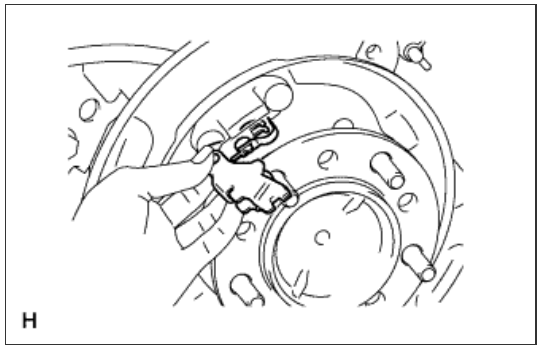
b. Remove the No. 2 parking brake shoe.



7. REMOVE PARKING BRAKE SHOE LEVER SUB-ASSEMBLY LH

a. Disconnect the No. 3 parking brake cable from the parking brake shoe lever.

b. Remove the parking brake shoe lever.



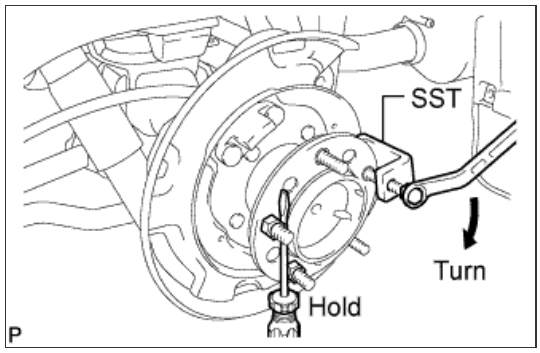
8. REMOVE REAR AXLE HUB BOLT LH

a. Using SST and a screwdriver or equivalent to hold the axle hub, remove the hub bolt.

SST
09650-17011

NOTICE:

- **Do not deform the oil deflector.**
- **Make sure to align the notch of SST with the flange of the oil deflector.**



9. INSTALL REAR AXLE HUB BOLT LH

a. Temporarily install a washer and hub nut to a new hub bolt as shown in the illustration.

NOTICE:

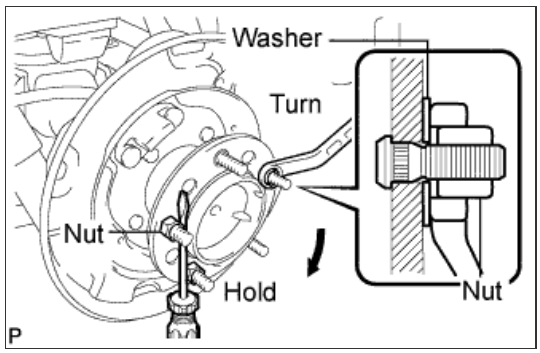
Install a hub nut to prevent damage to the hub bolt.

b. Using a screwdriver or equivalent to hold the hub, turn the hub nut until the bottom surface of the hub bolt head touches the axle hub.

c. Remove the washer and hub nut.

NOTICE:

Do not damage the threads of the hub bolt.



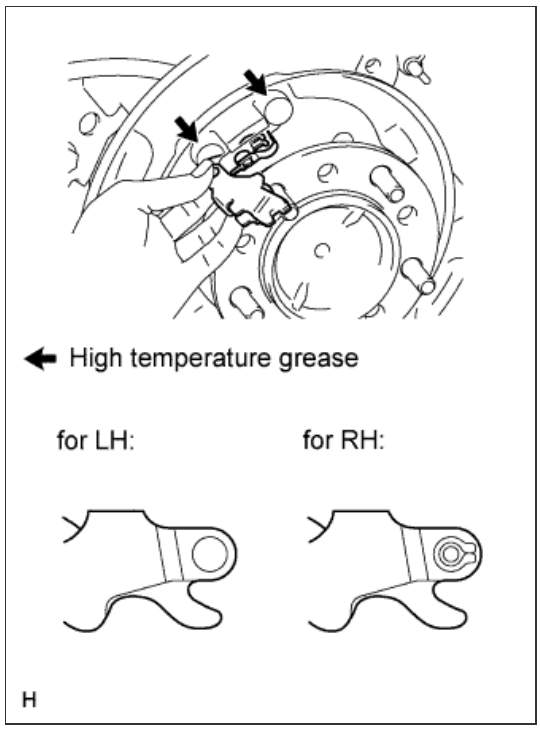
10. INSTALL PARKING BRAKE SHOE LEVER SUB-ASSEMBLY LH

a. Apply high temperature grease to the parking brake anchor block.

b. Install the parking brake shoe lever to the No. 3 parking brake cable.

NOTICE:

Be carefully to distinguish between the parking brake shoe lever RH and LH.

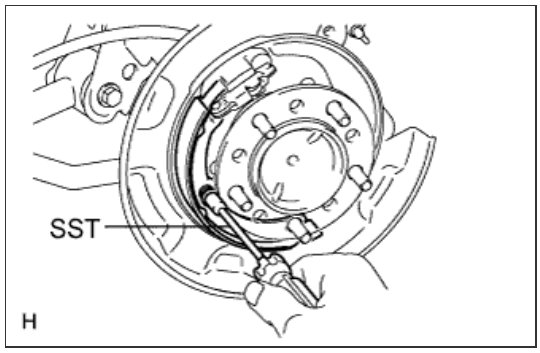


11. INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY LH

a. Using SST, install the No. 2 parking brake shoe with the shoe hold down spring pin, compression spring and shoe hold down spring cup.

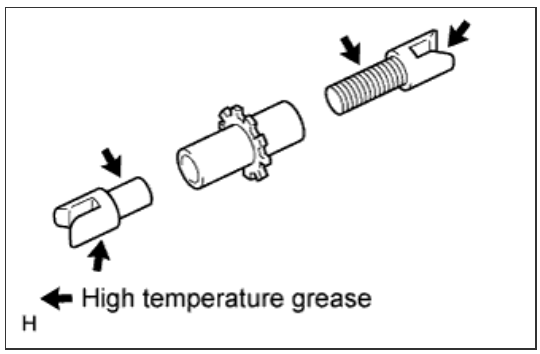
SST

09718-00011

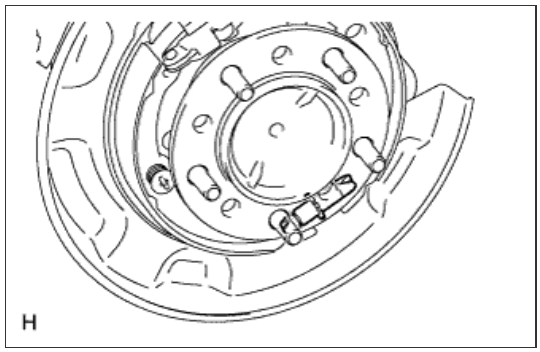


12. INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY LH

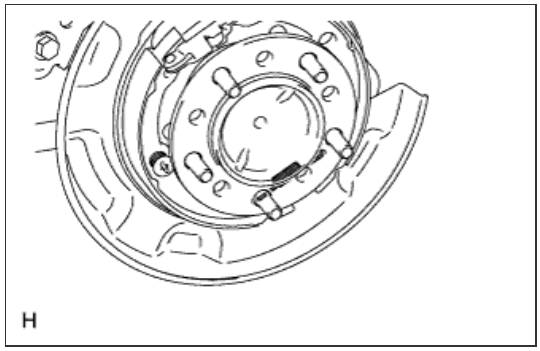
a. Apply high temperature grease to the thread and all joining areas of the parking brake shoe adjuster screw set.



b. Set the No. 1 parking brake shoe and shoe adjuster screw set in place.

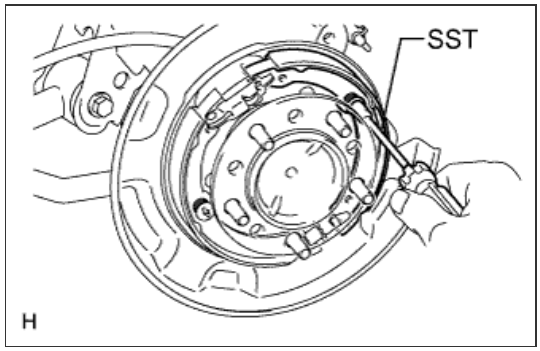


c. Connect the tension spring.



d. Using SST, install the shoe hold down spring pin, compression spring and shoe hold down spring cup.

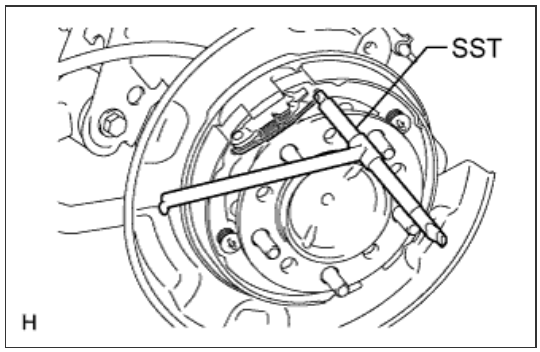
SST
09718-00011



13. INSTALL PARKING BRAKE SHOE RETURN TENSION SPRING LH

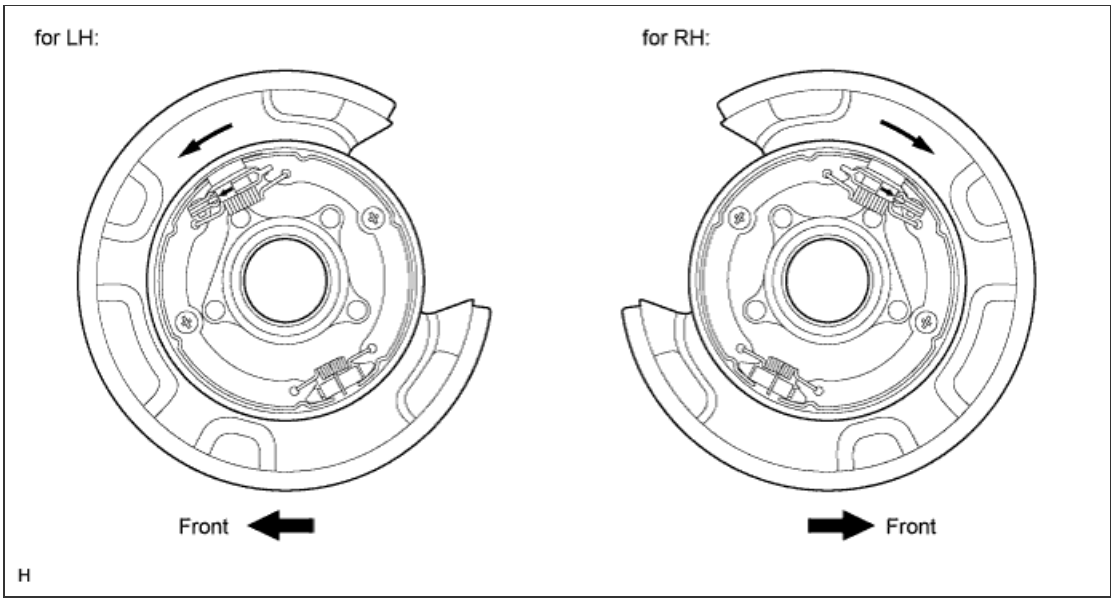
a. Using SST, install the shoe return spring.

SST
09703-30011



14. CHECK PARKING BRAKE INSTALLATION

a. Check that each part is installed properly.

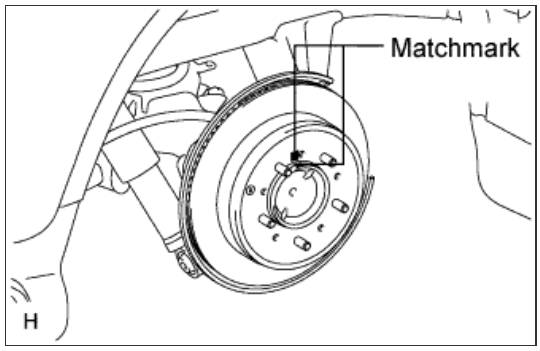


15. INSTALL REAR DISC LH

a. Align the matchmarks, and then install the rear disc.

HINT:

When replacing the rear disc with a new one, select the installation position where the rear disc has the minimum runout.



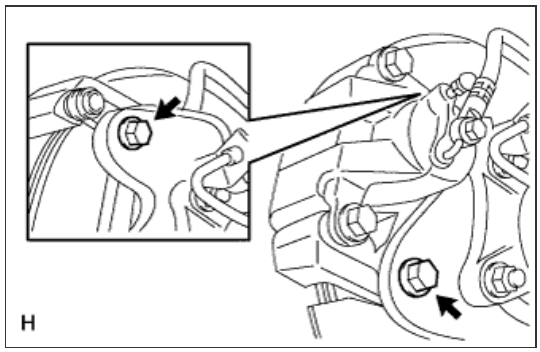
16. CONNECT REAR DISC BRAKE CYLINDER ASSEMBLY LH

a. Connect the rear disc brake cylinder and install 2 new bolts.

Torque:
95 N*m{ 969 kgf*cm , 70 ft.*lbf }

NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



17. CHECK PARKING BRAKE LEVER TRAVEL

a. Fully pull the parking brake lever to engage the parking brake.

b. Release the lever to disengage the parking brake.

c. Slowly pull the parking brake lever all the way, and count the number of clicks.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks

If the parking brake lever travel is not as specified, adjust the parking brake shoe clearance and parking brake lever travel.

18. ADJUST PARKING BRAKE LEVER TRAVEL

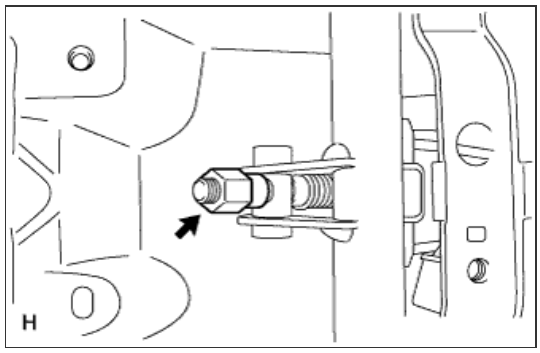
a. Remove the console cup holder box sub-assembly (Click here).

b. Completely release the parking brake lever.

c. Loosen the adjusting nut to completely release the parking brake cable.

d. Temporarily install the hub nuts.

e. Remove the hole plug.

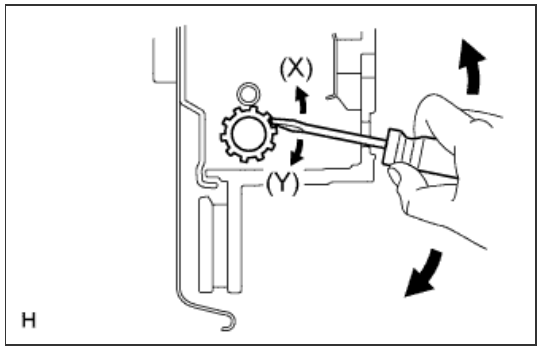


f. Insert an adjustment tool into the adjustment hole of the disc. Rotate the adjustment wheel in the "X" direction until the shoes are locked. Then rotate the adjustment wheel in the "Y" direction 8 notches.

g. Check that the disc can be rotated lightly. If not, rotate the adjustment wheel in the "Y" direction and check again.

h. Install the hole plug.

i. Remove the hub nuts.

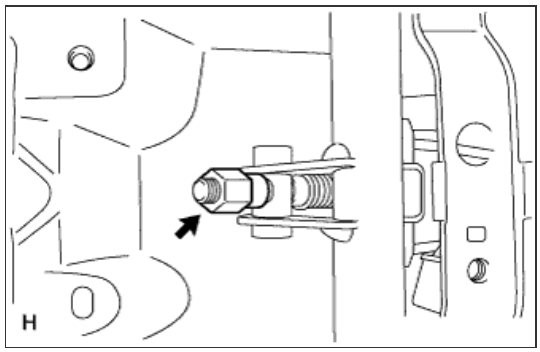


j. Turn the adjusting nut until the parking brake lever travel becomes correct.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks

k. Operate the parking brake lever 3 to 4 times, and check the parking brake lever travel.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks



l. Check whether the parking brake drags or not.

m. When operating the parking brake lever, check that the brake warning light comes on.

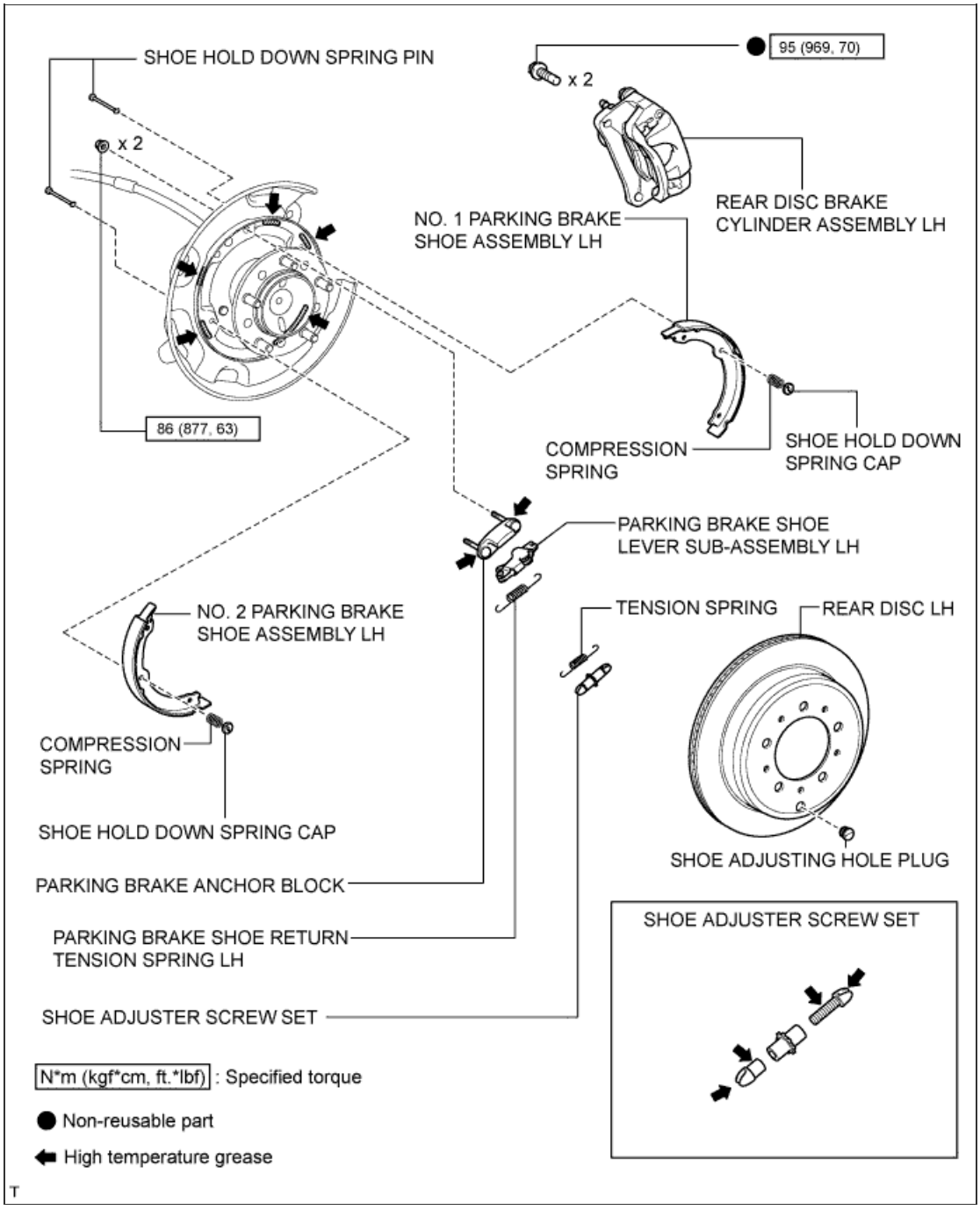
Standard Condition:
The brake warning light always illuminates at the first click.

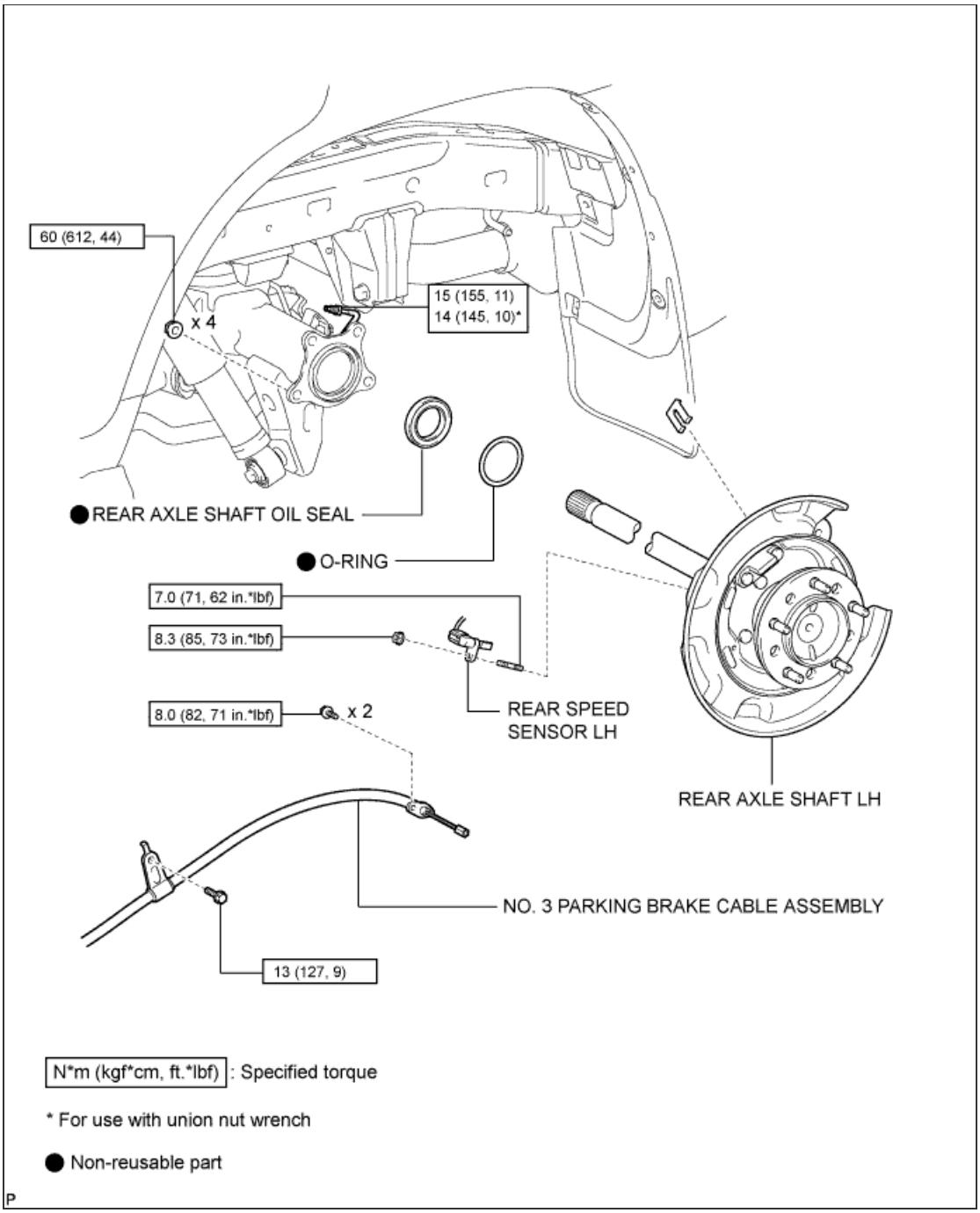
n. Install the console cup holder box sub-assembly (Click here).

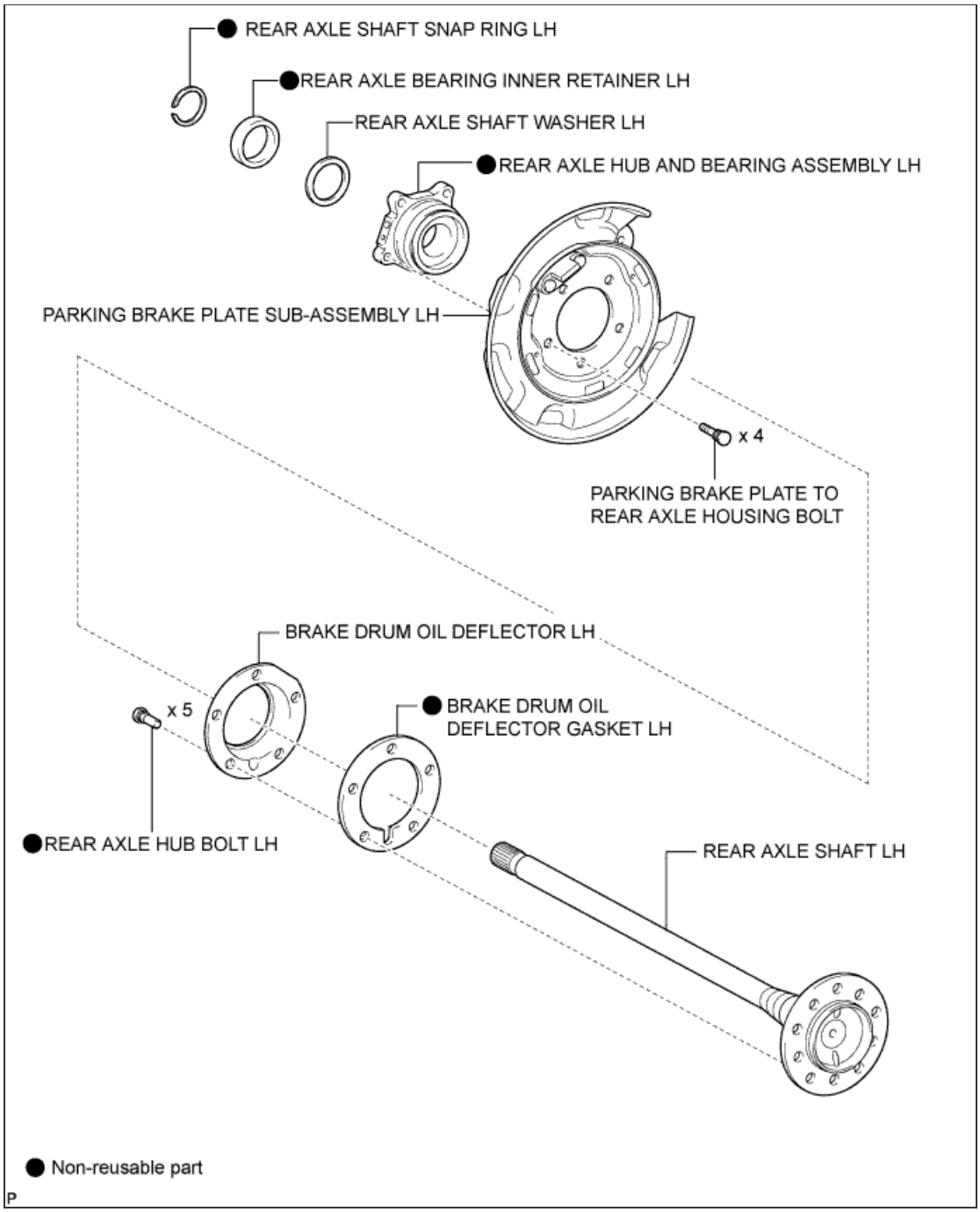
19. INSTALL REAR WHEEL LH

Torque:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

for Preparation Click here




60 (612, 44)
x 4
15 (155, 11)
14 (145, 10)*
REAR AXLE SHAFT OIL SEAL
O-RING
7.0 (71, 62 in.*lbf)
8.3 (85, 73 in.*lbf)
8.0 (82, 71 in.*lbf)
x 2
REAR SPEED SENSOR LH
REAR AXLE SHAFT LH
NO. 3 PARKING BRAKE CABLE ASSEMBLY
13 (127, 9)
N*m (kgf*cm, ft.*lbf) : Specified torque
* For use with union nut wrench
Non-reusable part
P


REAR AXLE SHAFT SNAP RING LH
REAR AXLE BEARING INNER RETAINER LH
REAR AXLE SHAFT WASHER LH
REAR AXLE HUB AND BEARING ASSEMBLY LH
PARKING BRAKE PLATE SUB-ASSEMBLY LH
x 4
PARKING BRAKE PLATE TO
REAR AXLE HOUSING BOLT
BRAKE DRUM OIL DEFLECTOR LH
x 5
BRAKE DRUM OIL
DEFLECTOR GASKET LH
REAR AXLE HUB BOLT LH
REAR AXLE SHAFT LH
Non-reusable part
P

for Preparation Click here

HINT:

- **Use the same procedures for the LH side and RH side.**
- **The procedures listed below are for the LH side.**

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

NOTICE:
w/ Navigation System:

After the engine switch is turned off, the HDD navigation system requires approximately 6 minutes to record various types of memory and settings. As a result, after turning the engine switch off, wait 6 minutes or more before disconnecting the cable from the negative (-) battery terminal.

2. REMOVE REAR WHEEL LH

3. DRAIN BRAKE FLUID

NOTICE:

Wash off brake fluid immediately if it comes in contact with any painted surface.

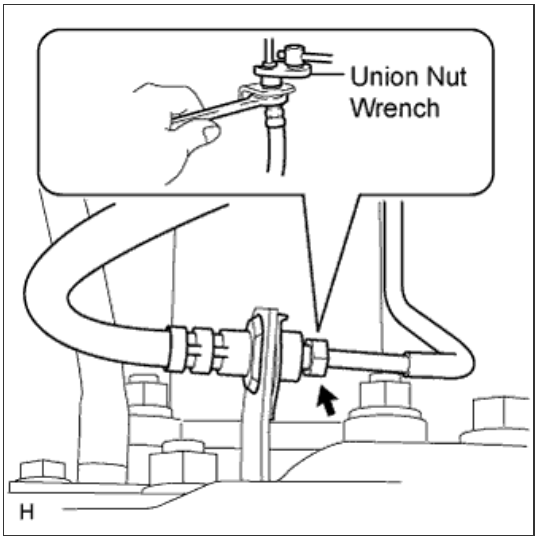
4. DISCONNECT REAR BRAKE FLEXIBLE HOSE

a. Disconnect the brake tube from the flexible hose with union nut wrench while holding the flexible hose with a wrench.

NOTICE:

- **Do not bend or damage the brake tube.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake tube from the connecting point.**

b. Remove the clip.

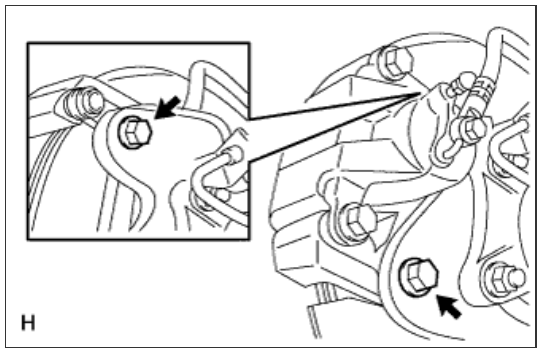


5. DISCONNECT REAR DISC BRAKE CYLINDER ASSEMBLY LH

a. Remove the 2 bolts and disconnect the rear disc brake cylinder.

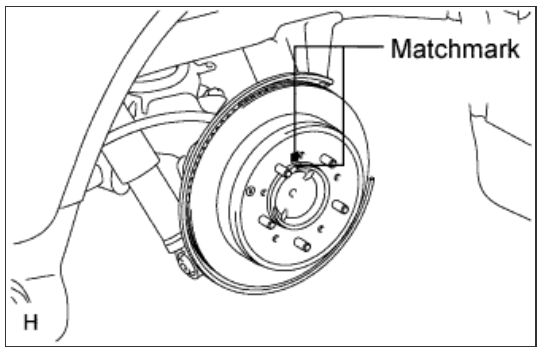
NOTICE:

- **Do not twist or bend the flexible hose.**
- **Do not disconnect the flexible hose from the disc brake cylinder.**

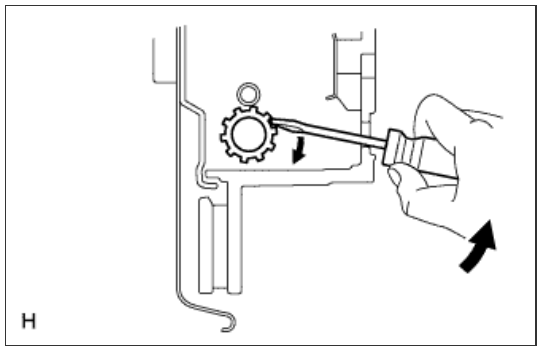


6. REMOVE REAR DISC LH

a. Put matchmarks on the rear disc and axle hub if planning to reuse the disc.



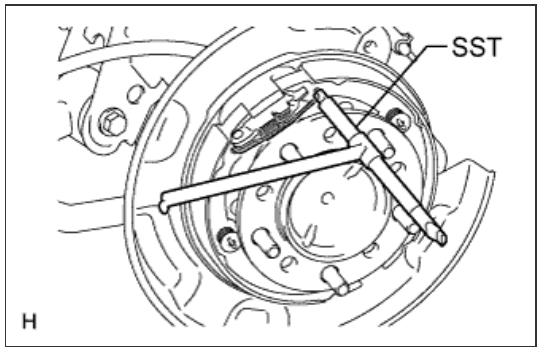
b. Turn the shoe adjuster as shown in the illustration until the disc turns freely, and then remove the disc.



7. REMOVE PARKING BRAKE SHOE RETURN TENSION SPRING LH

a. Using SST, remove the return spring.

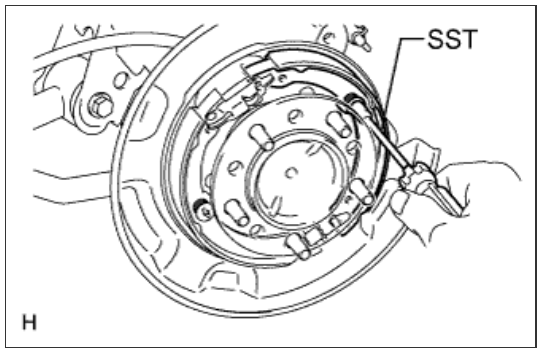
SST
09703-30011



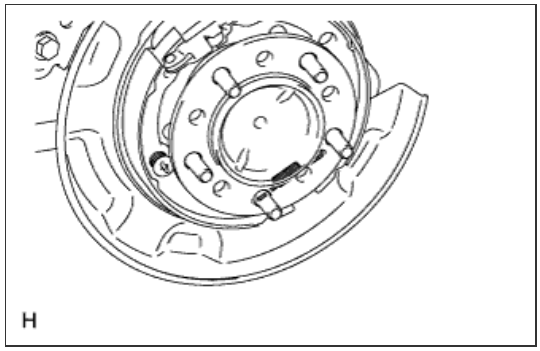
8. REMOVE NO. 1 PARKING BRAKE SHOE ASSEMBLY LH

a. Using SST, remove the shoe hold down spring cup, compression spring and shoe hold down spring pin.

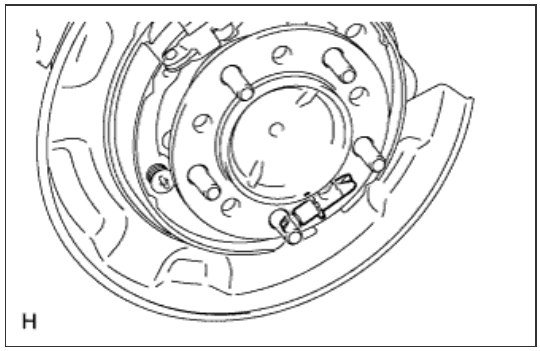
SST
09718-00011



b. Disconnect the tension spring from the No. 1 parking brake shoe.



c. Remove the No. 1 parking brake shoe and shoe adjuster screw set.

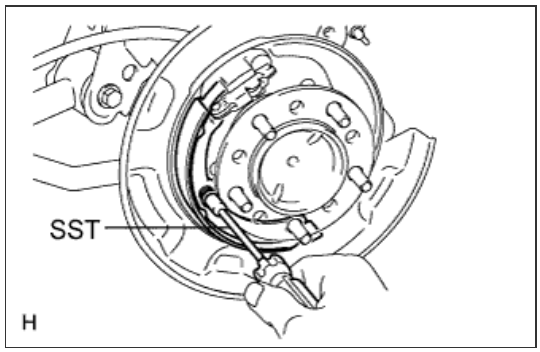


9. REMOVE NO. 2 PARKING BRAKE SHOE ASSEMBLY LH

a. Using SST, remove the shoe hold down spring cup, compression spring and shoe hold down spring pin.

SST
09718-00011

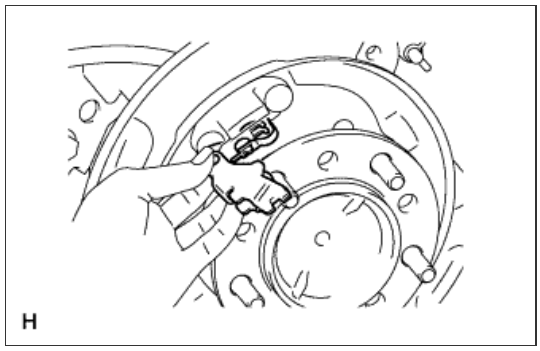
b. Remove the No. 2 parking brake shoe.



10. REMOVE PARKING BRAKE SHOE LEVER SUB-ASSEMBLY LH

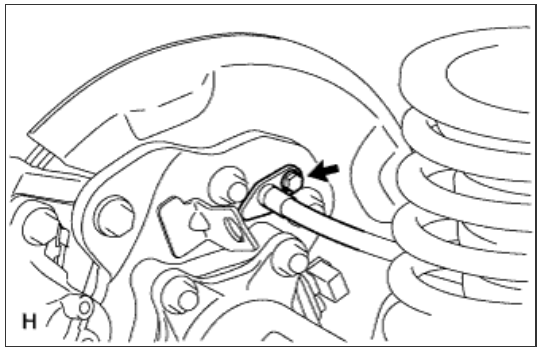
a. Disconnect the No. 3 parking brake cable from the parking brake shoe lever.

b. Remove the parking brake shoe lever.



11. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

a. Remove the bolt and No. 3 parking brake cable.

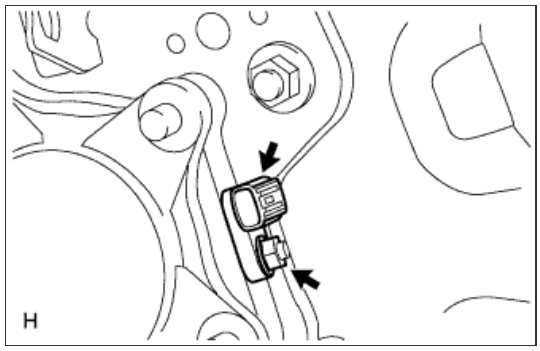


12. DISCONNECT REAR SPEED SENSOR LH

a. Remove the nut and speed sensor.

NOTICE:

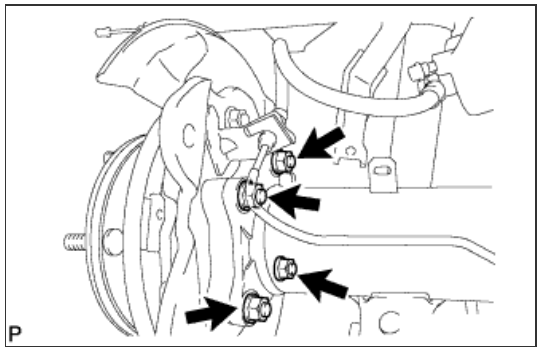
Pull out the sensor while trying as much as possible not to rotate it.



13. REMOVE REAR AXLE SHAFT LH

a. Remove the 4 nuts and rear axle shaft together with the parking brake plate.

b. Remove the O-ring.



14. REMOVE REAR AXLE SHAFT OIL SEAL LH

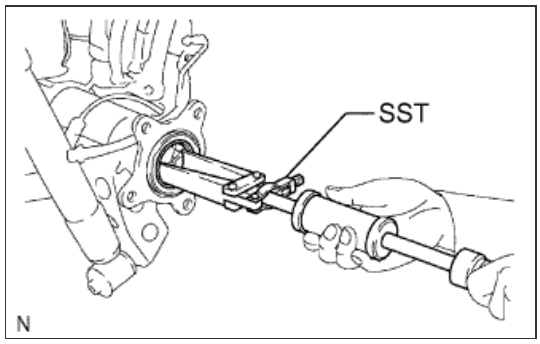
a. Using SST, tap out the oil seal.

SST

09308-00010

NOTICE:

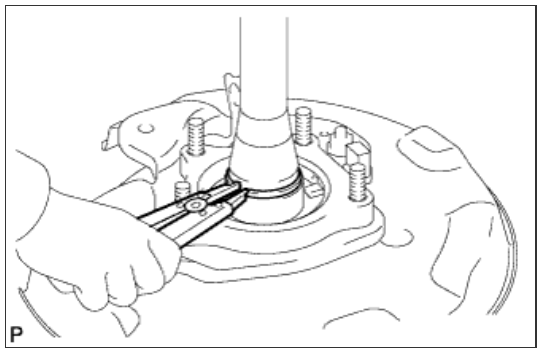
Be careful not to damage the axle housing hole.



for Preparation Click here

1. REMOVE REAR AXLE SHAFT SNAP RING

a. Using a snap ring expander, remove the snap ring.



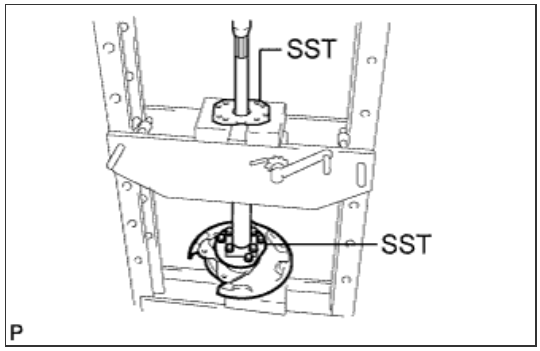
2. REMOVE REAR AXLE SHAFT LH

a. Using SST and a press, press out the rear axle shaft.

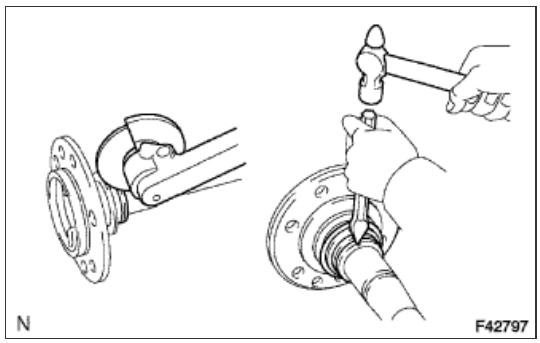
SST
09521-25011
09521-60010

b. Remove the rear axle bearing inner retainer from the axle hub.

c. Remove the rear axle shaft washer from the axle hub.



d. Grind the rear axle bearing inner race surface using a grinder, then remove it with a chisel.



3. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY LH

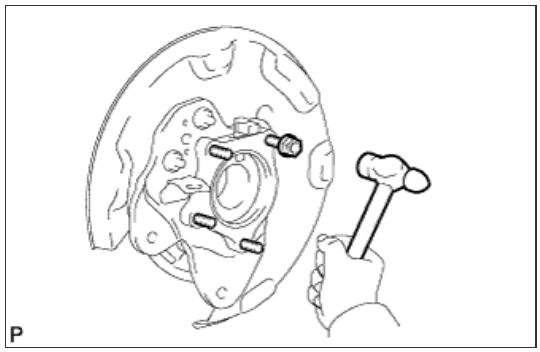
a. Temporarily install 4 nuts to the housing bolts.

NOTICE:

Do not use any nuts removed from the vehicle, as they may be damaged.

b. Using a hammer, remove the 4 housing bolts and rear axle hub and bearing.

c. Remove the 4 nuts.



4. REMOVE BRAKE DRUM OIL DEFLECTOR LH

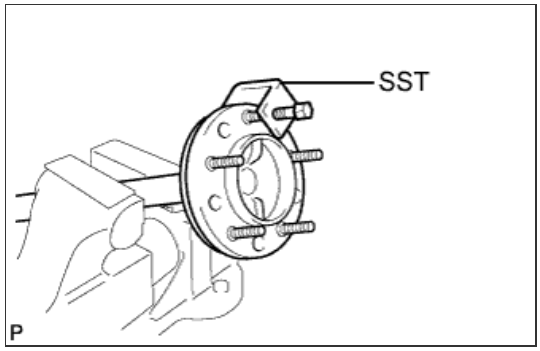
a. Using SST, remove the 5 hub bolts.

SST
09650-17011

NOTICE:

- **Do not deform the oil deflector.**
- **Make sure to align the notch of SST with the flange of the oil deflector.**

b. Remove the deflector and deflector gasket from the rear axle shaft.



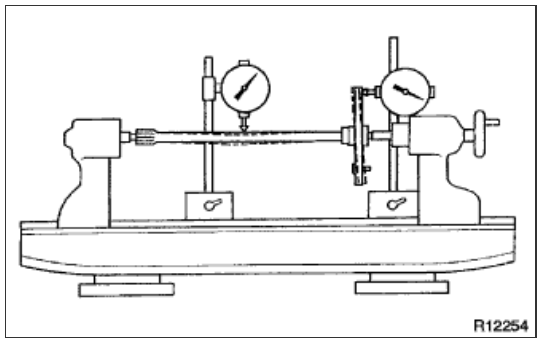
for Preparation Click here

1. INSPECT REAR AXLE SHAFT LH

a. Using a dial indicator, measure the rear axle shaft runout and flange runout.

Maximum runout:
Shaft runout:
1.50 mm (0.0591 in.)
Flange runout:
0.05 mm (0.00197 in.)

If the rear axle shaft or flange is damaged or worn, or if the runout is more than the maximum, replace the rear axle shaft.



for Preparation Click here

NOTICE:

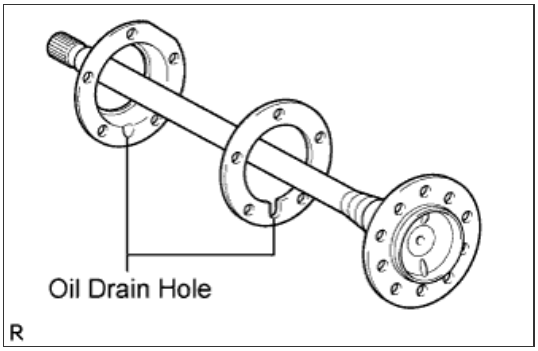
Do not allow foreign matter, etc. to contact the rear axle hub and bearing assembly.

1. INSTALL BRAKE DRUM OIL DEFLECTOR

a. Install a new deflector gasket and the deflector to the rear axle shaft.

HINT:

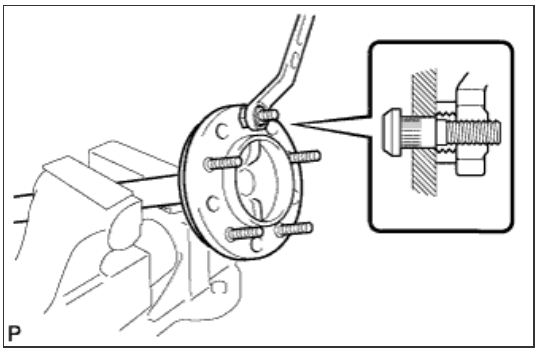
Align the 2 oil drain holes.



b. Temporarily install a washer and nut to 5 new hub bolts as shown in the illustration.

c. Install the hub bolts by tightening each nut.

d. Remove the washer and nut from each hub bolt.



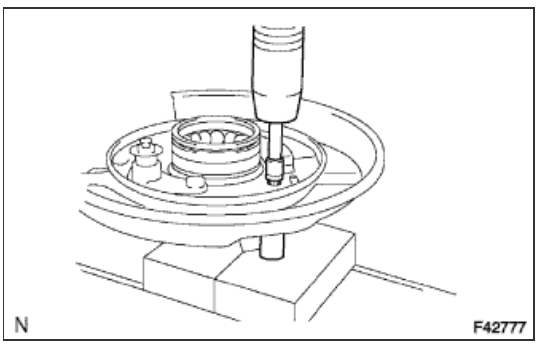
2. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY LH

a. Position the parking brake plate on a new rear axle hub and bearing.

NOTICE:

Make sure to securely fit the parking brake plate to the bearing.

b. Using 2 socket wrenches and a press, press in the 4 housing bolts.



3. INSTALL REAR AXLE SHAFT LH

a. Install the washer and a new retainer to the axle hub as shown in the illustration.

NOTICE:

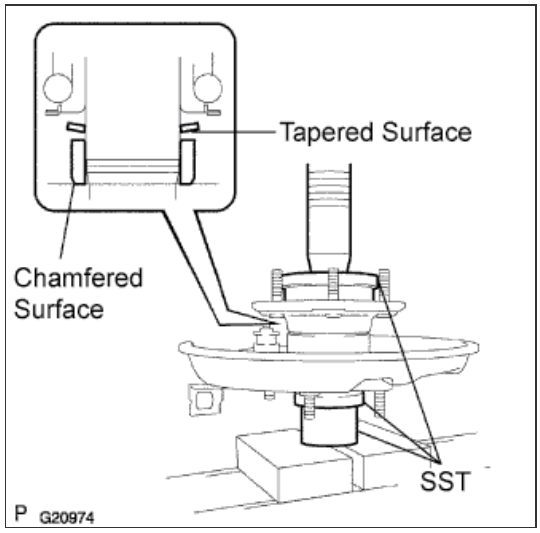
- **Install the washer with its tapered surface facing downward.**
- **Install the retainer with its chamfered surface facing downward.**

b. Using SST and a press, press in the rear axle shaft.

SST
09631-12090
09726-40010
09951-01100

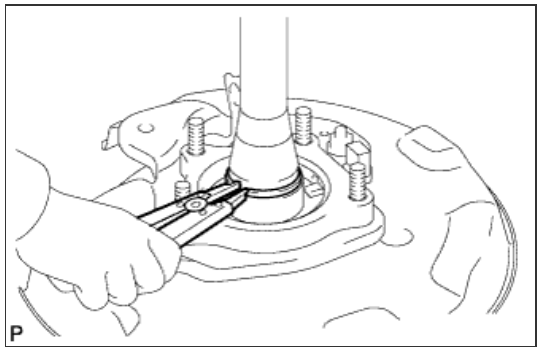
NOTICE:

Make sure to securely fit the bearing to the rear axle shaft.



4. INSTALL REAR AXLE SHAFT SNAP RING LH

a. Using a snap ring expander, install a new snap ring.



for Preparation Click here

1. INSTALL REAR AXLE SHAFT OIL SEAL LH

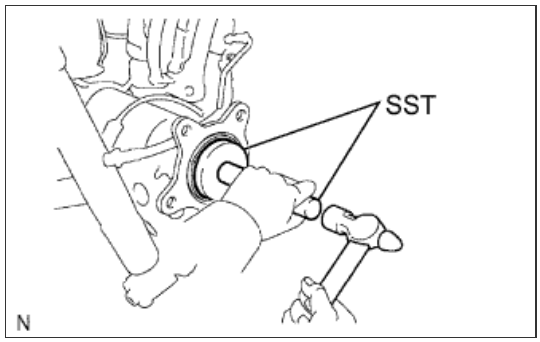
a. Using SST and a hammer, tap in a new oil seal.

NOTICE:

Do not allow foreign matter, etc. to contact the axle shaft housing hole.

SST

09950-60020 (09951-00770)
09950-70010 (09951-07150)

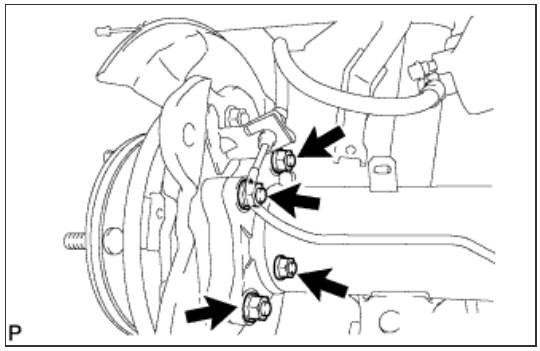


2. INSTALL REAR AXLE SHAFT LH

a. Install the O-ring to the axle housing.

b. Install the rear axle shaft and parking brake plate with the 4 nuts.

Torque:
60 N*m{ 612 kgf*cm , 44 ft.*lbf }



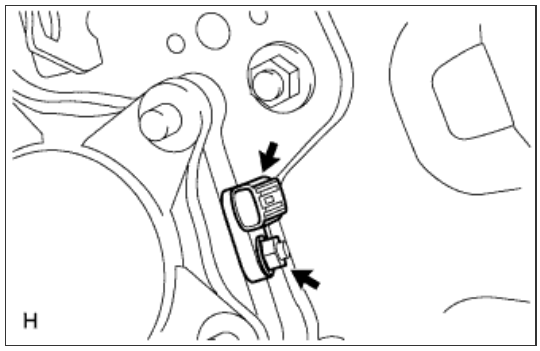
3. CONNECT REAR SPEED SENSOR LH

a. Install the speed sensor with the nut.

Torque:
8.3 N*m{ 85 kgf*cm , 73 in.*lbf }

NOTICE:

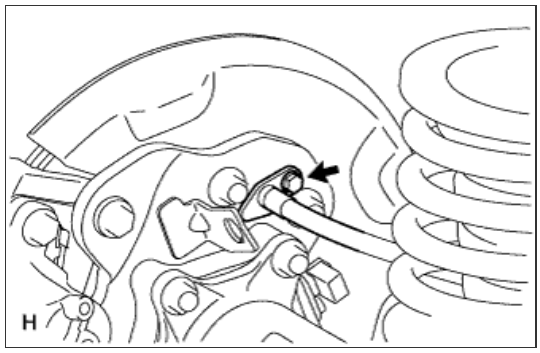
- **Make sure there are no pieces of iron or other foreign matter attached to the sensor tip.**
- **While inserting the speed sensor into the knuckle hole, do not strike or damage the sensor tip.**
- **After installing the speed sensor, make sure there is no clearance or foreign matter between the sensor stay part and the knuckle.**
- **Make sure there is no foreign matter attached to the speed sensor rotor.**



4. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

a. Connect the No. 3 parking brake cable with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }



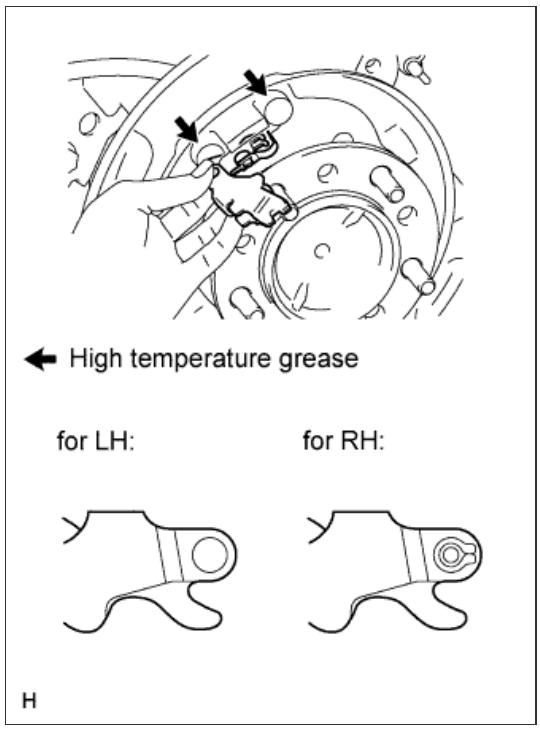
5. INSTALL PARKING BRAKE SHOE LEVER SUB-ASSEMBLY LH

a. Apply high temperature grease to the parking brake anchor block.

b. Install the parking brake shoe lever to the No. 3 parking brake cable.

NOTICE:

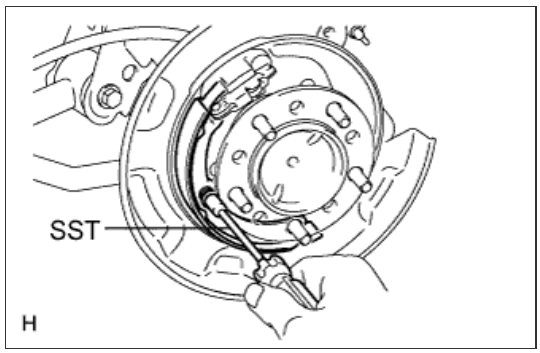
Be carefully to distinguish between the parking brake shoe lever RH and LH.



6. INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY LH

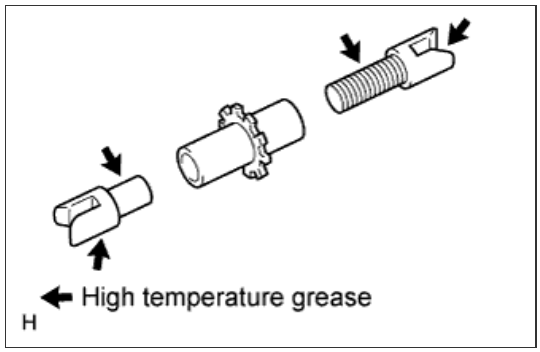
a. Using SST, install the No. 2 parking brake shoe with the shoe hold down spring pin, compression spring and shoe hold down spring cup.

SST
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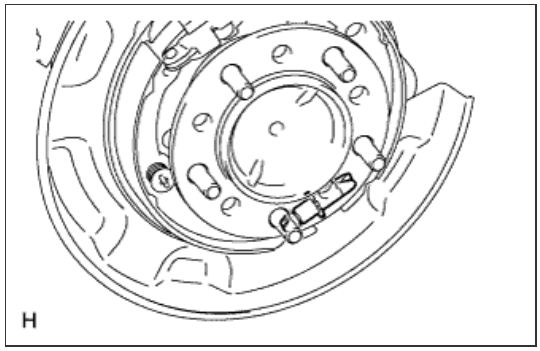


7. INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY LH

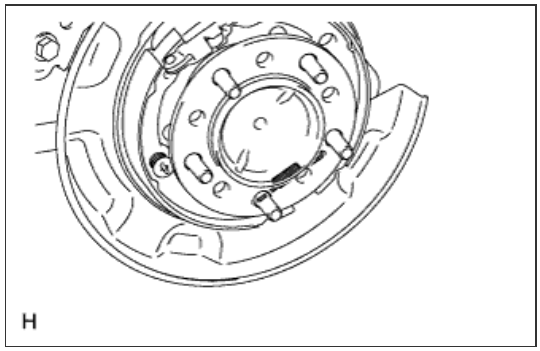
a. Apply high temperature grease to the thread and all joining areas of the parking brake shoe adjuster screw set.



b. Set the No. 1 parking brake shoe and shoe adjuster screw set in place.

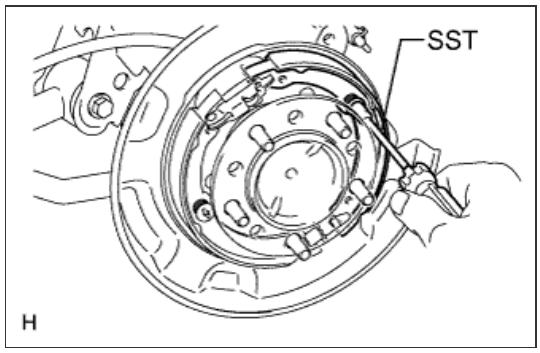


c. Connect the tension spring.



d. Using SST, install the shoe hold down spring pin, compression spring and shoe hold down spring cup.

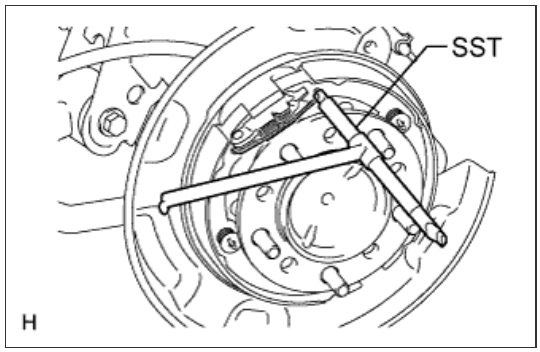
SST
09718-00011



8. INSTALL PARKING BRAKE SHOE RETURN TENSION SPRING LH

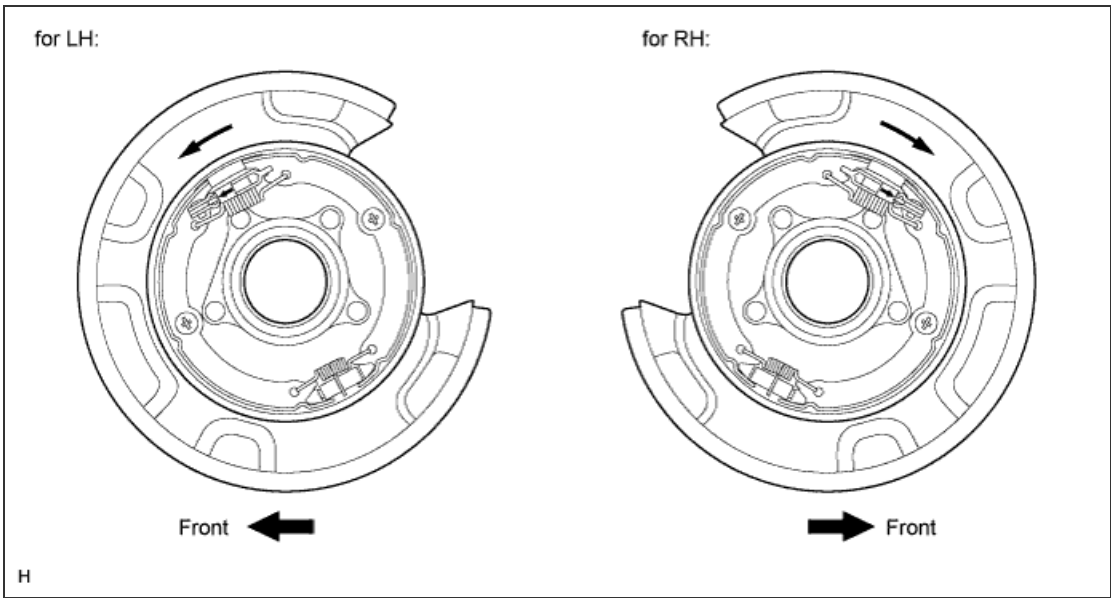
a. Using SST, install the shoe return spring.

SST
09703-30011



9. CHECK PARKING BRAKE INSTALLATION

a. Check that each part is installed properly.

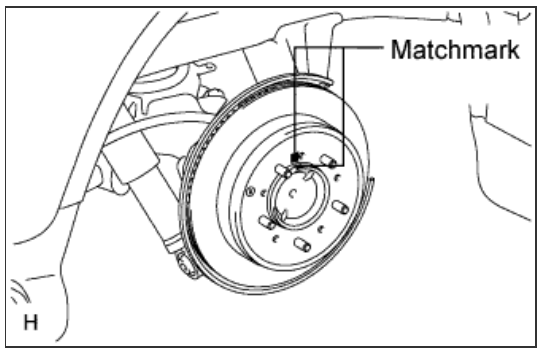


10. INSTALL REAR DISC LH

a. Align the matchmarks, and then install the rear disc.

HINT:

When replacing the rear disc with a new one, select the installation position where the rear disc has the minimum runout.



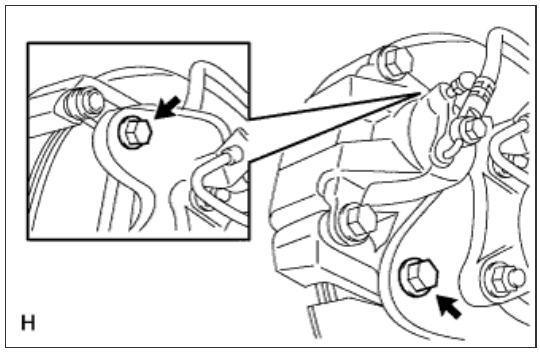
11. CONNECT REAR DISC BRAKE CYLINDER ASSEMBLY LH

a. Connect the rear disc brake cylinder and install 2 new bolts.

Torque:
95 N*m{ 969 kgf*cm , 70 ft.*lbf }

NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



12. CONNECT REAR BRAKE FLEXIBLE HOSE

a. Set the flexible hose to the connecting point with the brake tube, and then install a new clip.

b. Using union nut wrench, connect the flexible hose to the brake tube while holding the flexible hose with a wrench.

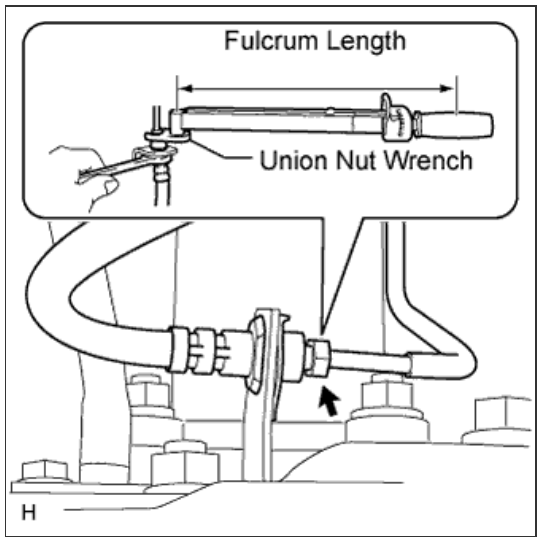
Torque:
without union nut wrench:
15 N*m{ 155 kgf*cm , 11 ft.*lbf }
with union nut wrench:
14 N*m{ 145 kgf*cm , 10 ft.*lbf }

HINT:

Use a torque wrench with a fulcrum length of 30 cm (11.8 in.).

NOTICE:

- **Do not bend or damage the brake tube.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake tube from the connecting point.**



13. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

14. BLEED BRAKE LINE

a. Turn the ignition switch to ON.

b. Remove the brake master cylinder reservoir filler cap assembly.

c. Add brake fluid until the fluid level is between the MIN and MAX lines of the reservoir.

d. Repeatedly depress the brake pedal and bleed air from the bleeder plug of the front disc brake cylinder RH.

e. Repeat the step above until the air is completely bled, and then tighten the bleeder plug while depressing the brake pedal.

Torque:
11 N*m{ 110 kgf*cm , 8 ft.*lbf }

f. Bleed the air from the bleeder plug of the front disc brake cylinder LH using the same procedure as for the RH side.

g. With the brake pedal depressed, loosen the bleeder plug of the rear disc brake cylinder RH, continue to hold the brake pedal and allow brake fluid to be drained from the bleeder plug while the pump motor operates.

HINT:

- **Air is bled as the pump motor operates while the brake pedal is being depressed.**
- **Be sure to release the brake pedal to stop the motor after approximately 100 seconds of continuous operation.**
- **As brake fluid is continuously drained while the pump operates, it is not necessary to repeatedly depress the brake pedal.**

h. When there is no more air in the brake fluid, tighten the bleeder plug, and then release the brake pedal.

Torque:
11 N*m{ 110 kgf*cm , 8 ft.*lbf }

i. Bleed the air from the bleeder plug of the rear disc brake cylinder LH using the same procedure as for the RH side.

j. Turn the ignition switch off.

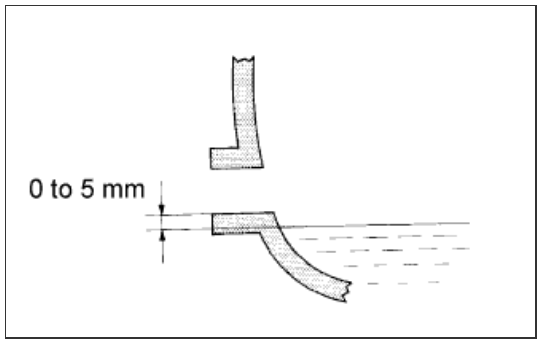
k. Inspect for brake fluid leaks.

l. Check and adjust the brake fluid level (Click here).

m. Clear the DTCs (Click here).

15. INSPECT DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.



NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)

b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

ii. Install the engine under cover (Click here).

c. Rear Differential:

i. Install a new gasket and the filler plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

16. INSPECT FOR DIFFERENTIAL OIL LEAK

17. CHECK PARKING BRAKE LEVER TRAVEL

a. Fully pull the parking brake lever to engage the parking brake.

b. Release the lever to disengage the parking brake.

c. Slowly pull the parking brake lever all the way, and count the number of clicks.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks

If the parking brake lever travel is not as specified, adjust the parking brake shoe clearance and parking brake lever travel.

18. ADJUST PARKING BRAKE LEVER TRAVEL

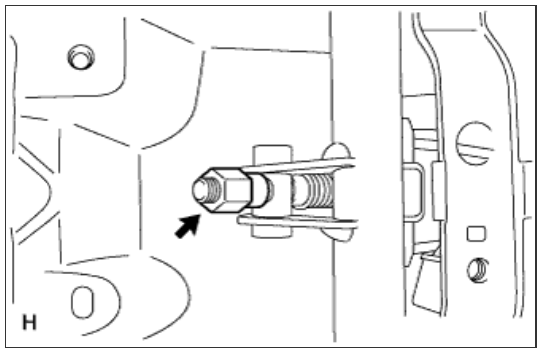
a. Remove the console cup holder box sub-assembly (Click here).

b. Completely release the parking brake lever.

c. Loosen the adjusting nut to completely release the parking brake cable.

d. Temporarily install the hub nuts.

e. Remove the hole plug.

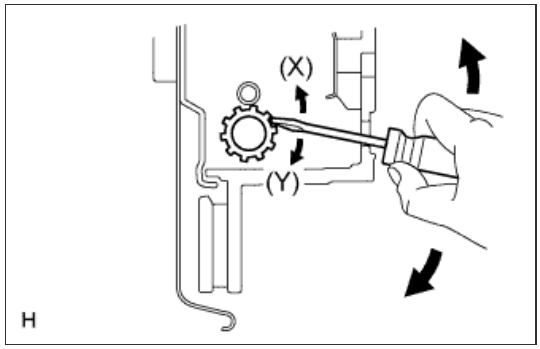


f. Insert an adjustment tool into the adjustment hole of the disc. Rotate the adjustment wheel in the "X" direction until the shoes are locked. Then rotate the adjustment wheel in the "Y" direction 8 notches.

g. Check that the disc can be rotated lightly. If not, rotate the adjustment wheel in the "Y" direction and check again.

h. Install the hole plug.

i. Remove the hub nuts.

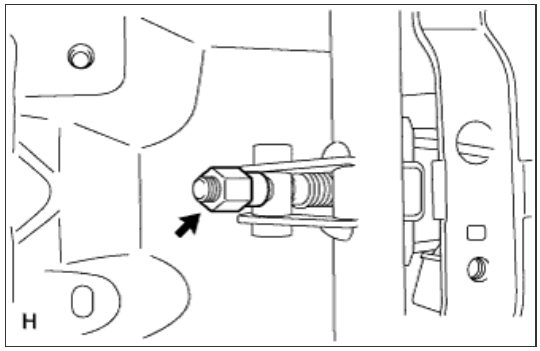


j. Turn the adjusting nut until the parking brake lever travel becomes correct.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks

k. Operate the parking brake lever 3 to 4 times, and check the parking brake lever travel.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks



l. Check whether the parking brake drags or not.

m. When operating the parking brake lever, check that the brake warning light comes on.

Standard Condition:
The brake warning light always illuminates at the first click.

n. Install the console cup holder box sub-assembly (Click here).

19. CHECK SRS WARNING LIGHT

a. Check the SRS warning light (Click here).

20. CHECK SPEED SENSOR SIGNAL

a. Check the speed sensor signal (Click here).

21. INSTALL REAR WHEEL LH

Torque:

131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

for Preparation Click here

1. INSTALL REAR AXLE SHAFT OIL SEAL LH

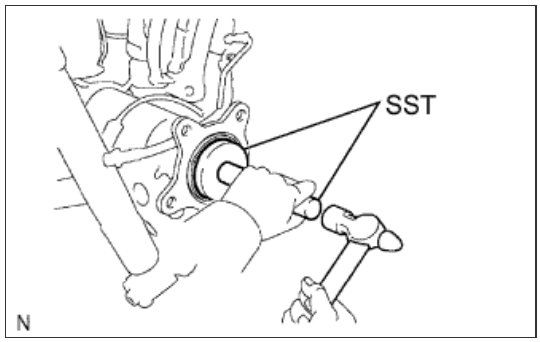
a. Using SST and a hammer, tap in a new oil seal.

NOTICE:

Do not allow foreign matter, etc. to contact the axle shaft housing hole.

SST

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09950-70010 (09951-07150)

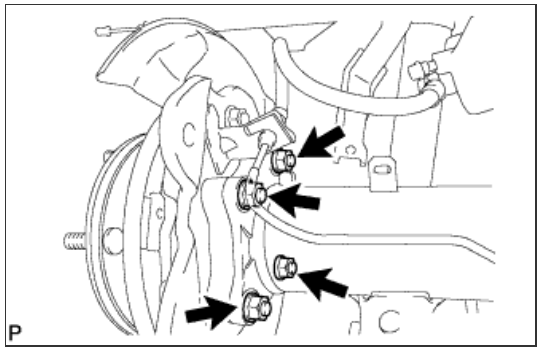


2. INSTALL REAR AXLE SHAFT LH

a. Install the O-ring to the axle housing.

b. Install the rear axle shaft and parking brake plate with the 4 nuts.

Torque:
60 N*m{ 612 kgf*cm , 44 ft.*lbf }



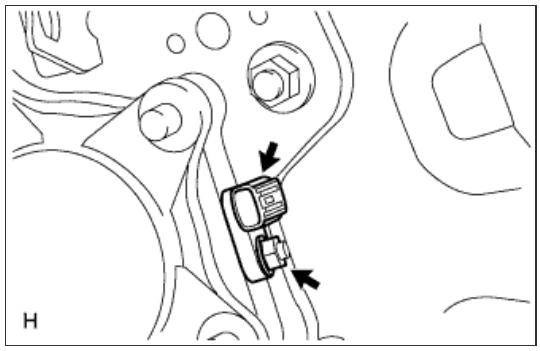
3. CONNECT REAR SPEED SENSOR LH

a. Install the speed sensor with the nut.

Torque:
8.3 N*m{ 85 kgf*cm , 73 in.*lbf }

NOTICE:

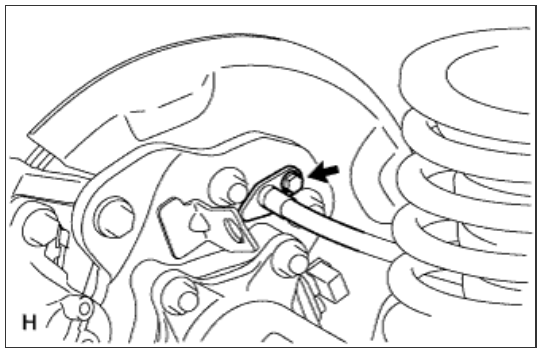
- **Make sure there are no pieces of iron or other foreign matter attached to the sensor tip.**
- **While inserting the speed sensor into the knuckle hole, do not strike or damage the sensor tip.**
- **After installing the speed sensor, make sure there is no clearance or foreign matter between the sensor stay part and the knuckle.**
- **Make sure there is no foreign matter attached to the speed sensor rotor.**



4. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

a. Connect the No. 3 parking brake cable with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }



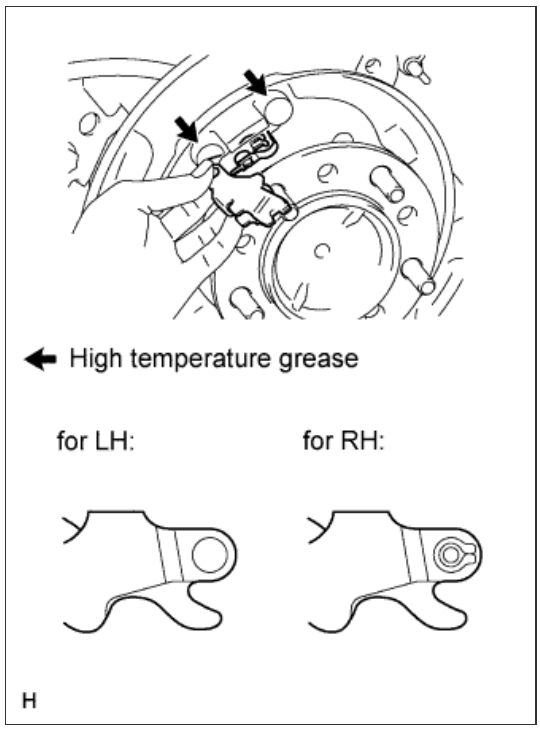
5. INSTALL PARKING BRAKE SHOE LEVER SUB-ASSEMBLY LH

a. Apply high temperature grease to the parking brake anchor block.

b. Install the parking brake shoe lever to the No. 3 parking brake cable.

NOTICE:

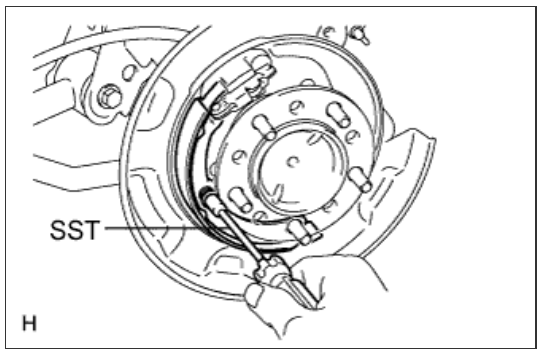
Be carefully to distinguish between the parking brake shoe lever RH and LH.



6. INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY LH

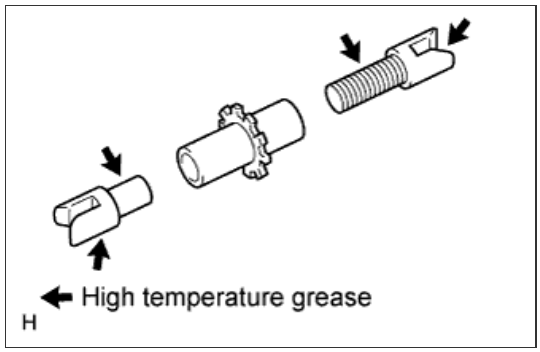
a. Using SST, install the No. 2 parking brake shoe with the shoe hold down spring pin, compression spring and shoe hold down spring cup.

SST
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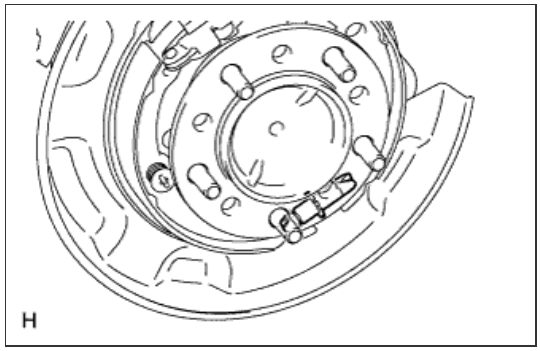


7. INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY LH

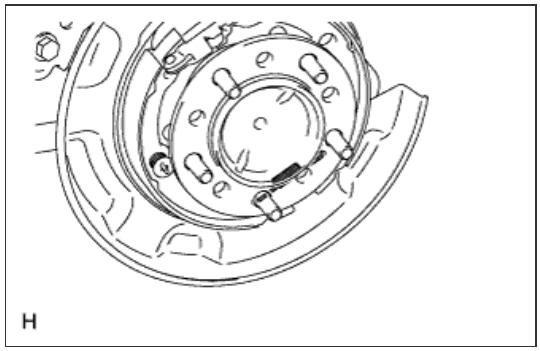
a. Apply high temperature grease to the thread and all joining areas of the parking brake shoe adjuster screw set.



b. Set the No. 1 parking brake shoe and shoe adjuster screw set in place.

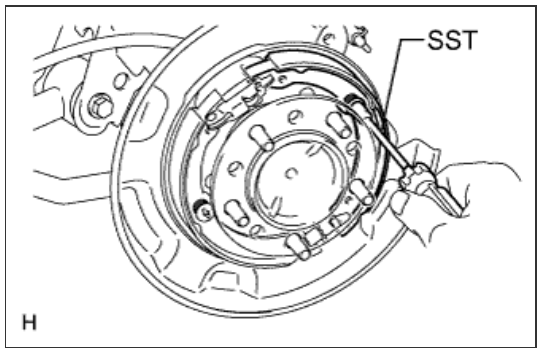


c. Connect the tension spring.



d. Using SST, install the shoe hold down spring pin, compression spring and shoe hold down spring cup.

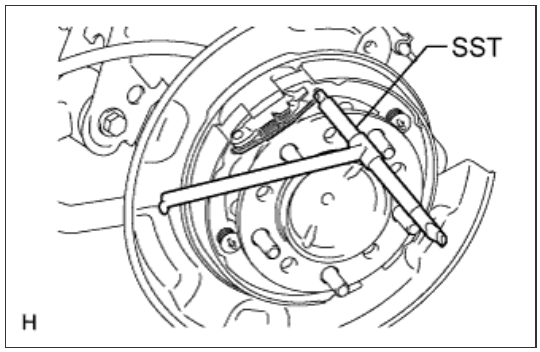
SST
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8. INSTALL PARKING BRAKE SHOE RETURN TENSION SPRING LH

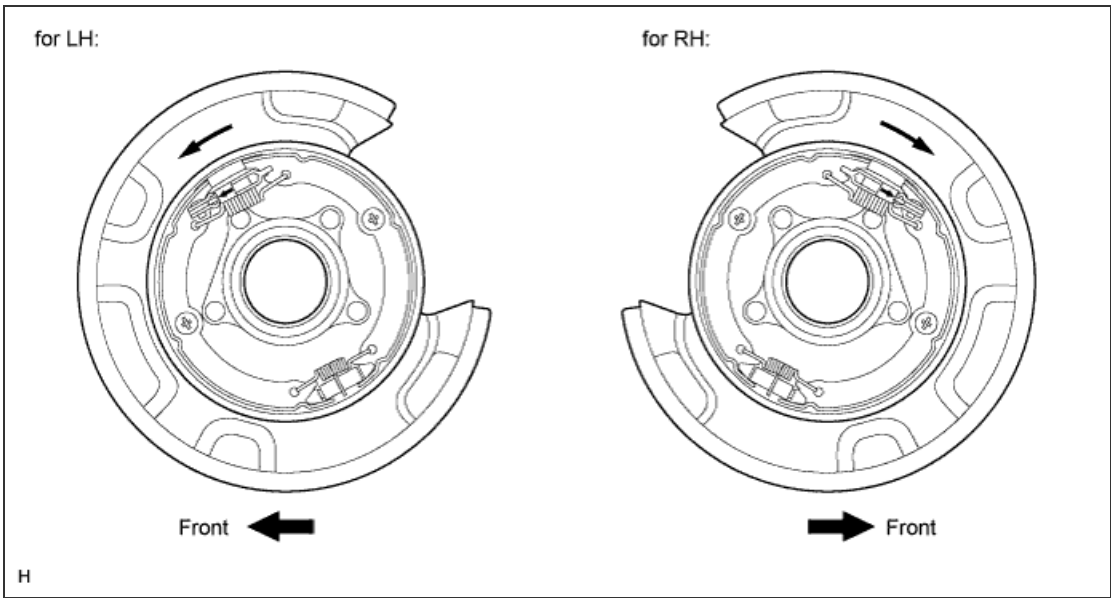
a. Using SST, install the shoe return spring.

SST
09703-30011



9. CHECK PARKING BRAKE INSTALLATION

a. Check that each part is installed properly.

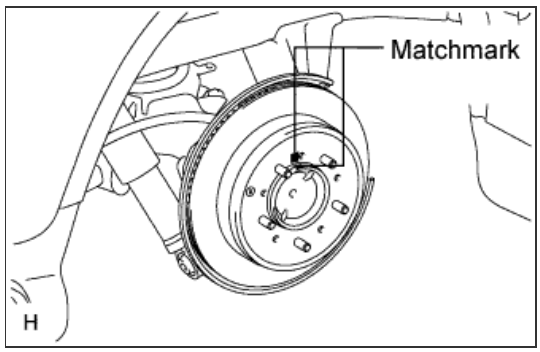


10. INSTALL REAR DISC LH

a. Align the matchmarks, and then install the rear disc.

HINT:

When replacing the rear disc with a new one, select the installation position where the rear disc has the minimum runout.



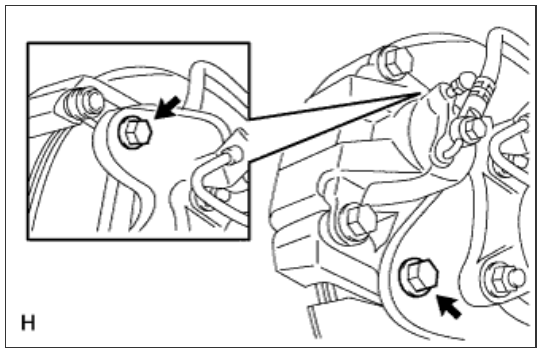
11. CONNECT REAR DISC BRAKE CYLINDER ASSEMBLY LH

a. Connect the rear disc brake cylinder and install 2 new bolts.

Torque:
95 N*m{ 969 kgf*cm , 70 ft.*lbf }

NOTICE:

- **Do not twist the flexible hose.**
- **Make sure that the bolts are free from damage and foreign matter.**
- **Do not overtighten the bolts.**



12. CONNECT REAR BRAKE FLEXIBLE HOSE

a. Set the flexible hose to the connecting point with the brake tube, and then install a new clip.

b. Using union nut wrench, connect the flexible hose to the brake tube while holding the flexible hose with a wrench.

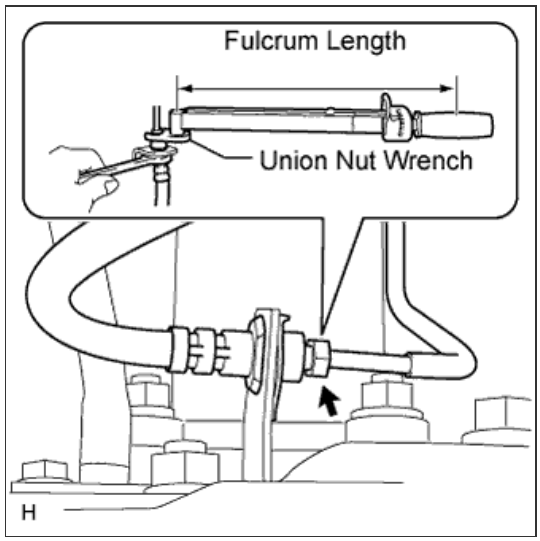
Torque:
without union nut wrench:
15 N*m{ 155 kgf*cm , 11 ft.*lbf }
with union nut wrench:
14 N*m{ 145 kgf*cm , 10 ft.*lbf }

HINT:

Use a torque wrench with a fulcrum length of 30 cm (11.8 in.).

NOTICE:

- **Do not bend or damage the brake tube.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake tube from the connecting point.**



13. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

14. BLEED BRAKE LINE

a. Turn the ignition switch to ON.

b. Remove the brake master cylinder reservoir filler cap assembly.

c. Add brake fluid until the fluid level is between the MIN and MAX lines of the reservoir.

d. Repeatedly depress the brake pedal and bleed air from the bleeder plug of the front disc brake cylinder RH.

e. Repeat the step above until the air is completely bled, and then tighten the bleeder plug while depressing the brake pedal.

Torque:
11 N*m{ 110 kgf*cm , 8 ft.*lbf }

f. Bleed the air from the bleeder plug of the front disc brake cylinder LH using the same procedure as for the RH side.

g. With the brake pedal depressed, loosen the bleeder plug of the rear disc brake cylinder RH, continue to hold the brake pedal and allow brake fluid to be drained from the bleeder plug while the pump motor operates.

HINT:

- **Air is bled as the pump motor operates while the brake pedal is being depressed.**
- **Be sure to release the brake pedal to stop the motor after approximately 100 seconds of continuous operation.**
- **As brake fluid is continuously drained while the pump operates, it is not necessary to repeatedly depress the brake pedal.**

h. When there is no more air in the brake fluid, tighten the bleeder plug, and then release the brake pedal.

Torque:
11 N*m{ 110 kgf*cm , 8 ft.*lbf }

i. Bleed the air from the bleeder plug of the rear disc brake cylinder LH using the same procedure as for the RH side.

j. Turn the ignition switch off.

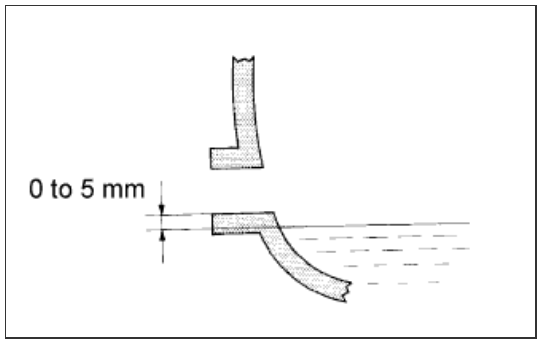
k. Inspect for brake fluid leaks.

l. Check and adjust the brake fluid level (Click here).

m. Clear the DTCs (Click here).

15. INSPECT DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.



NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)

b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

ii. Install the engine under cover (Click here).

c. Rear Differential:

i. Install a new gasket and the filler plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

16. INSPECT FOR DIFFERENTIAL OIL LEAK

17. CHECK PARKING BRAKE LEVER TRAVEL

a. Fully pull the parking brake lever to engage the parking brake.

b. Release the lever to disengage the parking brake.

c. Slowly pull the parking brake lever all the way, and count the number of clicks.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks

If the parking brake lever travel is not as specified, adjust the parking brake shoe clearance and parking brake lever travel.

18. ADJUST PARKING BRAKE LEVER TRAVEL

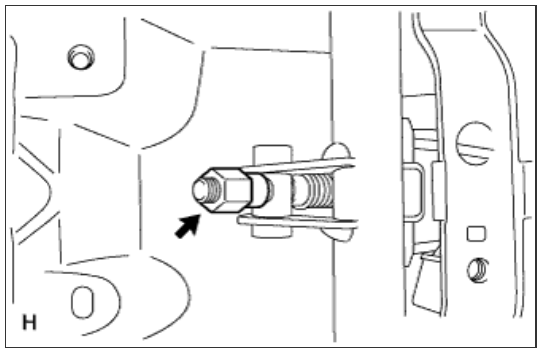
a. Remove the console cup holder box sub-assembly (Click here).

b. Completely release the parking brake lever.

c. Loosen the adjusting nut to completely release the parking brake cable.

d. Temporarily install the hub nuts.

e. Remove the hole plug.

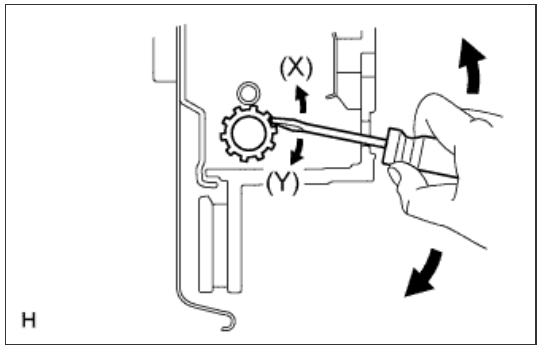


f. Insert an adjustment tool into the adjustment hole of the disc. Rotate the adjustment wheel in the "X" direction until the shoes are locked. Then rotate the adjustment wheel in the "Y" direction 8 notches.

g. Check that the disc can be rotated lightly. If not, rotate the adjustment wheel in the "Y" direction and check again.

h. Install the hole plug.

i. Remove the hub nuts.

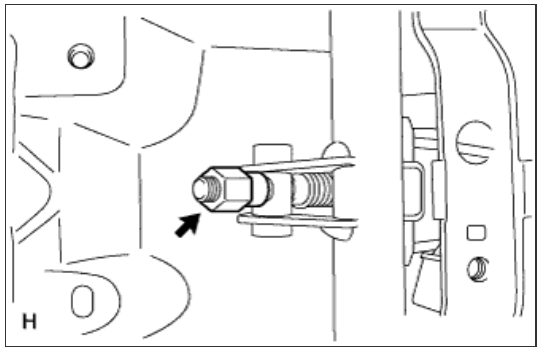


j. Turn the adjusting nut until the parking brake lever travel becomes correct.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks

k. Operate the parking brake lever 3 to 4 times, and check the parking brake lever travel.

Standard Parking Brake Lever Travel when Pulled with a Force of 200 N (20 kgf, 45 lbf):
5 to 7 clicks



l. Check whether the parking brake drags or not.

m. When operating the parking brake lever, check that the brake warning light comes on.

Standard Condition:
The brake warning light always illuminates at the first click.

n. Install the console cup holder box sub-assembly (Click here).

19. CHECK SRS WARNING LIGHT

a. Check the SRS warning light (Click here).

20. CHECK SPEED SENSOR SIGNAL

a. Check the speed sensor signal (Click here).

21. INSTALL REAR WHEEL LH

Torque:

131 N*m{ 1336 kgf*cm , 97 ft.*lbf }

for Preparation Click here

1.Before disassembly, clean the outside of the differential assembly and remove any sand or mud to prevent it from entering the assembly during disassembly and installation.

2.When removing connected parts made of a light alloy, such as differential carrier covers, tap them off with a plastic-faced hammer. Do not attempt to pry them off with a screwdriver.

3.Always arrange disassembled parts in order and protect them from dust.

4.Before installation, thoroughly clean and dry each part and then apply hypoid gear oil to it. Do not use alkaline cleaner for aluminum or rubber parts and ring gear set bolts. Also, do not clean rubber parts such as O-rings or oil seals with non-residue solvent.

5.Coat all sliding surfaces and rotating parts with hypoid gear oil.

6.When holding a part with a vise, be sure to place an aluminum sheet between the part and vise. Do not put the part directly in the vise.

7.Be careful not to damage the contact surfaces of the case. Such damage could cause oil leakage.

8.Before applying new sealant, remove any old sealant and clean the part to be sealed using non-residue solvent.

9.Do not add differential oil immediately after installing sealed parts. Leave them for at least an hour.

10.Damage to the surfaces in direct contact with oil seals, O-rings or gaskets could cause oil leakage.

11.When press-fitting an oil seal, be careful not to damage the lip of the oil seal and outside periphery.

12.When replacing a bearing, replace the inner and outer races as a set.

13.Be careful not to damage and deform aluminum parts when clamping them in a vise.

for Preparation Click here

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Front Differential

Symptom	Suspected Area	See page
Oil leakage	Oil (level too high or wrong grade)	Click here
	Carrier oil seal (worn or damaged)	Click here
	Side gear shaft oil seal (worn or damaged)	Click here
Noise in front differential	Oil level (low or wrong grade)	Click here
	Ring gear or drive pinion (worn or chipped)	Click here
	Backlash adjustment (defective)	Click here
	Preload adjustment (defective)	Click here
	Tooth contact between ring gear and drive pinion (defective)	Click here
	Bearing (worn)	Click here

Rear Differential

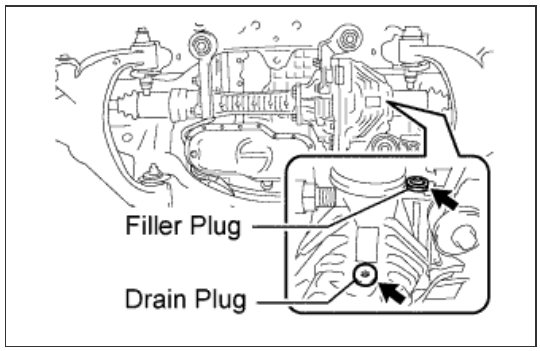
Symptom	Suspected Area	See page
Oil leakage	Oil (level too high or wrong grade)	Click here
	Carrier oil seal (worn or damaged)	Click here
Noise in rear differential	Oil level (low or wrong grade)	Click here
	Ring gear or drive pinion (worn or chipped)	Click here
	Backlash adjustment (defective)	Click here
	Preload adjustment (defective)	Click here
	Tooth contact between ring gear and drive pinion (defective)	Click here
	Bearing (worn)	Click here

for Preparation Click here

1. DRAIN DIFFERENTIAL OIL

a. Stop the vehicle on a level place.

b. Front Differential:



i. Remove the engine under cover (Click here).

ii. Using a 10 mm hexagon wrench, remove the filler plug and gasket.

iii. Using a 10 mm hexagon wrench, remove the drain plug and gasket, and drain the oil.

iv. Using a 10 mm hexagon wrench, install a new gasket and the drain plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

c. Rear Differential:

i. Remove the filler plug and gasket.

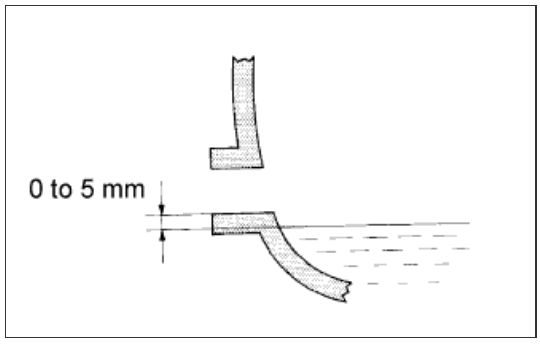
ii. Remove the drain plug and gasket, and drain the oil.

iii. Install a new gasket and the drain plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

2. ADD DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.



NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)

b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

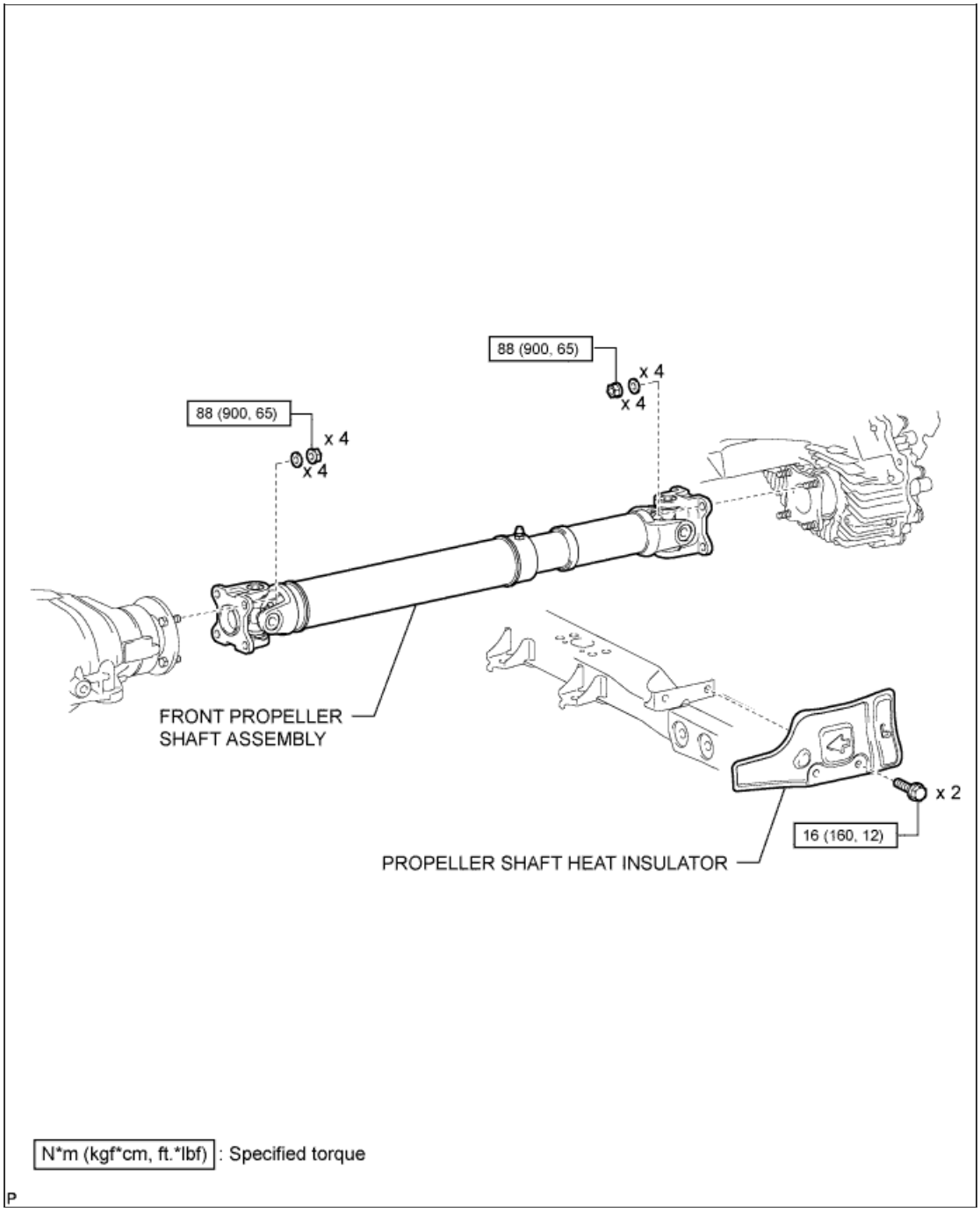
ii. Install the engine under cover (Click here).

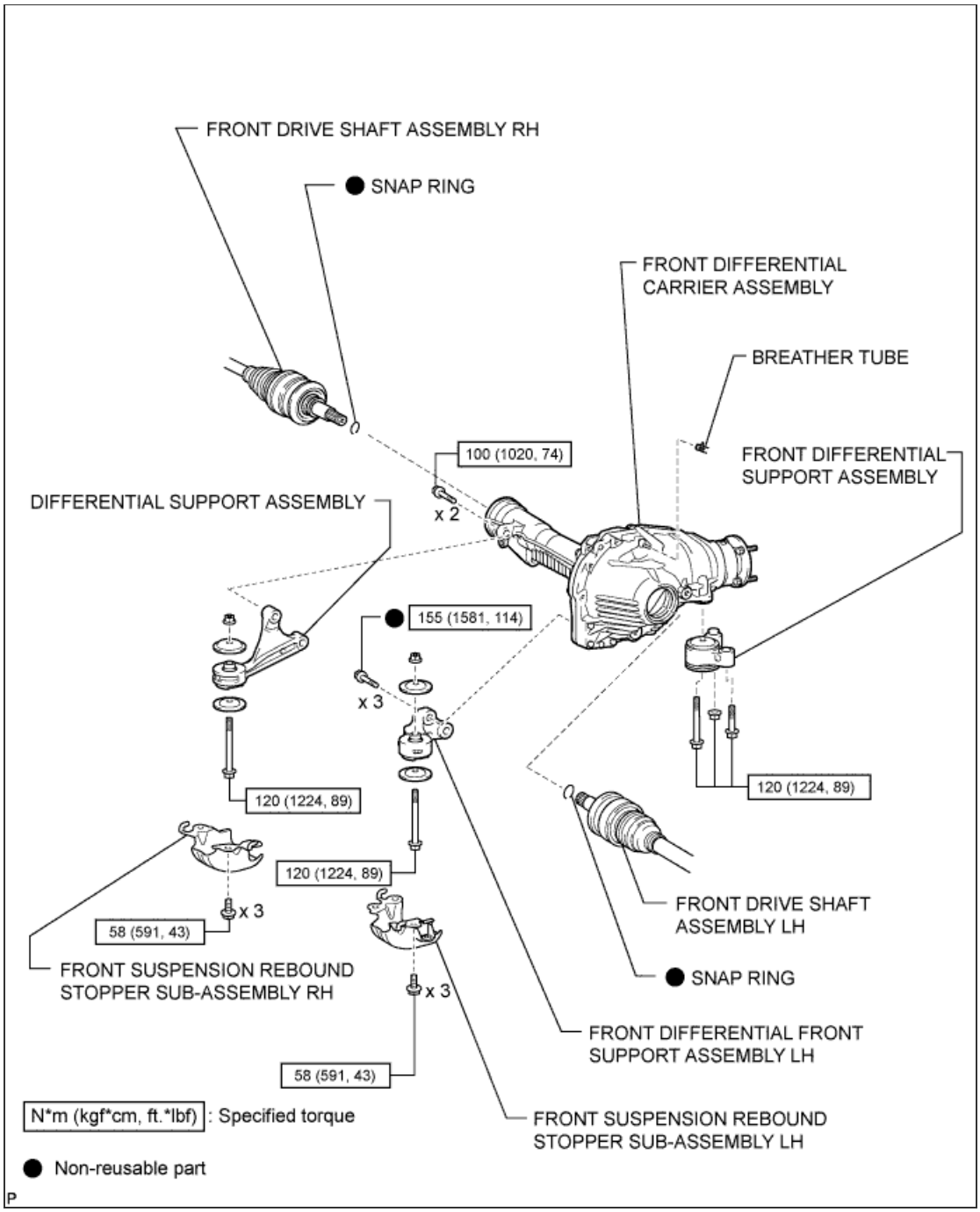
c. Rear Differential:

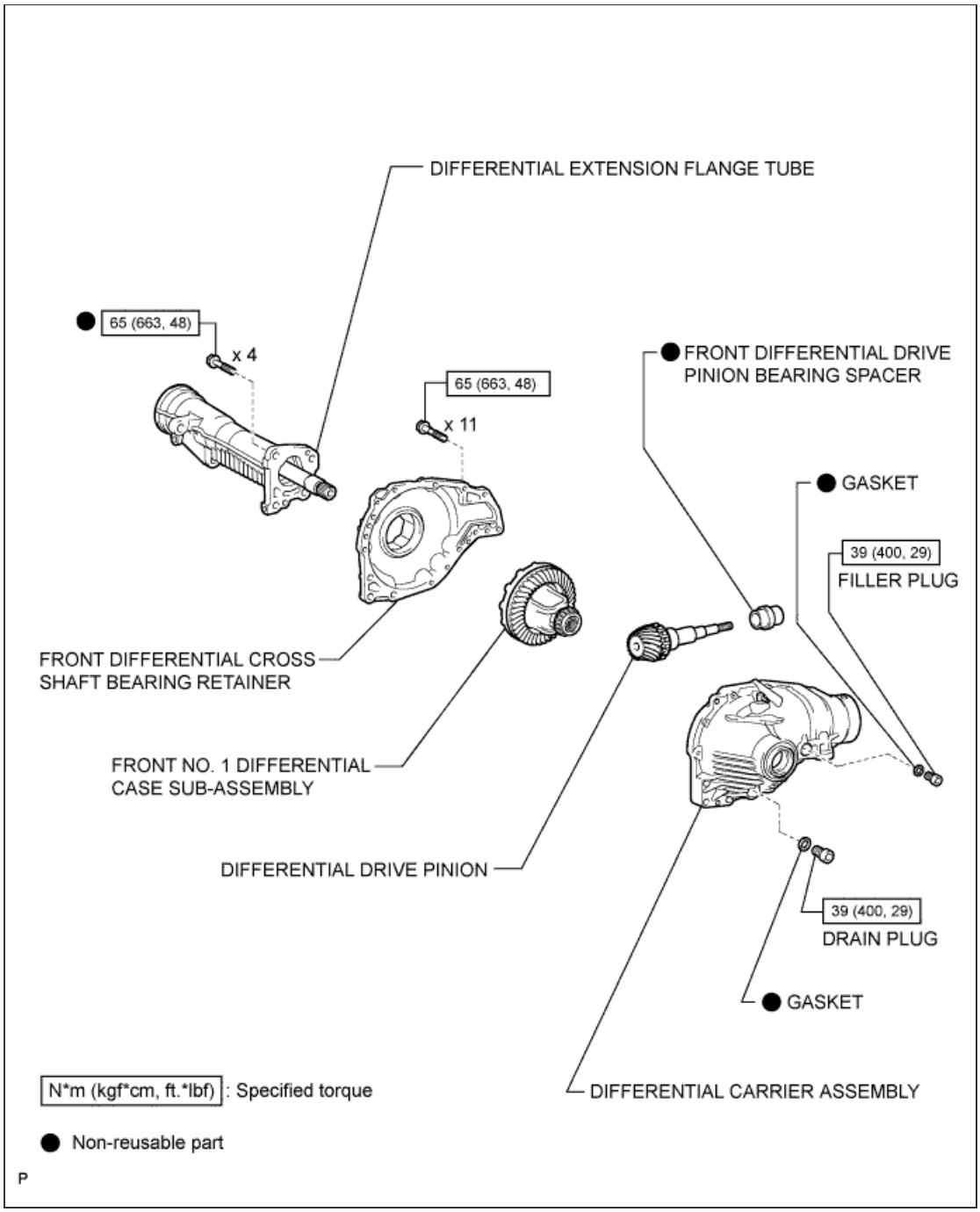
i. Install a new gasket and the filler plug.

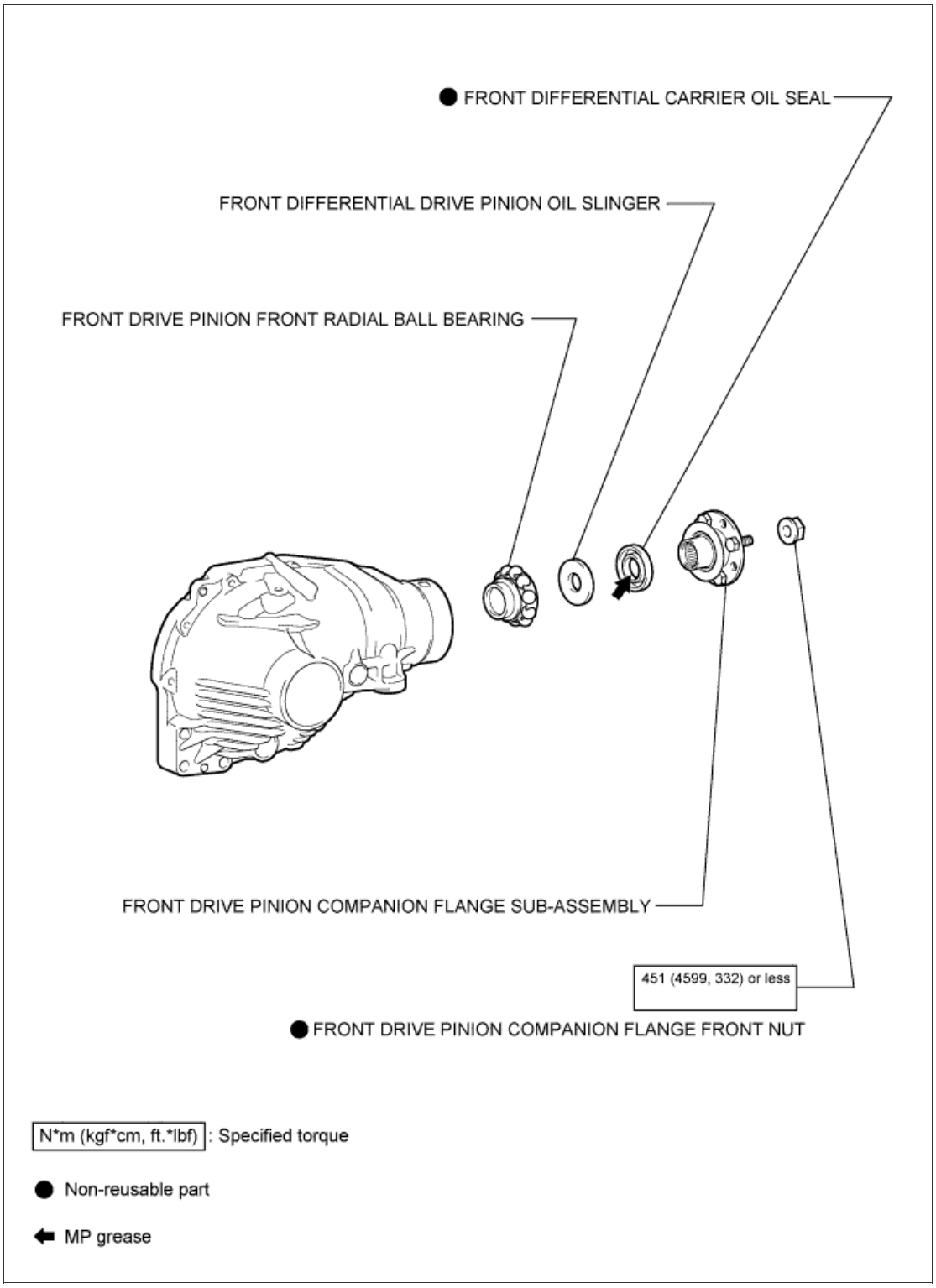
Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

for Preparation [Click here]




FRONT DRIVE SHAFT ASSEMBLY RH
SNAP RING
FRONT DIFFERENTIAL CARRIER ASSEMBLY
BREATHER TUBE
100 (1020, 74)
x 2
FRONT DIFFERENTIAL SUPPORT ASSEMBLY
DIFFERENTIAL SUPPORT ASSEMBLY
155 (1581, 114)
x 3
120 (1224, 89)
120 (1224, 89)
120 (1224, 89)
x 3
58 (591, 43)
FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY RH
FRONT DRIVE SHAFT ASSEMBLY LH
SNAP RING
x 3
FRONT DIFFERENTIAL FRONT SUPPORT ASSEMBLY LH
58 (591, 43)
FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY LH
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P


DIFFERENTIAL EXTENSION FLANGE TUBE
65 (663, 48)
x 4
65 (663, 48)
x 11
FRONT DIFFERENTIAL DRIVE PINION BEARING SPACER
GASKET
39 (400, 29)
FILLER PLUG
FRONT DIFFERENTIAL CROSS SHAFT BEARING RETAINER
FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY
DIFFERENTIAL DRIVE PINION
39 (400, 29)
DRAIN PLUG
GASKET
DIFFERENTIAL CARRIER ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P

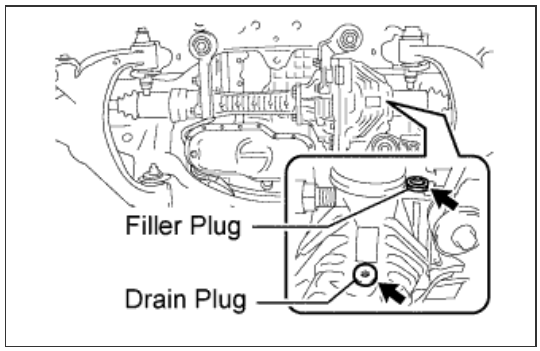

● FRONT DIFFERENTIAL CARRIER OIL SEAL
FRONT DIFFERENTIAL DRIVE PINION OIL SLINGER
FRONT DRIVE PINION FRONT RADIAL BALL BEARING
FRONT DRIVE PINION COMPANION FLANGE SUB-ASSEMBLY
451 (4599, 332) or less
● FRONT DRIVE PINION COMPANION FLANGE FRONT NUT
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
⬅ MP grease

for Preparation Click here

1. DRAIN DIFFERENTIAL OIL

a. Stop the vehicle on a level place.

b. Front Differential:



i. Remove the engine under cover (Click here).

ii. Using a 10 mm hexagon wrench, remove the filler plug and gasket.

iii. Using a 10 mm hexagon wrench, remove the drain plug and gasket, and drain the oil.

iv. Using a 10 mm hexagon wrench, install a new gasket and the drain plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

c. Rear Differential:

i. Remove the filler plug and gasket.

ii. Remove the drain plug and gasket, and drain the oil.

iii. Install a new gasket and the drain plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

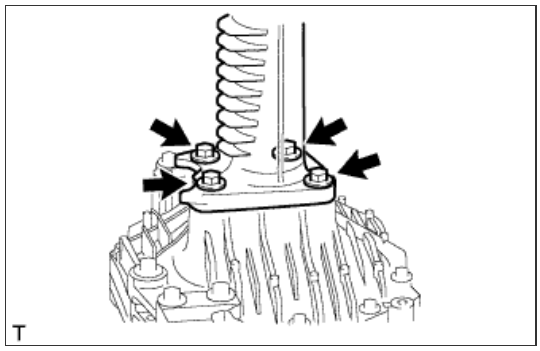
2. REMOVE FRONT DIFFERENTIAL CARRIER ASSEMBLY

a. Remove the differential carrier (Click here).

3. REMOVE DIFFERENTIAL EXTENSION FLANGE TUBE

a. Remove the 4 bolts.

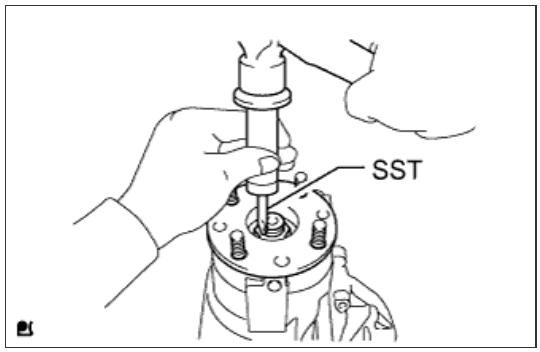
b. Using a plastic-faced hammer, remove the differential tube.



4. REMOVE FRONT DRIVE PINION COMPANION FLANGE FRONT NUT

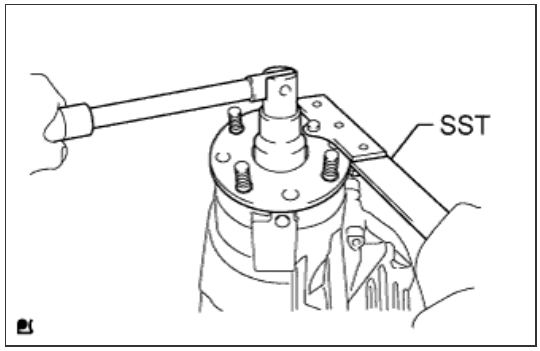
a. Using SST and a hammer, unstake the nut.

SST
09930-00010



b. Using SST to hold the companion flange, remove the nut.

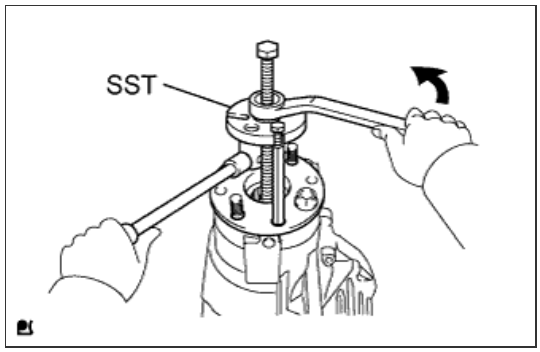
SST
09330-00021 (09330-00030)



5. REMOVE FRONT DRIVE PINION COMPANION FLANGE FRONT SUB-ASSEMBLY

a. Using SST, remove the companion flange from the differential carrier.

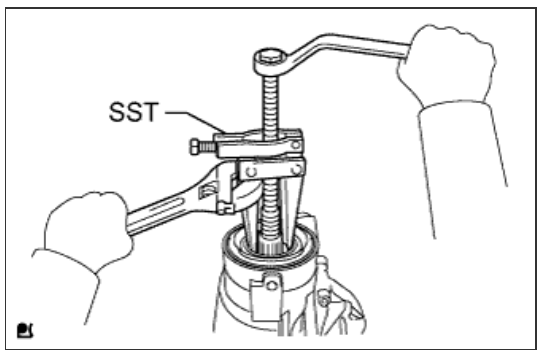
SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03020)



6. REMOVE FRONT DIFFERENTIAL CARRIER OIL SEAL

a. Using SST, remove the oil seal.

SST
09308-10010



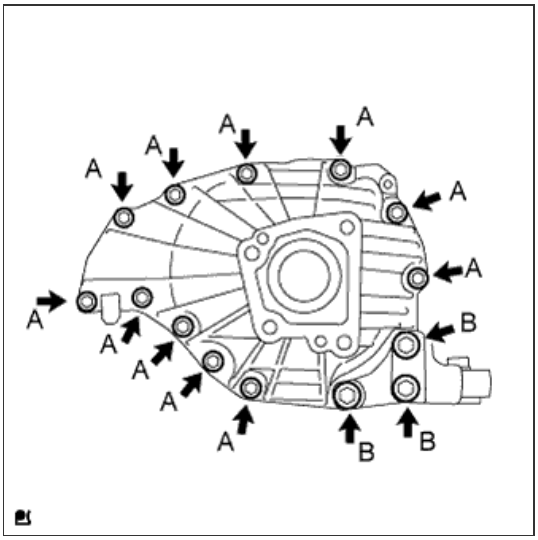
7. REMOVE FRONT DIFFERENTIAL DRIVE PINION OIL SLINGER

8. REMOVE FRONT DIFFERENTIAL CROSS SHAFT BEARING RETAINER

a. Remove the bolts labeled B and front differential front support assembly LH.

b. Remove the bolts labeled A.

c. Using a plastic-faced hammer, tap out the bearing retainer.



9. REMOVE FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY

a. Remove the differential case from the differential carrier.

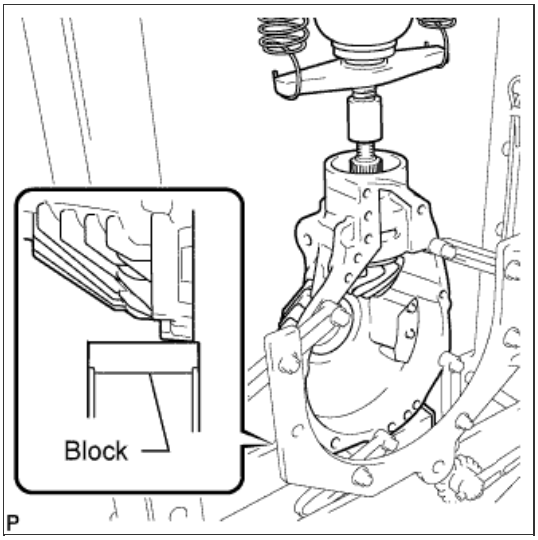
10. REMOVE DIFFERENTIAL DRIVE PINION

a. Set the differential carrier to an overhaul stand as shown in the illustration.

b. Using a press, press out the drive pinion.

NOTICE:

Do not drop the drive pinion.



11. REMOVE FRONT DRIVE PINION FRONT RADIAL BALL BEARING

a. Remove the bearing (inner race) from the differential carrier.

12. REPLACE FRONT DIFFERENTIAL DRIVE PINION BEARING SPACER

a. Replace the bearing spacer with a new one.

13. TEMPORARILY INSTALL DIFFERENTIAL DRIVE PINION

14. INSTALL FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY

15. INSTALL FRONT DIFFERENTIAL CROSS SHAFT BEARING RETAINER

a. Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential carrier and shaft bearing retainer.

b. Wipe off any residual FIPG material on the contact surface using gasoline or alcohol.

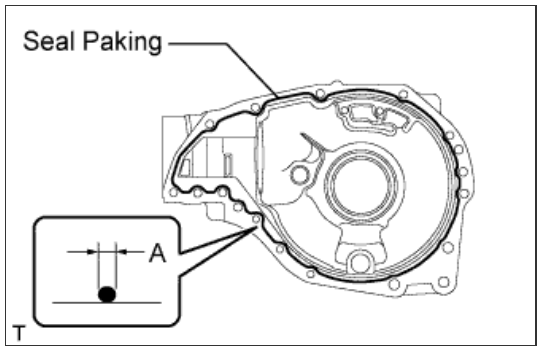
c. Apply seal packing to the differential carrier as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent

Standard Seal Diameter (A):
2.0 to 3.0 mm (0.0788 to 0.118 in.)

HINT:

Install the shaft bearing retainer within 10 minutes of applying seal packing.

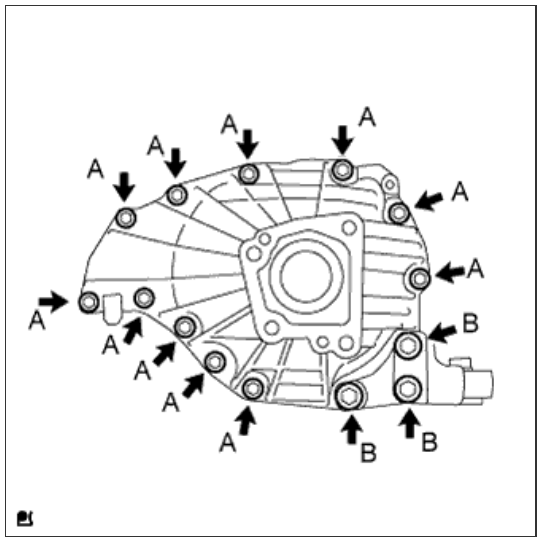


d. Install the front differential cross shaft bearing retainer and front differential front support assembly LH with the 11 bolts (A), and 3 new bolts (B).

Torque:
for bolt A:
65 N*m{ 633 kgf*cm , 48 ft.*lbf }
for bolt B:
155 N*m{ 1581 kgf*cm , 114 ft.*lbf }

NOTICE:

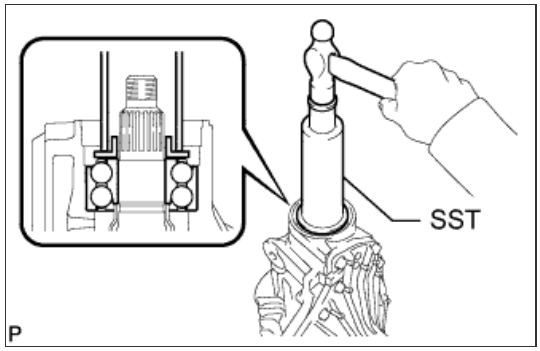
Do not add oil or drive the vehicle immediately after installing the cover, and leave it as is for at least an hour. Also, for 12 hours or less, avoid rapid acceleration/deceleration.



16. INSTALL FRONT DRIVE PINION FRONT RADIAL BALL BEARING

a. Using SST and a hammer, lightly tap in the bearing (inner race) to install it.

SST
09316-60011 (09316-00041)



17. INSTALL FRONT DIFFERENTIAL DRIVE PINION OIL SLINGER

18. INSTALL FRONT DIFFERENTIAL CARRIER OIL SEAL

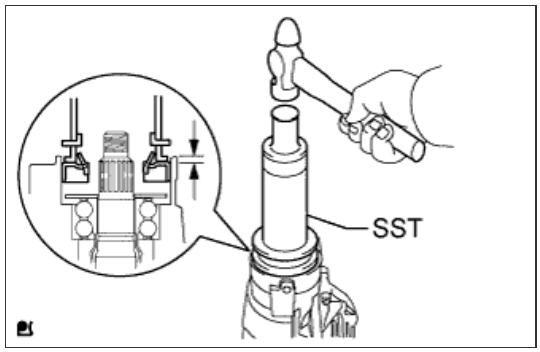
a. Using SST and a hammer, tap in a new oil seal.

SST

09502-12010
09316-60011 (09316-00041)

Standard oil seal depth:
5.6 to 6.6 mm (0.221 to 0.260 in.)

b. Coat the lip of the oil seal with MP grease.

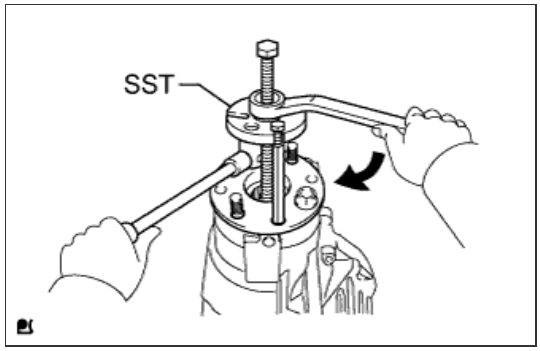


19. INSTALL FRONT DRIVE PINION COMPANION FLANGE SUB-ASSEMBLY

a. Using SST, install the companion flange.

SST

09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03020)



20. INSPECT DIFFERENTIAL DRIVE PINION PRELOAD

a. Using SST, hold the companion flange.

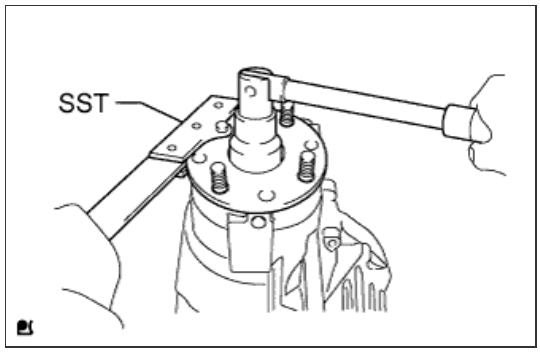
SST

09330-00021 (09330-00030)

b. Coat the threads of a new nut with hypoid gear oil.

c. Install the nut by tightening it until the standard preload is reached.

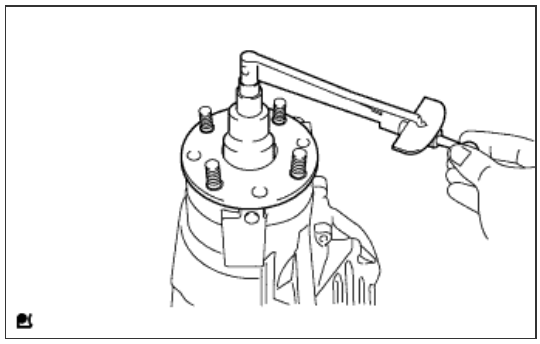
Torque:
451 N*m{ 4599 kgf*cm , 332 ft.*lbf } or less



d. Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Standard Preload (at Starting):

Bearing	Specified Condition
New	3.0 to 3.5 N*m (31 to 35 kgf*cm, 27 to 50 in.*lbf)
Reused	2.1 to 2.5 N*m (22 to 24 kgf*cm, 19 to 21 in.*lbf)



If the preload is more than the specification, replace the bearing spacer.
If the preload is less than the specification, tighten the nut with 13 N*m (130 kgf*cm, 9 ft.*lbf) of torque at a time until the specified preload is reached.

Torque:
451 N*m{ 4599 kgf*cm , 332 ft.*lbf } or less

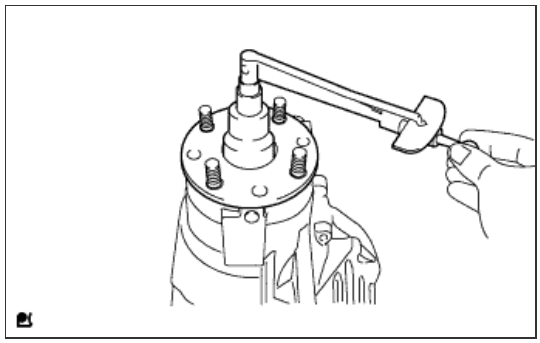
If the maximum torque is exceeded while tightening the nut, replace the bearing spacer and repeat the preload procedure.

HINT:

Do not loosen the nut to reduce the preload.

21. INSPECT TOTAL PRELOAD

a. With the drive pinion contacting the tooth side of the ring gear, use a torque wrench to measure the total preload.

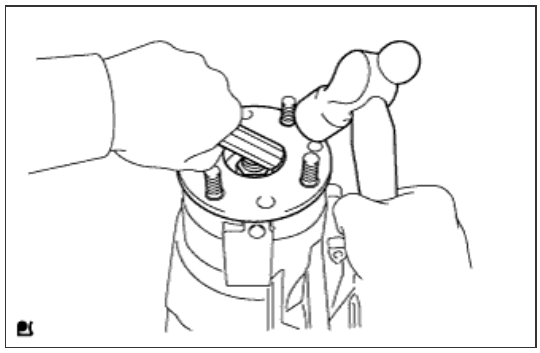


Standard Total Preload (at starting):

Bearing	Specified Condition
New	Standard drive pinion preload plus 1.6 to 2.4 N*m (17 to 24 kgf*cm, 15 to 21 in.*lbf)
Reused	Standard drive pinion preload plus 1.3 to 2.1 N*m (14 to 21 kgf*cm, 12 to 18 in.*lbf)

22. STAKE FRONT DRIVE PINION COMPANION FLANGE FRONT NUT

a. Using a chisel and hammer, stake the nut.

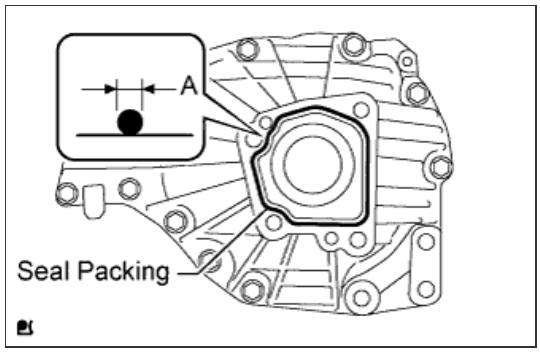


23. INSTALL DIFFERENTIAL EXTENSION FLANGE TUBE

a. Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential tube and bearing retainer.

b. Wipe off any residual FIPG material on the contact surface using gasoline or alcohol.

c. Apply seal packing to the bearing retainer as shown in the illustration.



Seal packing:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent

Standard Seal Diameter (A):
2.0 to 3.0 mm (0.0788 to 0.118 in.)

HINT:

Install the differential tube within 10 minutes of applying seal packing.

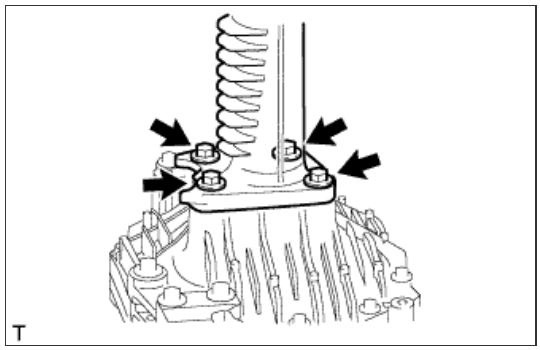
d. Install the differential tube onto the bearing retainer.

e. Install 4 new bolts.

Torque:
65 N*m{ 663 kgf*cm , 48 ft.*lbf } or less

NOTICE:

Do not add oil or drive the vehicle immediately after installing the cover, and leave it as is for at least an hour. Also, for 12 hours or less, avoid rapid acceleration/deceleration.

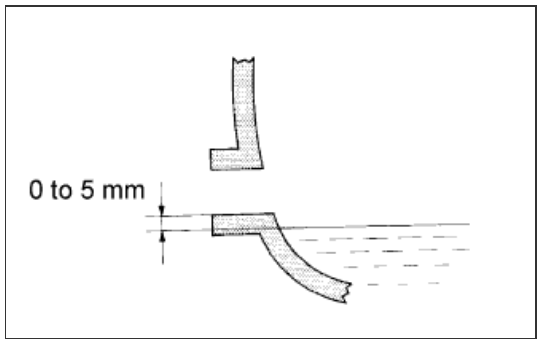


24. INSTALL FRONT DIFFERENTIAL CARRIER ASSEMBLY

a. Install the front differential carrier (Click here).

25. ADD DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.



NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)

b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

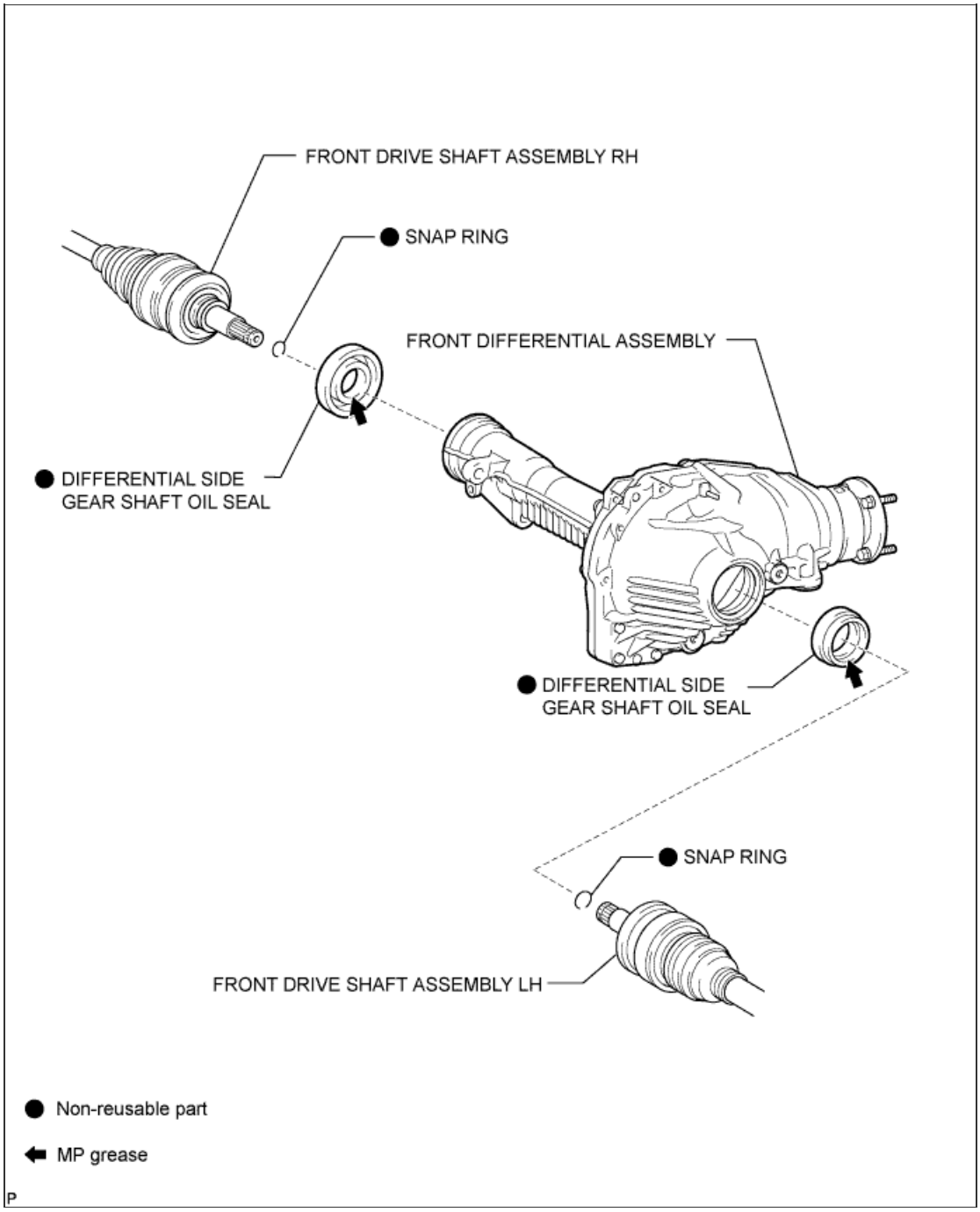
ii. Install the engine under cover (Click here).

c. Rear Differential:

i. Install a new gasket and the filler plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

for Preparation Click here



FRONT DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL > REPLACEMENT

for Preparation Click here

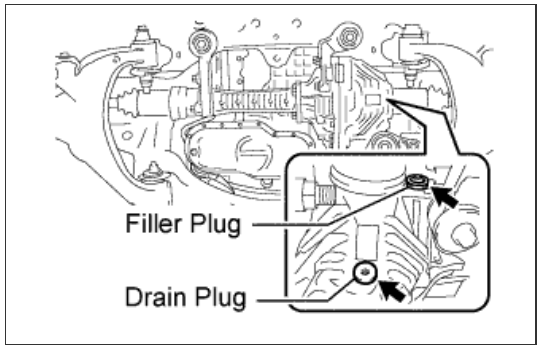
HINT:

The procedure described below is for the LH side. Use the same procedure for both the RH and LH sides, unless otherwise specified.

1. DRAIN DIFFERENTIAL OIL

a. Stop the vehicle on a level place.

b. Front Differential:



i. Remove the engine under cover (Click here).

ii. Using a 10 mm hexagon wrench, remove the filler plug and gasket.

iii. Using a 10 mm hexagon wrench, remove the drain plug and gasket, and drain the oil.

iv. Using a 10 mm hexagon wrench, install a new gasket and the drain plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

c. Rear Differential:

i. Remove the filler plug and gasket.

ii. Remove the drain plug and gasket, and drain the oil.

iii. Install a new gasket and the drain plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

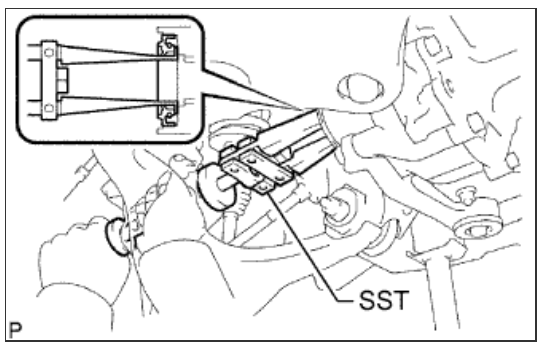
2. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

a. Remove the front drive shaft (Click here).

3. REMOVE DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

a. Using SST, tap out the 2 oil seals.

SST
09308-10010



4. INSTALL DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

a. Apply MP grease to 2 new oil seals.

b. Using SST and a hammer, tap in the 2 oil seals.

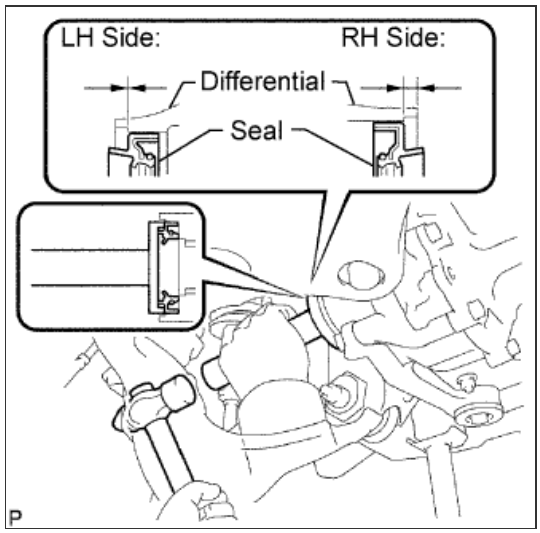
SST
09550-00032
09950-70010 (09951-07100)

NOTICE:

Make sure the LH and RH oil seals are installed in the proper locations.

Standard Oil Seal Depth:

Side	Specified Condition
LH	-0.45 to 0.45 mm (-0.0177 to 0.0177 in.)
RH	4.8 to 5.8 mm (0.189 to 0.228 in.)



5. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

a. Install the front drive shaft (Click here).

6. ADD DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.

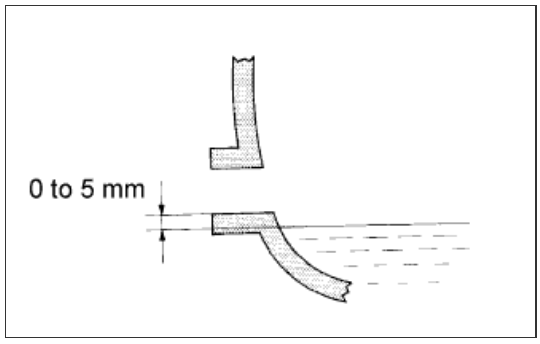
NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)



b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

ii. Install the engine under cover (Click here).

c. Rear Differential:

i. Install a new gasket and the filler plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

FRONT DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL > REPLACEMENT

for Preparation Click here

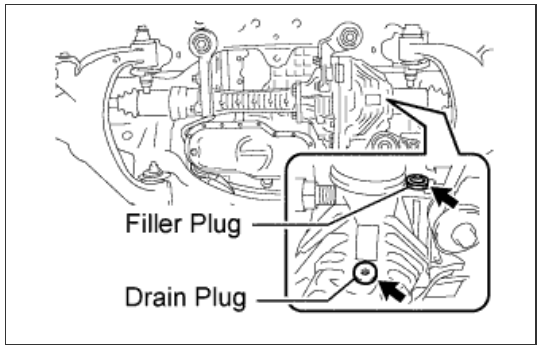
HINT:

The procedure described below is for the LH side. Use the same procedure for both the RH and LH sides, unless otherwise specified.

1. DRAIN DIFFERENTIAL OIL

a. Stop the vehicle on a level place.

b. Front Differential:



i. Remove the engine under cover (Click here).

ii. Using a 10 mm hexagon wrench, remove the filler plug and gasket.

iii. Using a 10 mm hexagon wrench, remove the drain plug and gasket, and drain the oil.

iv. Using a 10 mm hexagon wrench, install a new gasket and the drain plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

c. Rear Differential:

i. Remove the filler plug and gasket.

ii. Remove the drain plug and gasket, and drain the oil.

iii. Install a new gasket and the drain plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

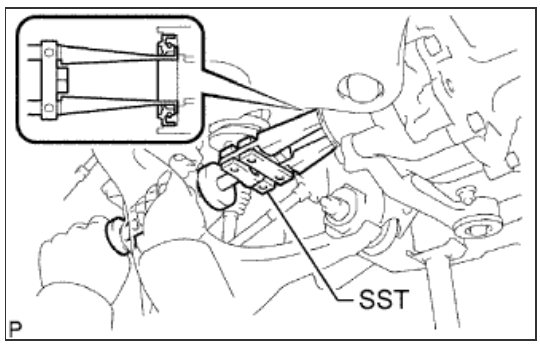
2. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

(Click here)

3. REMOVE DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

a. Using SST, tap out the 2 oil seals.

SST
09308-10010



4. INSTALL DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

a. Apply MP grease to 2 new oil seals.

b. Using SST and a hammer, tap in the 2 oil seals.

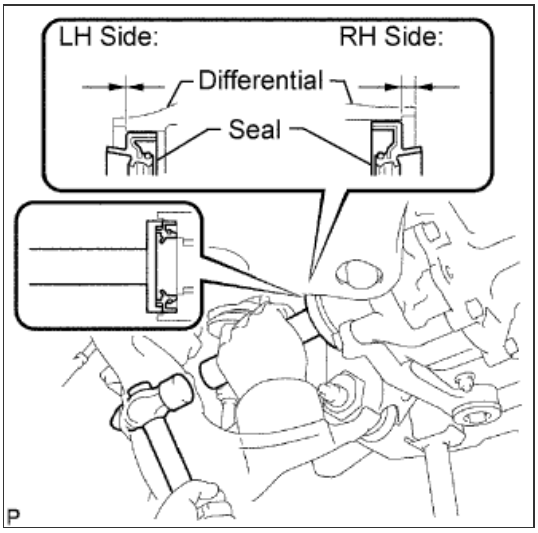
SST
09550-00032
09950-70010 (09951-07100)

NOTICE:

Make sure the LH and RH oil seals are installed in the proper locations.

Standard Oil Seal Depth:

Side	Specified Condition
LH	-0.45 to 0.45 mm (-0.0177 to 0.0177 in.)
RH	4.8 to 5.8 mm (0.189 to 0.228 in.)



5. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

(Click here)

6. ADD DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.

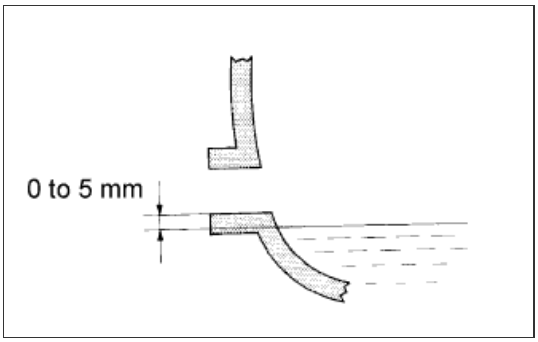
NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)



b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

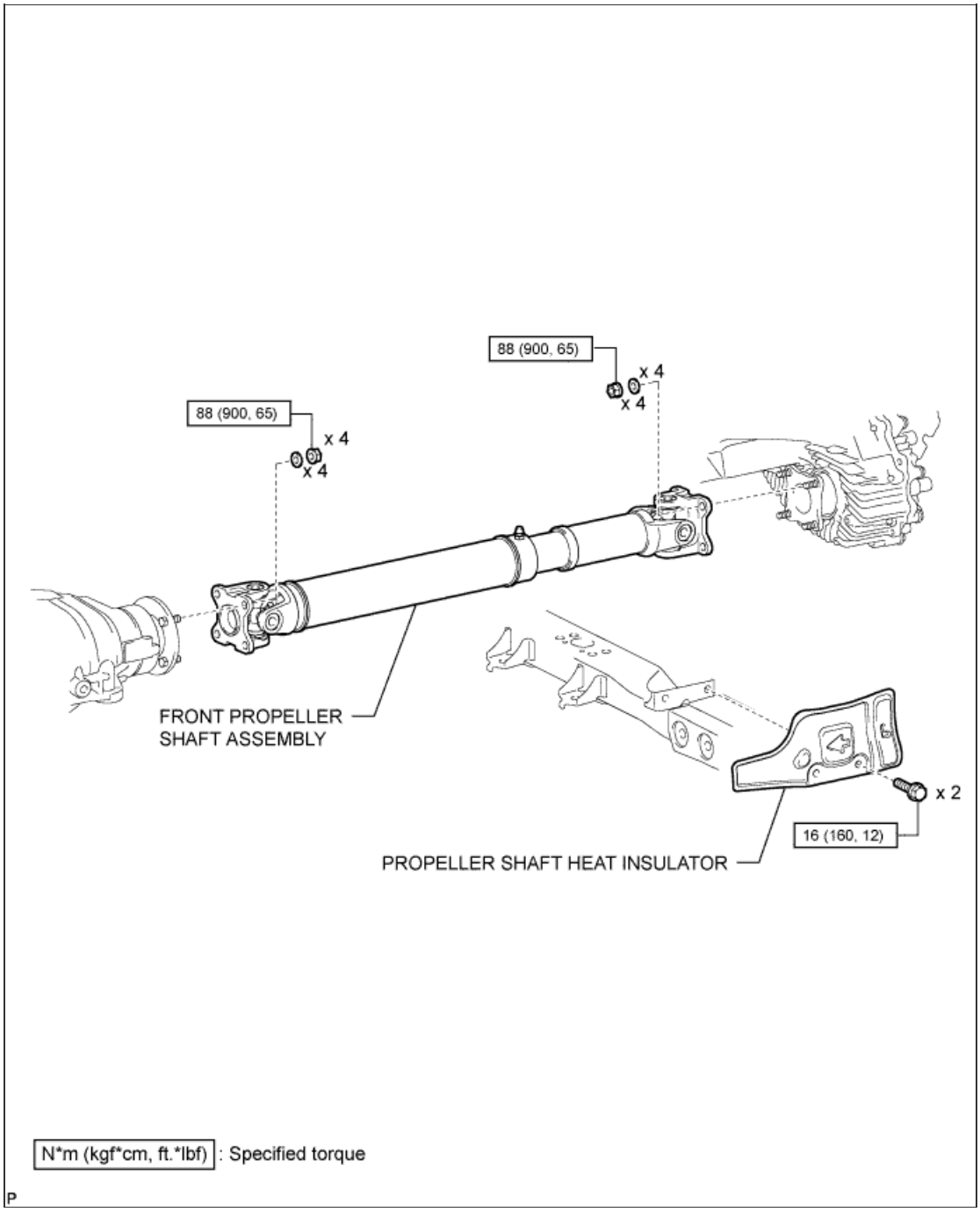
ii. Install the engine under cover (Click here).

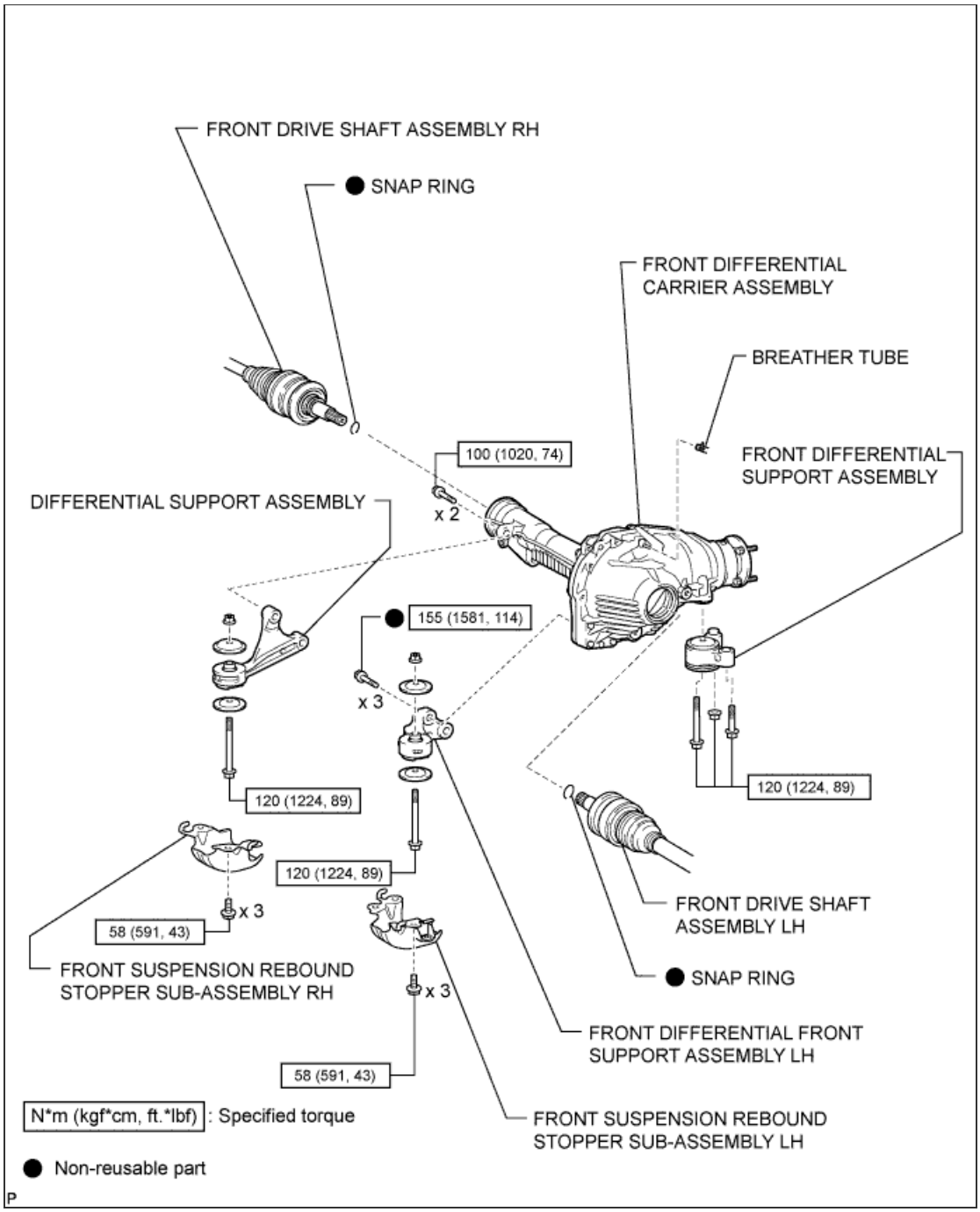
c. Rear Differential:

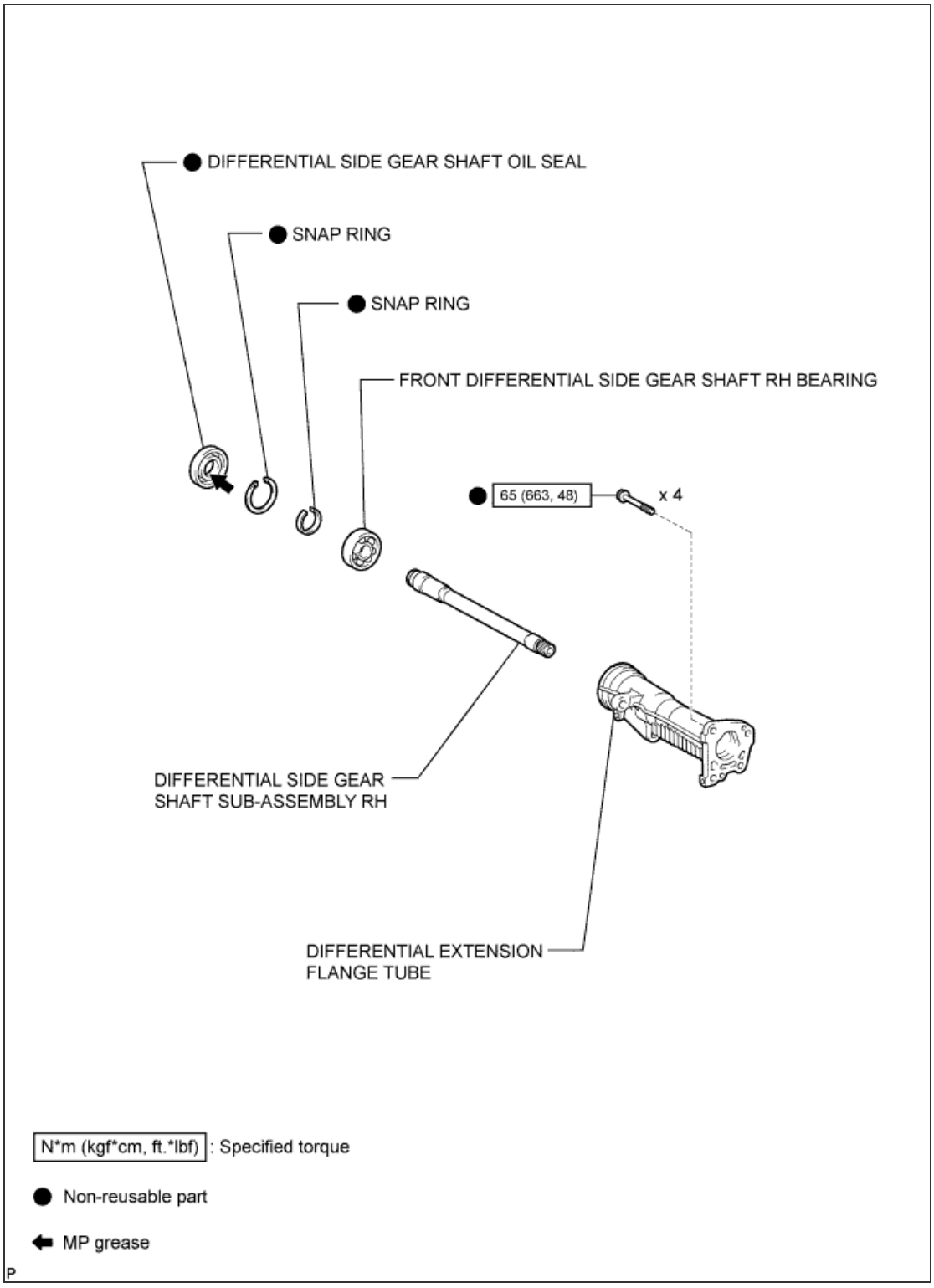
i. Install a new gasket and the filler plug.

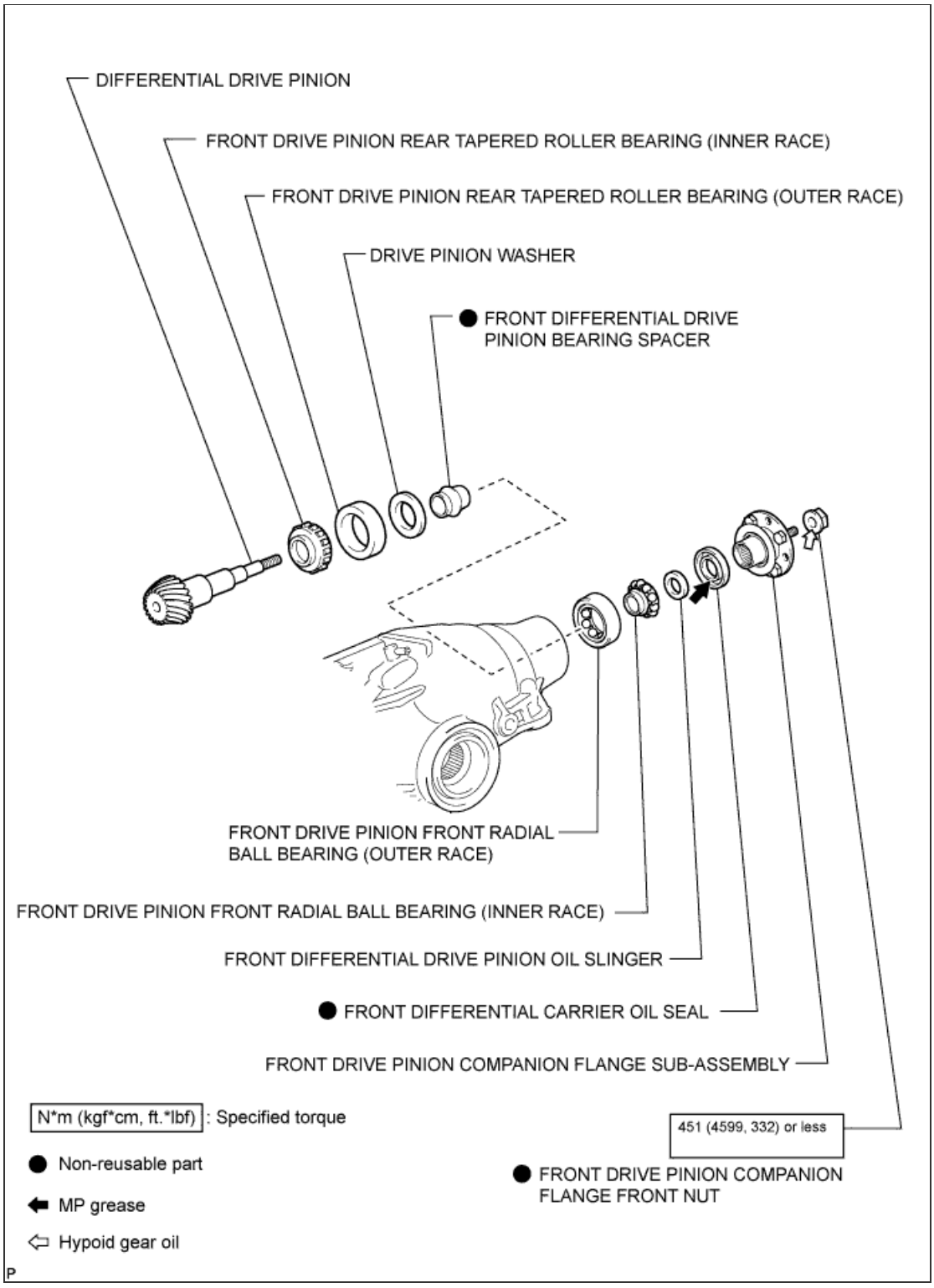
Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

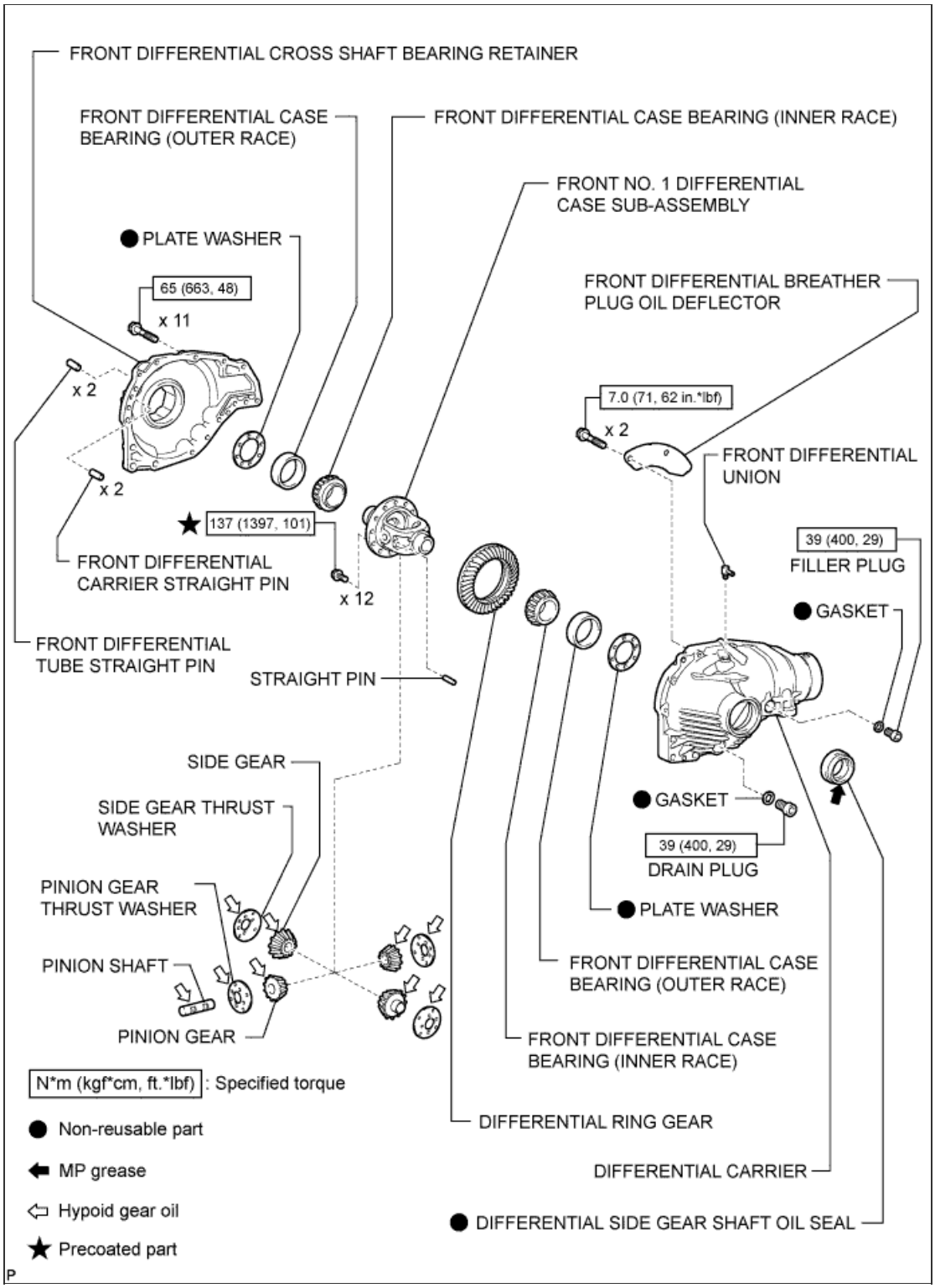
for Preparation [Click here]




FRONT DRIVE SHAFT ASSEMBLY RH
SNAP RING
FRONT DIFFERENTIAL CARRIER ASSEMBLY
BREATHER TUBE
100 (1020, 74)
x 2
FRONT DIFFERENTIAL SUPPORT ASSEMBLY
DIFFERENTIAL SUPPORT ASSEMBLY
155 (1581, 114)
x 3
120 (1224, 89)
120 (1224, 89)
120 (1224, 89)
x 3
58 (591, 43)
FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY RH
FRONT DRIVE SHAFT ASSEMBLY LH
SNAP RING
x 3
FRONT DIFFERENTIAL FRONT SUPPORT ASSEMBLY LH
58 (591, 43)
FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY LH
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P


DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL
SNAP RING
SNAP RING
FRONT DIFFERENTIAL SIDE GEAR SHAFT RH BEARING
65 (663, 48)
x 4
DIFFERENTIAL SIDE GEAR SHAFT SUB-ASSEMBLY RH
DIFFERENTIAL EXTENSION FLANGE TUBE
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
MP grease
P


DIFFERENTIAL DRIVE PINION
FRONT DRIVE PINION REAR TAPERED ROLLER BEARING (INNER RACE)
FRONT DRIVE PINION REAR TAPERED ROLLER BEARING (OUTER RACE)
DRIVE PINION WASHER
● FRONT DIFFERENTIAL DRIVE PINION BEARING SPACER
FRONT DRIVE PINION FRONT RADIAL BALL BEARING (OUTER RACE)
FRONT DRIVE PINION FRONT RADIAL BALL BEARING (INNER RACE)
FRONT DIFFERENTIAL DRIVE PINION OIL SLINGER
● FRONT DIFFERENTIAL CARRIER OIL SEAL
FRONT DRIVE PINION COMPANION FLANGE SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
MP grease
Hypoid gear oil
451 (4599, 332) or less
● FRONT DRIVE PINION COMPANION FLANGE FRONT NUT
P


FRONT DIFFERENTIAL CROSS SHAFT BEARING RETAINER
FRONT DIFFERENTIAL CASE BEARING (OUTER RACE)
FRONT DIFFERENTIAL CASE BEARING (INNER RACE)
FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY
PLATE WASHER
65 (663, 48)
x 11
FRONT DIFFERENTIAL BREATHER PLUG OIL DEFLECTOR
x 2
7.0 (71, 62 in.*lbf)
x 2
FRONT DIFFERENTIAL UNION
x 2
137 (1397, 101)
39 (400, 29)
FILLER PLUG
FRONT DIFFERENTIAL CARRIER STRAIGHT PIN
x 12
GASKET
FRONT DIFFERENTIAL TUBE STRAIGHT PIN
STRAIGHT PIN
SIDE GEAR
SIDE GEAR THRUST WASHER
GASKET
39 (400, 29)
DRAIN PLUG
PINION GEAR THRUST WASHER
PLATE WASHER
PINION SHAFT
FRONT DIFFERENTIAL CASE BEARING (OUTER RACE)
PINION GEAR
FRONT DIFFERENTIAL CASE BEARING (INNER RACE)
N*m (kgf*cm, ft.*lbf) : Specified torque
DIFFERENTIAL RING GEAR
Non-reusable part
MP grease
DIFFERENTIAL CARRIER
Hypoid gear oil
DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL
Precoated part
P

for Preparation Click here

1. REMOVE FRONT PROPELLER SHAFT ASSEMBLY

a. Remove the front propeller shaft (Click here).

2. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

a. Remove the front drive shaft (Click here).

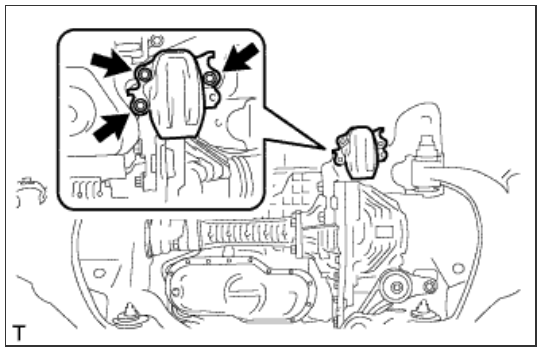
3. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH

HINT:

Use the same procedure as the LH side.

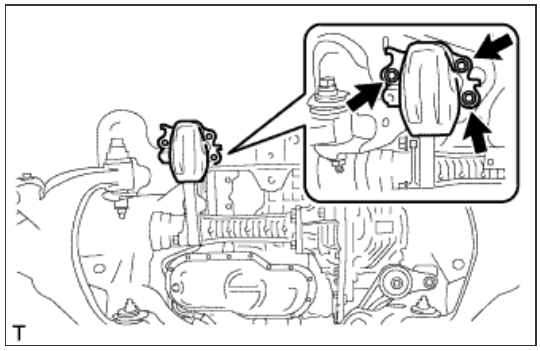
4. REMOVE FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY LH

a. Remove the 3 bolts and suspension rebound stopper LH.



5. REMOVE FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY RH

a. Remove the 3 bolts and suspension rebound stopper RH.



6. REMOVE FRONT DIFFERENTIAL CARRIER ASSEMBLY

a. Disconnect the breather tube from the front differential union.

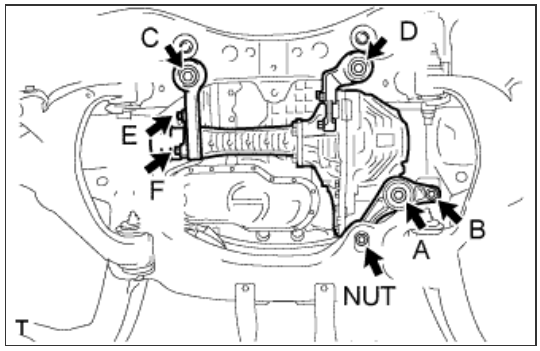
b. Support the front differential with a jack.

c. Remove bolts A and B, the nut and front differential support assembly.

d. Remove bolts C and D.

e. Slowly lower the jack, and remove the front differential carrier.

f. Remove bolts E and F, and the differential support assembly.

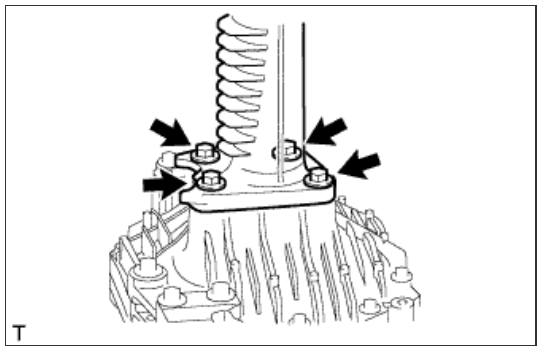


for Preparation Click here

1. REMOVE DIFFERENTIAL EXTENSION FLANGE TUBE

a. Remove the 4 bolts.

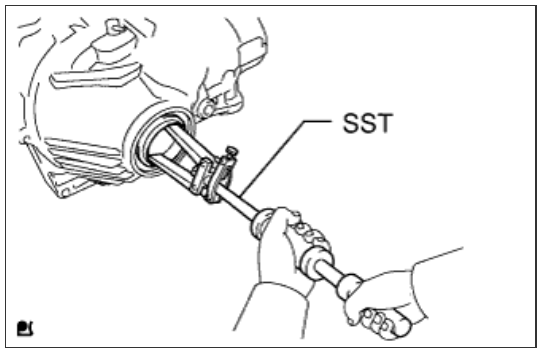
b. Using a plastic-faced hammer, remove the differential tube.



2. REMOVE DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

a. Using SST, tap out the oil seal.

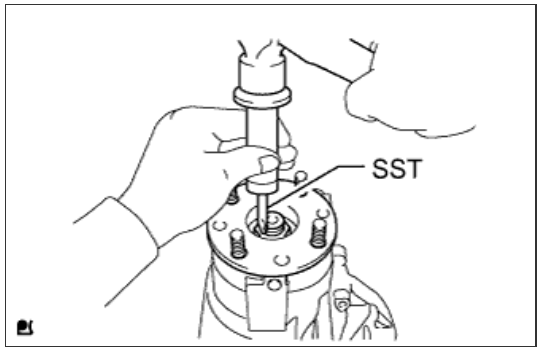
SST
09308-00010



3. REMOVE FRONT DRIVE PINION COMPANION FLANGE FRONT NUT

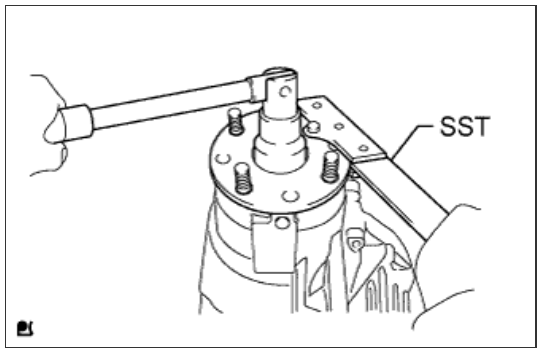
a. Using SST and a hammer, unstake the nut.

SST
09930-00010



b. Using SST to hold the companion flange, remove the nut.

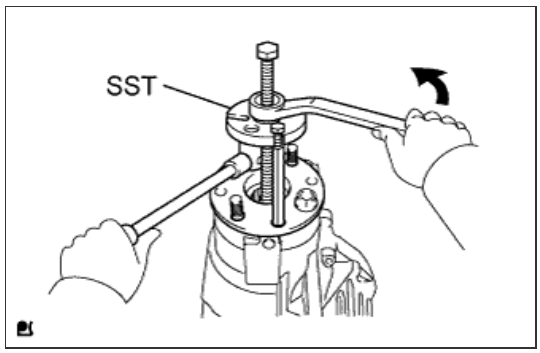
SST
09330-00021 (09330-00030)



4. REMOVE FRONT DRIVE PINION COMPANION FLANGE SUB-ASSEMBLY

a. Using SST, remove the companion flange from the differential carrier.

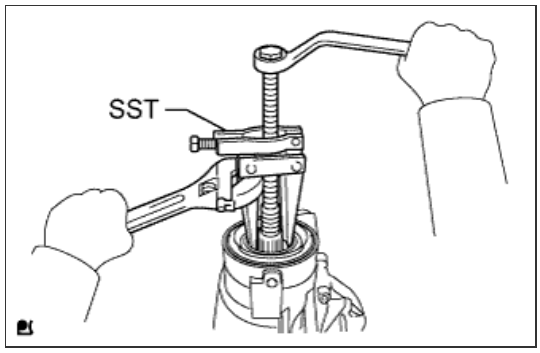
SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03020)



5. REMOVE FRONT DIFFERENTIAL CARRIER OIL SEAL

a. Using SST, remove the oil seal.

SST
09308-10010



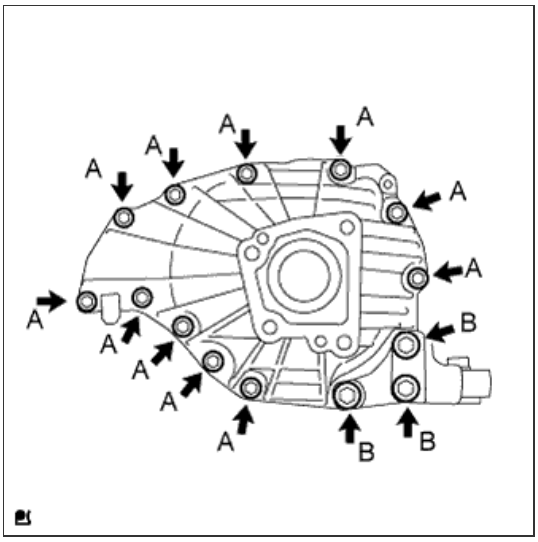
6. REMOVE FRONT DIFFERENTIAL DRIVE PINION OIL SLINGER

7. REMOVE FRONT DIFFERENTIAL CROSS SHAFT BEARING RETAINER

a. Remove the bolts labeled B and front differential front support assembly LH.

b. Remove the bolts labeled A.

c. Using a plastic-faced hammer, tap out the bearing retainer.



8. REMOVE FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY

a. Remove the differential case from the differential carrier.

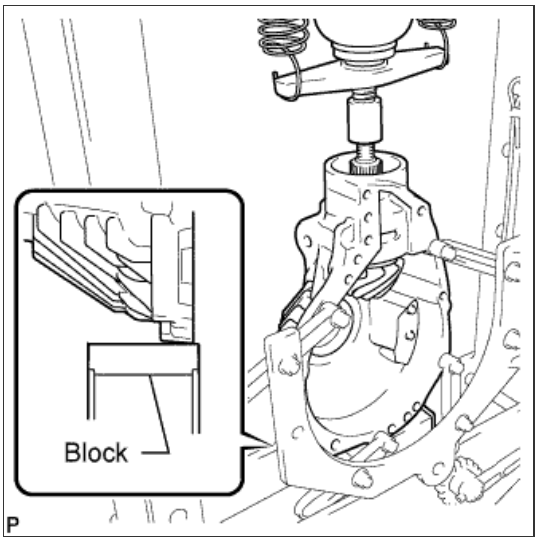
9. REMOVE DIFFERENTIAL DRIVE PINION

a. Set the differential carrier to an overhaul stand as shown in the illustration.

b. Using a press, press out the drive pinion.

NOTICE:

Do not drop the drive pinion.

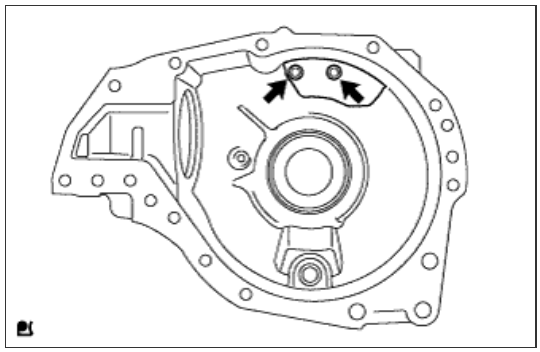


10. REMOVE FRONT DRIVE PINION FRONT RADIAL BALL BEARING

a. Remove the bearing (inner race) from the differential carrier.

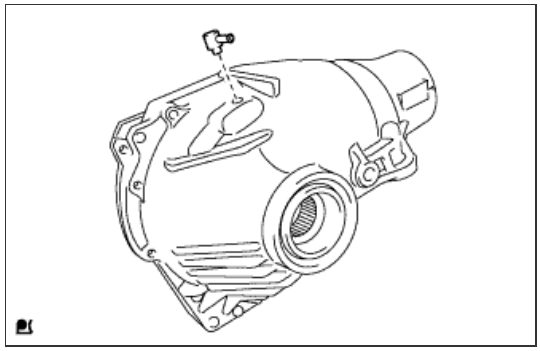
11. REMOVE FRONT DIFFERENTIAL BREATHER PLUG OIL DEFLECTOR

a. Remove the 2 bolts and oil deflector.



12. REMOVE FRONT DIFFERENTIAL UNION

a. Remove the front differential union from the differential carrier.

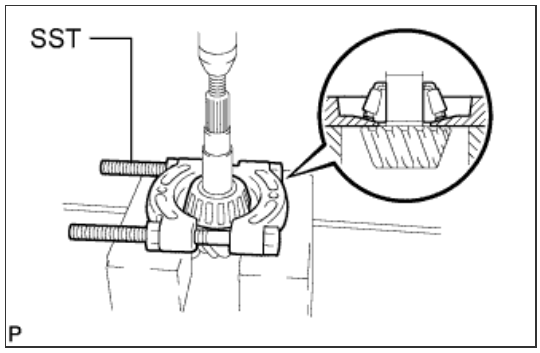


13. REMOVE FRONT DRIVE PINION REAR TAPERED ROLLER BEARING

a. Using SST and a press, press out the bearing (inner race) from the drive pinion.

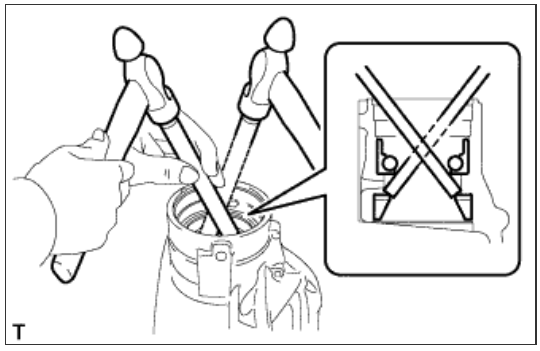
SST
09950-00020

If the drive pinion or ring gear is damaged, replace them as a set.



14. REMOVE FRONT DRIVE PINION REAR TAPERED ROLLER BEARING

a. Using a brass bar and hammer, tap out the bearing (outer race) and washer.

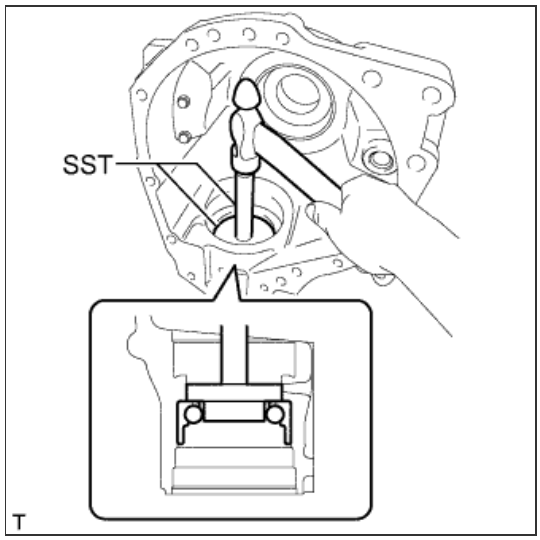


15. REMOVE FRONT DRIVE PINION FRONT RADIAL BALL BEARING

a. Using SST and a hammer, tap out the bearing (outer race) from the differential carrier.

SST

09950-70010 (09951-07100)
09950-60010 (09951-00450)
09950-60020 (09951-00710, 09952-06010)



16. REMOVE FRONT DIFFERENTIAL CASE BEARING

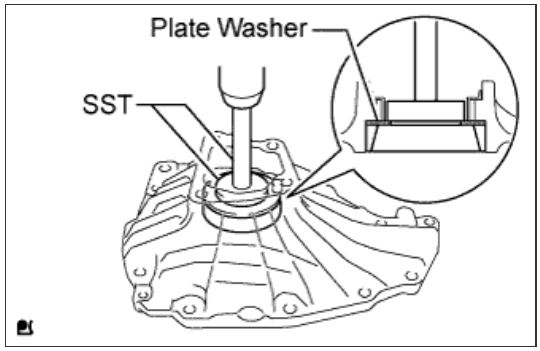
HINT:

- **Measure the plate washer and note its thickness.**
- **Tag the bearing outer races to show the location for reassembly.**

a. Using SST and a press, press out the bearing (outer race) and plate washer from the bearing retainer.

SST

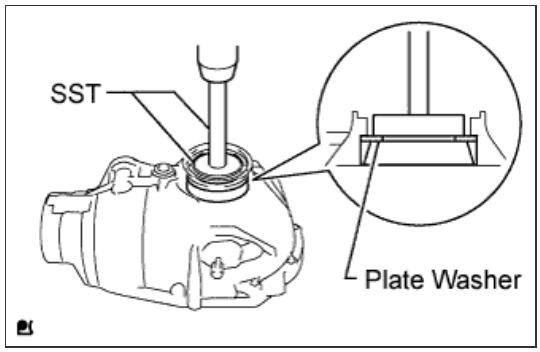
09950-60020 (09951-00680)
09950-70010 (09951-07150)



b. Using SST and a press, press out the bearing (outer race) and plate washer from the differential carrier.

SST

09950-60020 (09951-00680)
09950-70010 (09951-07150)

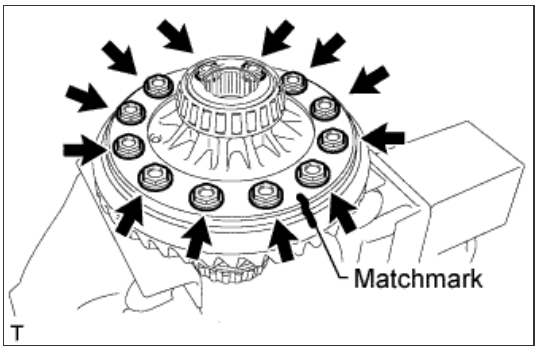


17. REMOVE DIFFERENTIAL RING GEAR

a. Place matchmarks on the ring gear and differential case.

b. Remove the 12 bolts.

c. Using a plastic-faced hammer, tap on the ring gear to disconnect it from the differential case.



18. REMOVE FRONT DIFFERENTIAL CASE BEARING

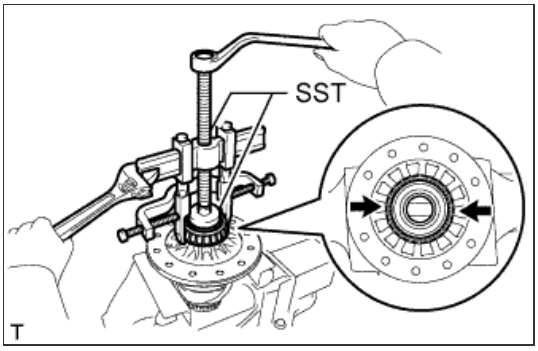
a. Using SST, remove the 2 bearings (inner race).

SST

09950-60010 (09951-00390)
09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011)

HINT:

Fix the claws of SST into the notch in the differential case assembly.



19. DISASSEMBLE DIFFERENTIAL CASE

a. Using a pin punch and hammer, tap out the straight pin.

b. Remove these parts from the differential case assembly.

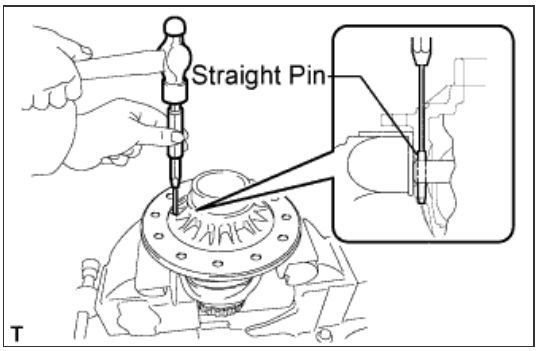
i. 2 differential side gears

ii. 2 differential side gear thrust washers

iii. Differential pinion shaft

iv. 2 differential pinion gears

v. 2 differential pinion gear thrust washers



20. INSPECT DIFFERENTIAL GEAR KIT

a. Check that there is no damage to the pinion gears and side gears.
If a pinion gear and/or side gear is damaged, replace the differential gear kit.

21. INSPECT FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY

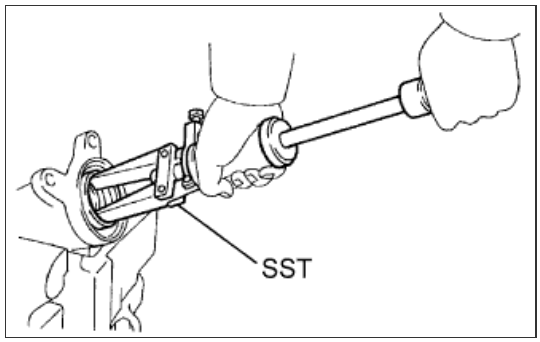
a. Check that the differential case is not damaged.
If the differential case is damaged, replace it.

22. REMOVE DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

a. Using SST, tap out the oil seal from the flange tube.

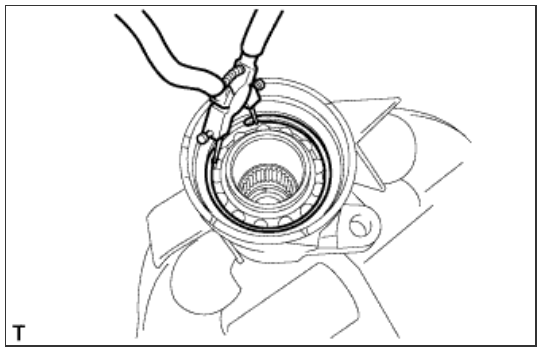
SST

09308-00010

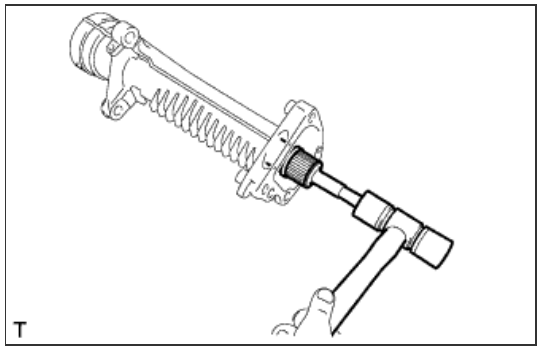


23. REMOVE DIFFERENTIAL SIDE GEAR SHAFT SUB-ASSEMBLY RH

a. Using a snap ring expander, remove the snap ring.

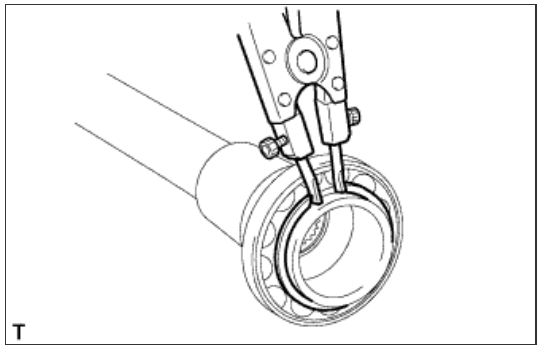


b. Using a plastic-faced hammer, tap out the side gear shaft.



24. REMOVE FRONT DIFFERENTIAL SIDE GEAR SHAFT RH BEARING

a. Using a snap ring expander, remove the snap ring.



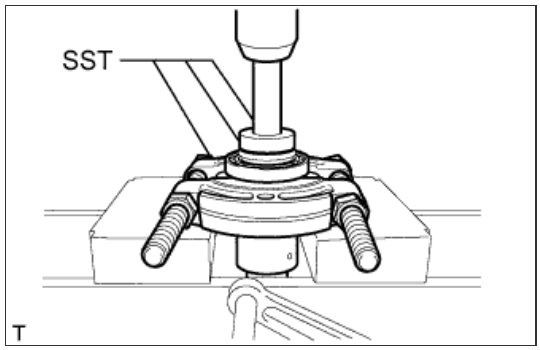
b. Using SST and a press, press out the bearing.

SST

09950-00020
09950-70010 (09951-07100)
09950-60010 (09951-00450)

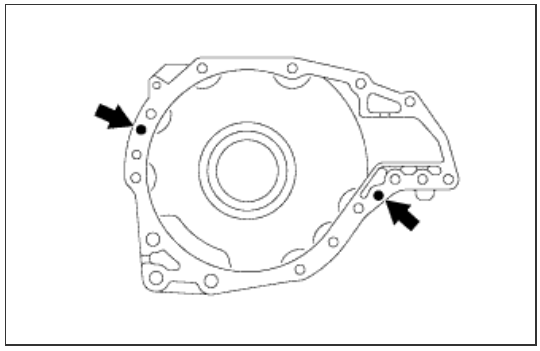
NOTICE:

Do not damage the bearing.



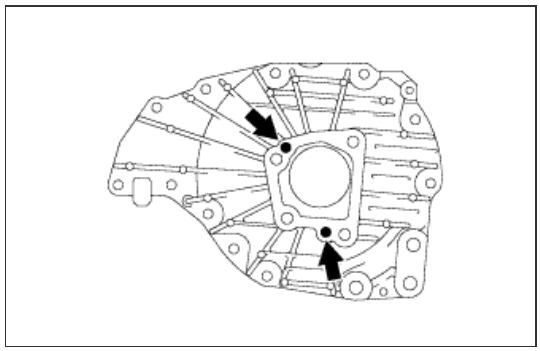
25. REMOVE FRONT DIFFERENTIAL CARRIER STRAIGHT PIN

a. Remove the straight pins from the bearing retainer.



26. REMOVE FRONT DIFFERENTIAL TUBE STRAIGHT PIN

a. Remove the straight pins from the bearing retainer.

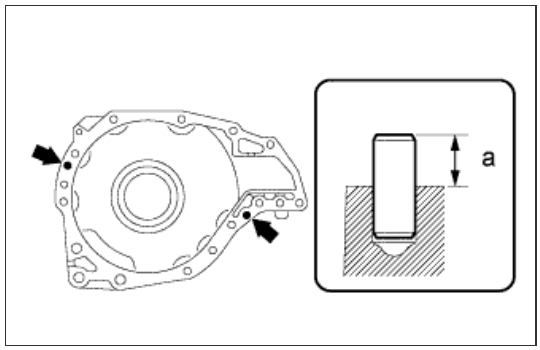


for Preparation Click here

1. INSTALL FRONT DIFFERENTIAL CARRIER STRAIGHT PIN

a. Using a plastic-faced hammer, tap in the straight pins until the protrusion height shown in the illustration is within the specification.

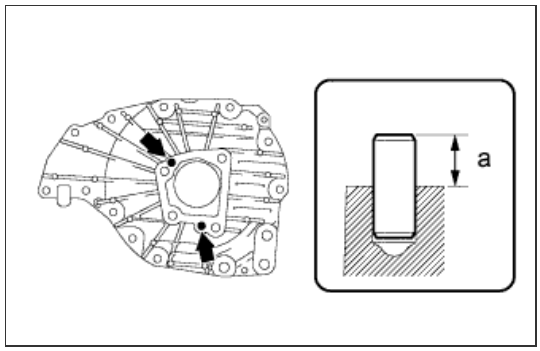
Standard depth (a):
9.5 to 10.0 mm (0.374 to 0.394 in.)



2. INSTALL FRONT DIFFERENTIAL TUBE STRAIGHT PIN

a. Using a plastic-faced hammer, tap in the straight pins until the protrusion height shown in the illustration is within the specification.

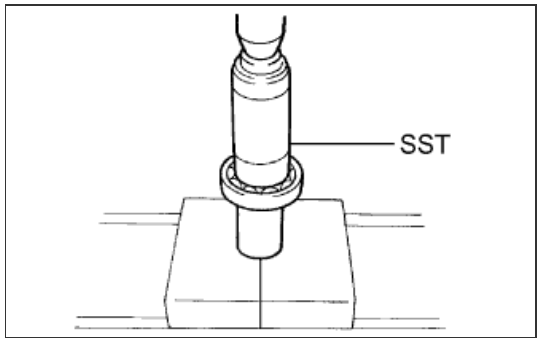
Standard depth (a):
9.5 to 10.0 mm (0.374 to 0.394 in.)



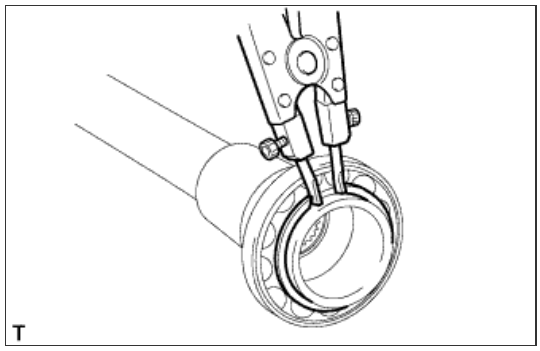
3. INSTALL FRONT DIFFERENTIAL SIDE GEAR SHAFT RH BEARING

a. Using SST and a press, press in the bearing.

SST
09223-00010



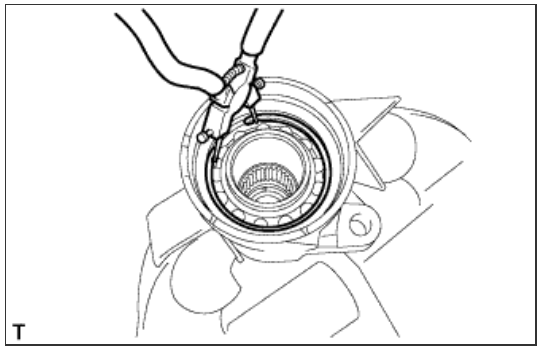
b. Using a snap ring expander, install a new snap ring.



4. INSTALL DIFFERENTIAL SIDE GEAR SHAFT SUB-ASSEMBLY RH

a. Install the side gear shaft into the differential tube.

b. Using snap ring pliers, install a new snap ring.



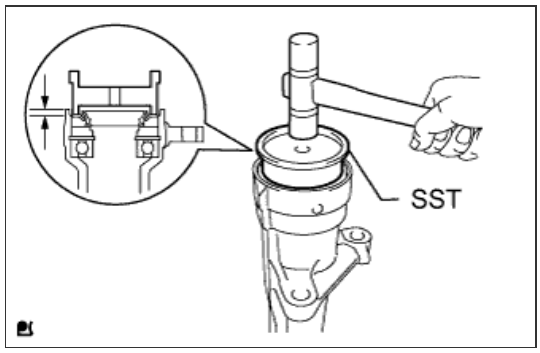
5. INSTALL DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

a. Using SST and a plastic-faced hammer, tap in a new oil seal.

SST
09608-32010

Standard oil seal depth:
4.8 to 5.8 mm (0.189 to 0.228 in.)

b. Coat the lip of the oil seal with MP grease.



6. INSTALL FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY

a. Install the 2 side gear thrust washers onto the 2 side gears.

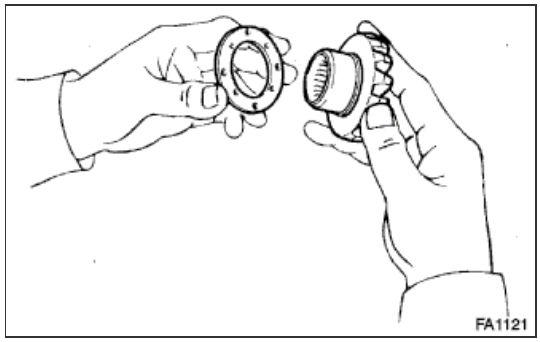
HINT:

Using the table below, select 2 thrust washers which will ensure that the backlash is within the specifications.

b. Install the 2 side gears (with thrust washers), 2 pinion gears, 2 pinion gear thrust washers and pinion shaft into the differential case assembly.

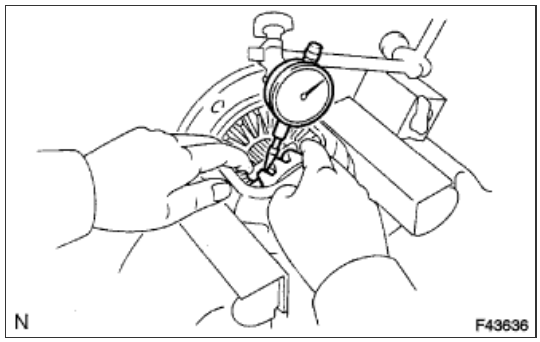
HINT:

- **Align the holes of the differential case assembly and pinion shaft.**
- **Apply hypoid gear oil to each sliding surface and rotating part.**



c. Measure the side gear backlash.

i. Using a dial indicator, measure the side gear backlash while holding one pinion gear toward the differential case assembly.



Standard backlash:
0 to 0.15 mm (0 to 0.00591 in.)

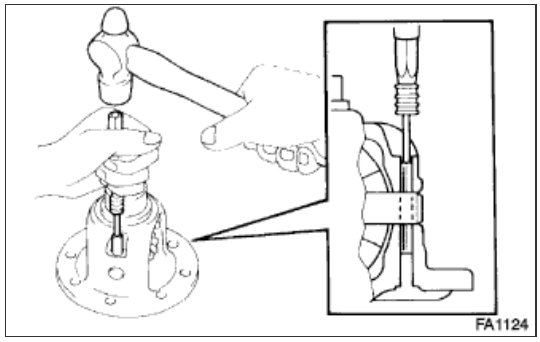
If the backlash is not within the specification, replace the 2 side gear thrust washers. Use the table below to select 2 thrust washers of the same thickness which will ensure that the backlash is within the specification.

Standard Thrust Washer Thickness:

Specified Condition	Specified Condition
1.43 to 1.47 mm (0.0563 to 0.0579 in.)	1.68 to 1.72 mm (0.0661 to 0.0677 in.)
1.48 to 1.52 mm (0.0583 to 0.0598 in.)	1.73 to 1.77 mm (0.0681 to 0.0697 in.)
1.53 to 1.57 mm (0.0602 to 0.0618 in.)	1.78 to 1.82 mm (0.0701 to 0.0717 in.)
1.58 to 1.62 mm (0.0622 to 0.0638 in.)	1.83 to 1.87 mm (0.0720 to 0.0736 in.)
1.63 to 1.67 mm (0.0642 to 0.0657 in.)	-

d. Using a pin punch and hammer, tap in the straight pin through the differential case and hole of the pinion shaft.

e. Stake the differential case.



7. INSTALL DIFFERENTIAL RING GEAR

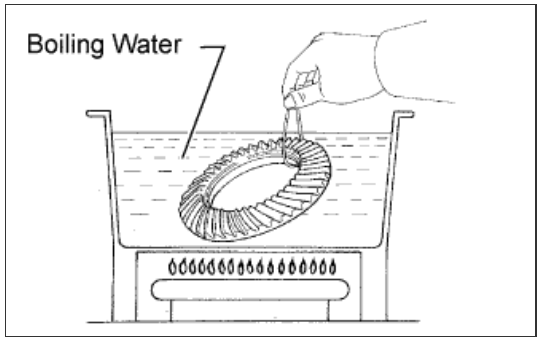
a. Clean the contact surfaces of the differential case and ring gear.

b. Heat the ring gear to about 100°C (212°F) in boiling water.

c. Carefully take the ring gear out of the boiling water.

d. After the moisture on the ring gear has completely evaporated, quickly align the matchmarks on the ring gear and differential case and set the ring gear onto the differential case. Then temporarily install the 10 bolts so that the bolt holes in the ring gear and differential case are aligned.

e. After the ring gear cools down sufficiently, remove the 10 bolts. Then apply adhesive to the 10 bolts and install them.



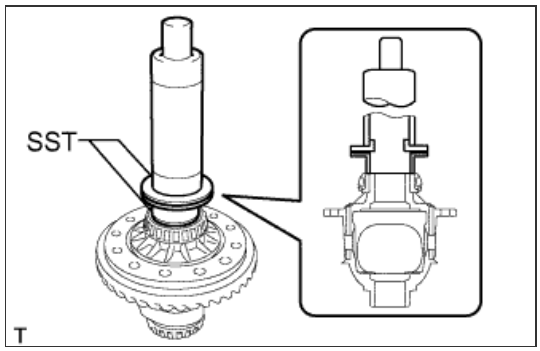
Torque:
137 N*m{ 1397 kgf*cm , 101 ft.*lbf }

Adhesive:
Toyota Genuine Adhesive 1360K, Three Bond 1360K or equivalent

8. INSTALL FRONT DIFFERENTIAL CASE BEARING

a. Using SST and a press, press in the 2 bearings (inner race).

SST
09316-20011
09316-60011 (09316-00041)



9. INSTALL FRONT DIFFERENTIAL CASE BEARING

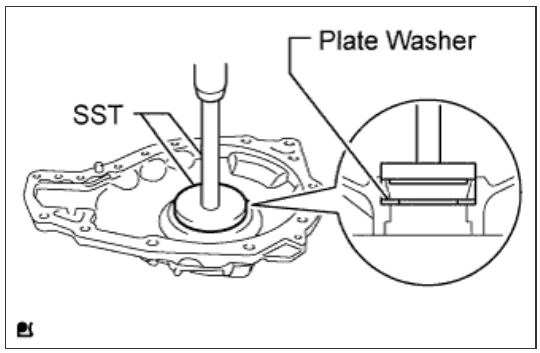
HINT:

When replacing the 2 differential case bearings, fit the thinnest washer to each bearing. When reusing the bearings, fit a washer of the same thickness as the one removed to each bearing.

a. Install a new plate washer to the shaft bearing retainer.

b. Using SST and a press, press the bearing (outer race) into the differential case bearing retainer.

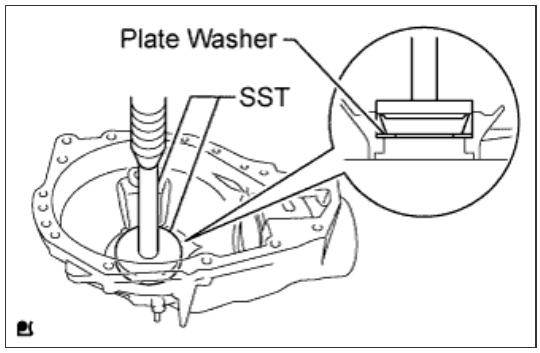
SST
09950-60020 (09951-00890)
09950-70010 (09951-07150)



c. Install a new plate washer onto the differential carrier.

d. Using SST and a press, press the bearing (outer race) into the differential carrier assembly.

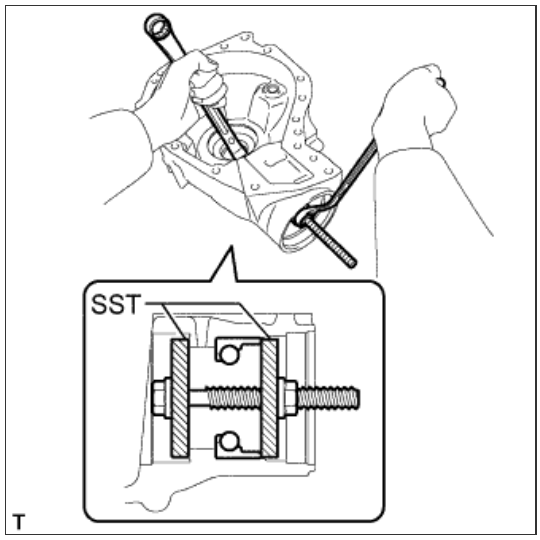
SST
09950-60020 (09951-00890)
09950-70010 (09951-07150)



10. INSTALL FRONT DRIVE PINION FRONT RADIAL BALL BEARING

a. Using SST, install the bearing (outer race).

SST
09950-60020 (09951-00810, 09951-00890)



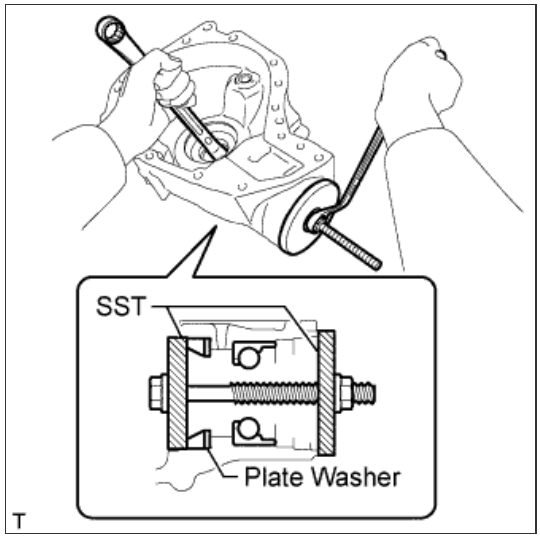
11. INSTALL FRONT DRIVE PINION REAR TAPERED ROLLER BEARING

a. Using SST, install the washer and bearing (outer race).

SST
09950-60020 (09951-00890, 09951-01030)

HINT:

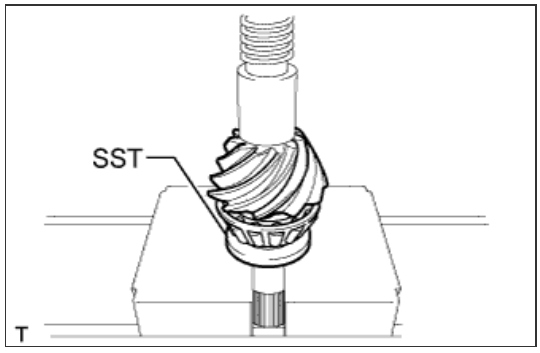
After installing the washer, check the tooth contact pattern. If necessary, replace the washer with one of a different thickness.



12. INSTALL FRONT DRIVE PINION REAR TAPERED ROLLER BEARING

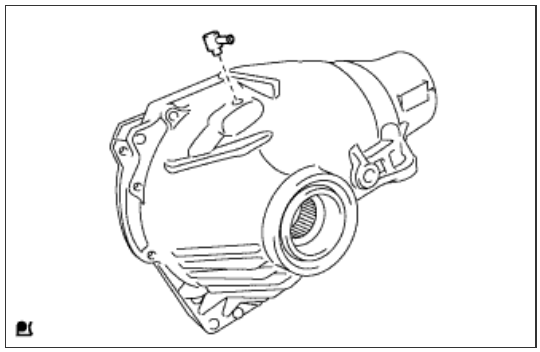
a. Using SST and a press, press in the bearing (inner race).

SST
09506-35010



13. INSTALL FRONT DIFFERENTIAL UNION

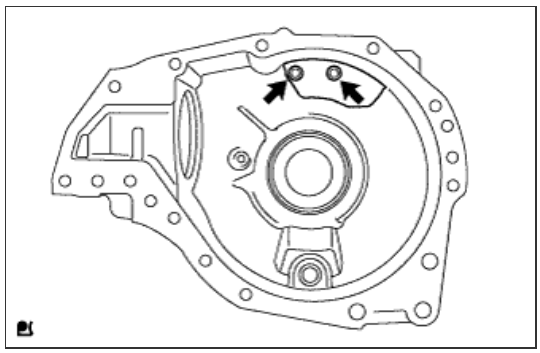
a. Install the front differential union to the differential carrier.



14. INSTALL FRONT DIFFERENTIAL BREATHER PLUG OIL DEFLECTOR

a. Install the 2 bolts and oil deflector.

Torque:
7.0 N*m{ 71 kgf*cm , 62 in.*lbf }



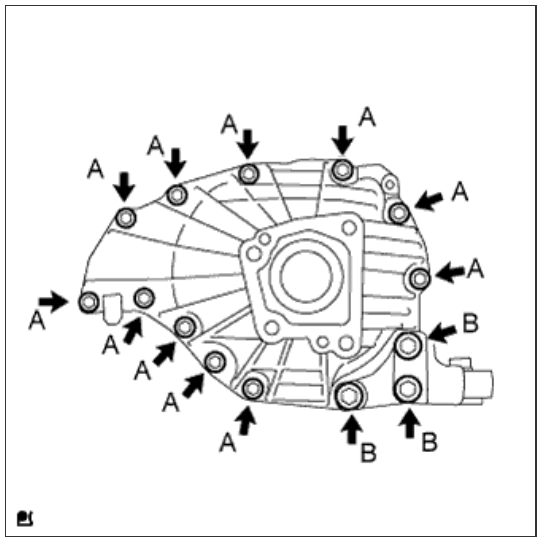
15. TEMPORARILY INSTALL DIFFERENTIAL DRIVE PINION

16. INSTALL FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY

17. INSTALL FRONT DIFFERENTIAL CROSS SHAFT BEARING RETAINER

a. Install the differential cross shaft bearing retainer and differential support with the 14 bolts.

Torque:
for bolt A:
65 N*m{ 633 kgf*cm , 48 ft.*lbf }
for bolt B:
155 N*m{ 1581 kgf*cm , 114 ft.*lbf }

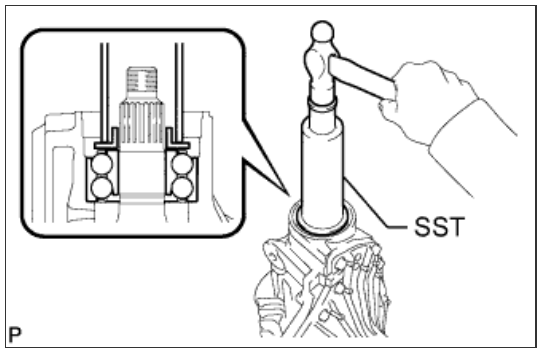


18. INSTALL FRONT DRIVE PINION FRONT RADIAL BALL BEARING

a. Using SST and a hammer, lightly tap in the bearing (inner race) to install it.

SST

09316-60011 (09316-00041)



19. INSTALL FRONT DIFFERENTIAL DRIVE PINION OIL SLINGER

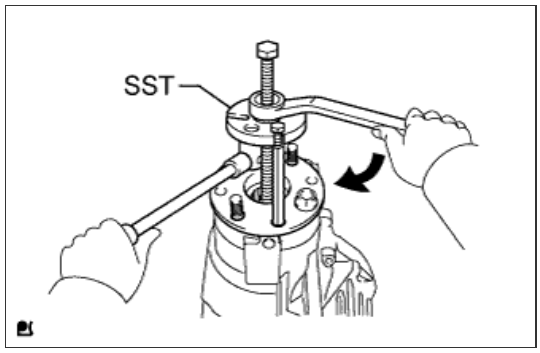
20. INSPECT DIFFERENTIAL DRIVE PINION PRELOAD

a. Using SST, install the companion flange.

SST

09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03020)

b. Coat the threads of the nut with hypoid gear oil.



c. Using SST, hold the companion flange.

SST

09330-00021 (09330-00030)

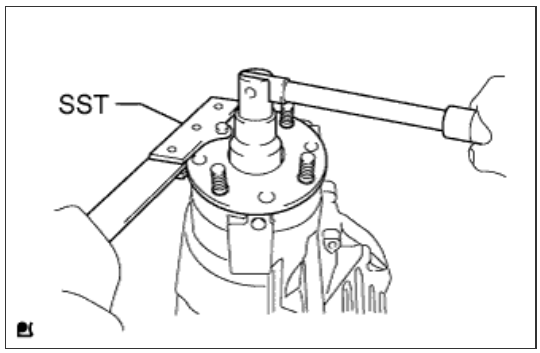
d. Tighten the nut until the standard preload is reached.

Torque:

451 N*m{ 4599 kgf*cm , 332 ft.*lbf } or less

NOTICE:

As there is no spacer, tighten the nut a little at a time, being careful not to overtighten it.

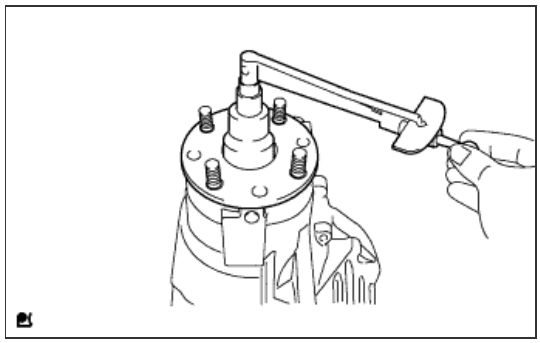


e. Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Standard Preload (at Starting):

Bearing	Specified Condition
New	3.0 to 3.5 N*m (31 to 35 kgf*cm, 27 to 50 in.*lbf)
Reused	2.1 to 2.5 N*m (22 to 24 kgf*cm, 19 to 21 in.*lbf)

If necessary, disassemble and inspect the differential assembly.



21. ADJUST BACKLASH BETWEEN DIFFERENTIAL RING GEAR AND DIFFERENTIAL DRIVE PINION

a. Using SST and a dial indicator, measure the ring gear backlash.

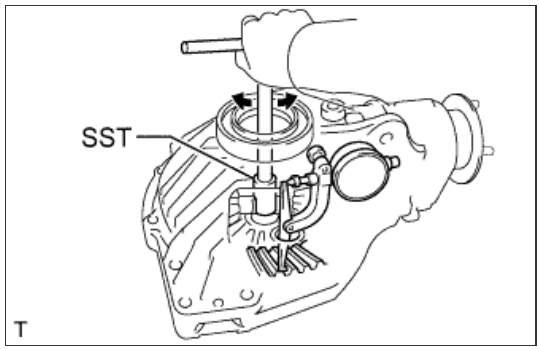
SST
09564-33010

Standard backlash:
0.17 to 0.27 mm (0.00670 to 0.0106 in.)

If the backlash is not within the specification, adjust it by either increasing or decreasing the thickness of the washers on both sides by an equal amount.

HINT:

- **There should be no clearance between the plate washer and differential case.**
- **Make sure that there is ring gear backlash.**

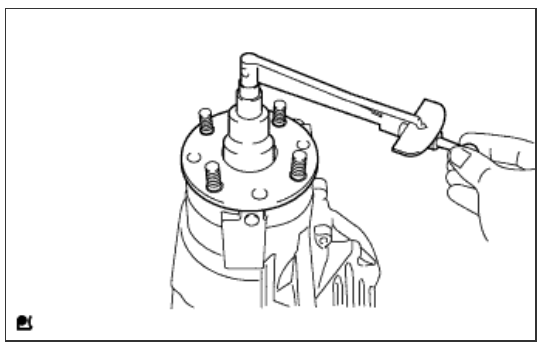


Standard Plate Washer Thickness:

Specified Condition	Specified Condition
1.49 to 1.51 mm (0.0587 to 0.0594 in.)	1.93 to 1.95 mm (0.0760 to 0.0768 in.)
1.51 to 1.53 mm (0.0594 to 0.0602 in.)	1.95 to 1.97 mm (0.0768 to 0.0776 in.)
1.53 to 1.55 mm (0.0602 to 0.0610 in.)	1.97 to 1.99 mm (0.0776 to 0.0783 in.)
1.55 to 1.57 mm (0.0610 to 0.0618 in.)	1.99 to 2.01 mm (0.0783 to 0.0791 in.)
1.57 to 1.59 mm (0.0618 to 0.0626 in.)	2.01 to 2.03 mm (0.0791 to 0.0799 in.)
1.59 to 1.61 mm (0.0626 to 0.0634 in.)	2.03 to 2.05 mm (0.0799 to 0.0807 in.)
1.61 to 1.63 mm (0.0634 to 0.0642 in.)	2.05 to 2.07 mm (0.0807 to 0.0815 in.)
1.63 to 1.65 mm (0.0642 to 0.0650 in.)	2.07 to 2.09 mm (0.0815 to 0.0823 in.)
1.65 to 1.67 mm (0.0650 to 0.0657 in.)	2.09 to 2.11 mm (0.0823 to 0.0831 in.)
1.67 to 1.69 mm (0.0657 to 0.0665 in.)	2.11 to 2.13 mm (0.0831 to 0.0839 in.)
1.69 to 1.71 mm (0.0665 to 0.0673 in.)	2.13 to 2.15 mm (0.0839 to 0.0846 in.)
1.71 to 1.73 mm (0.0673 to 0.0681 in.)	2.15 to 2.17 mm (0.0846 to 0.0854 in.)
1.73 to 1.75 mm (0.0681 to 0.0689 in.)	2.17 to 2.19 mm (0.0854 to 0.0862 in.)
1.75 to 1.77 mm (0.0689 to 0.0697 in.)	2.19 to 2.21 mm (0.0862 to 0.0870 in.)
1.77 to 1.79 mm (0.0697 to 0.0705 in.)	2.21 to 2.23 mm (0.0870 to 0.0878 in.)
1.79 to 1.81 mm (0.0705 to 0.0713 in.)	2.23 to 2.25 mm (0.0878 to 0.0886 in.)
1.81 to 1.83 mm (0.0713 to 0.0720 in.)	2.25 to 2.27 mm (0.0886 to 0.0894 in.)
1.83 to 1.85 mm (0.0720 to 0.0728 in.)	2.27 to 2.29 mm (0.0894 to 0.0902 in.)
1.85 to 1.87 mm (0.0728 to 0.0736 in.)	2.29 to 2.31 mm (0.0902 to 0.0909 in.)
1.87 to 1.89 mm (0.0736 to 0.0744 in.)	2.31 to 2.33 mm (0.0909 to 0.0917 in.)
1.89 to 1.91 mm (0.0744 to 0.0752 in.)	2.33 to 2.35 mm (0.0917 to 0.0925 in.)
1.91 to 1.93 mm (0.0752 to 0.0760 in.)	-

22. INSPECT TOTAL PRELOAD

a. Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.



Standard Total Preload (at starting):

Bearing	Specified Condition
New	Standard drive pinion preload plus 1.6 to 2.4 N*m (17 to 24 kgf*cm, 15 to 21 in.*lbf)
Reused	Standard drive pinion preload plus 1.3 to 2.1 N*m (14 to 21 kgf*cm, 12 to 18 in.*lbf)

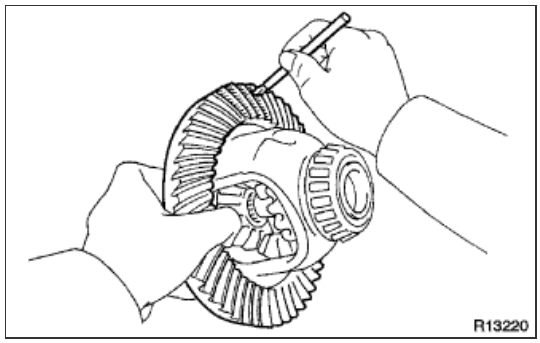
If necessary, disassemble and inspect the differential.

23. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

a. Remove the bearing retainer and differential case.

b. Coat 3 or 4 teeth at 3 different positions on the ring gear with Prussian blue.

c. Install the differential case to the differential carrier.

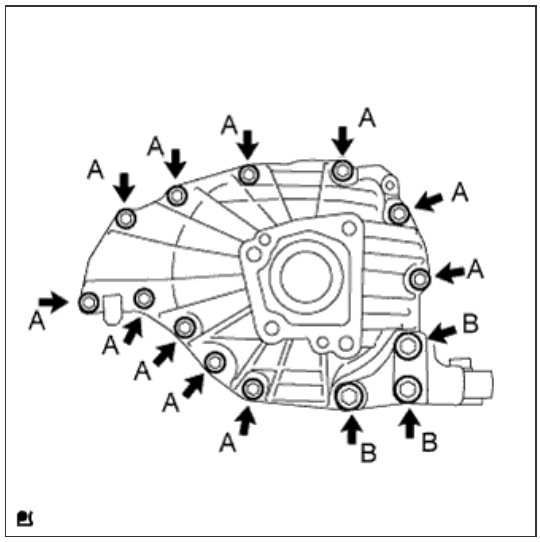


d. Install the differential cross shaft bearing retainer and front differential front support assembly LH with the 14 bolts.

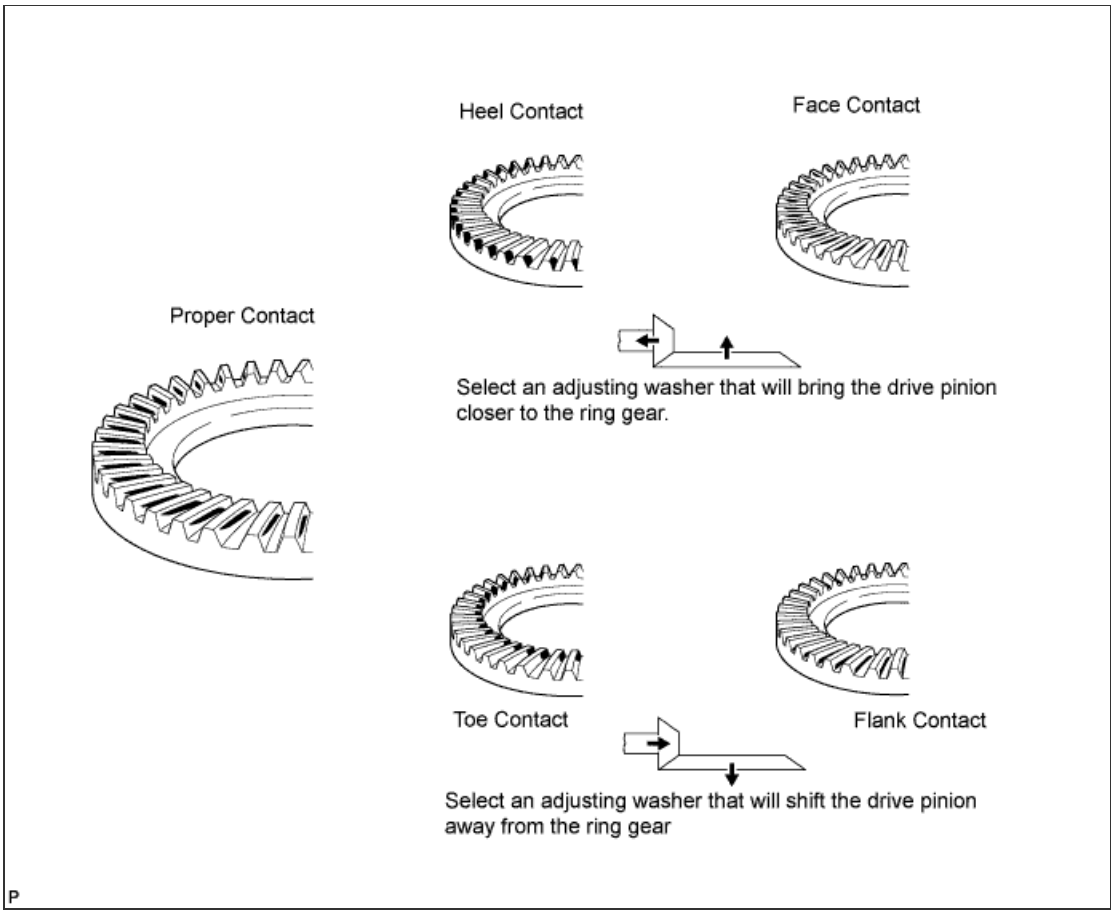
Torque:
for bolt A:
65 N*m{ 633 kgf*cm , 48 ft.*lbf }
for bolt B:
155 N*m{ 1581 kgf*cm , 114 ft.*lbf }

e. Hold the companion flange firmly and rotate it in both directions.

f. Remove the 14 bolts, differential case, shaft bearing retainer and front support.



g. Inspect the tooth contact pattern.



If the teeth are not engaged properly, use the following chart to select the appropriate drive pinion washer for correction.

Standard Drive Pinion Washer Thickness:

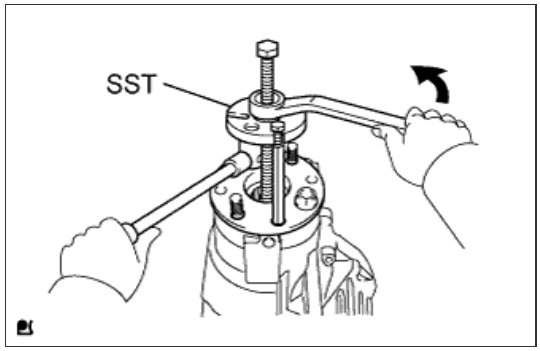
Specified Condition	Specified Condition
1.815 to 1.835 mm (0.0715 to 0.0722 in.)	2.065 to 2.085 mm (0.0813 to 0.0821 in.)
1.840 to 1.860 mm (0.0724 to 0.0732 in.)	2.090 to 2.110 mm (0.0823 to 0.0831 in.)
1.865 to 1.885 mm (0.0734 to 0.0742 in.)	2.115 to 2.135 mm (0.0793 to 0.0841 in.)
1.890 to 1.910 mm (0.0744 to 0.0752 in.)	2.140 to 2.160 mm (0.0843 to 0.0850 in.)
1.915 to 1.935 mm (0.0754 to 0.0762 in.)	2.165 to 2.185 mm (0.0852 to 0.0860 in.)
1.940 to 1.960 mm (0.0764 to 0.0772 in.)	2.190 to 2.210 mm (0.0862 to 0.0870 in.)
1.965 to 1.985 mm (0.0774 to 0.0781 in.)	2.215 to 2.235 mm (0.0872 to 0.0870 in.)
1.990 to 2.010 mm (0.0783 to 0.0791 in.)	2.240 to 2.260 mm (0.0882 to 0.0890 in.)
2.015 to 2.035 mm (0.0793 to 0.0801 in.)	2.265 to 2.285 mm (0.0892 to 0.0900 in.)
2.040 to 2.060 mm (0.0803 to 0.0811 in.)	-

24. REMOVE FRONT DRIVE PINION COMPANION FLANGE SUB-ASSEMBLY

a. Using SST, remove the companion flange from the differential carrier.

SST

09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03020)



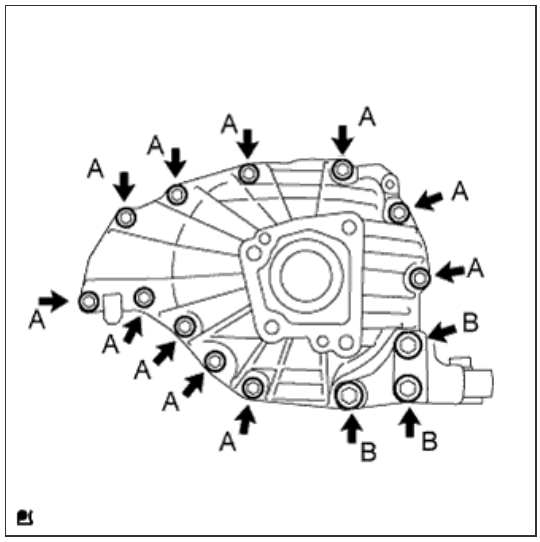
25. REMOVE FRONT DIFFERENTIAL DRIVE PINION OIL SLINGER

26. REMOVE FRONT DIFFERENTIAL CROSS SHAFT BEARING RETAINER

a. Remove the bolts labeled B and front differential front support assembly LH.

b. Remove the bolts labeled A.

c. Using a plastic-faced hammer, tap out the bearing retainer.



27. REMOVE FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY

a. Remove the differential case from the differential carrier.

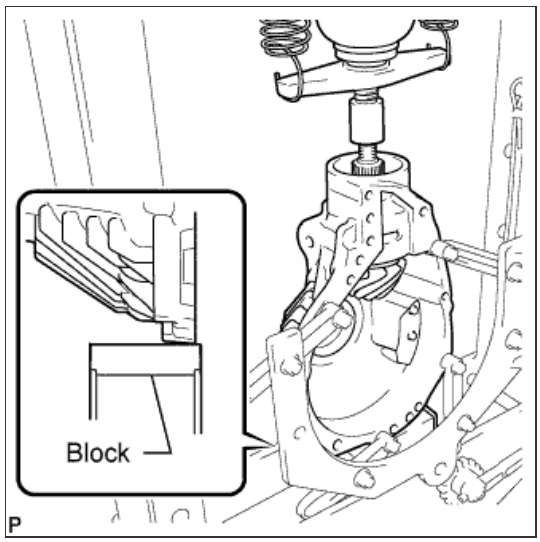
28. REMOVE DIFFERENTIAL DRIVE PINION

a. Set the differential carrier to an overhaul stand as shown in the illustration.

b. Using a press, press out the drive pinion.

NOTICE:

Do not drop the drive pinion.



29. REMOVE FRONT DRIVE PINION FRONT RADIAL BALL BEARING

30. INSTALL FRONT DIFFERENTIAL DRIVE PINION BEARING SPACER

a. Install a new bearing spacer.

31. TEMPORARILY INSTALL DIFFERENTIAL DRIVE PINION

32. INSTALL FRONT NO. 1 DIFFERENTIAL CASE SUB-ASSEMBLY

33. INSTALL FRONT DIFFERENTIAL CROSS SHAFT BEARING RETAINER

a. Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential carrier and shaft bearing retainer.

b. Wipe off any residual FIPG material on the contact surface using gasoline or alcohol.

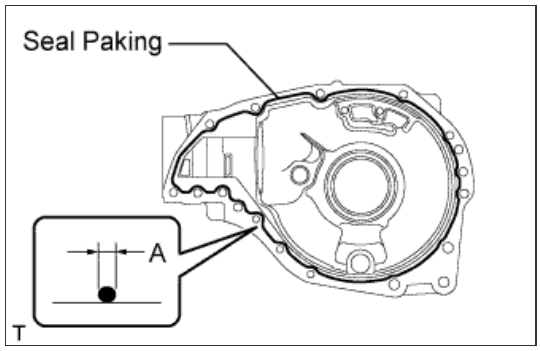
c. Apply seal packing to the differential carrier as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent

Standard Seal Diameter (A):
2.0 to 3.0 mm (0.0788 to 0.118 in.)

HINT:

Install the shaft bearing retainer within 10 minutes of applying seal packing.

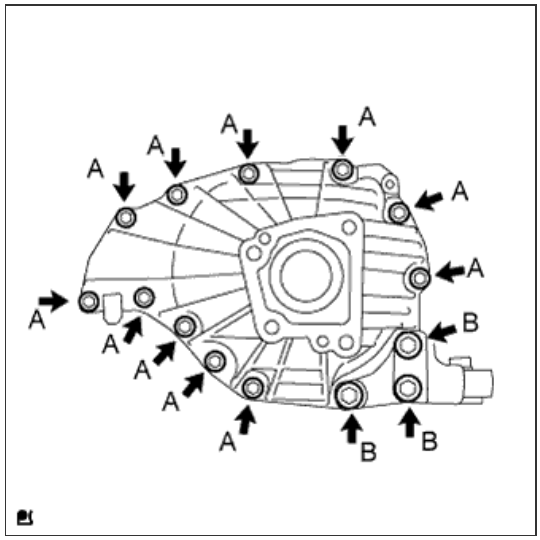


d. Install the front differential cross shaft bearing retainer and front differential front support assembly LH with the 11 bolts (A), and 3 new bolts (B).

Torque:
for bolt A:
65 N*m{ 633 kgf*cm , 48 ft.*lbf }
for bolt B:
155 N*m{ 1581 kgf*cm , 114 ft.*lbf }

NOTICE:

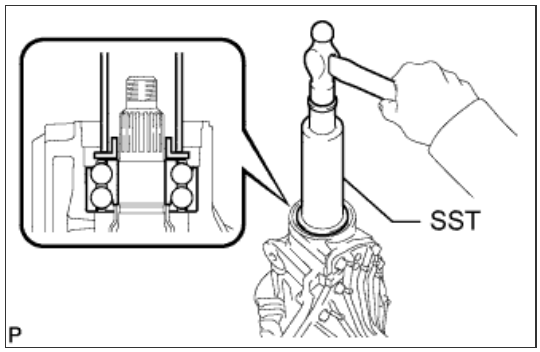
Do not add oil or drive the vehicle immediately after installing the cover, and leave it as is for at least an hour. Also, for 12 hours or less, avoid rapid acceleration/deceleration.



34. INSTALL FRONT DRIVE PINION FRONT RADIAL BALL BEARING

a. Using SST and a hammer, lightly tap in the bearing (inner race) to install it.

SST
09316-60011 (09316-00041)



35. INSTALL FRONT DIFFERENTIAL DRIVE PINION OIL SLINGER

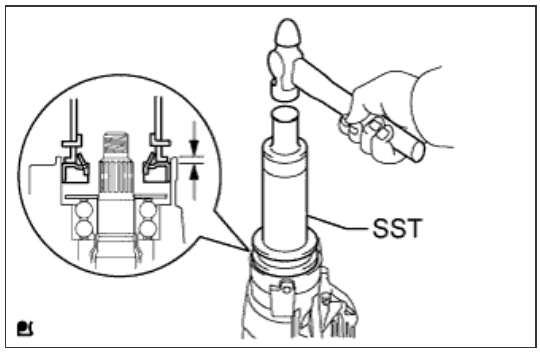
36. INSTALL FRONT DIFFERENTIAL CARRIER OIL SEAL

a. Using SST and a hammer, tap in a new oil seal.

SST
09502-12010
09316-60011 (09316-00041)

Standard oil seal depth:
5.6 to 6.6 mm (0.221 to 0.260 in.)

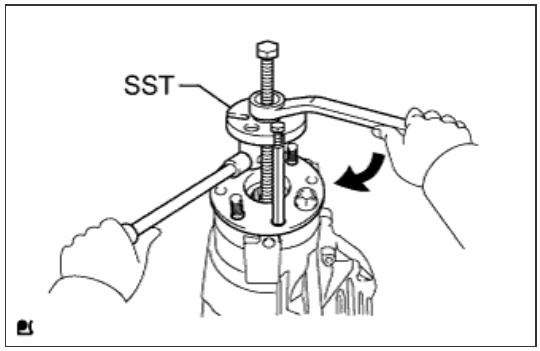
b. Coat the lip of the oil seal with MP grease.



37. INSTALL FRONT DRIVE PINION COMPANION FLANGE SUB-ASSEMBLY

a. Using SST, install the companion flange.

SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03020)



38. INSPECT DIFFERENTIAL DRIVE PINION PRELOAD

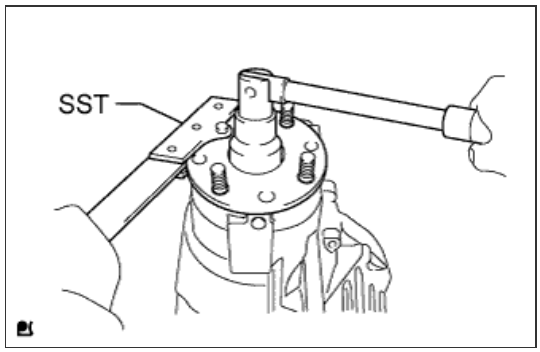
a. Using SST, hold the companion flange.

SST
09330-00021 (09330-00030)

b. Coat the threads of a new nut with hypoid gear oil.

c. Install the nut by tightening it until the standard preload is reached.

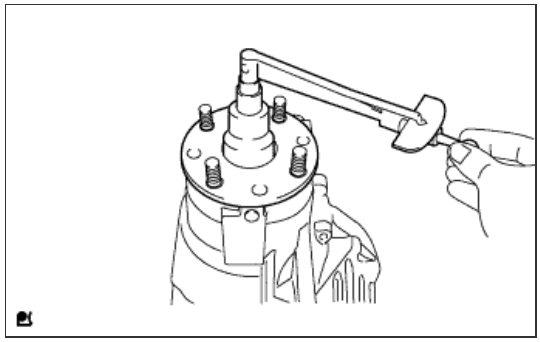
Torque:
451 N*m{ 4599 kgf*cm , 332 ft.*lbf } or less



d. Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Standard Preload (at Starting):

Bearing	Specified Condition
New	3.0 to 3.5 N*m (31 to 35 kgf*cm, 27 to 50 in.*lbf)
Reused	2.1 to 2.5 N*m (22 to 24 kgf*cm, 19 to 21 in.*lbf)



If the preload is more than the specification, replace the bearing spacer.
If the preload is less than the specification, tighten the nut with 13 N*m (130 kgf*cm, 9 ft.*lbf) of torque at a time until the specified preload is reached.

Torque:
451 N*m{ 4599 kgf*cm , 332 ft.*lbf } or less

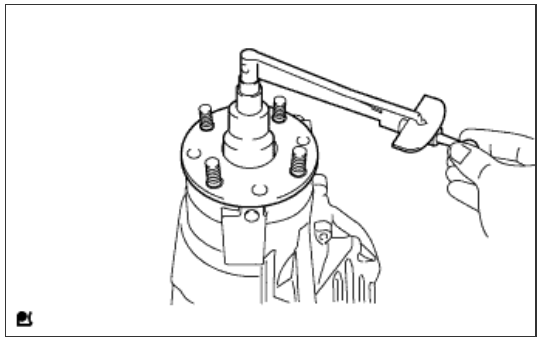
If the maximum torque is exceeded while tightening the nut, replace the bearing spacer and repeat the preload procedure.

HINT:

Do not loosen the nut to reduce the preload.

39. INSPECT TOTAL PRELOAD

a. With the drive pinion contacting the tooth side of the ring gear, use a torque wrench to measure the total preload.

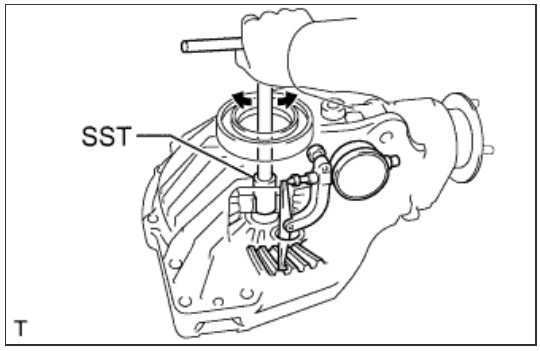


Standard Total Preload (at starting):

Bearing	Specified Condition
New	Standard drive pinion preload plus 1.6 to 2.4 N*m (17 to 24 kgf*cm, 15 to 21 in.*lbf)
Reused	Standard drive pinion preload plus 1.3 to 2.1 N*m (14 to 21 kgf*cm, 12 to 18 in.*lbf)

40. INSPECT BACKLASH BETWEEN DIFFERENTIAL RING GEAR AND DIFFERENTIAL DRIVE PINION

a. Using SST and a dial indicator, measure the ring gear backlash.

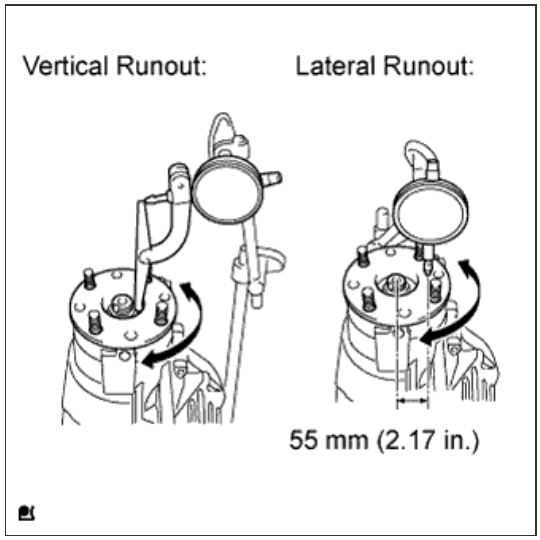


SST
09564-33010

Standard backlash:
0.17 to 0.27 mm (0.00670 to 0.0106 in.)

41. INSPECT RUNOUT OF FRONT DRIVE PINION COMPANION FLANGE SUB-ASSEMBLY

a. Using a dial indicator, measure the runout of the companion flange vertically and laterally.



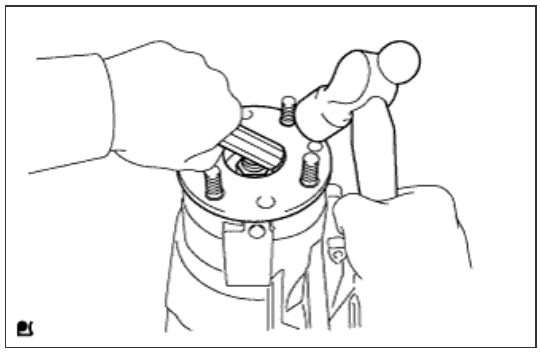
Maximum Runout:

Runout	Specified Condition
Vertical runout	0.10 mm (0.00394 in.)
Lateral runout	0.10 mm (0.00394 in.)

If the runout is more than the maximum, replace the companion flange.

42. STAKE FRONT DRIVE PINION COMPANION FLANGE FRONT NUT

a. Using a chisel and hammer, stake the nut.



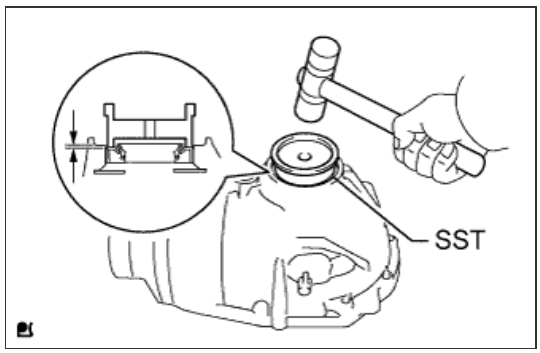
43. INSTALL DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

a. Using SST and a plastic-faced hammer, tap in a new oil seal until its surface is flush with the differential carrier end.

SST
09608-32010

b. Coat the lip of the oil seal with MP grease.

Standard oil seal depth:
-0.45 to 0.45 mm (-0.0177 to 0.0177 in.)



44. INSTALL DIFFERENTIAL EXTENSION FLANGE TUBE

a. Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential tube and bearing retainer.

b. Wipe off any residual FIPG material on the contact surface using gasoline or alcohol.

c. Apply seal packing to the bearing retainer as shown in the illustration.

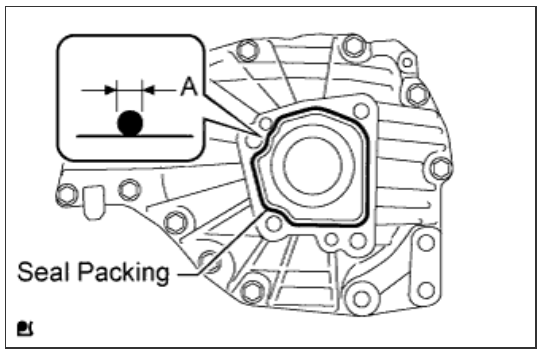
Seal packing:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent

Standard Seal Diameter (A):
2.0 to 3.0 mm (0.0788 to 0.118 in.)

HINT:

Install the differential tube within 10 minutes of applying seal packing.

d. Install the differential tube onto the bearing retainer.

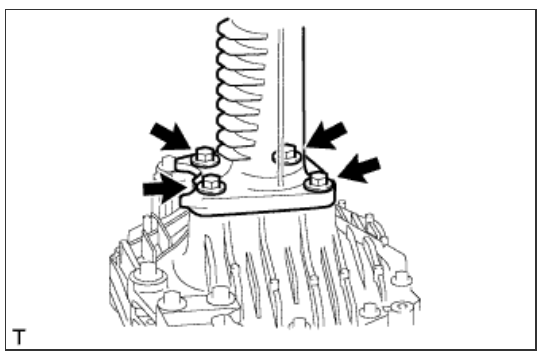


e. Install 4 new bolts.

Torque:
65 N*m{ 663 kgf*cm , 48 ft.*lbf } or less

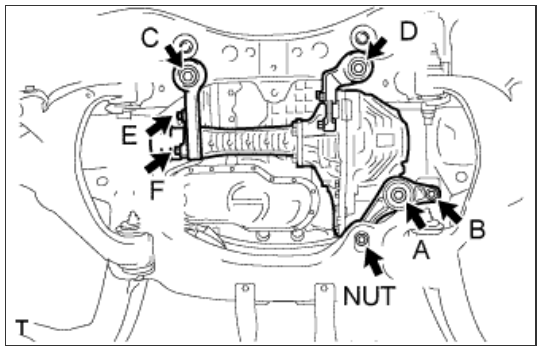
NOTICE:

Do not add oil or drive the vehicle immediately after installing the cover, and leave it as is for at least an hour. Also, for 12 hours or less, avoid rapid acceleration/deceleration.



for Preparation Click here

1. INSTALL FRONT DIFFERENTIAL CARRIER ASSEMBLY



a. Install the differential support assembly with bolts E and F.

Torque:
100 N*m{ 1020 kgf*cm , 74 ft.*lbf }

b. Using a jack, slowly raise the front differential carrier assembly to its installation position.

c. Temporarily install the front differential support assembly with bolts A and B and the nut.

d. Temporarily install the bolts C and D.

e. Tighten bolt A.

Torque:
120 N*m{ 1224 kgf*cm , 89 ft.*lbf }

f. Tighten bolt B and the nut.

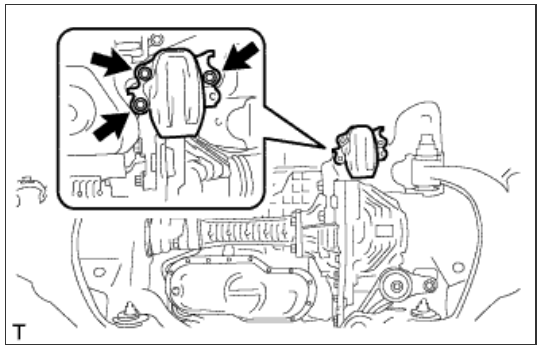
Torque:
120 N*m{ 1224 kgf*cm , 89 ft.*lbf }

g. Tighten bolts C and D.

Torque:
120 N*m{ 1224 kgf*cm , 89 ft.*lbf }

h. Connect the breather tube to the front differential union.

2. INSTALL FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY LH



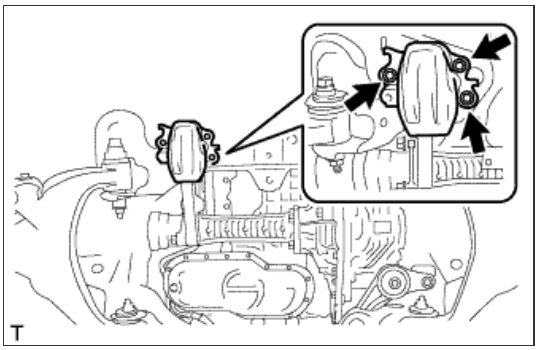
a. Install the suspension rebound stopper LH with 3 bolts.

Torque:
58 N*m{ 591 kgf*cm , 43 ft.*lbf }

3. INSTALL FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY RH

a. Install the suspension rebound stopper RH with 3 bolts.

Torque:
58 N*m{ 591 kgf*cm , 43 ft.*lbf }



4. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

a. Install the front drive shaft (Click here).

5. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

HINT:

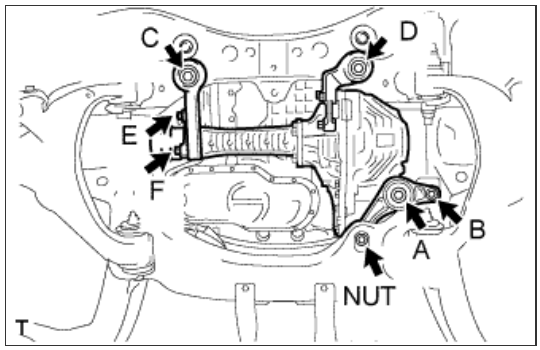
Use the same procedure as the LH side.

6. INSTALL FRONT PROPELLER SHAFT ASSEMBLY

a. Install the front propeller shaft (Click here).

for Preparation Click here

1. INSTALL FRONT DIFFERENTIAL CARRIER ASSEMBLY



a. Install the differential support assembly with bolts E and F.

Torque:
100 N*m{ 1020 kgf*cm , 74 ft.*lbf }

b. Using a jack, slowly raise the front differential carrier assembly to its installation position.

c. Temporarily install the front differential support assembly with bolts A and B and the nut.

d. Temporarily install the bolts C and D.

e. Tighten bolt A.

Torque:
120 N*m{ 1224 kgf*cm , 89 ft.*lbf }

f. Tighten bolt B and the nut.

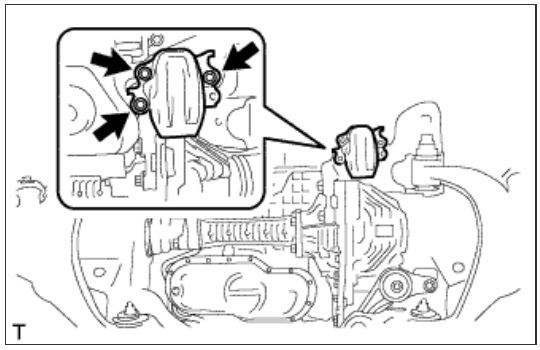
Torque:
120 N*m{ 1224 kgf*cm , 89 ft.*lbf }

g. Tighten bolts C and D.

Torque:
120 N*m{ 1224 kgf*cm , 89 ft.*lbf }

h. Connect the breather tube to the front differential union.

2. INSTALL FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY LH



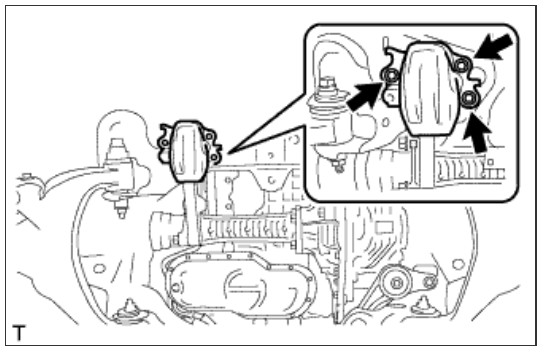
a. Install the suspension rebound stopper LH with 3 bolts.

Torque:
58 N*m{ 591 kgf*cm , 43 ft.*lbf }

3. INSTALL FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY RH

a. Install the suspension rebound stopper RH with 3 bolts.

Torque:
58 N*m{ 591 kgf*cm , 43 ft.*lbf }



4. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

(Click here)

5. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

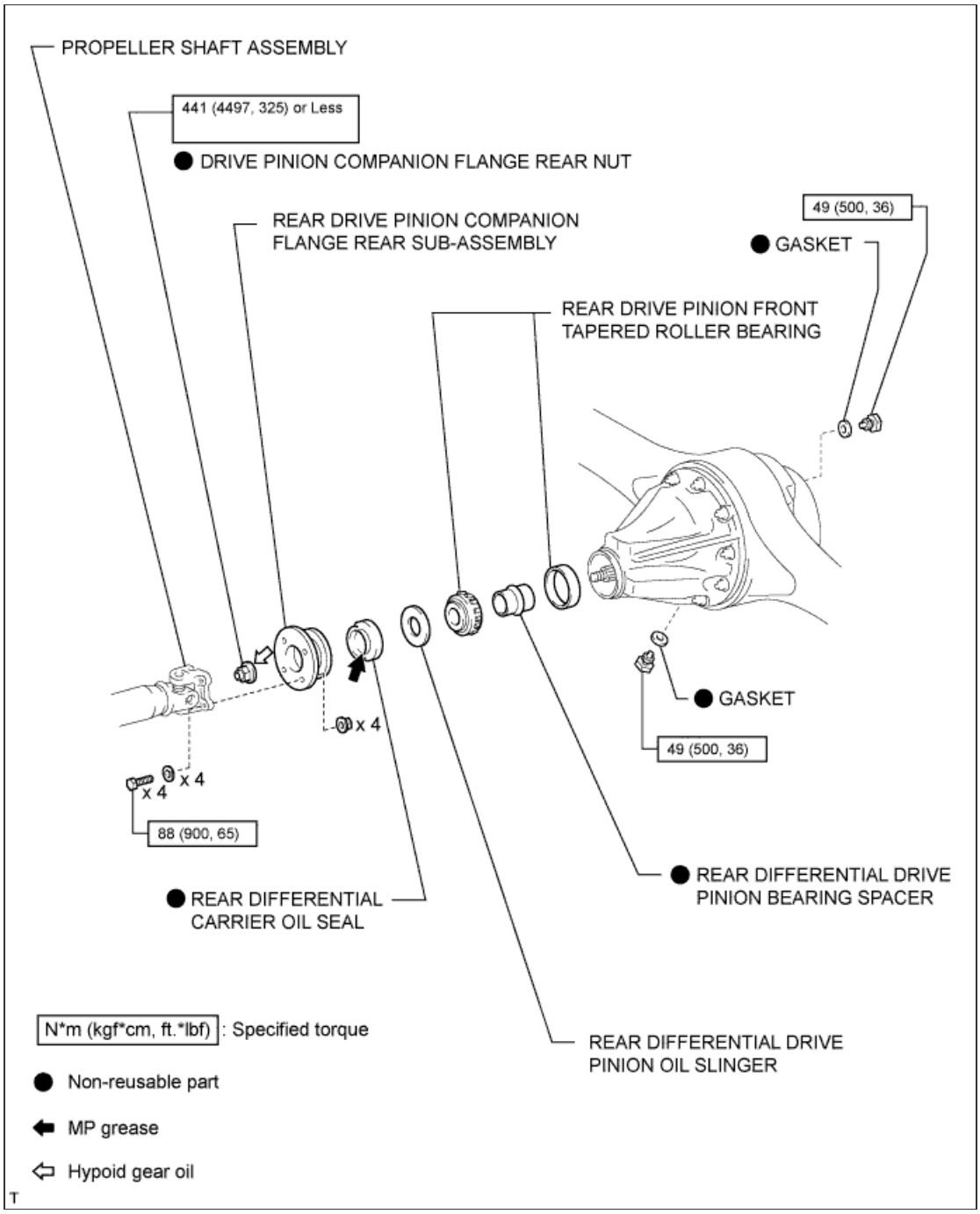
HINT:

Use the same procedure as the LH side.

6. INSTALL FRONT PROPELLER SHAFT ASSEMBLY

(Click here)

for Preparation Click here

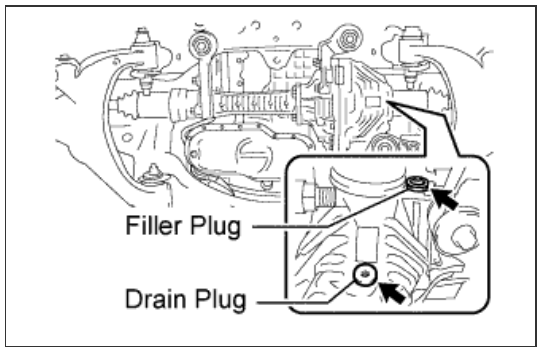


for Preparation Click here

1. DRAIN DIFFERENTIAL OIL

a. Stop the vehicle on a level place.

b. Front Differential:



i. Remove the engine under cover (Click here).

ii. Using a 10 mm hexagon wrench, remove the filler plug and gasket.

iii. Using a 10 mm hexagon wrench, remove the drain plug and gasket, and drain the oil.

iv. Using a 10 mm hexagon wrench, install a new gasket and the drain plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

c. Rear Differential:

i. Remove the filler plug and gasket.

ii. Remove the drain plug and gasket, and drain the oil.

iii. Install a new gasket and the drain plug.

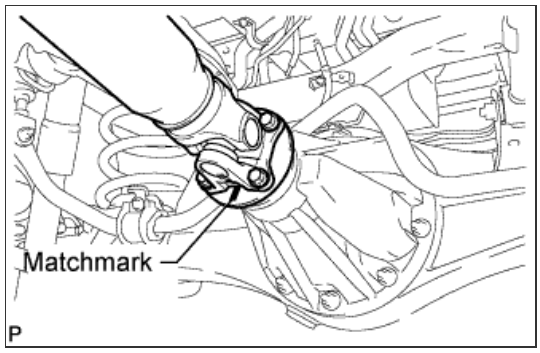
Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

2. DISCONNECT PROPELLER SHAFT ASSEMBLY

a. Place matchmarks on the rear propeller shaft and companion flange.

b. Remove the 4 nuts, 4 washers and 4 bolts, and disconnect the propeller shaft from the differential side.

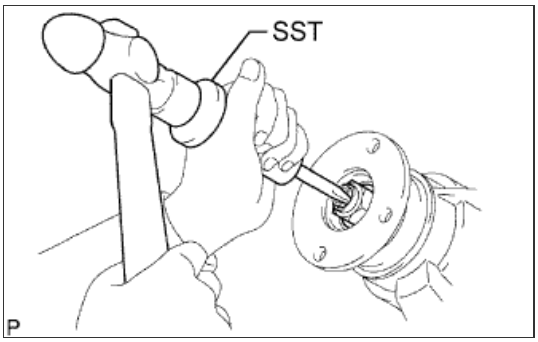
c. Support the propeller shaft securely.



3. REMOVE DRIVE PINION COMPANION FLANGE REAR NUT

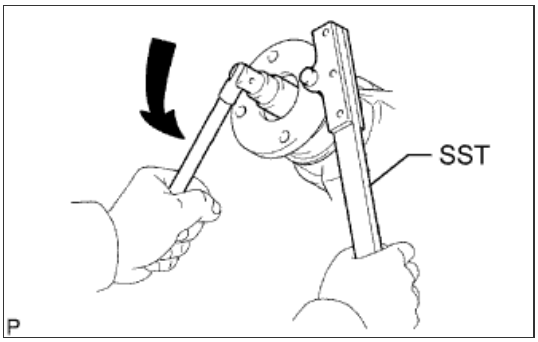
a. Using SST and a hammer, loosen the staked part of the nut.

SST
09930-00010



b. Using SST to hold the companion flange, remove the nut.

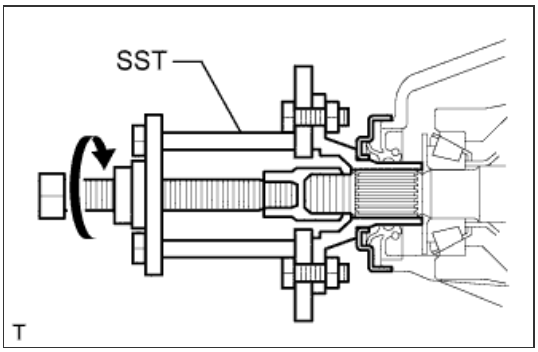
SST
09330-00021 (09330-00030)



4. REMOVE REAR DRIVE PINION COMPANION FLANGE REAR SUB-ASSEMBLY

a. Using SST, remove the companion flange.

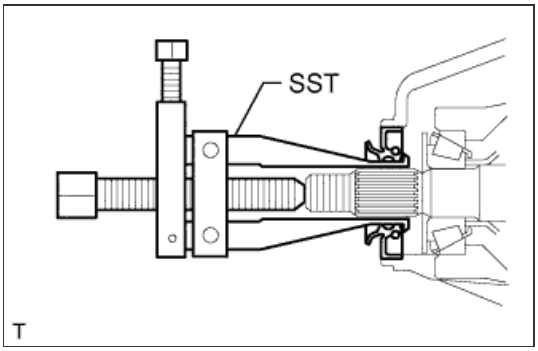
SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)



5. REMOVE REAR DIFFERENTIAL CARRIER OIL SEAL

a. Using SST, remove the oil seal.

SST
09308-10010

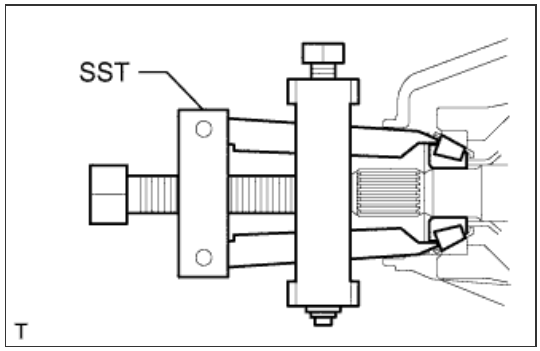


6. REMOVE REAR DIFFERENTIAL DRIVE PINION OIL SLINGER

7. REMOVE REAR DRIVE PINION FRONT TAPERED ROLLER BEARING

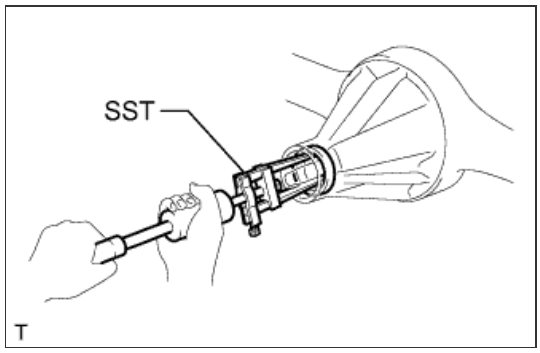
a. Using SST, remove the front bearing (inner race) from the drive pinion.

SST
09556-22010



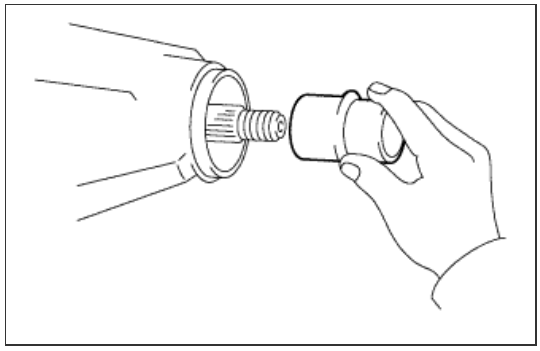
b. Using SST, remove the front bearing (outer race) from the drive pinion.

SST
09308-00010



8. REPLACE REAR DIFFERENTIAL DRIVE PINION BEARING SPACER

a. Replace the bearing spacer with a new one.

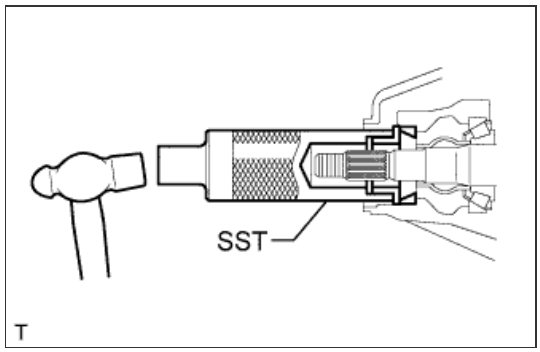


9. INSTALL REAR DRIVE PINION FRONT TAPERED ROLLER BEARING

a. Using SST and a hammer, tap in the bearing (outer race).

SST
09316-60011 (09316-00011, 09316-00021)

b. Install the bearing (inner race).



10. INSTALL REAR DIFFERENTIAL DRIVE PINION OIL SLINGER

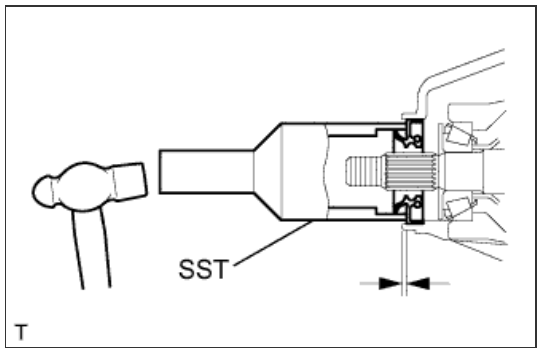
11. INSTALL REAR DIFFERENTIAL CARRIER OIL SEAL

a. Using SST and a hammer, tap in a new oil seal.

SST
09214-76011

Standard oil seal depth:
0.05 to 0.95 mm (0.00197 to 0.0374 in.)

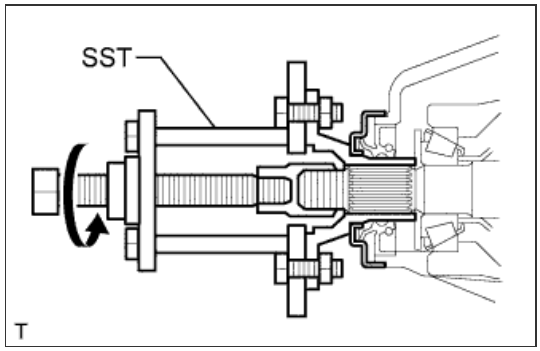
b. Coat the lip of the oil seal with MP grease.



12. INSTALL REAR DRIVE PINION COMPANION FLANGE REAR SUB-ASSEMBLY

a. Using SST, install the companion flange on the drive pinion.

SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)



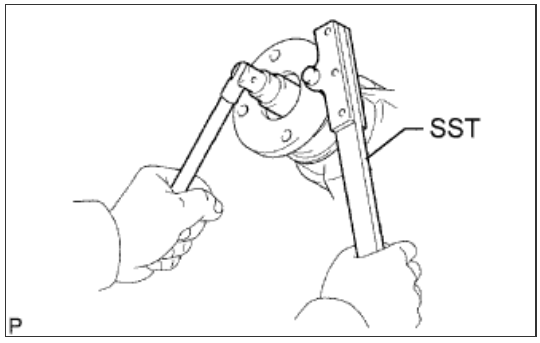
13. ADJUST DRIVE PINION PRELOAD

a. Coat the threads of a new nut with hypoid gear oil.

b. Using SST to hold the companion flange, install the nut by tightening it until the standard preload is reached.

SST
09330-00021 (09330-00030)

Torque:
441 N*m{ 4497 kgf*cm , 325 ft.*lbf } or less

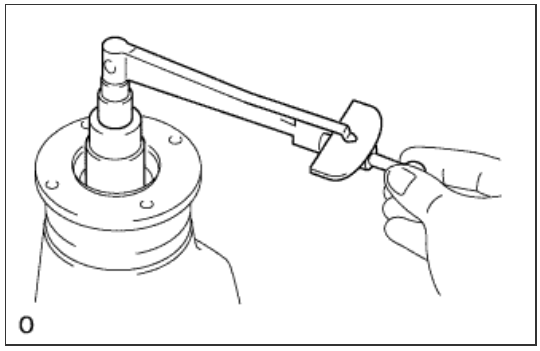


c. Using a torque wrench, measure the preload.

Standard Preload (at Starting):

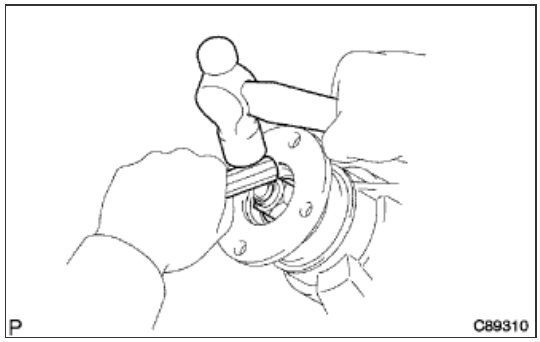
Bearing	Specified Condition
New	1.0 to 1.7 N*m (11 to 17 kgf*cm, 10 to 14 in.*lbf)
Reused	0.9 to 1.4 N*m (9 to 13 kgf*cm, 8 to 12 in.*lbf)

If the preload is not within the specification, adjust the preload.



14. STAKE DRIVE PINION COMPANION FLANGE REAR NUT

a. Using a chisel and hammer, stake the nut.

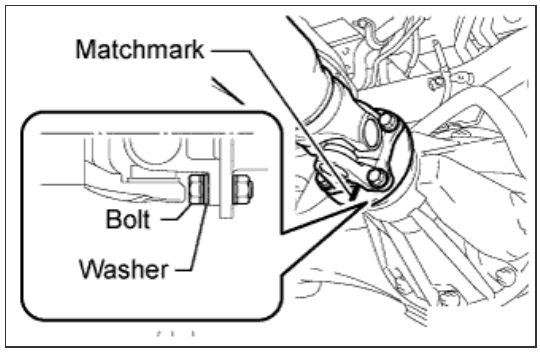


15. CONNECT PROPELLER SHAFT ASSEMBLY

a. Align the matchmarks on the propeller shaft flange and differential flange.

b. Connect the propeller shaft with the 4 bolts, 4 washers and 4 nuts.

Torque:
88 N*m{ 900 kgf*cm , 65 ft.*lbf }



16. ADD DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.

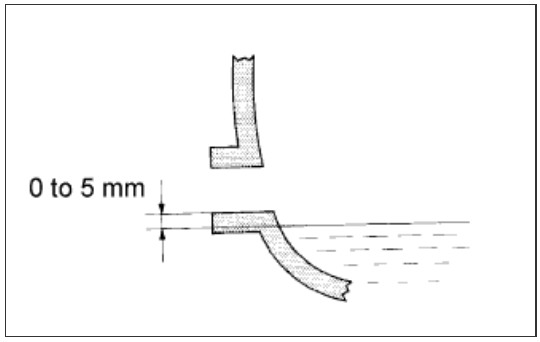
NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71 Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)



b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

ii. Install the engine under cover (Click here).

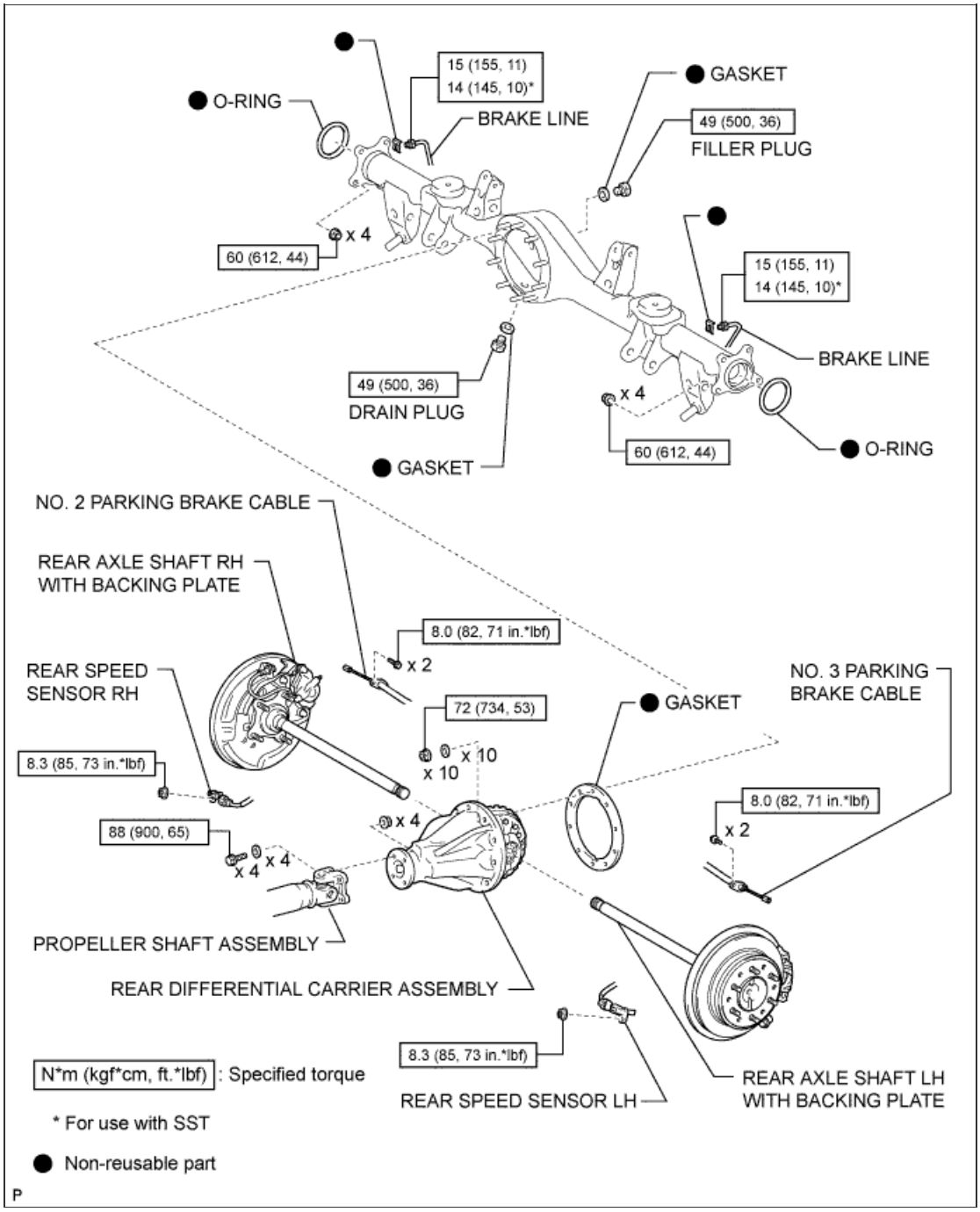
c. Rear Differential:

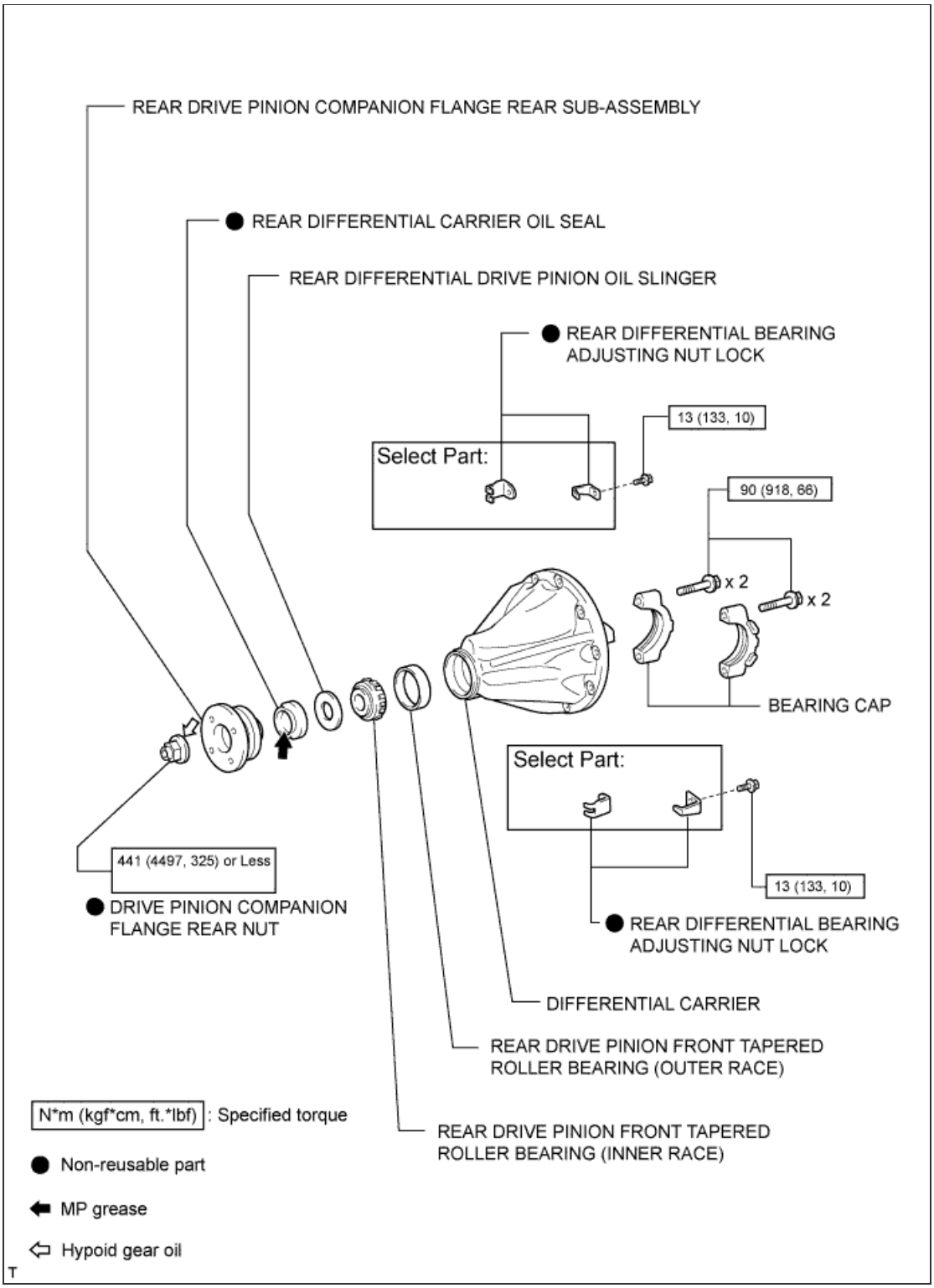
i. Install a new gasket and the filler plug.

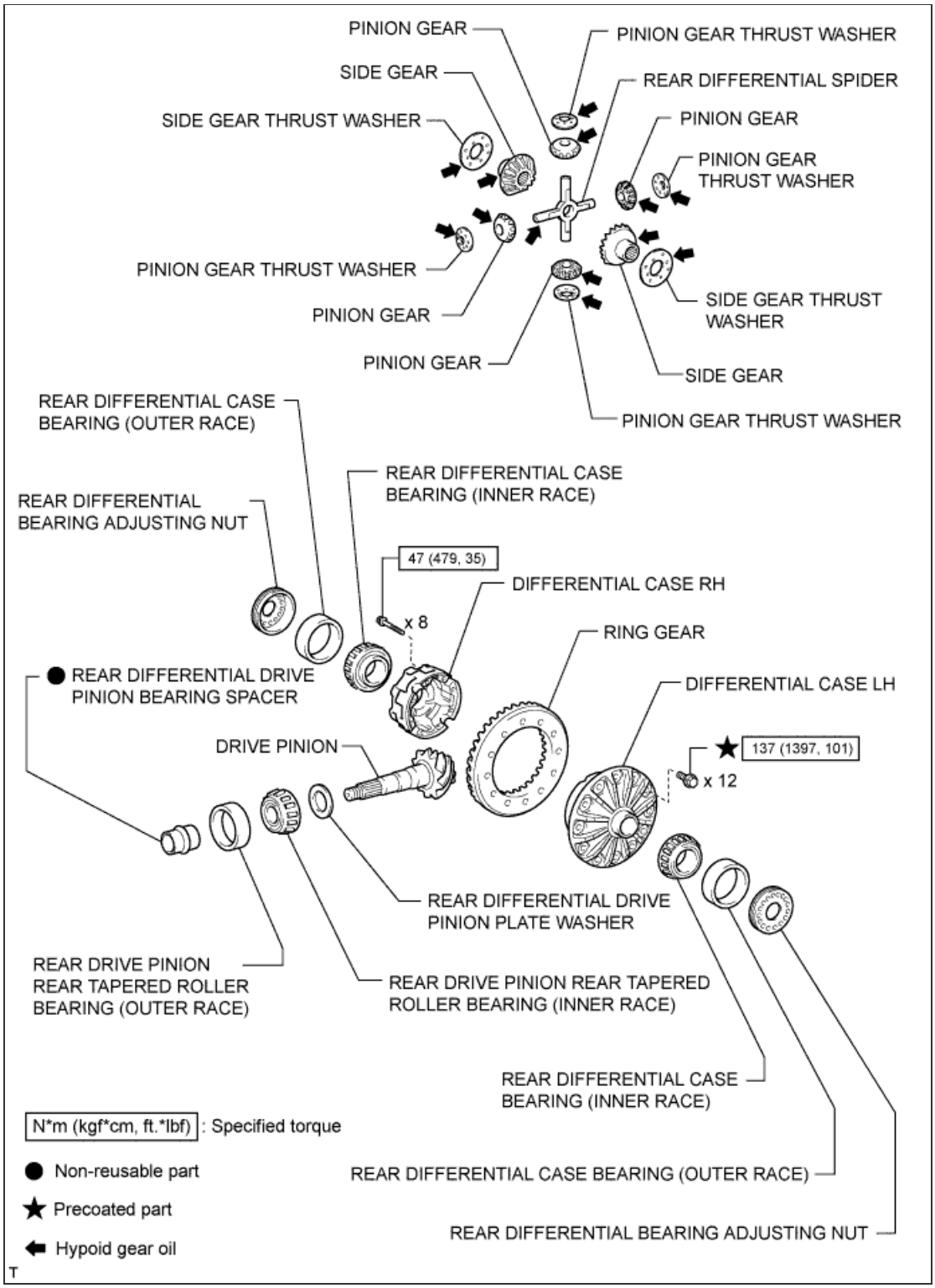
Torque:

49 N*m{ 500 kgf*cm , 36 ft.*lbf }

for Preparation [Click here]




REAR DRIVE PINION COMPANION FLANGE REAR SUB-ASSEMBLY
REAR DIFFERENTIAL CARRIER OIL SEAL
REAR DIFFERENTIAL DRIVE PINION OIL SLINGER
REAR DIFFERENTIAL BEARING ADJUSTING NUT LOCK
13 (133, 10)
Select Part:
90 (918, 66)
x 2
x 2
BEARING CAP
Select Part:
13 (133, 10)
441 (4497, 325) or Less
DRIVE PINION COMPANION FLANGE REAR NUT
REAR DIFFERENTIAL BEARING ADJUSTING NUT LOCK
DIFFERENTIAL CARRIER
REAR DRIVE PINION FRONT TAPERED ROLLER BEARING (OUTER RACE)
REAR DRIVE PINION FRONT TAPERED ROLLER BEARING (INNER RACE)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
MP grease
Hypoid gear oil
T

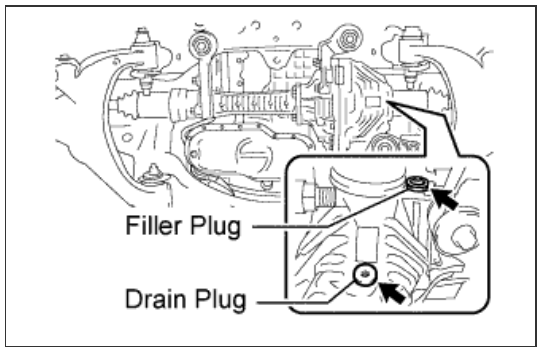

PINION GEAR
PINION GEAR THRUST WASHER
SIDE GEAR
REAR DIFFERENTIAL SPIDER
SIDE GEAR THRUST WASHER
PINION GEAR
PINION GEAR THRUST WASHER
PINION GEAR THRUST WASHER
PINION GEAR
SIDE GEAR THRUST WASHER
PINION GEAR
SIDE GEAR
PINION GEAR THRUST WASHER
REAR DIFFERENTIAL CASE BEARING (OUTER RACE)
REAR DIFFERENTIAL CASE BEARING (INNER RACE)
REAR DIFFERENTIAL BEARING ADJUSTING NUT
47 (479, 35)
DIFFERENTIAL CASE RH
x 8
RING GEAR
REAR DIFFERENTIAL DRIVE PINION BEARING SPACER
DIFFERENTIAL CASE LH
DRIVE PINION
137 (1397, 101)
x 12
REAR DIFFERENTIAL DRIVE PINION PLATE WASHER
REAR DRIVE PINION REAR TAPERED ROLLER BEARING (OUTER RACE)
REAR DRIVE PINION REAR TAPERED ROLLER BEARING (INNER RACE)
REAR DIFFERENTIAL CASE BEARING (INNER RACE)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Precoated part
Hypoid gear oil
REAR DIFFERENTIAL CASE BEARING (OUTER RACE)
REAR DIFFERENTIAL BEARING ADJUSTING NUT
T

for Preparation Click here

1. DRAIN DIFFERENTIAL OIL

a. Stop the vehicle on a level place.

b. Front Differential:



i. Remove the engine under cover (Click here).

ii. Using a 10 mm hexagon wrench, remove the filler plug and gasket.

iii. Using a 10 mm hexagon wrench, remove the drain plug and gasket, and drain the oil.

iv. Using a 10 mm hexagon wrench, install a new gasket and the drain plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

c. Rear Differential:

i. Remove the filler plug and gasket.

ii. Remove the drain plug and gasket, and drain the oil.

iii. Install a new gasket and the drain plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }

2. REMOVE REAR AXLE SHAFT

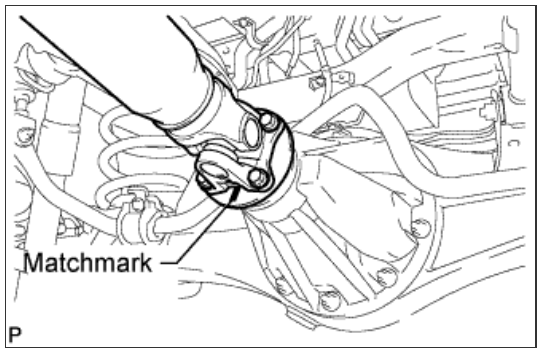
a. Remove the axle shaft (Click here).

3. DISCONNECT REAR PROPELLER SHAFT ASSEMBLY

a. Place matchmarks on the rear propeller shaft and companion flange.

b. Remove the 4 nuts, 4 washers and 4 bolts, and disconnect the propeller shaft from the differential side.

c. Support the propeller shaft securely.



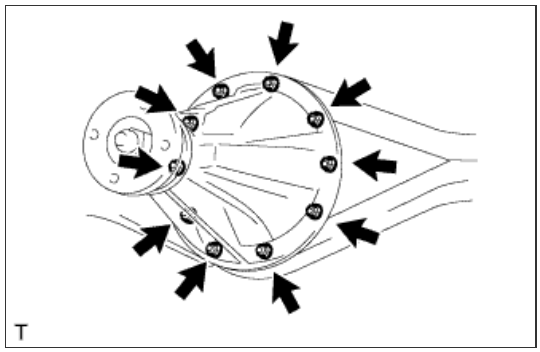
4. REMOVE REAR DIFFERENTIAL CARRIER SUB-ASSEMBLY

a. Remove the 10 nuts, 10 washers and differential carrier.

NOTICE:

Be careful not to damage the contact surfaces of the differential carrier and rear axle housing.

b. Remove the gasket.



for Preparation Click here

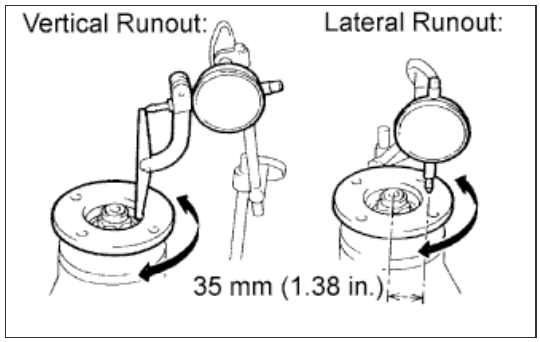
1. INSPECT RUNOUT OF REAR DRIVE PINION COMPANION FLANGE

a. Using a dial indicator, measure the runout of the companion flange vertically and laterally.

Maximum Runout:

Runout	Specified Condition
Vertical runout	0.10 mm (0.00394 in.)
Lateral runout	0.10 mm (0.00394 in.)

If the runout is more than the maximum, replace the companion flange.

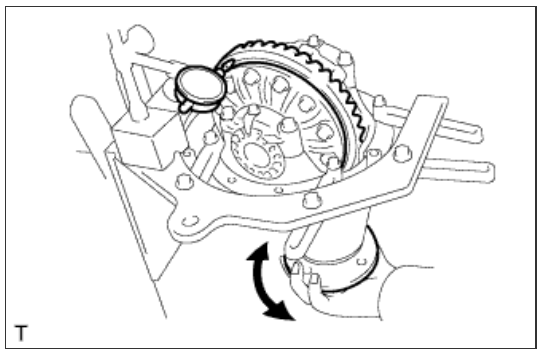


2. INSPECT RUNOUT OF DIFFERENTIAL RING GEAR

a. Using a dial indicator, measure the ring gear runout.

Maximum runout:
0.05 mm (0.00197 in.)

If the runout is more than the maximum, replace the ring gear.



3. INSPECT DIFFERENTIAL RING GEAR BACKLASH

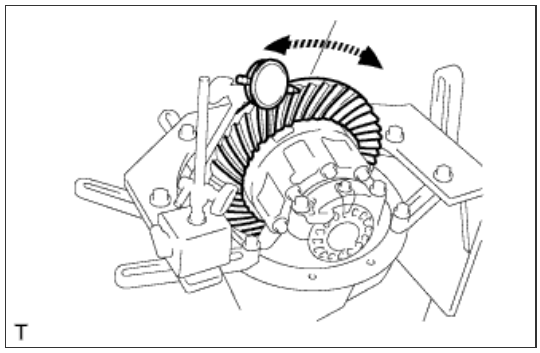
a. Using a dial indicator, measure the ring gear backlash.

Standard backlash:
0.10 to 0.20 mm (0.00394 to 0.00787 in.)

HINT:

Measure at 3 or more positions around the circumference of the ring gear.

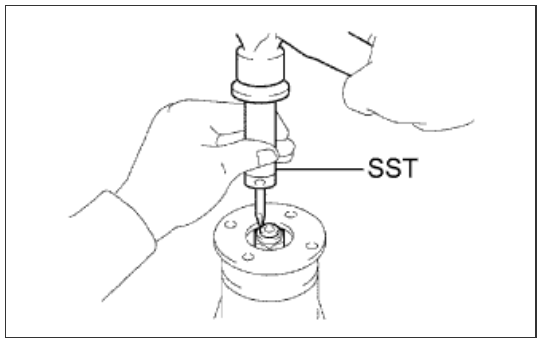
If the backlash is not as specified, adjust the side bearing preload or repair as necessary.



4. REMOVE DRIVE PINION COMPANION FLANGE REAR NUT

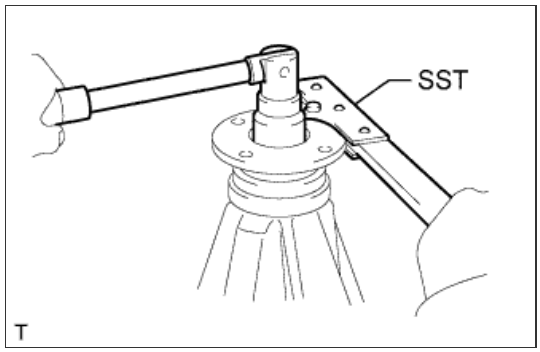
a. Using SST and a hammer, unstake the nut.

SST
09930-00010



b. Using SST to hold the companion flange, remove the nut.

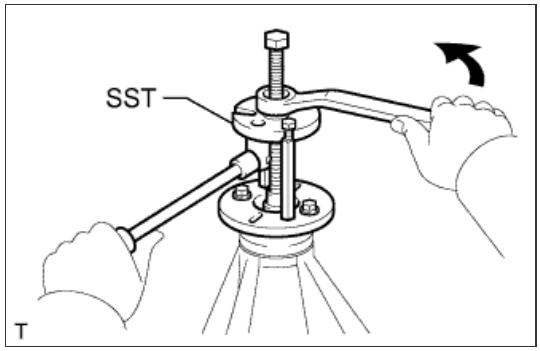
SST
09330-00021 (09330-00030)



5. REMOVE REAR DRIVE PINION COMPANION FLANGE REAR SUB-ASSEMBLY

a. Using SST, remove the companion flange.

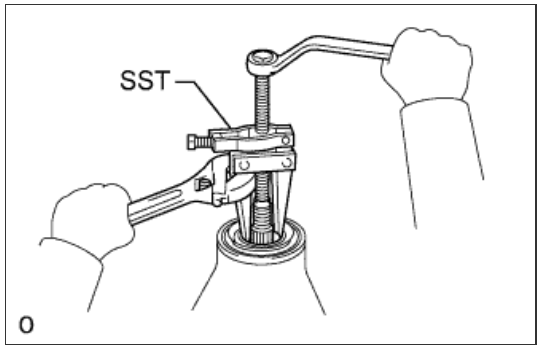
SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)



6. REMOVE REAR DIFFERENTIAL CARRIER OIL SEAL

a. Using SST, remove the oil seal from the differential carrier.

SST
09308-10010



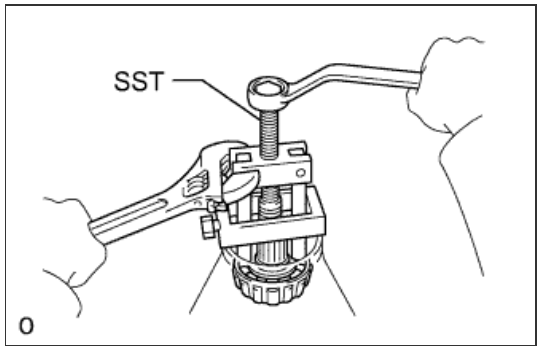
7. REMOVE REAR DIFFERENTIAL DRIVE PINION OIL SLINGER

8. REMOVE REAR DRIVE PINION FRONT TAPERED ROLLER BEARING

a. Using SST, remove the front bearing (inner race) from the drive pinion.

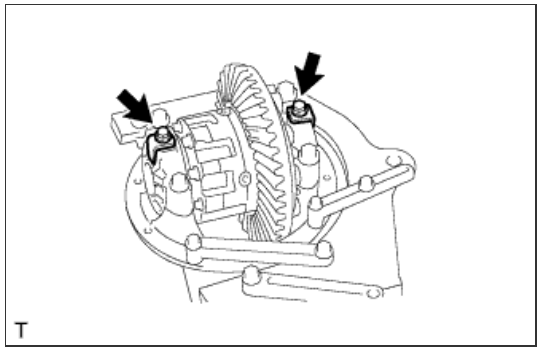
SST
09556-22010

If the front bearing is damaged or worn, replace the bearing.



9. REMOVE REAR DIFFERENTIAL BEARING ADJUSTING NUT LOCK

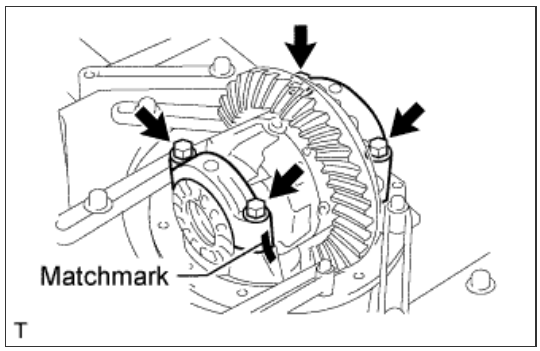
a. Remove the 2 bolts and 2 adjusting nut locks.



10. REMOVE DIFFERENTIAL CASE ASSEMBLY

a. Place matchmarks on the bearing caps and differential carrier.

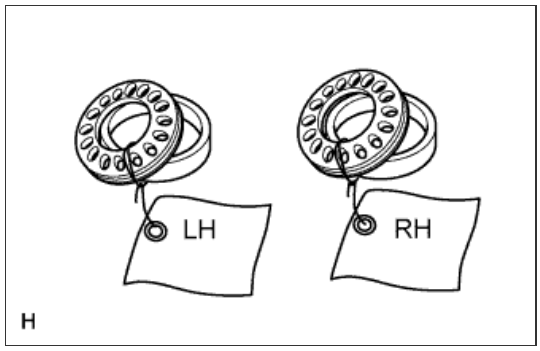
b. Remove the 4 bolts, 2 bearing caps and 2 adjusting nuts.



c. Remove the differential case from the differential carrier.

HINT:

Tag the 2 case bearing outer races to show the location for reassembly.



11. REMOVE DIFFERENTIAL DRIVE PINION

a. Remove the differential drive pinion from the differential carrier.

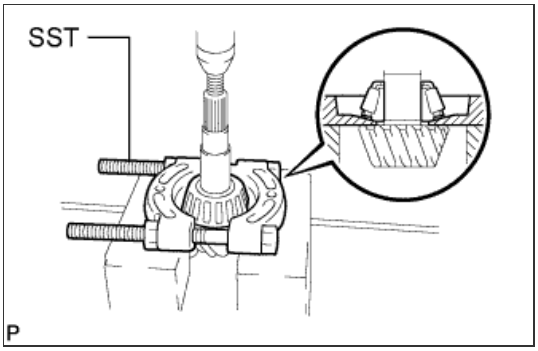
12. REMOVE REAR DIFFERENTIAL DRIVE PINION BEARING SPACER

13. REMOVE REAR DRIVE PINION REAR TAPERED ROLLER BEARING

a. Using SST and a press, press out the bearing (inner race).

SST
09950-00020

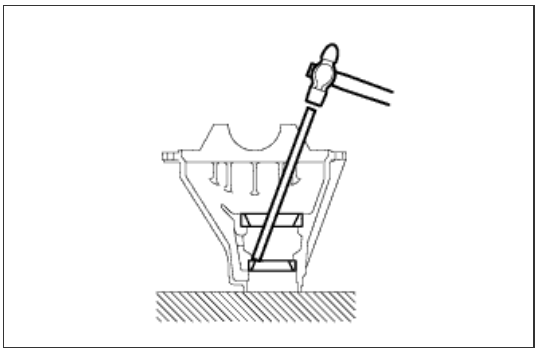
If either the drive pinion or ring gear is damaged, replace them as a set.



14. REMOVE REAR DIFFERENTIAL DRIVE PINION PLATE WASHER

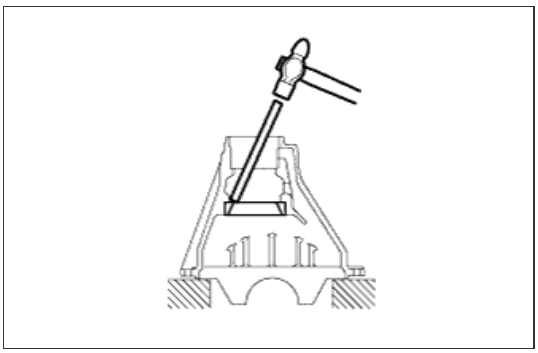
15. REMOVE REAR DRIVE PINION FRONT TAPERED ROLLER BEARING

a. Using a brass bar and hammer, tap out the bearing (outer race).



16. REMOVE REAR DRIVE PINION REAR TAPERED ROLLER BEARING

a. Using a brass bar and hammer, tap out the bearing (outer race).

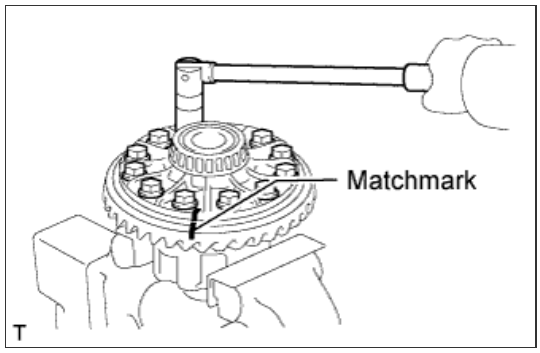


17. REMOVE DIFFERENTIAL RING GEAR

a. Place matchmarks on the ring gear and differential case.

b. Remove the 12 ring gear set bolts.

c. Using a plastic-faced hammer, tap on the ring gear to disconnect it from the differential case.



18. INSPECT RUNOUT OF DIFFERENTIAL CASE

HINT:

If the ring gear runout is at the maximum or less (see "Inspect Runout of Differential Ring Gear" procedure), this inspection is not necessary.

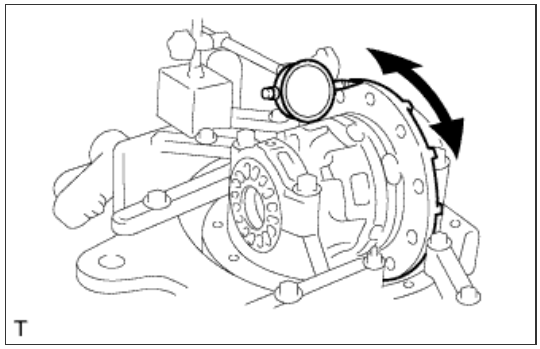
a. Using a dial indicator, measure the differential case to the differential carrier.

b. Using a dial indicator, measure the differential case runout.

Maximum runout:
0.04 mm (0.00157 in.)

If the runout is more than the maximum, replace the differential case and side bearing as a set.

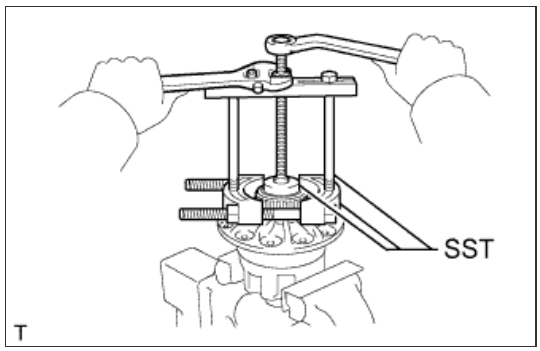
c. Remove the differential case from the differential carrier.



19. REMOVE REAR DIFFERENTIAL CASE BEARING

a. Using SST, remove the 2 side bearings (inner race) from the differential case.

SST
09950-00020
09950-00030
09950-40011 (09957-04010)
09950-60010 (09951-00480)



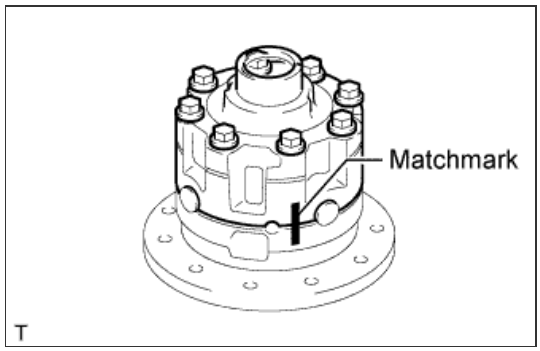
20. DISASSEMBLE DIFFERENTIAL CASE

a. Place matchmarks on the differential case LH and RH.

b. Remove the 8 bolts uniformly, a little at a time.

c. Using a plastic-faced hammer, disconnect the differential case LH and RH.

d. Remove the 2 side gear thrust washers, 2 side gears, spider, 4 pinion gears and 4 pinion gear thrust washers.



for Preparation Click here

1. INSPECT DIFFERENTIAL SIDE GEAR BACKLASH

a. Install the 2 thrust washers to the side gears.

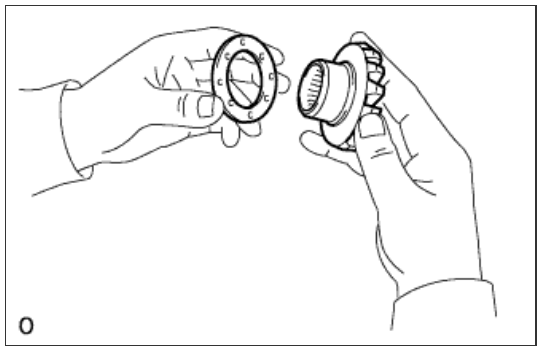
b. Install the side gears to the differential case.

c. Install the 4 pinion gears and 4 thrust washers to the spider.

d. Install the spider assembly to the differential case.

HINT:

Install the spider to the differential case tightly.



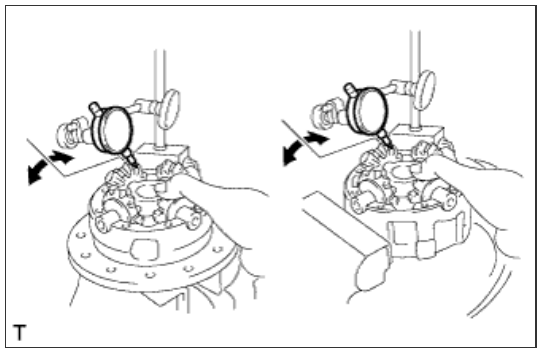
e. Using a dial indicator, measure the side gear backlash while holding the side gear and spider.

Standard backlash:
0.02 to 0.15 mm (0.000787 to 0.00591 in.)

HINT:

- **Measure at all 4 pinion gear locations.**
- **Measure the backlash at the differential case LH and RH.**
- **Apply hypoid gear oil to each sliding surface and rotating part.**

If the backlash is not within the specification, replace the side gear thrust washers with washers of a different thickness.



Standard Thrust Washer Thickness:

Specified Condition	Specified Condition
1.53 to 1.57 mm (0.0602 to 0.0618 in.)	1.83 to 1.87 mm (0.0720 to 0.0736 in.)
1.58 to 1.62 mm (0.0622 to 0.0638 in.)	1.88 to 1.92 mm (0.0740 to 0.0756 in.)
1.63 to 1.67 mm (0.0641 to 0.0657 in.)	1.93 to 1.97 mm (0.0760 to 0.0776 in.)
1.68 to 1.72 mm (0.0661 to 0.0677 in.)	1.98 to 2.02 mm (0.0780 to 0.0795 in.)
1.73 to 1.77 mm (0.0681 to 0.0697 in.)	2.03 to 2.07 mm (0.0799 to 0.0815 in.)
1.78 to 1.82 mm (0.0701 to 0.0717 in.)	2.08 to 2.12 mm (0.0820 to 0.0835 in.)

2. ASSEMBLE DIFFERENTIAL CASE

a. Install the spider assembly to the differential case.

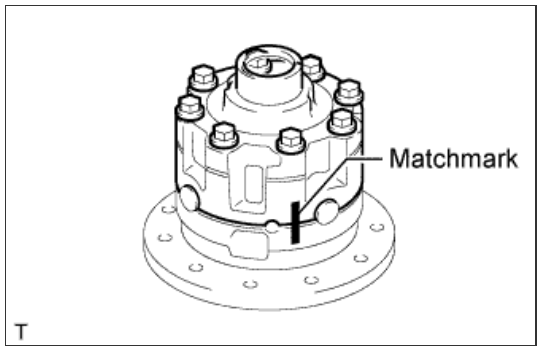
HINT:

Install the spider to the differential case tightly.

b. Align the matchmarks and assemble the differential case LH and RH.

c. Install the 8 bolts and tighten them uniformly, a little at a time.

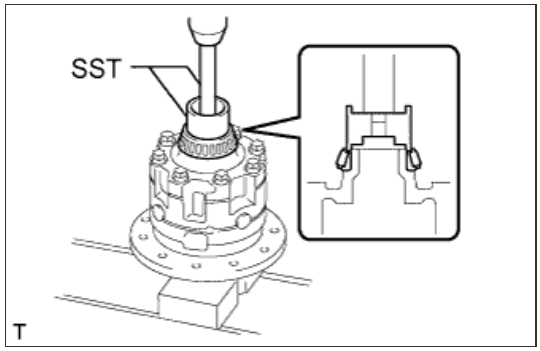
Torque:
47 N*m{ 479 kgf*cm , 35 ft.*lbf }



3. INSTALL REAR DIFFERENTIAL CASE BEARING

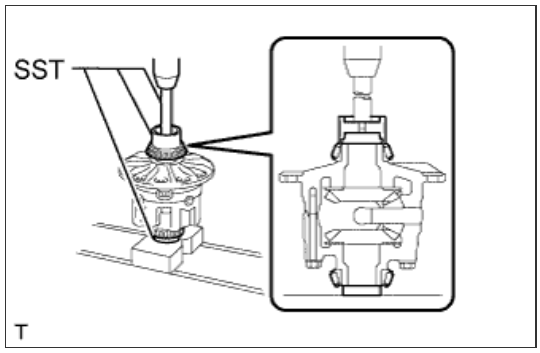
a. Using SST and a press, press the RH side bearing (inner race) into the differential case.

SST
09710-30050
09950-70010 (09951-07150)



b. Using SST and a press, press the LH side bearing (inner race) into the differential case.

SST
09710-30050
09950-60010 (09951-00480)
09950-70010 (09951-07150)



4. INSTALL DIFFERENTIAL RING GEAR

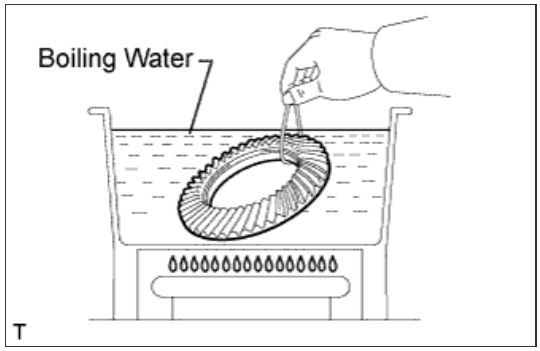
a. Clean the threads of the bolts and differential case with non-residue solvent.

b. Clean the contact surfaces of the differential case and ring gear.

c. Heat the ring gear to about 100°C (212°F) in boiling water.

d. Carefully take the ring gear out of the boiling water.

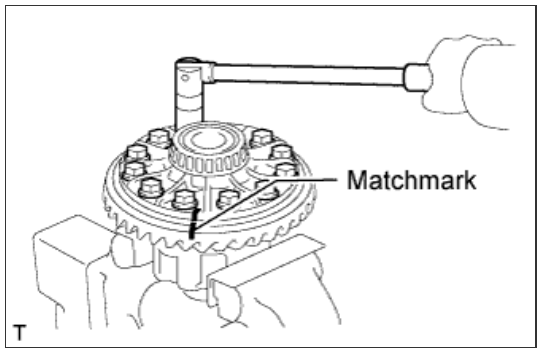
e. After the moisture on the ring gear has completely evaporated, quickly align the matchmarks on the ring gear and differential case and set the ring gear onto the differential case. Then temporarily install the 12 bolts so that the bolt holes in the ring gear and differential case are aligned.



f. After the ring gear cools down sufficiently, remove the 12 bolts. Then apply thread lock adhesive to the 12 bolts and install them.

Thread lock:
Toyota Genuine Adhesive 1360K, Three Bond 1360K or equivalent

Torque:
137 N*m{ 1397 kgf*cm , 101 ft.*lbf }



5. CHECK DIFFERENTIAL RING GEAR RUNOUT

a. Place the bearing outer races on their respective bearings.

HINT:

Do not interchange the left and right outer races.

b. Install the assembled plate washers onto the side bearing.

c. Install the differential case onto the differential carrier.

HINT:

If it is difficult to install the differential case onto the carrier, replace the plate washer with a thinner one. However, select a plate washer that allows no clearance between it and the carrier.

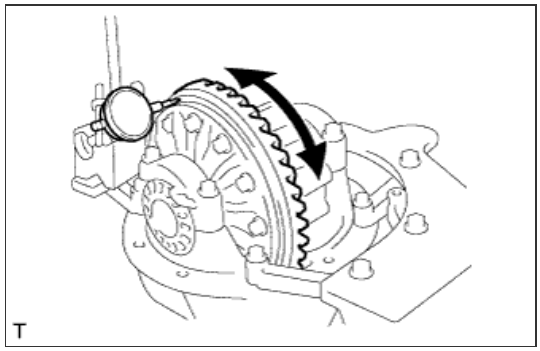
d. Align the matchmarks on the bearing caps and differential carrier.

e. Install and uniformly tighten the 4 bolts a little at a time.

f. Using a dial indicator, check the ring runout.

Maximum runout:
0.05 mm (0.00197)

If the runout is more than the maximum, replace the ring gear.

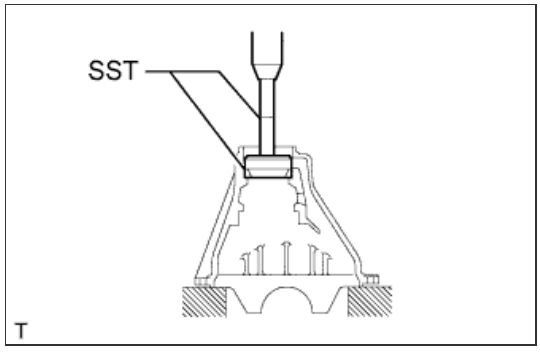


g. Remove the differential case.

6. INSTALL REAR DRIVE PINION FRONT TAPERED ROLLER BEARING

a. Using SST and a press, press in the bearing (outer race).

SST
09950-60020 (09951-00710)
09950-70010 (09951-07150)

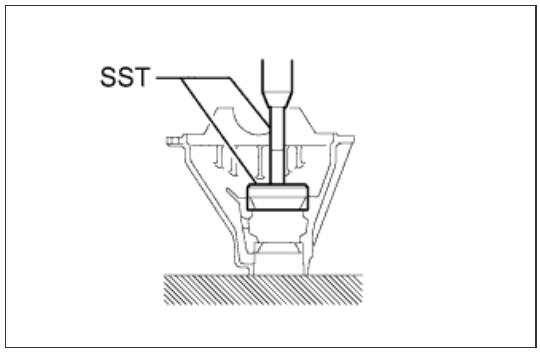


7. INSTALL REAR DRIVE PINION REAR TAPERED ROLLER BEARING

a. Using SST and a press, press in the bearing (outer race).

a. Using SST and a press, press in the bearing (outer race).

SST
09950-60020 (09951-00890)
09950-70010 (09951-07150)



8. INSTALL REAR DRIVE PINION REAR TAPERED ROLLER BEARING

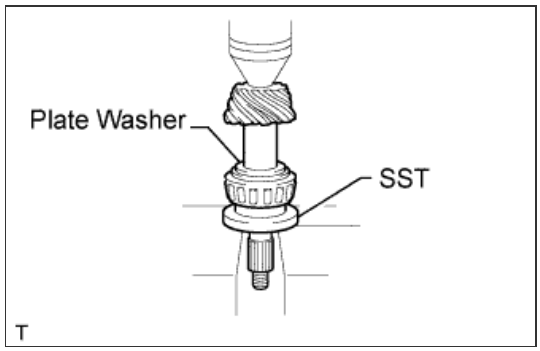
a. Install the washer on the drive pinion.

HINT:

After installing the washer, check the tooth contact pattern. If necessary, replace the washer with one of a different thickness.

b. Using SST and a press, press the rear bearing (inner race) into the drive pinion.

SST
09506-35010

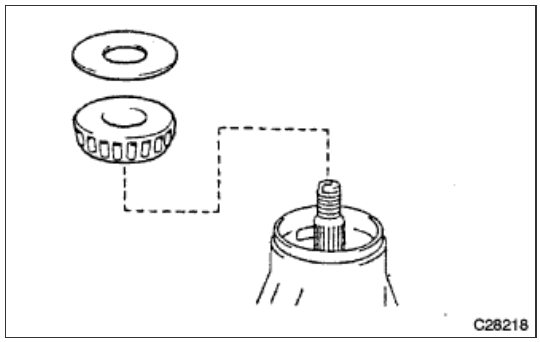


9. INSPECT DIFFERENTIAL DRIVE PINION PRELOAD

a. Install the drive pinion, front bearing (inner race) and oil slinger.

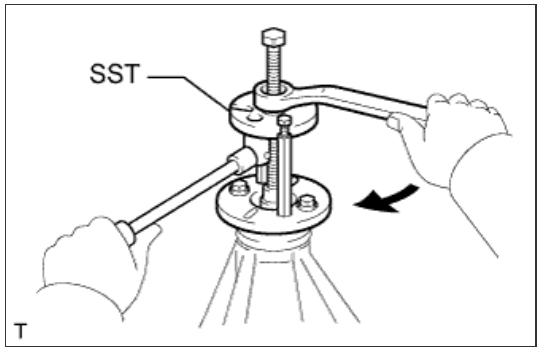
HINT:

Install the spacer and oil seal after adjusting the gear contact pattern.



b. Using SST, install the companion flange.

SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)



c. Using SST to hold the companion flange, install the nut.

SST

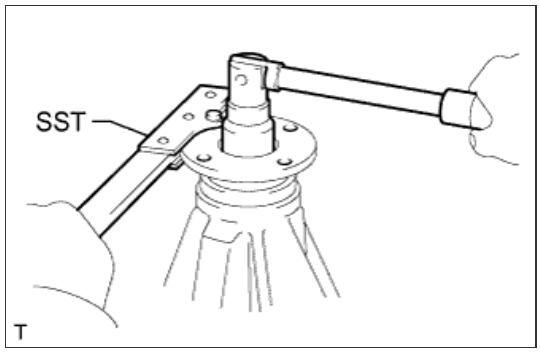
09330-00021 (09330-00030)

Torque:

441 N*m{ 4497 kgf*cm , 325 ft.*lbf } or less

NOTICE:

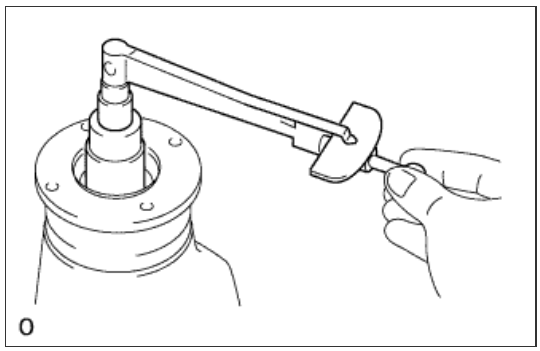
- **Apply hypoid gear oil to the nut.**
- **As there is no spacer, tighten a little at a time, being careful not to overtighten it.**



d. Using a torque wrench, measure the preload.

Standard Preload (at Starting):

Bearing	Specified Condition
New	1.0 to 1.7 N*m (11 to 17 kgf*cm, 10 to 14 in.*lbf)
Reused	0.9 to 1.4 N*m (9 to 13 kgf*cm, 8 to 12 in.*lbf)



HINT:

Measure the total preload after first turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

10. INSTALL DIFFERENTIAL CASE ASSEMBLY

a. Place the bearing (outer races) on their respective bearings.

HINT:

Do not interchange the left and right outer races.

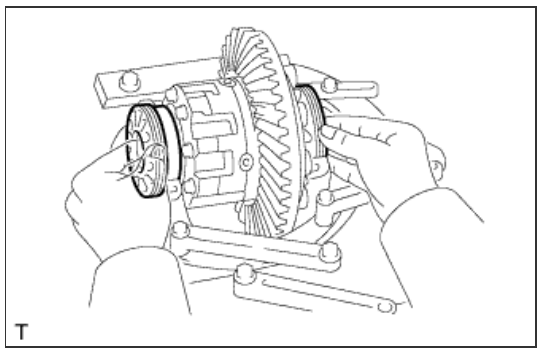
b. Install the differential case onto the carrier.

HINT:

Make sure that there is backlash between the ring gear and drive pinion.

11. INSTALL REAR DIFFERENTIAL BEARING ADJUSTING NUT

a. Install the 2 adjusting nuts onto the carrier, making sure the nuts are threaded properly.



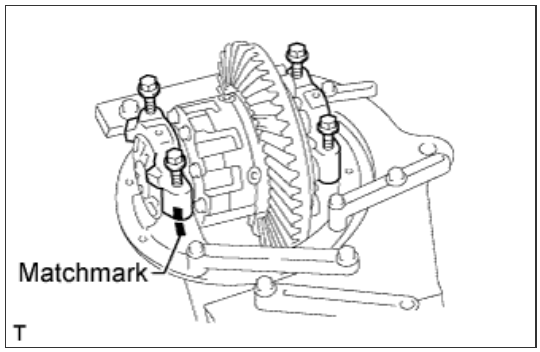
12. INSPECT AND ADJUST DIFFERENTIAL RING GEAR BACKLASH

a. Align the matchmarks on the bearing caps and carrier. Screw in the 4 bearing cap bolts 2 or 3 turns and press down the bearing caps by hand.

HINT:

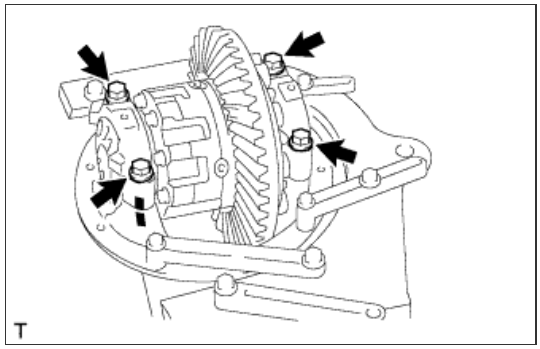
If the bearing caps do not fit tightly on the carrier, the adjusting nuts are not engaged properly.

Reinstall the adjusting nuts if necessary.



b. Tighten the 4 bolts.

Torque:
90 N*m{ 918 kgf*cm , 66 ft.*lbf }

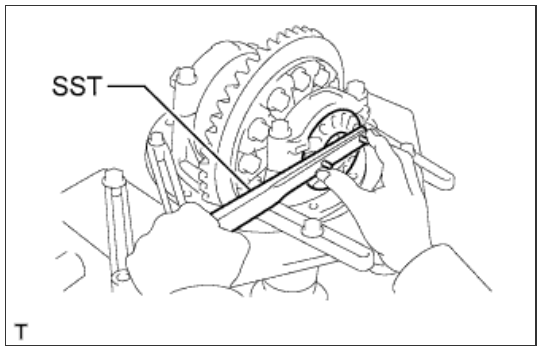


c. Loosen the 4 bolts to the point where the adjusting nuts can be turned by SST.

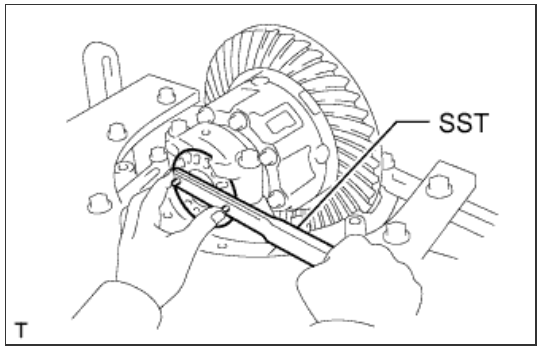
SST
09504-00011

d. Using SST, tighten the adjusting nut on the ring gear side until the ring gear has a backlash of about 0.2 mm (0.00787 in.).

SST
09504-00011

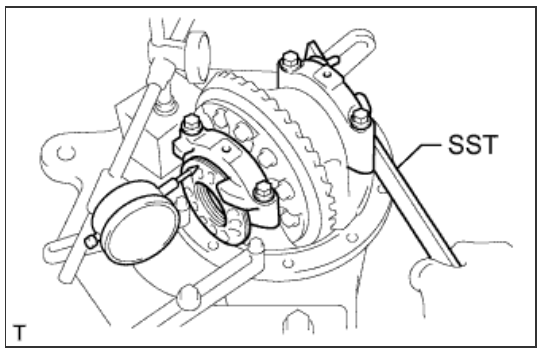


e. While turning the ring gear, use SST to tighten the adjusting nut on the drive pinion side. After the bearings are settled, loosen the adjusting nut on the drive pinion side.



f. Place a dial indicator on the top of the adjusting nut on the ring gear side.

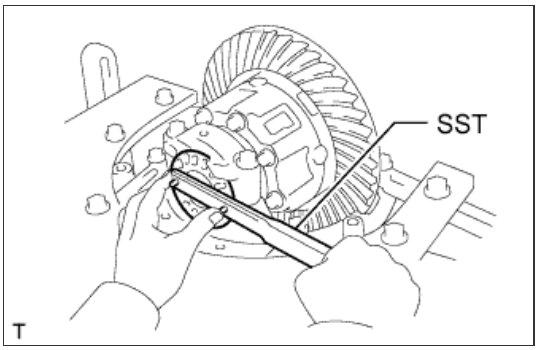
g. Adjust the side bearing to zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.



h. Using SST, tighten the adjusting nut 1 to 1.5 notches from the zero preload

position.

SST
09504-00011

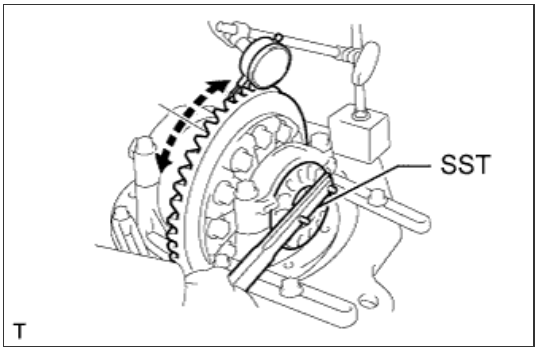


i. Using a dial indicator, adjust the ring gear backlash until it is within the specification.

Standard backlash:
0.10 to 0.20 mm (0.00394 to 0.00787 in.)

HINT:

The backlash is adjusted by turning the left and right adjusting nuts by an equal amount. For example, loosen the nut on the left side 1 notch and tighten the nut on the right side 1 notch.

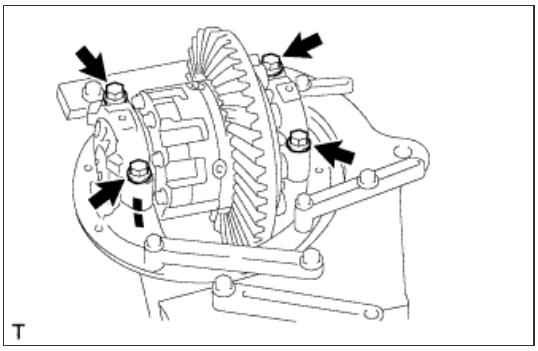


j. Tighten the 4 bearing cap bolts.

Torque:
90 N*m{ 918 kgf*cm , 66 ft.*lbf }

k. After rotating the ring gear 5 turns or more, recheck the ring gear backlash.

Standard backlash:
0.10 to 0.20 mm (0.00394 to 0.00787 in.)

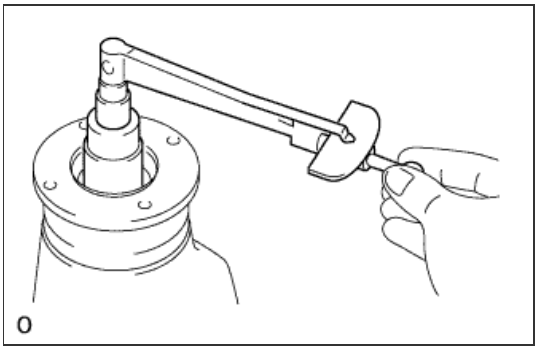


13. INSPECT TOTAL PRELOAD

a. Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

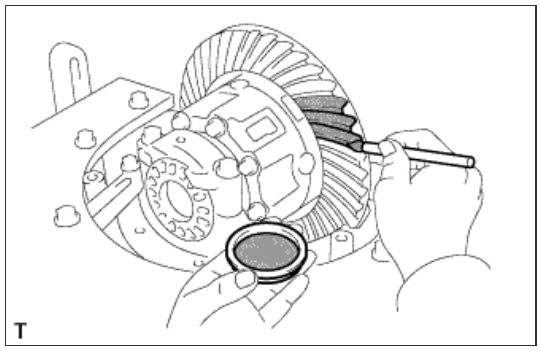
Standard Drive Pinion Preload (at Starting):

Side Bearing Supplier	Specified Condition
New	Standard drive pinion preload plus 0.4 to 0.6 N*m (4 to 6 kgf*cm, 4 to 5 in.*lbf)
Reused	Standard drive pinion preload plus 0.4 to 0.6 N*m (4 to 6 kgf*cm, 4 to 5 in.*lbf)

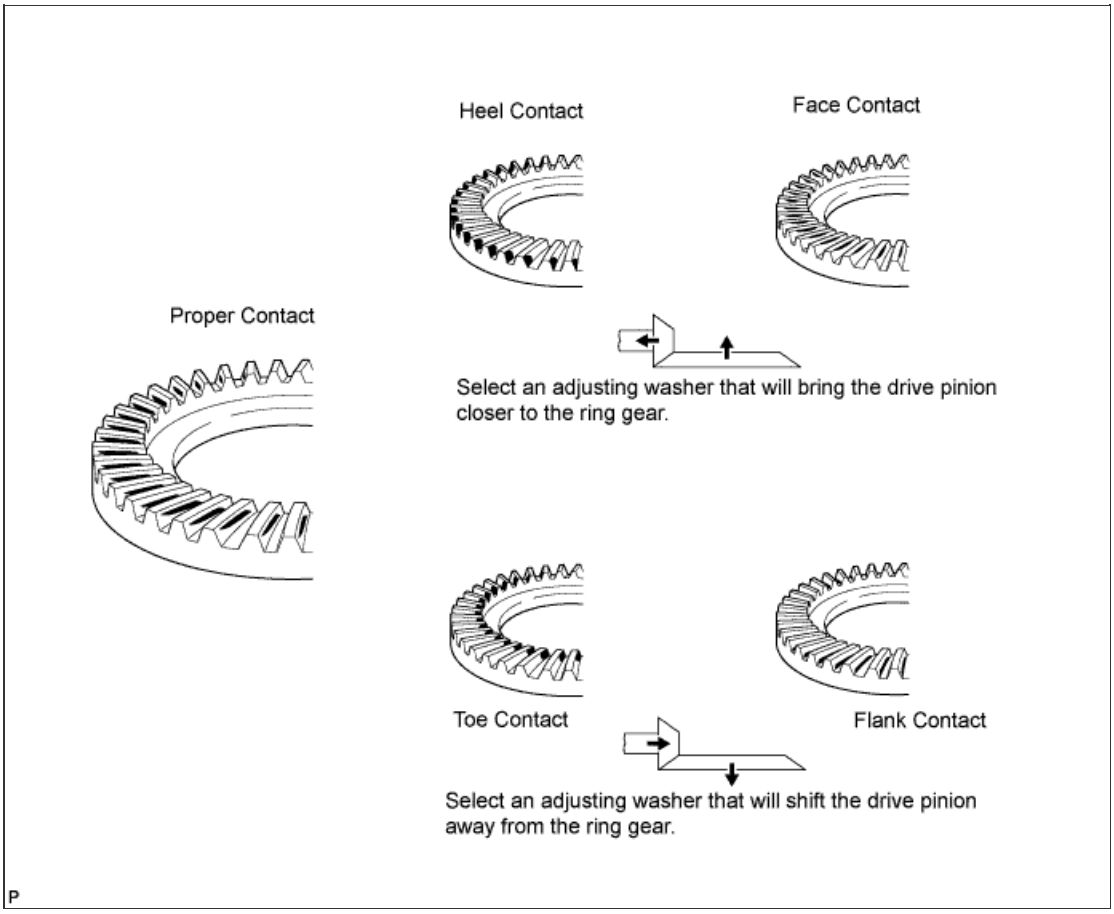


14. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

a. Coat 3 or 4 teeth at 3 different positions on the ring gear with Prussian blue.



b. Turn the companion flange in both directions and inspect the ring gear for proper tooth contact.



If the teeth are not contacting properly, use the following table and select a proper plate washer for correction.

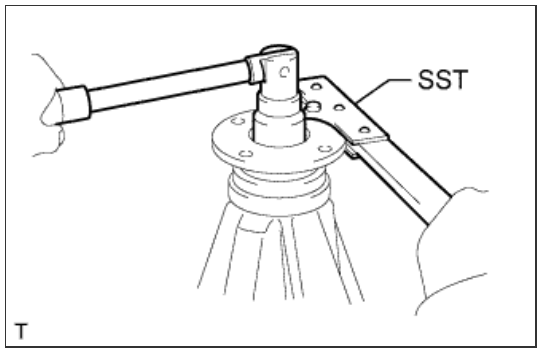
Standard Plate Washer Thickness:

Specified Condition	Specified Condition
1.04 to 1.06 mm (0.0409 to 0.0417 in.)	1.315 to 1.335 mm (0.0518 to 0.0526 in.)
1.065 to 1.085 mm (0.0420 to 0.0427 in.)	1.34 to 1.36 mm (0.0528 to 0.0535 in.)
1.09 to 1.11 mm (0.0419 to 0.0437 in.)	1.365 to 1.385 mm (0.0537 to 0.0545 in.)
1.115 to 1.135 mm (0.0439 to 0.0447 in.)	1.39 to 1.41 mm (0.0547 to 0.0555 in.)
1.14 to 1.16 mm (0.0449 to 0.0457 in.)	1.415 to 1.435 mm (0.0558 to 0.0565 in.)
1.165 to 1.185 mm (0.0459 to 0.0467 in.)	1.44 to 1.46 mm (0.0567 to 0.0575 in.)
1.19 to 1.21 mm (0.0469 to 0.0476 in.)	1.465 to 1.485 mm (0.0577 to 0.0585 in.)
1.215 to 1.235 mm (0.0478 to 0.0486 in.)	1.49 to 1.51 mm (0.0587 to 0.0595 in.)
1.24 to 1.26 mm (0.0488 to 0.0496 in.)	1.515 to 1.535 mm (0.0597 to 0.0605 in.)
1.265 to 1.285 mm (0.0498 to 0.0506 in.)	1.54 to 1.56 mm (0.0607 to 0.0615 in.)
1.29 to 1.31 mm (0.0508 to 0.0516 in.)	-

15. REMOVE DRIVE PINION COMPANION FLANGE REAR NUT

a. Using SST to hold the flange, remove the nut.

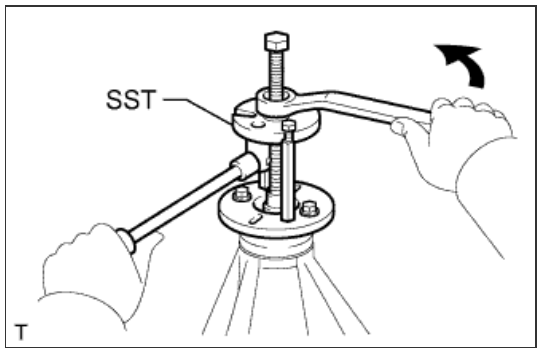
SST
09330-00021 (09330-00030)



16. REMOVE REAR DRIVE PINION REAR COMPANION FLANGE SUB-ASSEMBLY

a. Using SST, remove the companion flange.

SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)



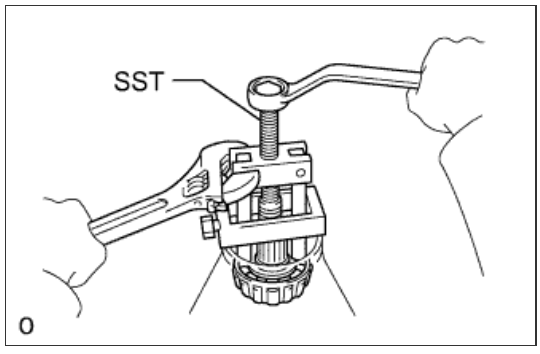
17. REMOVE REAR DIFFERENTIAL DRIVE PINION OIL SLINGER

18. REMOVE REAR DRIVE PINION FRONT TAPERED ROLLER BEARING

a. Using SST, remove the front bearing (inner race) from the drive pinion.

SST
09556-22010

If the front bearing is damaged or worn, replace the bearing.



19. INSTALL REAR DIFFERENTIAL DRIVE PINION BEARING SPACER

a. Install a new spacer onto the drive pinion.

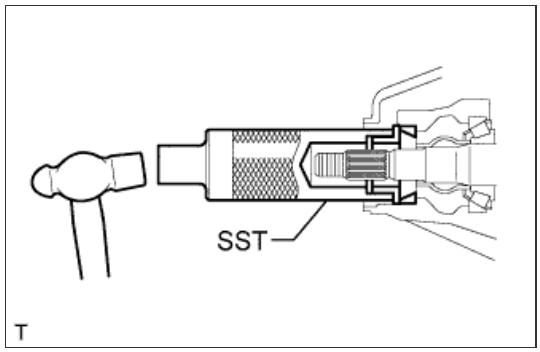
20. INSTALL REAR DRIVE PINION FRONT TAPERED ROLLER BEARING

a. Using SST and a hammer, tap in the bearing (outer race)

a. Using SST and a hammer, tap in the bearing (outer race).

SST
09316-60011 (09316-00011, 09316-00021)

b. Install the bearing (inner race).



21. INSTALL REAR DIFFERENTIAL DRIVE PINION OIL SLINGER

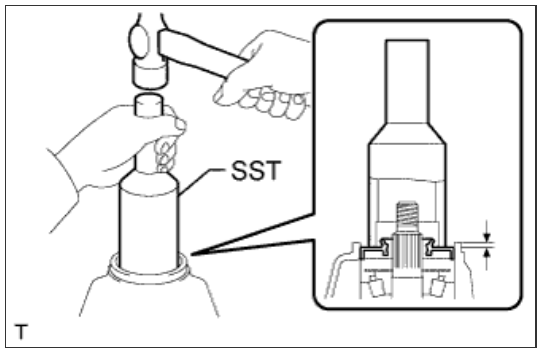
22. INSTALL REAR DIFFERENTIAL CARRIER OIL SEAL

a. Using SST and a hammer, tap in a new oil seal.

SST
09214-76011

Standard oil seal depth:
0.05 to 0.95 mm (0.00197 to 0.0374 in.)

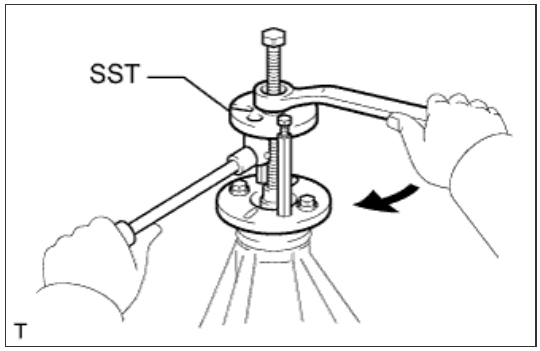
b. Coat the lip of the oil seal with MP grease.



23. INSTALL REAR DRIVE PINION COMPANION FLANGE REAR SUB-ASSEMBLY

a. Using SST, install the companion flange.

SST
09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)



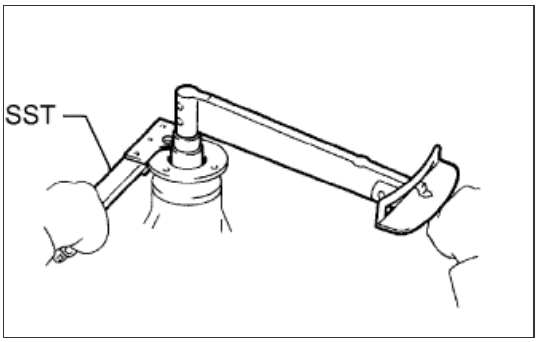
24. INSPECT DRIVE PINION PRELOAD

a. Coat the threads of a new nut with hypoid gear oil.

b. Using SST to hold the companion flange, install the nut by tightening it until the standard preload is reached.

SST
09330-00021 (09330-00030)

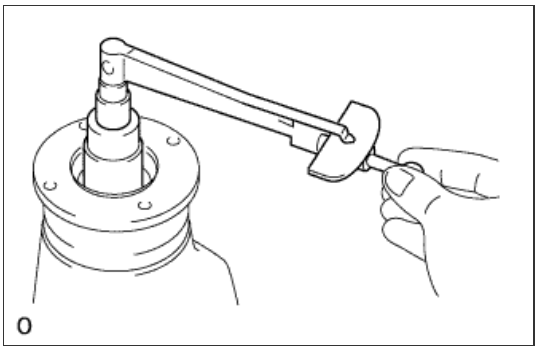
Torque:
441 N*m{ 4497 kgf*cm , 325 ft.*lbf } or less



c. Using a torque wrench, measure the preload.

Standard Preload (at Starting):

Bearing	Specified Condition
New	1.0 to 1.7 N*m (11 to 17 kgf*cm, 10 to 14 in.*lbf)
Reused	0.9 to 1.4 N*m (9 to 13 kgf*cm, 8 to 12 in.*lbf)

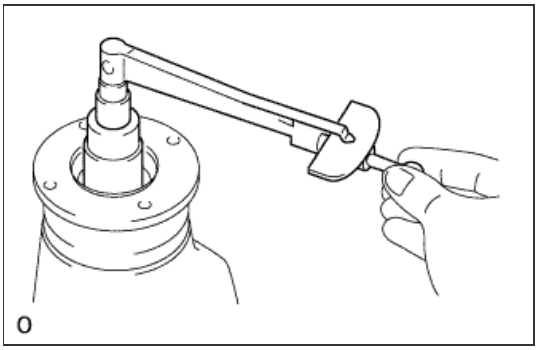


25. INSPECT TOTAL PRELOAD

a. Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

Standard Drive Pinion Preload (at Starting):

Side Bearing Supplier	Specified Condition
New	Standard drive pinion preload plus 0.4 to 0.6 N*m (4 to 6 kgf*cm, 4 to 5 in.*lbf)
Reused	Standard drive pinion preload plus 0.4 to 0.6 N*m (4 to 6 kgf*cm, 4 to 5 in.*lbf)



26. INSPECT DIFFERENTIAL RING GEAR BACKLASH

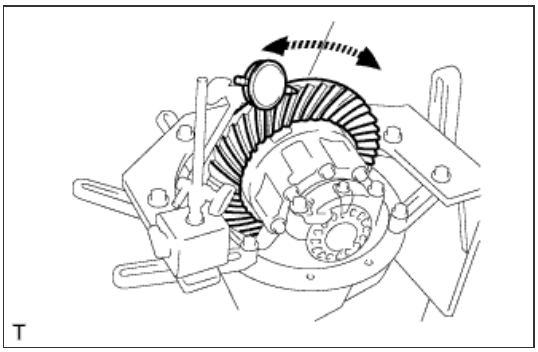
a. Using a dial indicator, measure the ring gear backlash.

Standard backlash:
0.10 to 0.20 mm (0.00394 to 0.00787 in.)

HINT:

Measure at 3 or more positions around the circumference of the ring gear.

If the backlash is not as specified, adjust the side bearing preload or repair as necessary.



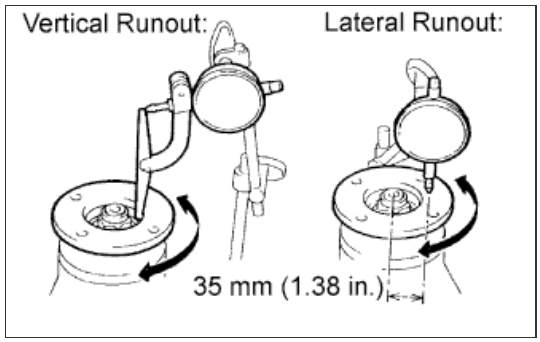
27. INSPECT RUNOUT OF REAR DRIVE PINION COMPANION FLANGE REAR SUB-ASSEMBLY

a. Using a dial indicator, measure the runout of the companion flange vertically and laterally.

Maximum Runout:

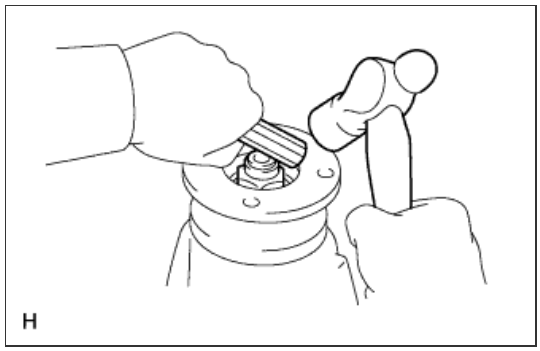
Runout	Specified Condition
Vertical runout	0.10 mm (0.00394 in.)
Lateral runout	0.10 mm (0.00394 in.)

If the runout is more than the maximum, replace the companion flange.



28. STAKE DRIVE PINION COMPANION FLANGE REAR NUT

a. Using a chisel and hammer, stake the nut.



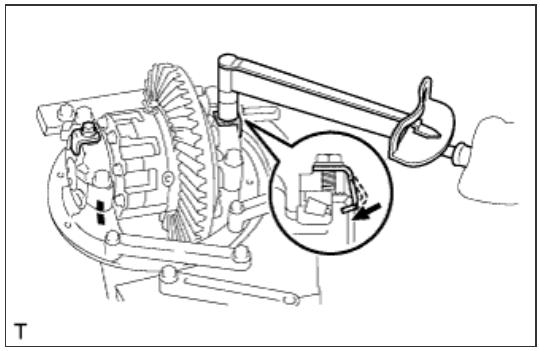
29. INSTALL REAR DIFFERENTIAL BEARING ADJUSTING NUT LOCK

a. Install 2 new nut locks on the bearing caps.

b. Install the 2 bolts, and bend the nut locks.

Torque:
13 N*m{ 133 kgf*cm , 10 ft.*lbf }

c. Bend the nut locks.



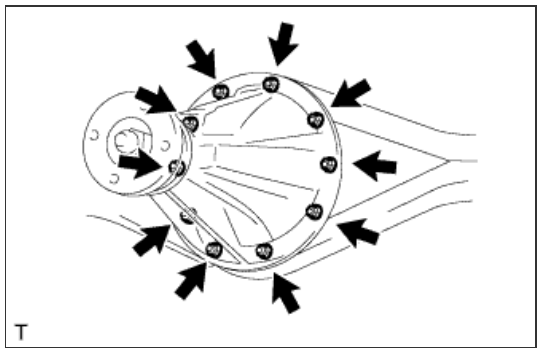
for Preparation Click here

1. INSTALL REAR DIFFERENTIAL CARRIER ASSEMBLY

a. Install a new gasket.

b. Install the differential carrier with the 10 washers and 10 nuts.

Torque:
72 N*m{ 734 kgf*cm , 53 ft.*lbf }

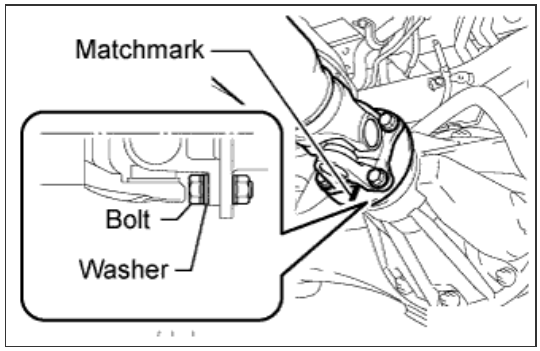


2. CONNECT PROPELLER SHAFT ASSEMBLY

a. Align the matchmarks on the propeller shaft flange and differential flange.

b. Connect the propeller shaft with the 4 bolts, 4 washers and 4 nuts.

Torque:
88 N*m{ 900 kgf*cm , 65 ft.*lbf }



3. INSTALL REAR AXLE SHAFT

a. Install the axle shaft (Click here).

4. ADD DIFFERENTIAL OIL

a. Add differential oil so that the oil level is between 0 to 5 mm (0 to 0.196 in.) from the bottom lip of the differential filler plug hole.

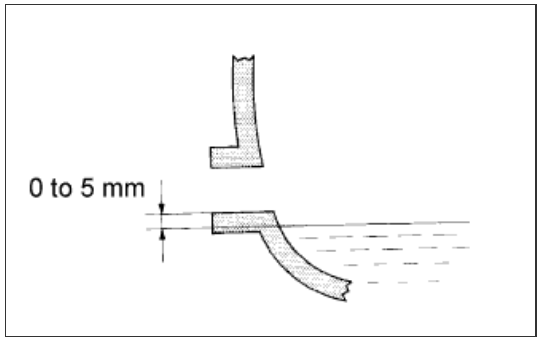
NOTICE:

- **Too much or too little oil will lead to differential problems.**
- **After changing the oil, drive the vehicle and then check the oil level again.**

Differential oil type and viscosity:
Toyota Genuine Differential gear oil LT 75W-85 GL-5 or equivalent

Differential Oil Capacity:

Item	Specified Condition
Front Differential	1.85 to 1.95 liters (1.96 to 2.06 US qts., 1.63 to 1.71



	Imp. qts.)
Rear Differential	4.15 to 4.25 liters (4.39 to 4.49 US qts., 3.66 to 3.74 Imp. qts.)

b. Front Differential:

i. Using a 10 mm hexagon wrench, install a new gasket and the filler plug.

Torque:
39 N*m{ 400 kgf*cm , 29 ft.*lbf }

ii. Install the engine under cover (Click here).

c. Rear Differential:

i. Install a new gasket and the filler plug.

Torque:
49 N*m{ 500 kgf*cm , 36 ft.*lbf }