for Preparation Click here

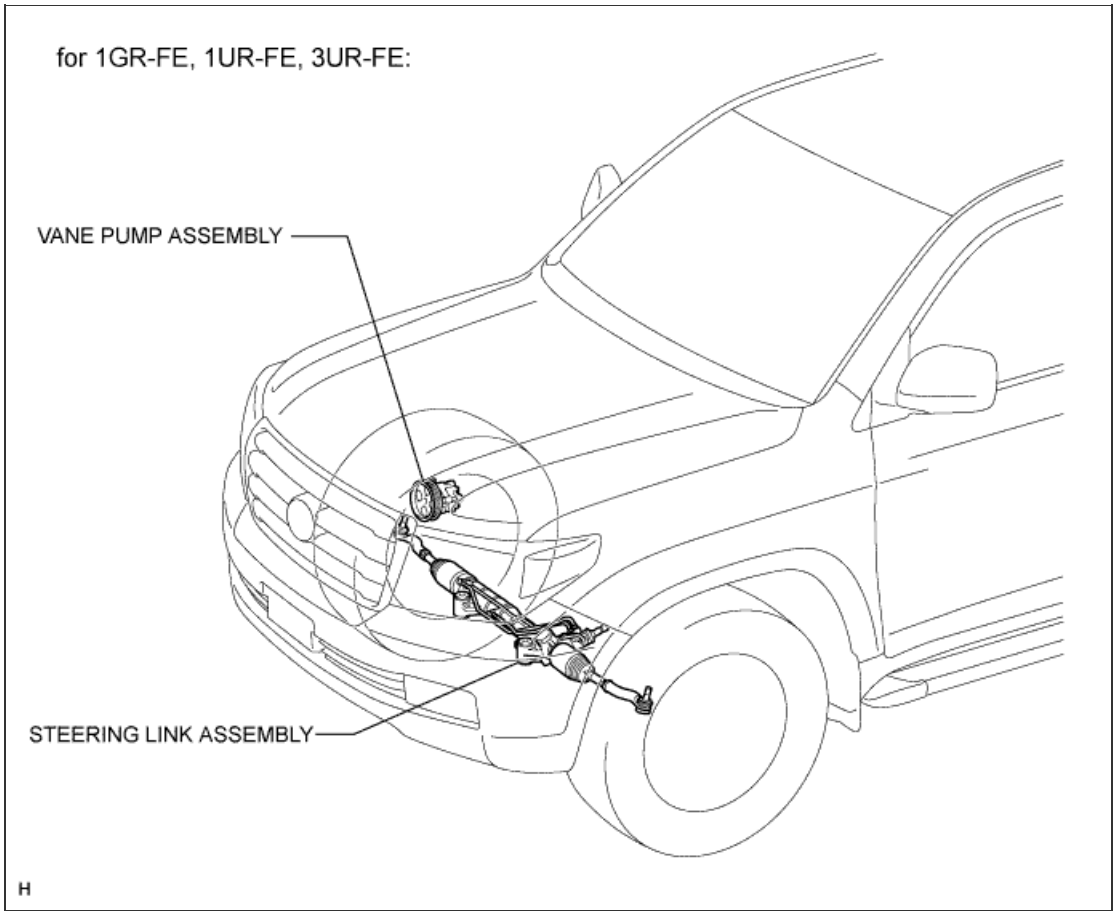
1.HANDLING PRECAUTIONS FOR STEERING SYSTEM

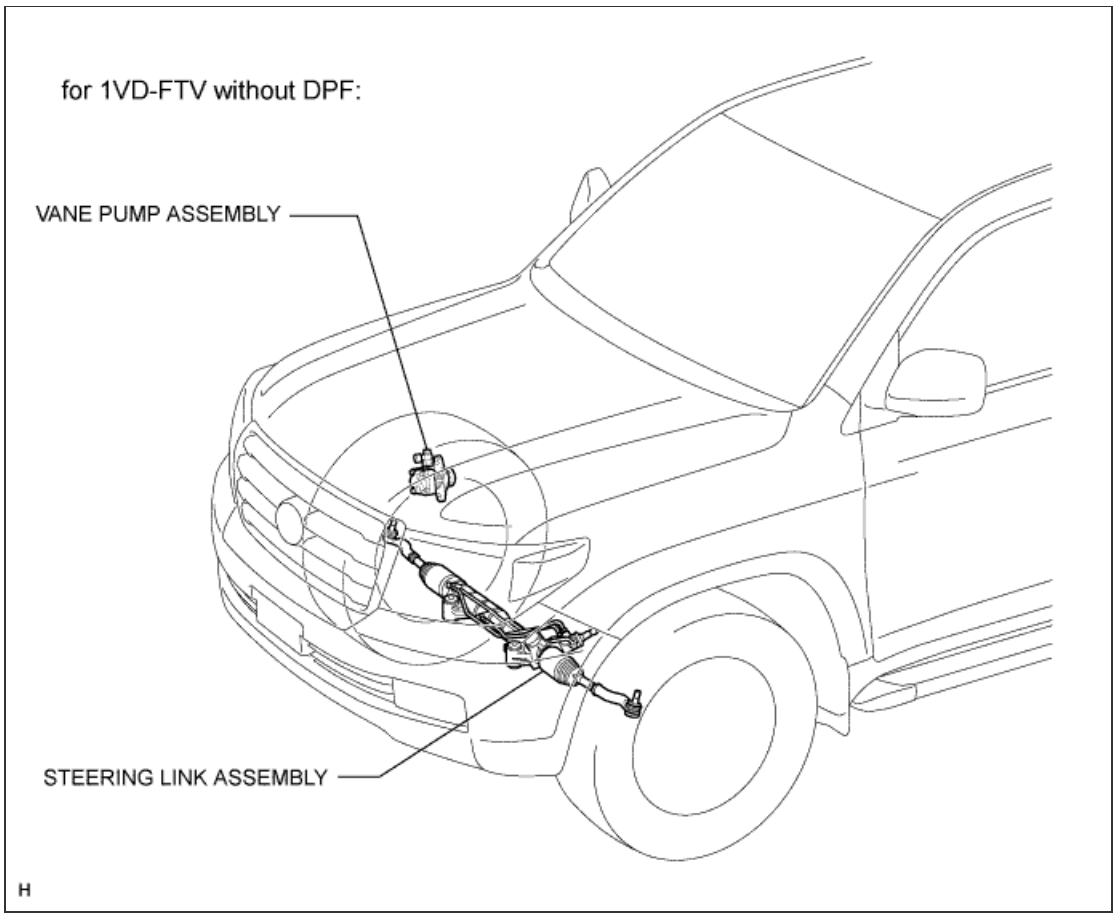
a. Care must be taken when replacing parts. Incorrect replacement may affect the performance of the steering system and result in driving hazards.

2.HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

a. The vehicle is equipped with an SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident. Before servicing (including inspection, replacement, removal and installation of parts), be sure to read the precautionary notices for the supplemental restraint system (Click here).

for Preparation 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.

Power Steering System

Symptom	Suspected Area	See Page
Hard steering	Tires (Improperly inflated)	Click here
	Power steering fluid level (Low)	Click here
	Drive belt (Loose) for 1GR-FE	Click here
	Drive belt (Loose) for 1UR-FE	Click here
	Drive belt (Loose) for 3UR-FE	Click here
	Drive belt (Loose) for 1VD-FTV (without DPF)	Click here
	Front wheel alignment (Incorrect)	Click here
	Steering system joints (Worn)	-
	Suspension arm ball joints (Worn)	Click here
	Steering column (Binding)	-
	Pressure feed tube assembly with relief valve (Abnormal relief valve)	-
	Power steering vane pump for 1GR-FE	Click here
	Power steering vane pump for 1UR-FE	Click here
	Power steering vane pump for 1VD-FTV (without DPF)	Click here
	Power steering vane pump for 3UR-FE	Click here
	Power steering gear	Click here
Poor return	Tires (Improperly inflated)	Click here
	Front wheel alignment (Incorrect)	Click here
	Steering column (Binding)	-
	Power steering gear	Click here
Excessive play	Steering system joints (Worn)	-
	Suspension arm ball joints (Worn)	Click here
	Intermediate shaft, sliding yoke (Worn)	-
	Front wheel bearing (Worn)	Click here
	Power steering gear	Click here
Abnormal noise	Power steering fluid level (Low)	Click here
	Steering system joints (Worn)	-
	Power steering vane pump for 1GR-FE	Click here
	Power steering vane pump for 1UR-FE	Click here
	Power steering vane pump for 1VD-FTV (without DPF)	Click here
	Power steering vane pump for 3UR-FE	Click here
	Power steering gear	Click here

for Preparation Click here

1. INSPECT DRIVE BELT

a. Visually check the belt for excessive wear, frayed cords, etc.

Text in Illustration

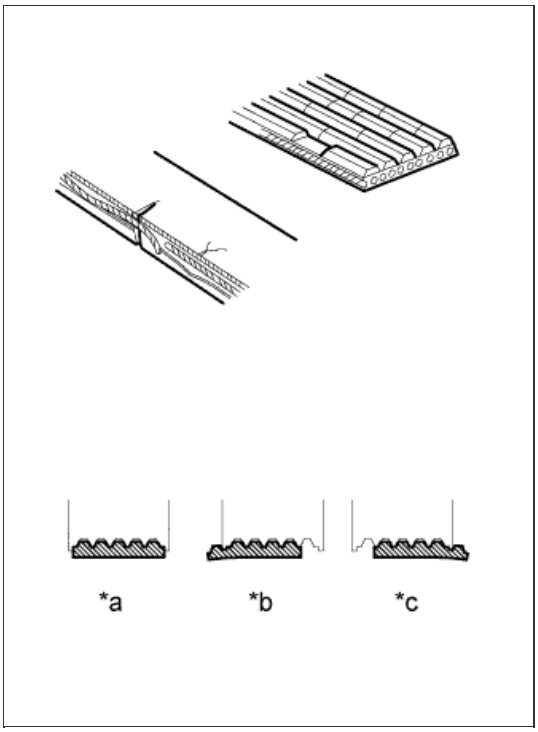
*a	Correct
*b	Incorrect
*c	Incorrect

If any defect is found, replace the drive belt.

HINT:

Cracks on the rib side of a belt are considered acceptable. Replace the belt if there are any missing ribs.

b. Check by hand that the belt fits properly in the ribbed grooves and has not slipped out of the grooves on the bottom of the crank pulley.



2. BLEED POWER STEERING SYSTEM

a. Check the fluid level.

b. Jack up the front of the vehicle and support it with stands.

c. Turn the steering wheel.

i. With the engine stopped, turn the wheel slowly from lock to lock several times.

d. Lower the vehicle.

e. Start the engine.

f. Idle the engine for a few minutes.

g. Turn the steering wheel.

i. With the engine idling, turn the wheel left or right to the full lock position and keep it there for 2 to 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 to 3 seconds. *1

ii. Repeat *1 several times.

NOTICE:

For vehicles with VGRS, if the steering wheel is turned from lock to lock repeatedly, the system may stop operating and the amount of rotation before the steering wheel locks may increase due to operation of the overheating prevention function. When the system temperature drops, the system operation automatically returns to normal.

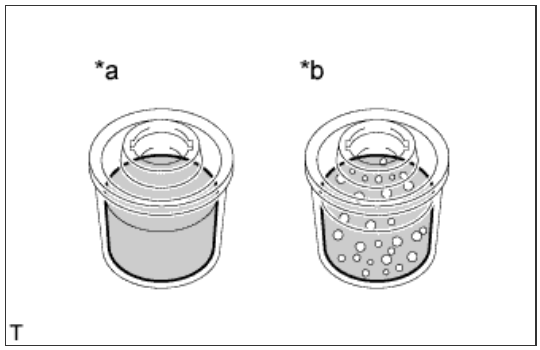
h. Stop the engine.

i. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

If the system has to be bled twice because of foaming or emulsification, check for fluid leaks in the system.



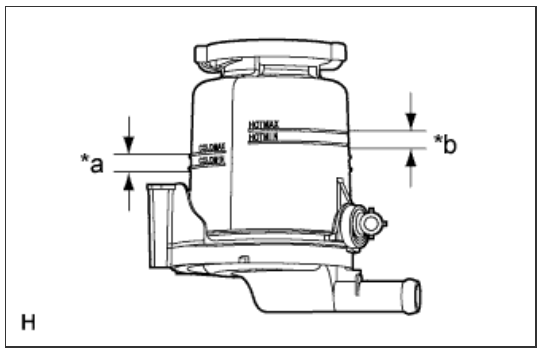
j. Check the fluid level.

3. CHECK FLUID LEVEL

a. Keep the vehicle horizontal.

Text in Illustration

*a	COLD Range
*b	HOT Range



b. With the engine stopped, check the fluid level in the reservoir.
If necessary, add fluid.

Fluid:
ATF DEXRON II or III, or equivalent

HINT:

If the fluid is hot, check that the fluid level is within the HOT range. If the fluid is cold, check that the fluid level is within the COLD range.

c. Start the engine and idle it.

d. Turn the steering wheel from lock to lock several times to raise the fluid temperature.

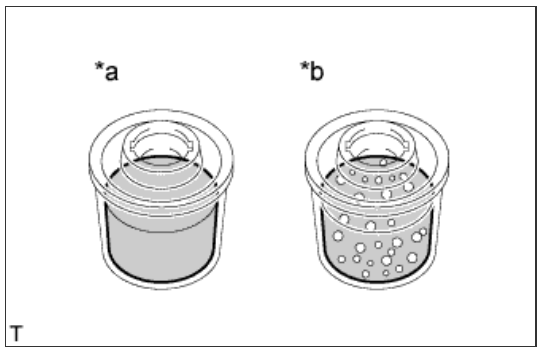
Fluid temperature:
80°C (176°F)

e. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

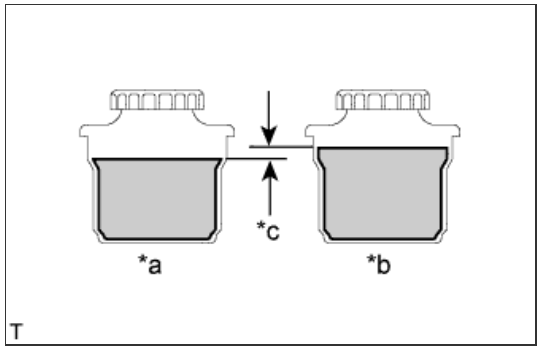
If foaming or emulsification is identified, bleed the power steering system.



f. With the engine idling, measure the fluid level in the reservoir.

Text in Illustration

*a	Engine idling
*b	Engine stopped
*c	5.0 mm (0.197 in.) or less



g. Stop the engine.

h. Wait a few minutes and remeasure the fluid level in the reservoir.

Maximum fluid level rise:
5.0 mm (0.197 in.)

If the fluid level rise is more than the maximum, bleed the power steering system.

i. Check the fluid level.

4. CHECK STEERING FLUID PRESSURE

a. Disconnect the pressure feed tube from the vane pump.

i. for 1GR-FE:
Refer to the following procedures (Click here).

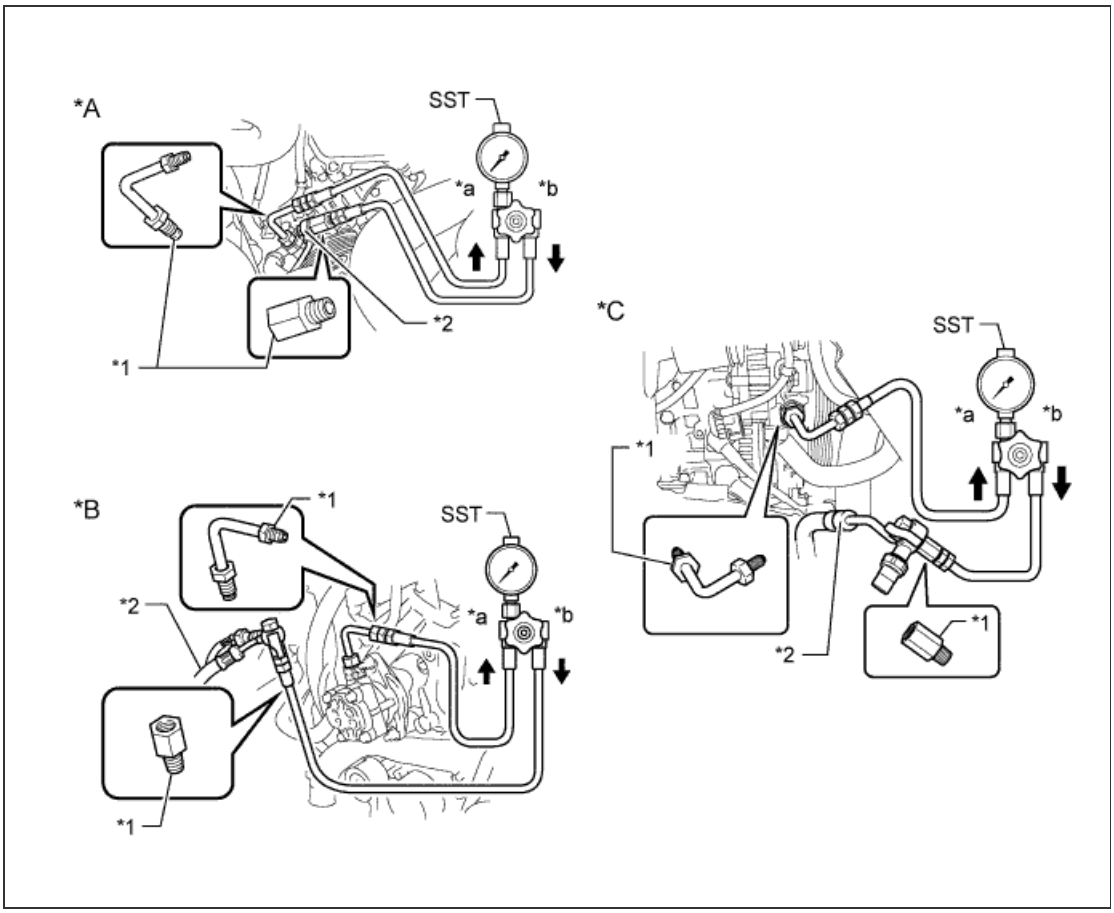
ii. for 1UR-FE:
Refer to the following procedures (Click here).

iii. for 1VD-FTV (without DPF):
Refer to the following procedures (Click here).

iv. for 3UR-FE:
Refer to the following procedures (Click here).

b. Connect SST as shown in the illustration.

SST
09640-10010 (09641-01010, 09641-01030, 09641-01060)



Text in Illustration

*A	for 1GR-FE	*B	for 1VD-FTV without DPF
*C	for 1UR-FE, 3UR-FE	-	-
*1	Attachment	*2	Pressure feed tube
*a	IN	*b	OUT

NOTICE:

Make sure that the valve of SST is in the open position.

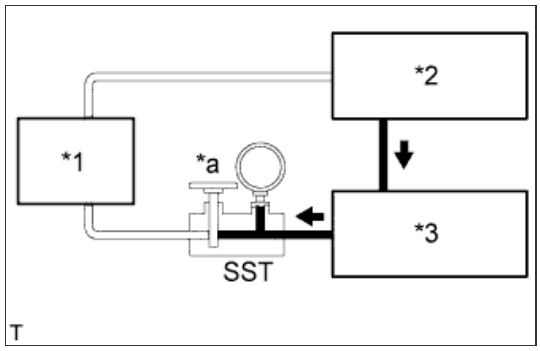
c. Bleed the power steering system.

d. Start the engine and idle it.

e. Turn the steering wheel from lock to lock several times to raise the fluid temperature.

Fluid temperature:
80°C (176°F)

f. With the engine idling, close the valve of SST and observe the reading on SST.



Standard fluid pressure:
10000 to 10700 kPa (102.0 to 109.0 kgf/cm^2, 1450 to 1551 psi)

Text in Illustration

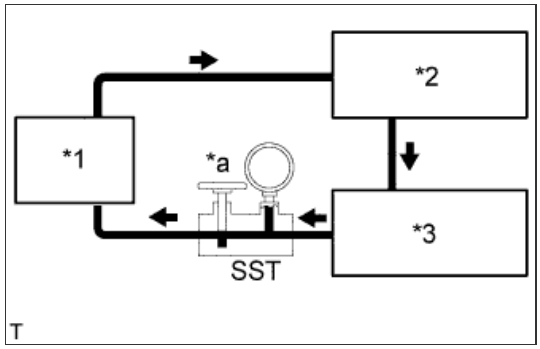
*1	Power steering gear
*2	Oil reservoir
*3	Vane pump
*a	Closed

NOTICE:

- **Do not keep the valve closed for more than 10 seconds.**
- **Do not allow the fluid temperature to become too high.**

If the pressure is less than the minimum, check for fluid leaks and replace parts as necessary.

g. With the engine idling, fully open the valve.



Text in Illustration

*1	Power steering gear
*2	Oil reservoir
*3	Vane pump
*a	Open

h. Measure the fluid pressure at engine speeds of 1000 rpm and 3000 rpm.

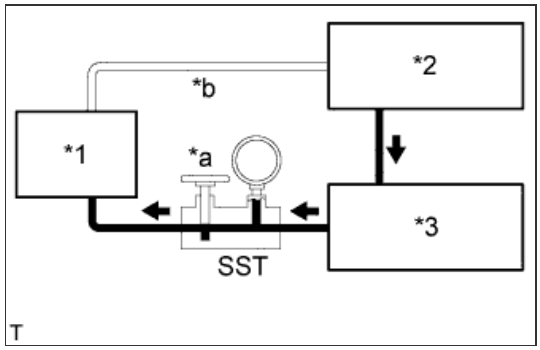
Difference in fluid pressure:
500 kPa (5.1 kgf/cm^2, 73 psi) or less

NOTICE:

Do not turn the steering wheel.

If the pressure difference is higher than the specified value, check for fluid leaks and replace parts as necessary.

i. With the engine idling and the valve fully open, turn the steering wheel left or right to the full lock position. Observe the reading on SST.



Standard fluid pressure:
10000 to 10700 kPa (102.0 to 109.0 kgf/cm^2, 1450 to 1551 psi)

Text in Illustration

*1	Power steering gear
*2	Oil reservoir
*3	Vane pump
*a	Open
*b	Lock position

NOTICE:

- **Do not keep the steering wheel in the full lock position for more than 10 seconds.**
- **Do not allow the fluid temperature to become too high.**

If the pressure is less than the minimum, check for fluid leaks and replace parts as necessary.

j. Disconnect SST.

SST

09640-10010 (09641-01010, 09641-01030, 09641-01060)

k. Connect the pressure feed tube to the vane pump.

   i. for 1GR-FE:
   Refer to the following procedures (Click here).

   ii. for 1UR-FE:
   Refer to the following procedures (Click here).

   iii. for 1VD-FTV (without DPF):
   Refer to the following procedures (Click here).

   iv. for 3UR-FE:
   Refer to the following procedures (Click here).

l. Bleed the power steering system.

for Preparation Click here

1.HANDLING PRECAUTIONS FOR STEERING SYSTEM

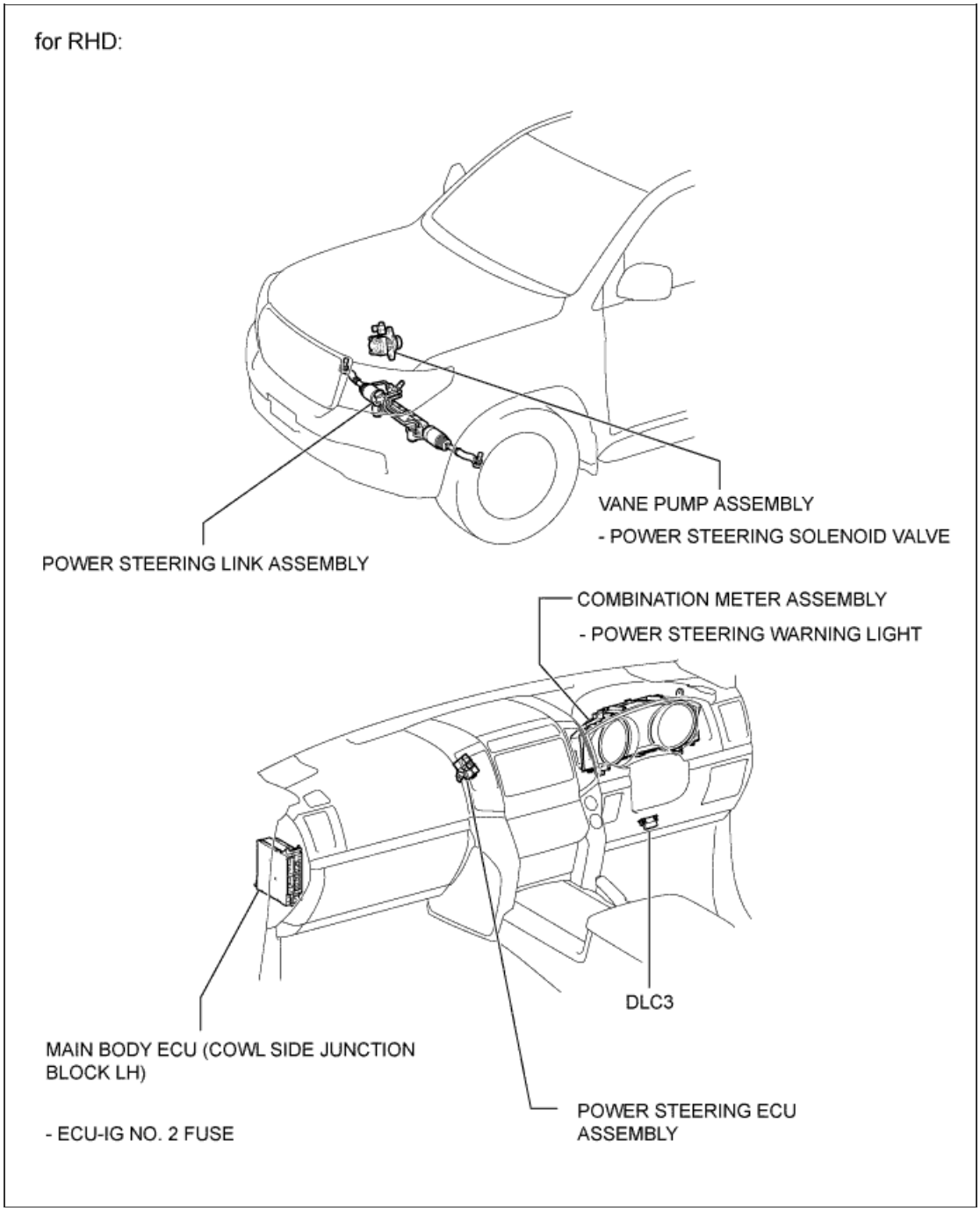
a. Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in driving hazards.

b. Complete the adjustment of the steering wheel and wheel alignment, and then initialize the steering angle sensor. If the order is reversed, the steering wheel and wheel alignment will become misaligned.

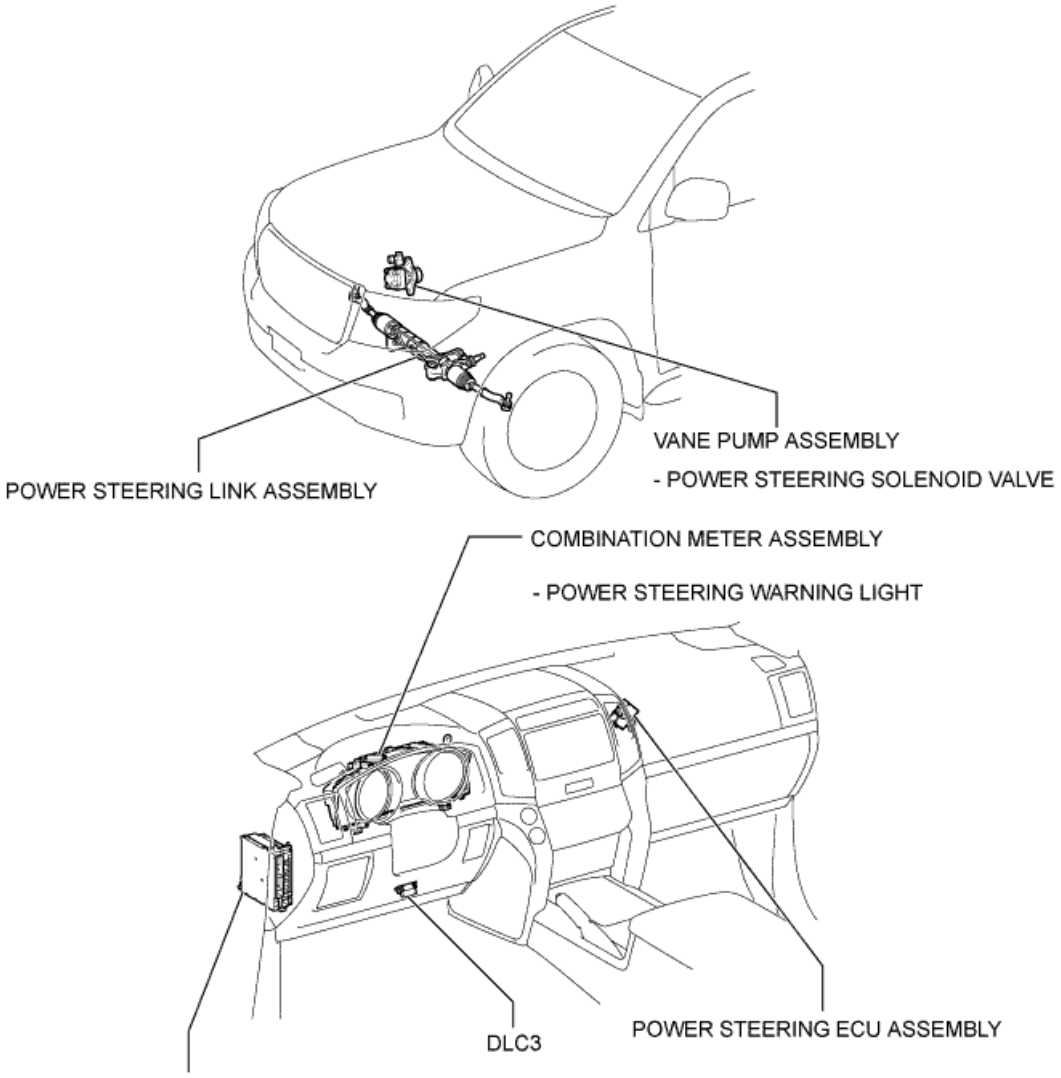
2.HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

a. The vehicle is equipped with a Supplemental Restraint System (SRS). Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal/installation, inspection and replacement of parts), be sure to read the precautionary notices for the supplemental restraint system (Click here).

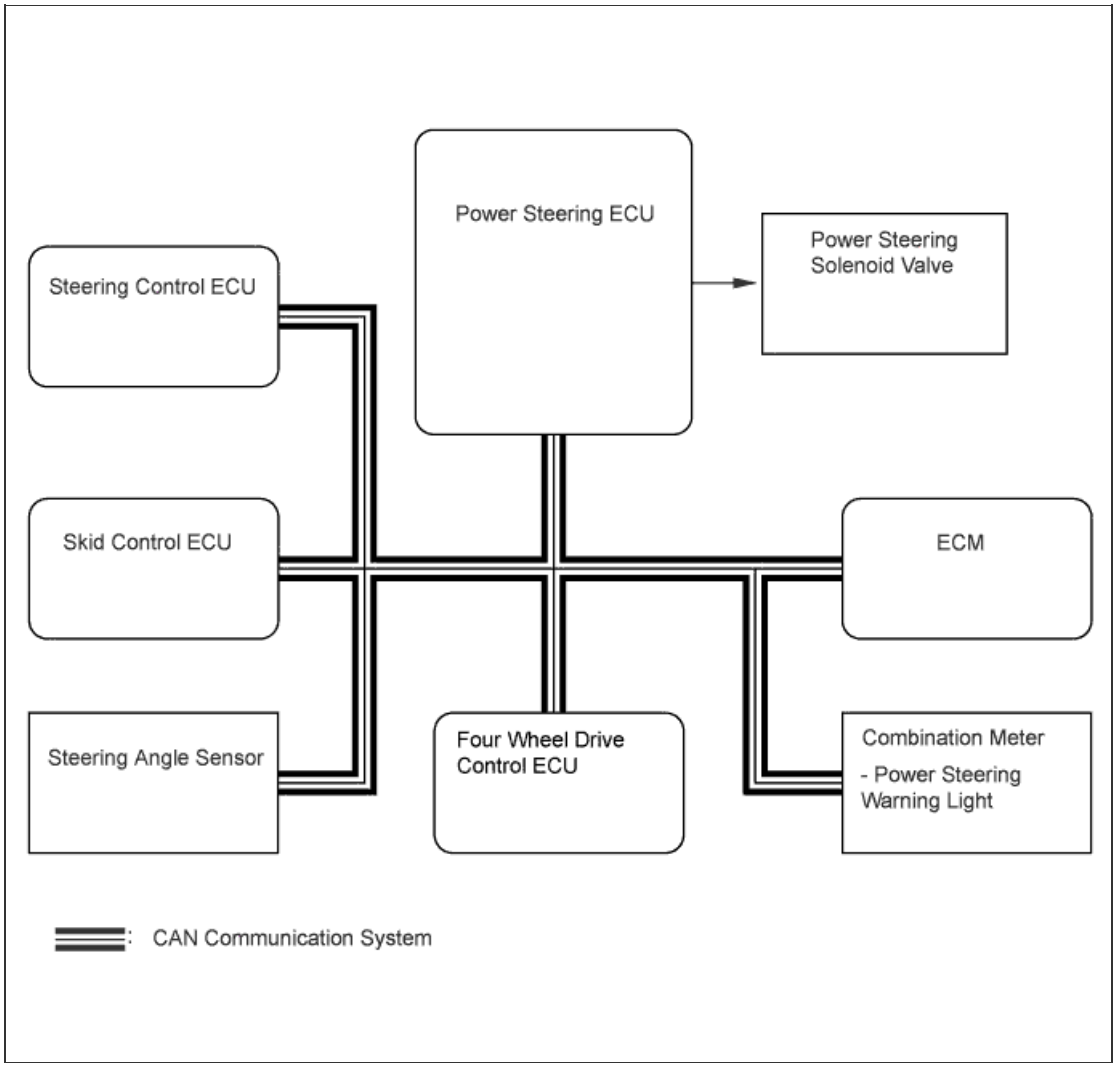
for Preparation Click here



for LHD:


VANE PUMP ASSEMBLY
- POWER STEERING SOLENOID VALVE
POWER STEERING LINK ASSEMBLY
COMBINATION METER ASSEMBLY
- POWER STEERING WARNING LIGHT
DLC3
POWER STEERING ECU ASSEMBLY
MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)
- ECU-IG NO. 2 FUSE

for Preparation Click here



for Preparation Click here

DESCRIPTION

a. In the Variable Flow Control (VFC) power steering system, the power steering ECU receives the steering angle signal, steering zero point memory, steering speed, vehicle speed signal, VGRS relative angle signal and engine speed signal through the CAN communication system. The power steering ECU also controls the power steering solenoid valve mounted on the vane pump assembly in accordance with whether the vehicle is driving straight or turning in order to supply an appropriate power steering fluid volume.
Furthermore, without regard to whether or not the vehicle is being turned, if the power steering ECU cannot receive the steering angle signal, steering zero point memory, vehicle speed signal, VGRS relative angle signal or engine speed signal, the power steering warning light in the combination meter illuminates and the vehicle enters fail-safe mode. During fail-safe control, the resistance of the steering wheel increases drastically to inform the driver that the vehicle is in fail-safe mode.

FUNCTION OF MAIN COMPONENTS

Item	Function
Power steering warning light	Illuminates to inform the driver that a malfunction in the power steering system has occurred.
Power steering solenoid valve	Controls the power steering fluid volume according to the control signals from the power steering ECU.
Power steering ECU	Processes the signals sent from the skid control ECU, steering angle sensor, steering control ECU and ECM, and controls the power steering solenoid valve.
Steering angle sensor	Transmits the steering angle signal and steering zero point memory to the power steering ECU via CAN communication.
Skid control ECU	Transmits the vehicle speed signal to the power steering ECU via CAN communication.
Steering control ECU	Transmits the VGRS relative angle signal to the power steering ECU via CAN communication.
ECM	Transmits the engine speed signal to the power steering ECU via CAN communication.

for Preparation Click here

HINT:

*: Use the GTS.

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.CUSTOMER PROBLEM ANALYSIS

a. Confirm problem symptoms (Click here).

NEXT

3.INSPECT BATTERY VOLTAGE*

a. Measure the voltage of the battery.

Standard voltage:
11 to 14 V

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

NEXT

4.CHECK DTC*

a. Check and record DTCs.

NEXT

5.CLEAR DTC*

a. Clear the DTCs.

NEXT

6.PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom does not occur.	A
Symptom occurs.	B

B. Go to step 8

A

7.SYMPTOM SIMULATION

a. Perform symptom simulation (Click here).

NEXT

8.CHECK CAN COMMUNICATION SYSTEM*

a. Check for DTCs (Click here).

Result

Result	Proceed to
CAN communication system DTC is not output.	A
CAN communication system DTC is output.	B

HINT:

- **If any CAN communication system DTCs are output, perform troubleshooting for the CAN communication system first.**
  for LHD:
  Refer to the following procedures (Click here).
  for RHD:
  Refer to the following procedures (Click here).
- **If communication with the power steering ECU cannot be established through the GTS, inspect terminals CANH and CANL of the DLC3 and power steering ECU, and the IG circuit of the power steering ECU.**

B. → PROCEED TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING)

A

9.CHECK FOR DTC*

a. Check for DTCs (Click here).

HINT:

Refer to Diagnostic Trouble Code Chart when any DTCs are output (Click here).

Result

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

B. → Go to step 11

A

10.PROBLEM SYMPTOMS TABLE

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

NEXT

11.CIRCUIT INSPECTION

NEXT

12.IDENTIFICATION OF PROBLEM

NEXT

13.REPAIR OR REPLACE

NEXT

14.CONFIRMATION TEST

NEXT

END

for Preparation Click here

HINT:

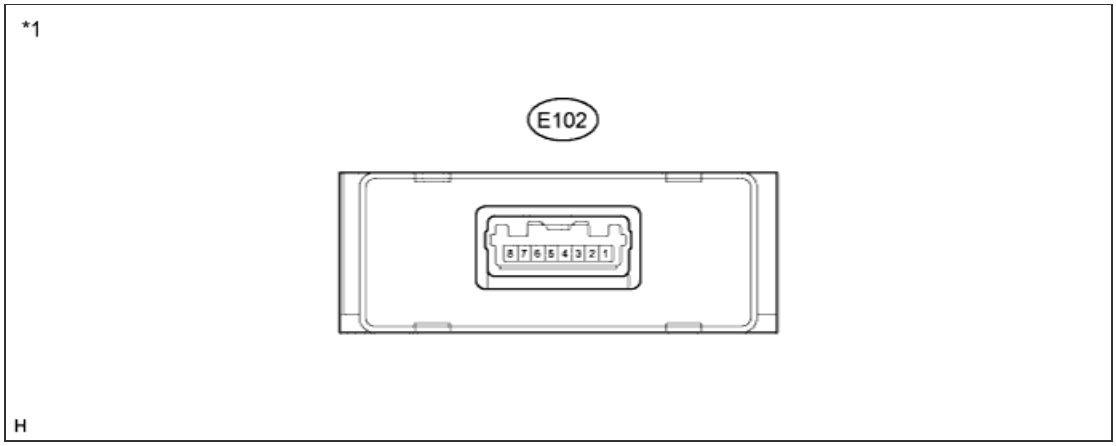
- **Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.**
- **Inspect the fuses and relays related to this system before inspecting the suspected areas below.**

Power Steering System

Symptom	Suspected Area	See page
Hard steering	Tires (Improperly inflated)	Click here
	Power steering fluid level (Low)	Click here
	Front wheel alignment (Incorrect)	Click here
	Steering system joints (Worn)	-
	Suspension arm ball joints (Worn)	Click here
	Steering column (Binding)	-
	Pressure feed tube assembly with relief valve (Abnormal relief valve)	-
	Power steering vane pump	Click here
	Power steering link assembly	Click here
Poor return	Tires (Improperly inflated)	Click here
	Front wheel alignment (Incorrect)	Click here
	Steering column (Binding)	-
	Power steering link assembly	Click here
Excessive play	Steering system joints (Worn)	-
	Suspension arm ball joints (Worn)	Click here
	Intermediate shaft, sliding yoke (Worn)	-
	Front wheel bearing (Worn)	Click here
	Power steering link assembly	Click here
Abnormal noise	Power steering fluid level (Low)	Click here
	Steering system joints (Worn)	-
	Power steering vane pump	Click here
	Power steering link assembly	Click here
Power steering system does not operate	IG power source circuit	Click here
	VFC power steering solenoid circuit	Click here
	Power steering ECU communication circuit	Click here
	Vehicle stability control system	Click here
	Steering angle sensor	Click here
	ECD system	Click here
	Power steering ECU	Click here
When the vehicle is idling, steering effort is high (with the vehicle stopped)	Tire size and tire pressure	Click here
	Power steering fluid level and pressure	Click here
	Front wheel alignment	Click here
	IG power source circuit	Click here
	VFC power steering solenoid circuit	Click here
	Power steering ECU communication circuit	Click here
	Steering angle sensor	Click here
	Power steering ECU	Click here
Even if vehicle speed increases, steering effort does not increase	VFC power steering solenoid circuit	Click here
	Power steering ECU communication circuit	Click here
	Vehicle stability control system	Click here
	Power steering ECU	Click here
Power steering warning light is abnormal	Power steering warning light circuit	Click here

for Preparation Click here

CHECK POWER STEERING ECU



Text in Illustration

*1	Power Steering ECU	-	-

a. Measure the voltage and resistance according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
E102-3 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E102-2 (CANL) - E102-1 (CANH)	L - LG	CAN communication	Engine switch off	54 to 69 Ω
E102-5 (IG) - E102-3 (GND)	G - W-B	IG power supply	Engine switch on (IG)	11 to 14 V
E102-7 (SOF+) - E102-8 (SOF-)	W - V	Power steering solenoid valve signal	• Engine idling • Steering wheel turned to right or left	Pulse generation

If the result is not as specified, the ECU may have a malfunction.

for Preparation Click here

CHECK DLC3

a. Check the DLC3 (Click here).

FUNCTION OF POWER STEERING WARNING LIGHT

a. When a malfunction is detected in the power steering system, the power steering warning light in the combination meter comes on to inform the driver of the malfunction.

HINT:

When power assist is stopped or reduced, the power steering warning light comes on.

Power assist is stopped:

- **When a malfunction occurs in the power steering system (including when CAN communication is lost, etc.)**
- **When the engine stalls (not a malfunction)**

Power assist is reduced:

When a malfunction occurs in the power steering system (including when CAN communication is lost, etc.)

for Preparation Click here

CHECK DTC

a. Turn the engine switch 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: Chassis / PPS / Trouble codes.

f. Read the DTCs by following the display on the GTS.

CLEAR DTC

a. Turn the engine switch 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: Chassis / PPS / Trouble codes.

f. Clear the DTCs by following the display on the GTS.

g. Turn the engine switch off.

h. Disconnect the GTS from the DLC3.

for Preparation Click here

If a problem occurs in the power steering system, the power steering warning light in the combination meter comes on and power steering assist is stopped, locked at a particular point or decreased simultaneously to protect the system.

Power Steering System

DTC Code	Detection Condition	Fail-safe Operation
C15F0	Short circuit between power steering solenoid valve terminal SOF+ and ground	Assist force is restricted.
	Short circuit between power steering solenoid valve terminal SOF- and ground	Power assist continues as normal.
	Short circuit between power steering solenoid valve terminals SOF+ and SOF-	Assist force is restricted.
	Power steering solenoid valve open circuit	Assist force is restricted.
C15F1	Steering angle sensor circuit malfunction	The power steering system is limited depending on which ECU has lost communication. For details, refer to Fail-safe Function.
C15F2	VGRS system malfunction	
C1541	Vehicle speed signal malfunction	
C1544	Engine speed signal malfunction	
U0100	Lost communication with ECM/PCM "A"	
U0126	Lost communication with steering angle sensor module	
U0129	Lost communication with brake system control module	
U0130	Lost communication with steering effort control module	

FAIL-SAFE FUNCTION

If the power steering ECU cannot receive the steering angle signal, VGRS relative angle signal, steering zero point memory, vehicle speed signal or engine speed signal, the power steering warning light in the combination meter illuminates and the vehicle enters fail-safe mode.

Malfunction Area				Fail-Safe Mode
Steering Angle Signal / VGRS relative angle signal	Steering Zero Point Memory	Vehicle Speed Signal	Engine Speed Signal	
X	-	-	-	• V-Q control fixed • Steering angle compensation disabled • Steering wheel return compensation disabled • Engine speed compensation normal
-	X	-	-	• V-Q control normal • Steering angle compensation disabled • Steering wheel return compensation disabled • Engine speed compensation normal
-	-	X	-	Vehicle speed of 40 km/h (25 mph) assumed and each compensation performed
-	-	-	X	• V-Q control normal • Steering angle compensation normal • Steering wheel return compensation normal • Engine speed compensation disabled
X	X	-	-	• V-Q control fixed • Steering angle compensation disabled • Steering wheel return compensation disabled • Engine speed compensation normal
X	-	X	-	Fluid flow maintained at constant rate
X	-	-	X	• V-Q control characteristics fixed • Steering angle compensation disabled • Steering wheel return compensation disabled • Engine speed compensation disabled

-	X	X	-	• V-Q control fixed • Steering angle compensation disabled • Steering wheel return compensation disabled • Engine speed compensation normal
-	X	-	X	• V-Q control normal • Steering angle compensation disabled • Steering wheel return compensation disabled • Engine speed compensation disabled
-	-	X	X	• Vehicle speed of 40 km/h (25 mph) assumed and each compensation performed • Engine speed compensation disabled
-	X	X	X	• V-Q control characteristics fixed • Steering angle compensation disabled • Steering wheel return compensation disabled • Engine speed compensation disabled
X	-	X	X	Fluid flow maintained at constant rate
X	X	-	X	• V-Q control characteristics fixed • Steering angle compensation disabled • Steering wheel return compensation disabled • Engine speed compensation disabled
X	X	X	-	Fluid flow maintained at constant rate
X	X	X	X	Fluid flow maintained at constant rate

HINT:

X: Malfunction

for Preparation Click here

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. Turn the engine switch 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: Chassis / PPS / Data List.

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

PPS

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Steering Angle Velocity	Steering angle speed/ Min.: -32768 deg/s Max.: 32767 deg/s	Value changes in proportion to steering effort	The engine is running and the steering wheel is being turned.
Meter Vehicle Velocity	Vehicle speed from meter/ Min.: 0.00 km/h (0.00 mph) Max.: 300.00 km/h (186.41 mph)	0 km/h (0 mph)	The vehicle is stopped.
		No large fluctuation	The vehicle is driven at a constant speed.
Engine Revolution	Engine speed/ Min.: 0 rpm Max.: 12800 rpm	No large fluctuation	The engine is running at a constant speed.
Steering Angle	Steering angle/ Min.: -2048.0 deg Max.: 2047.0 deg	Left turn: Increases Right turn: Decreases	The engine is running and the steering wheel is being turned.
Solenoid Current	Solenoid Current/ Min.: 0 mA Max.: 1000 mA	200 to 950 mA	The engine is running and the steering wheel is being turned.
IG Power Supply	ECU power source voltage/ Min.: 0.0 V Max.: 25.5 V	11 to 14 V	The engine switch is on (IG)
The Number of DTCs	Number of DTCs/ Min.: 0 Max.: 255	0	-

for Preparation Click here

HINT:

If a trouble code is output during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

Power Steering System

DTC Code	Detection Item	Return-to-normal	See page
C1541	Vehicle Speed Signal Malfunction	After normal confirmation	Click here
C1544	High Engine Revolution Signal	After normal confirmation	Click here
C15F0	VFC Solenoid Circuit	Engine switch on (IG) again	Click here
C15F1	Steering Angle Sensor Circuit	After normal confirmation	Click here
C15F2	VGRS System Malfunction	After normal confirm	Click here
U0100	Lost Communication with ECM / PCM "A"	After CAN communication system returns to normal condition or engine switch turned on (IG) again	Click here
U0126	Lost Communication with Steering Angle Sensor Module	After CAN communication system returns to normal condition or engine switch turned on (IG) again	Click here
U0129	Lost Communication with Brake System Control Module	After CAN communication system returns to normal condition or engine switch turned on (IG) again	Click here
U0130	Lost Communication with Steering Effort Control Module	After CAN communication system returns to normal condition or engine switch turned on (IG) again	Click here

DTC C1541 Vehicle Speed Signal Malfunction

for Preparation Click here

DESCRIPTION

The power steering ECU receives vehicle speed signals from the skid control ECU via CAN communication. The power steering ECU provides appropriate assisting force in accordance with the vehicle speed signal.

DTC Code	DTC Detection Condition	Trouble Area
C1541	An abnormal vehicle speed signal is received.	• Speed sensor circuit • Vehicle stability control system • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1.CHECK OTHER DTC OUTPUT (CAN COMMUNICATION SYSTEM)

a. Check if DTC U0129 is output (Click here).

Result

Result	Proceed to
DTC U0129 is not output.	A
DTC U0129 is output.	B

HINT:

DTC U0129 indicates a CAN communication malfunction in the power steering system.

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE (**Click here**)

A

2.CHECK OTHER DTC OUTPUT (VEHICLE STABILITY CONTROL SYSTEM)

a. Using the GTS, check for DTCs and confirm that there are no problems in the vehicle stability control system (Click here).

Result

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

B → GO TO VEHICLE STABILITY CONTROL SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (**Click here**)

A

REPLACE POWER STEERING ECU ASSEMBLY (**Click here**)

DTC U0100 Lost Communication with ECM / PCM "A"

DTC U0126 Lost Communication with Steering Angle Sensor Module

DTC U0129 Lost Communication with Brake System Control Module

DTC U0130 Lost Communication with Steering Effort Control Module

for Preparation Click here

DESCRIPTION

The power steering ECU receives signals from the ECM, steering angle sensor, skid control ECU and steering control ECU via the CAN communication system.

DTC Code	DTC Detection Condition	Trouble Area
U0100	The engine speed signal is lost.	• ECM • CAN communication system • Power steering ECU assembly
U0126	The steering angle signal is lost.	• Steering angle sensor • CAN communication system • Power steering ECU assembly
U0129	The vehicle speed signal is lost.	• Skid control ECU • CAN communication system • Power steering ECU assembly
U0130	The VGRS relative angle signal is lost.	• Steering control ECU • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1.CHECK FOR DTC (CAN COMMUNICATION SYSTEM)

a. Clear the DTCs (Click here).

b. Check for DTCs (Click here).

Result

Result		Proceed to
DTC is not output.		A
DTC is output.	for LHD	B
	for RHD	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

DTC C1544 High Engine Revolution Signal

for Preparation Click here

DESCRIPTION

The power steering ECU receives engine speed signals from the ECM via CAN communication. The power steering ECU provides appropriate assisting force in accordance with the engine speed signal.

DTC Code	DTC Detection Condition	Trouble Area
C1544	An abnormal engine speed signal is received.	• ECD system • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1.CHECK OTHER DTC OUTPUT (CAN COMMUNICATION SYSTEM)

a. Check if DTC U0100 is output (Click here).

Result

Result	Proceed to
DTC U0100 is not output.	A
DTC U0100 is output.	B

HINT:

DTC U0100 indicates a CAN communication malfunction in the power steering system.

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE (Click here)

A

2.CHECK OTHER DTC OUTPUT (ECD SYSTEM)

a. Using the GTS, check for DTCs and confirm that there are no problems in the ECD system (Click here).

Result

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

B → GO TO ECD SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)

A

REPLACE POWER STEERING ECU ASSEMBLY (Click here)

DTC U0100 Lost Communication with ECM / PCM "A"

DTC U0126 Lost Communication with Steering Angle Sensor Module

DTC U0129 Lost Communication with Brake System Control Module

DTC U0130 Lost Communication with Steering Effort Control Module

for Preparation Click here

DESCRIPTION

The power steering ECU receives signals from the ECM, steering angle sensor, skid control ECU and steering control ECU via the CAN communication system.

DTC Code	DTC Detection Condition	Trouble Area
U0100	The engine speed signal is lost.	• ECM • CAN communication system • Power steering ECU assembly
U0126	The steering angle signal is lost.	• Steering angle sensor • CAN communication system • Power steering ECU assembly
U0129	The vehicle speed signal is lost.	• Skid control ECU • CAN communication system • Power steering ECU assembly
U0130	The VGRS relative angle signal is lost.	• Steering control ECU • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1.CHECK FOR DTC (CAN COMMUNICATION SYSTEM)

a. Clear the DTCs (Click here).

b. Check for DTCs (Click here).

Result

Result		Proceed to
DTC is not output.		A
DTC is output.	for LHD	B
	for RHD	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

DTC C15F0 VFC Solenoid Circuit

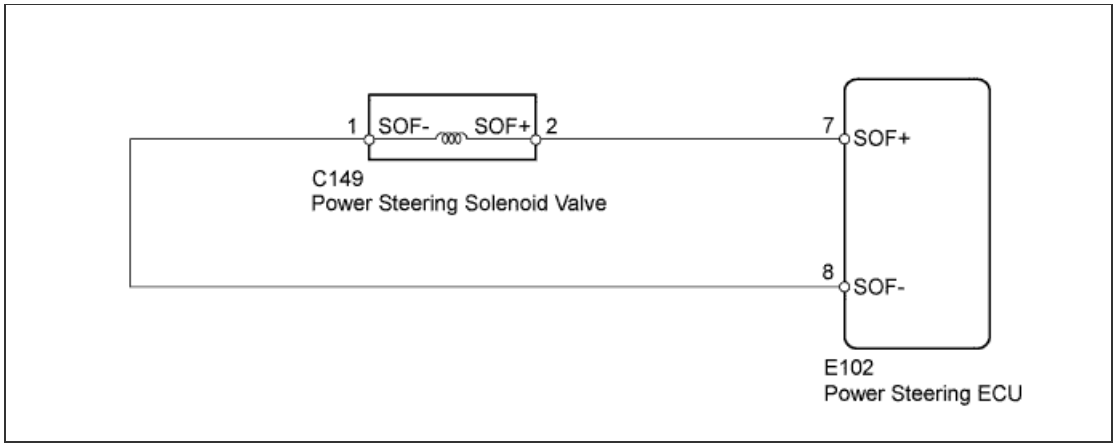
for Preparation Click here

DESCRIPTION

This circuit supplies electric power to the power steering solenoid valve.
The power steering ECU controls the output current to the power steering solenoid valve in accordance with the steering angle signal, VGRS relative angle signal, steering zero point memory, vehicle speed signal and engine speed signal, adjusting the amount of power steering assist.

DTC Code	DTC Detection Condition	Trouble area
C15F0	A short or open in the solenoid valve circuit.	• Harness or connector • Vane pump assembly • Power steering ECU assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1.READ VALUE USING GTS (SOLENOID CURRENT)

a. Turn the engine switch 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: Chassis / PPS / Data List.

PPS

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Solenoid Current	Solenoid Current/ Min.: 0 mA Max.: 1000 mA	200 to 950 mA	The engine is running and the steering wheel is being turned.

OK:
The normal condition value is displayed on the GTS.

NG → Go to step 2

OK

REPLACE POWER STEERING ECU ASSEMBLY (Click here)

2.CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - POWER STEERING SOLENOID VALVE)

a. Disconnect the E102 power steering ECU connector.

b. Disconnect the C149 power steering solenoid valve connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E102-7 (SOF+) - C149-2 (SOF+)	Always	Below 1 Ω
E102-8 (SOF-) - C149-1 (SOF-)		
E102-7 (SOF+) - Body ground	Always	10 kΩ or higher
E102-8 (SOF-) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.INSPECT POWER STEERING SOLENOID VALVE ASSEMBLY

a. Disconnect the C149 power steering solenoid valve connector.

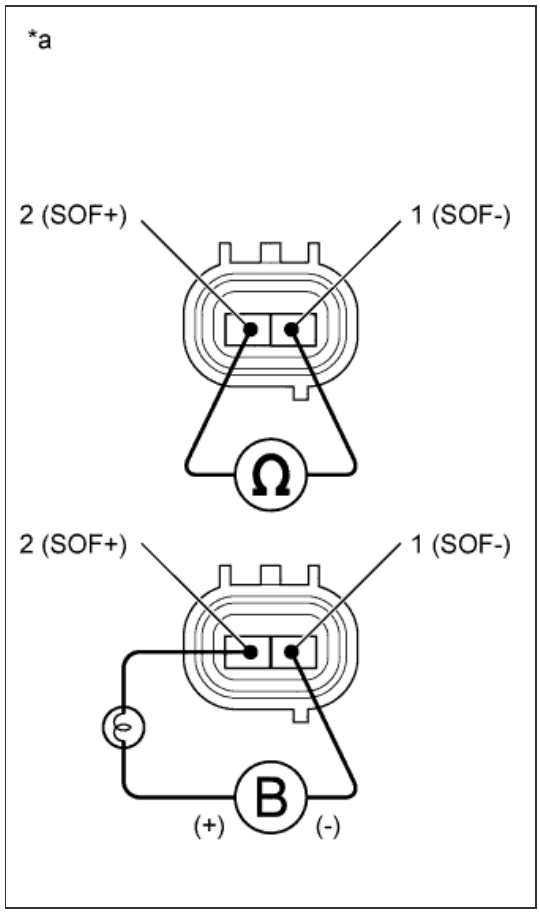
b. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
1 (SOF-) - 2 (SOF+)	20°C (68°F)	6.7 to 7.3 Ω

c. Connect the positive (+) lead of the battery with a 21 W bulb to terminal 2 (SOF+) and the negative (-) lead to terminal 1 (SOF-) of the solenoid valve connector. Then check that the valve moves and makes an operating noise.

OK:
Valve moves and makes an operating noise.



Text in Illustration

*a	Component without harness connected (Power Steering Solenoid Valve)

NG → REPLACE VANE PUMP ASSEMBLY (Click here)

OK

REPLACE POWER STEERING ECU ASSEMBLY (Click here)

DTC U0100 Lost Communication with ECM / PCM "A"

DTC U0126 Lost Communication with Steering Angle Sensor Module

DTC U0129 Lost Communication with Brake System Control Module

DTC U0130 Lost Communication with Steering Effort Control Module

for Preparation Click here

DESCRIPTION

The power steering ECU receives signals from the ECM, steering angle sensor, skid control ECU and steering control ECU via the CAN communication system.

DTC Code	DTC Detection Condition	Trouble Area
U0100	The engine speed signal is lost.	• ECM • CAN communication system • Power steering ECU assembly
U0126	The steering angle signal is lost.	• Steering angle sensor • CAN communication system • Power steering ECU assembly
U0129	The vehicle speed signal is lost.	• Skid control ECU • CAN communication system • Power steering ECU assembly
U0130	The VGRS relative angle signal is lost.	• Steering control ECU • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1.CHECK FOR DTC (CAN COMMUNICATION SYSTEM)

a. Clear the DTCs (Click here).

b. Check for DTCs (Click here).

Result

Result		Proceed to
DTC is not output.		A
DTC is output.	for LHD	B
	for RHD	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

DTC C15F1 Steering Angle Sensor Circuit

for Preparation Click here

DESCRIPTION

The power steering ECU receives steering angle signals from the steering angle sensor via CAN communication. The power steering ECU provides appropriate assisting force in accordance with the steering angle signal.

DTC Code	DTC Detection Condition	Trouble Area
C15F1	An abnormal steering angle signal is received.	• Steering angle sensor • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1.CHECK OTHER DTC OUTPUT (CAN COMMUNICATION SYSTEM)

a. Check if DTC U0126 is output (Click here).

Result

Result	Proceed to
DTC U0126 is not output.	A
DTC U0126 is output.	B

HINT:

DTC U0126 indicates a CAN communication malfunction in the power steering system.

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE (Click here)

A

2.CHECK OTHER DTC OUTPUT (VEHICLE STABILITY CONTROL SYSTEM)

a. Using the GTS, check for DTCs related to the steering angle sensor and confirm that there are no problems in the vehicle stability control system (Click here).

Result

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

B → REPAIR OR REPLACE CIRCUIT INDICATED BY OUTPUT CODE (STEERING ANGLE SENSOR CIRCUIT) (Click here)

A

REPLACE POWER STEERING ECU ASSEMBLY (Click here)

DTC U0100 Lost Communication with ECM / PCM "A"

DTC U0126 Lost Communication with Steering Angle Sensor Module

DTC U0129 Lost Communication with Brake System Control Module

DTC U0130 Lost Communication with Steering Effort Control Module

for Preparation Click here

DESCRIPTION

The power steering ECU receives signals from the ECM, steering angle sensor, skid control ECU and steering control ECU via the CAN communication system.

DTC Code	DTC Detection Condition	Trouble Area
U0100	The engine speed signal is lost.	• ECM • CAN communication system • Power steering ECU assembly
U0126	The steering angle signal is lost.	• Steering angle sensor • CAN communication system • Power steering ECU assembly
U0129	The vehicle speed signal is lost.	• Skid control ECU • CAN communication system • Power steering ECU assembly
U0130	The VGRS relative angle signal is lost.	• Steering control ECU • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1.CHECK FOR DTC (CAN COMMUNICATION SYSTEM)

a. Clear the DTCs (Click here).

b. Check for DTCs (Click here).

Result

Result		Proceed to
DTC is not output.		A
DTC is output.	for LHD	B
	for RHD	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

DTC C15F2 VGRS System Malfunction

for Preparation Click here

DESCRIPTION

The power steering ECU receives VGRS relative angle signal from the steering control ECU via CAN communication. The power steering ECU provides appropriate assisting force in accordance with the VGRS relative angle signal.

DTC Code	DTC Detection Condition	Trouble Area
C15F2	An abnormal VGRS relative angle signal is received.	• Variable gear ratio steering system • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1.CHECK OTHER DTC OUTPUT (CAN COMMUNICATION SYSTEM)

a. Check if DTC U0130 is output (Click here).

Result

Result	Proceed to
DTC U0130 is not output.	A
DTC U0130 is output.	B

HINT:

DTC U0130 indicates a CAN communication malfunction in the power steering system.

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE (**Click here**)

A

2.CHECK OTHER DTC OUTPUT (VARIABLE GEAR RATIO STEERING SYSTEM)

a. Using the GTS, check for DTCs and confirm that there are no problems in the variable gear ratio steering system (Click here).

Result

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

B → GO TO VARIABLE GEAR RATIO STEERING SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (**Click here**)

A

REPLACE POWER STEERING ECU ASSEMBLY (**Click here**)

for Preparation Click here

1. INSPECT DRIVE BELT

a. Visually check the belt for excessive wear, frayed cords, etc.

Text in Illustration

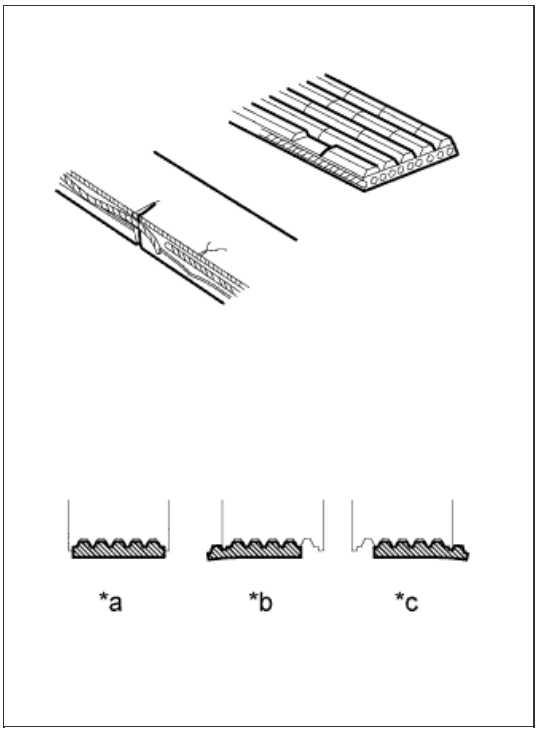
*a	Correct
*b	Incorrect
*c	Incorrect

If any defect is found, replace the drive belt.

HINT:

Cracks on the rib side of a belt are considered acceptable. Replace the belt if there are any missing ribs.

b. Check by hand that the belt fits properly in the ribbed grooves and has not slipped out of the grooves on the bottom of the crank pulley.



2. BLEED POWER STEERING SYSTEM

a. Check the fluid level.

b. Jack up the front of the vehicle and support it with stands.

c. Turn the steering wheel.

i. With the engine stopped, turn the wheel slowly from lock to lock several times.

d. Lower the vehicle.

e. Start the engine.

f. Idle the engine for a few minutes.

g. Turn the steering wheel.

i. With the engine idling, turn the wheel left or right to the full lock position and keep it there for 2 to 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 to 3 seconds. *1

ii. Repeat *1 several times.

NOTICE:

For vehicles with VGRS, if the steering wheel is turned from lock to lock repeatedly, the system may stop operating and the amount of rotation before the steering wheel locks may increase due to operation of the overheating prevention function. When the system temperature drops, the system operation automatically returns to normal.

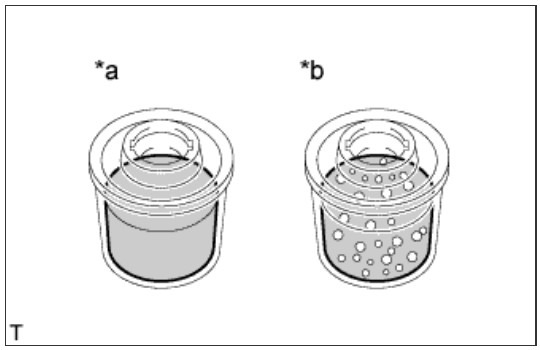
h. Stop the engine.

i. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

If the system has to be bled twice because of foaming or emulsification, check for fluid leaks in the system.



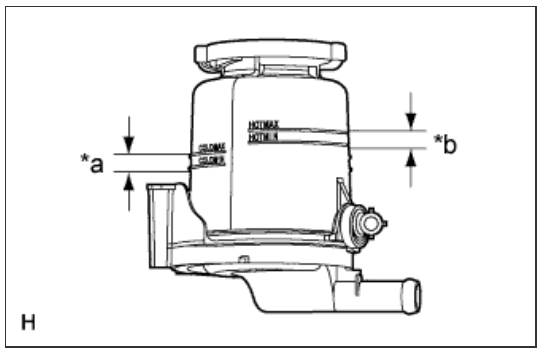
j. Check the fluid level.

3. CHECK FLUID LEVEL

a. Keep the vehicle horizontal.

Text in Illustration

*a	COLD Range
*b	HOT Range



b. With the engine stopped, check the fluid level in the reservoir.
If necessary, add fluid.

Fluid:
ATF DEXRON II or III, or equivalent

HINT:

If the fluid is hot, check that the fluid level is within the HOT range. If the fluid is cold, check that the fluid level is within the COLD range.

c. Start the engine and idle it.

d. Turn the steering wheel from lock to lock several times to raise the fluid temperature.

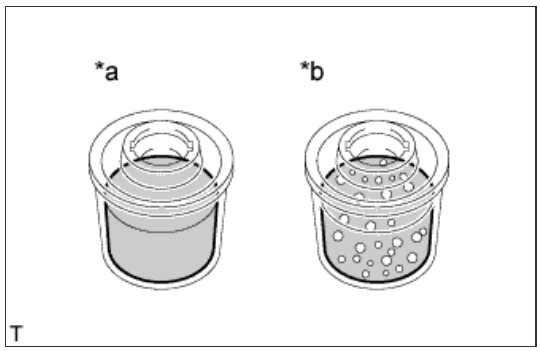
Fluid temperature:
80°C (176°F)

e. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

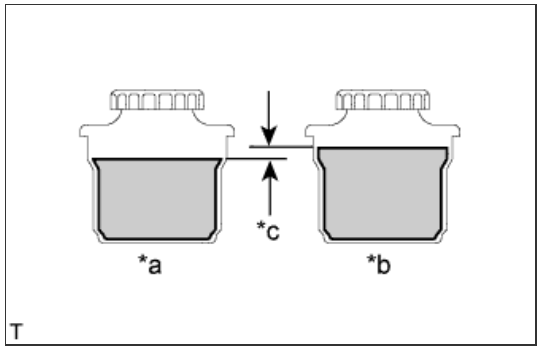
If foaming or emulsification is identified, bleed the power steering system.



f. With the engine idling, measure the fluid level in the reservoir.

Text in Illustration

*a	Engine idling
*b	Engine stopped
*c	5.0 mm (0.197 in.) or less



g. Stop the engine.

h. Wait a few minutes and remeasure the fluid level in the reservoir.

Maximum fluid level rise:
5.0 mm (0.197 in.)

If the fluid level rise is more than the maximum, bleed the power steering system.

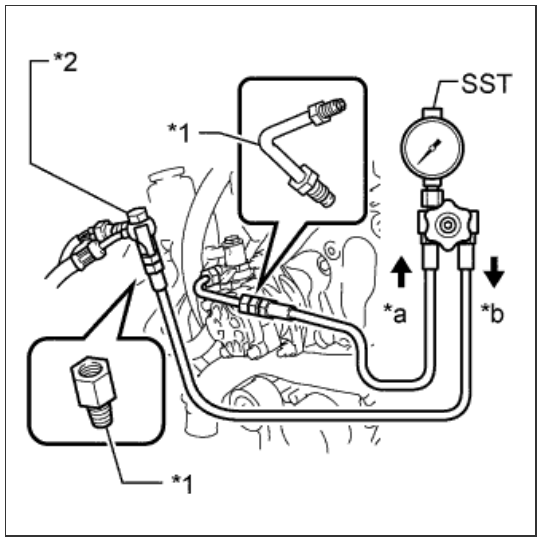
i. Check the fluid level.

4. CHECK STEERING FLUID PRESSURE

a. Disconnect the pressure feed tube from the vane pump (Click here).

b. Connect SST as shown in the illustration.

SST
09640-10010 (09641-01010, 09641-01030, 09641-01060)



Text in Illustration

*1	Attachment
*2	Pressure feed tube
*a	IN
*b	OUT

NOTICE:

Make sure that the valve of SST is in the open position.

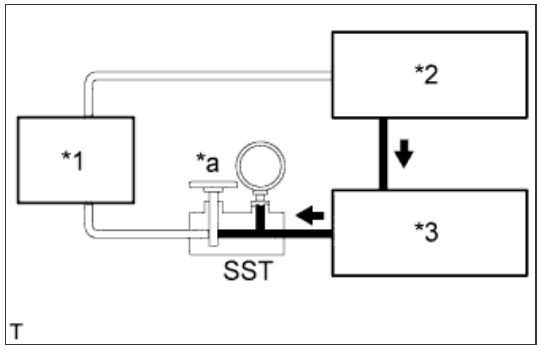
c. Bleed the power steering system.

d. Start the engine and idle it.

e. Turn the steering wheel from lock to lock several times to raise the fluid temperature.

Fluid temperature:
80°C (176°F)

f. With the engine idling, close the valve of SST and observe the reading on SST.



Standard fluid pressure:
10000 to 10700 kPa (102.0 to 109.0 kgf/cm^2, 1450 to 1551 psi)

Text in Illustration

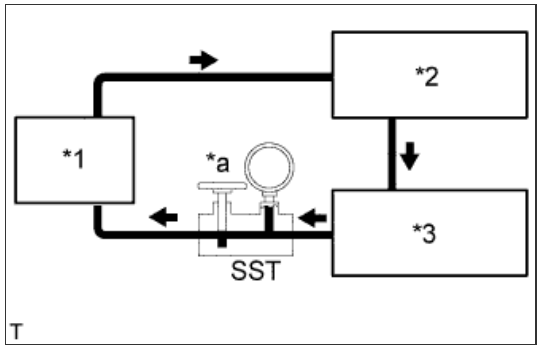
*1	Power steering gear
*2	Oil reservoir
*3	Vane pump
*a	Closed

NOTICE:

- **Do not keep the valve closed for more than 10 seconds.**
- **Do not allow the fluid temperature to become too high.**

If the pressure is less than the minimum, check for fluid leaks and replace parts as necessary.

g. With the engine idling, fully open the valve.



Text in Illustration

*1	Power steering gear
*2	Oil reservoir
*3	Vane pump
*a	Open

h. Measure the fluid pressure at engine speeds of 1000 rpm and 3000 rpm.

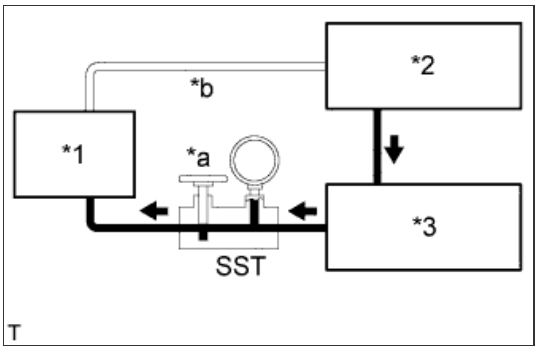
Difference in fluid pressure:
500 kPa (5.1 kgf/cm^2, 73 psi) or less

NOTICE:

Do not turn the steering wheel.

If the pressure difference is higher than the specified value, check for fluid leaks and replace parts as necessary.

i. With the engine idling and the valve fully open, turn the steering wheel left or right to the full lock position. Observe the reading on SST.



Standard fluid pressure:

10000 to 10700 kPa (102.0 to 109.0 kgf/cm^2, 1450 to 1551 psi)

Text in Illustration

*1	Power steering gear
*2	Oil reservoir
*3	Vane pump
*a	Open
*b	Lock position

NOTICE:

- **Do not keep the steering wheel in the full lock position for more than 10 seconds.**
- **Do not allow the fluid temperature to become too high.**

If the pressure is less than the minimum, check for fluid leaks and replace parts as necessary.

j. Disconnect SST.

SST

09640-10010 (09641-01010, 09641-01030, 09641-01060)

k. Connect the pressure feed tube to the vane pump (Click here).

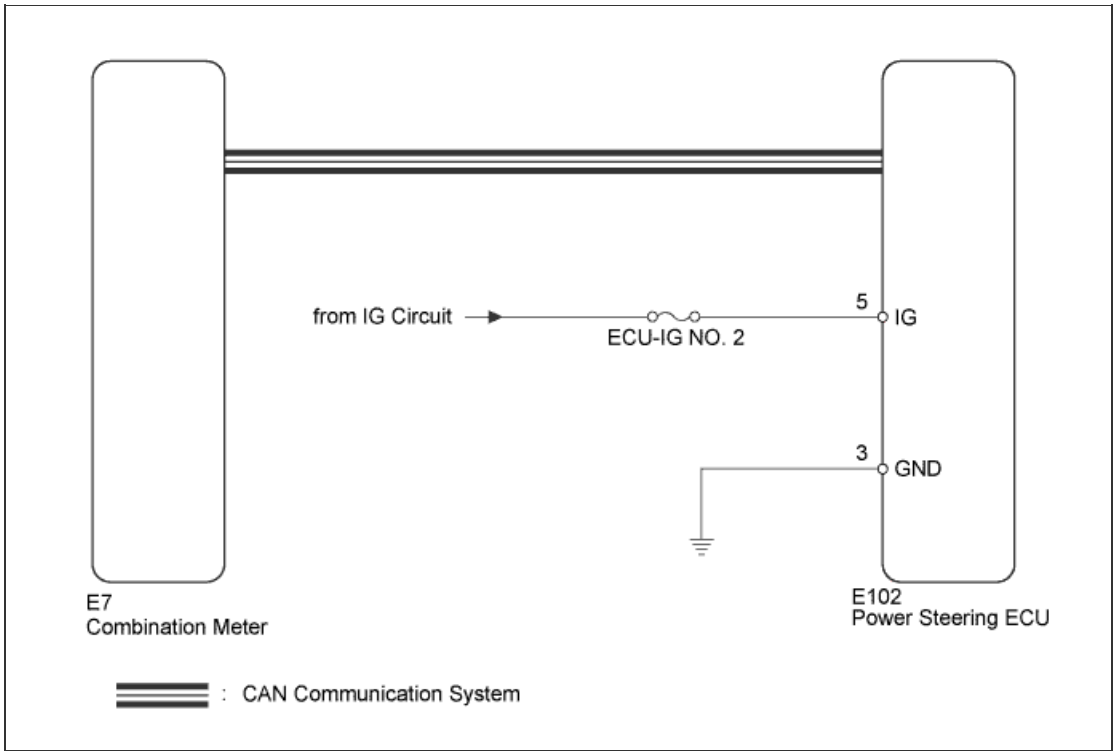
l. Bleed the power steering system.

for Preparation Click here

DESCRIPTION

The power steering ECU is connected to the combination meter via CAN communication. If the power steering ECU detects a malfunction, the power steering warning light comes on. At this time, the vehicle enters fail-safe mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

1.INSPECT CAN COMMUNICATION SYSTEM

a. Check for DTCs of the CAN communication system.
for LHD
Refer to the following procedures (Click here).
for RHD
Refer to the following procedures (Click here).

Result

Result		Proceed to
DTC is not output.		A
DTC is output.	for LHD	B
	for RHD	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

2.CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BATTERY AND BODY GROUND)

a. Disconnect the power steering ECU connector.

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

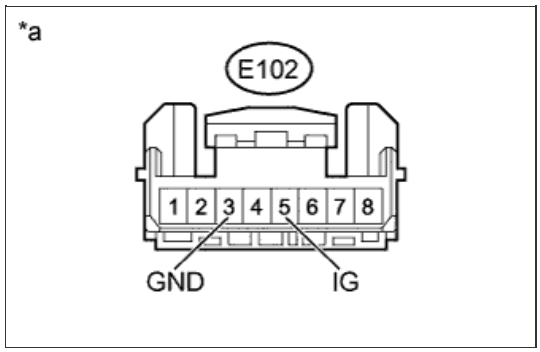
Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E102-5 (IG) - Body ground	Engine switch on (IG)	11 to 14 V

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E102-3 (GND) - Body ground	Always	Below 1 Ω



Text in Illustration

*a	Front view of wire harness connector (to Power Steering ECU)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.PERFORM ACTIVE TEST USING GTS (METER/GAUGE SYSTEM)

a. Connect the GTS to the DLC3.

b. Turn the engine switch on (IG) and turn the GTS on.

c. Perform the Active Test of the combination meter using GTS (Click here).

Combination Meter

Tester Display	Test Part	Control Range	Diagnostic Note
PPS Indicator	Power steering warning light	ON or OFF	Perform the test with the vehicle stopped and the engine idling.

d. Check that the power steering warning light operates in accordance with the Active Test.

HINT:

Reconnect the connectors and restore the vehicle to its previous condition before checking the combination meter.

OK:

The power steering warning light turns on and off in accordance with GTS operation.

NG → INSPECT METER/GAUGE SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

OK

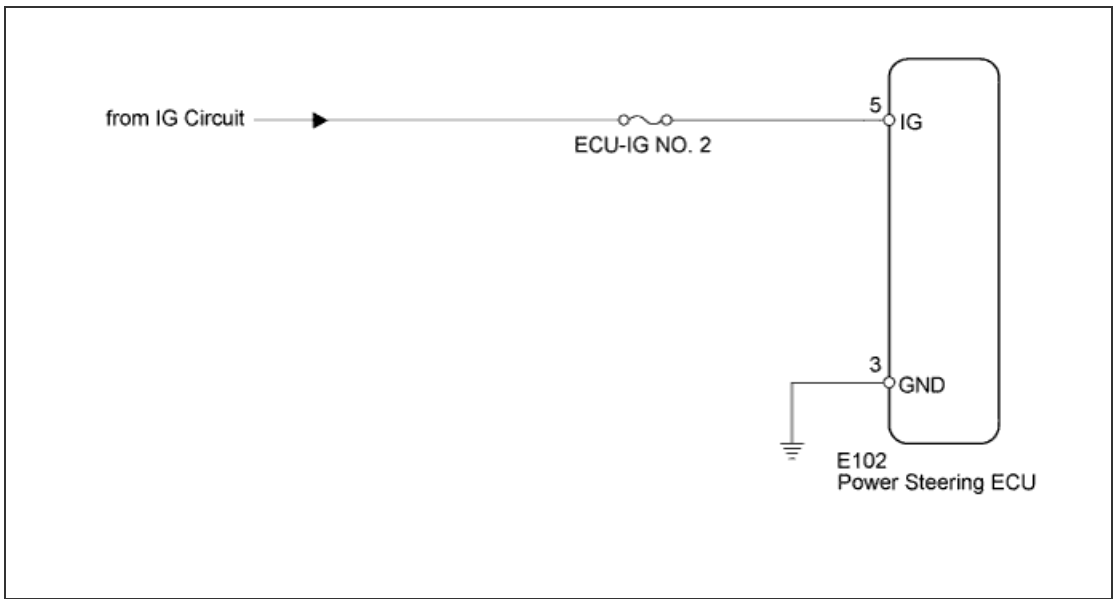
REPLACE POWER STEERING ECU ASSEMBLY (Click here)

for Preparation Click here

DESCRIPTION

When the engine switch is turned on (IG), the IG power source circuit supplies positive (+) voltage to the power steering ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

1.CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BATTERY AND BODY GROUND)

a. Disconnect the power steering ECU connector.

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

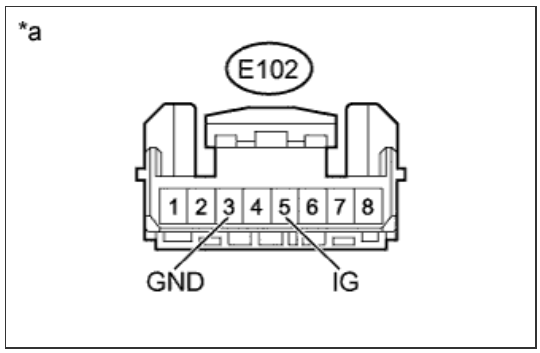
Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E102-5 (IG) - Body ground	Engine switch on (IG)	11 to 14 V

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E102-3 (GND) - Body ground	Always	Below 1 Ω



Text in Illustration

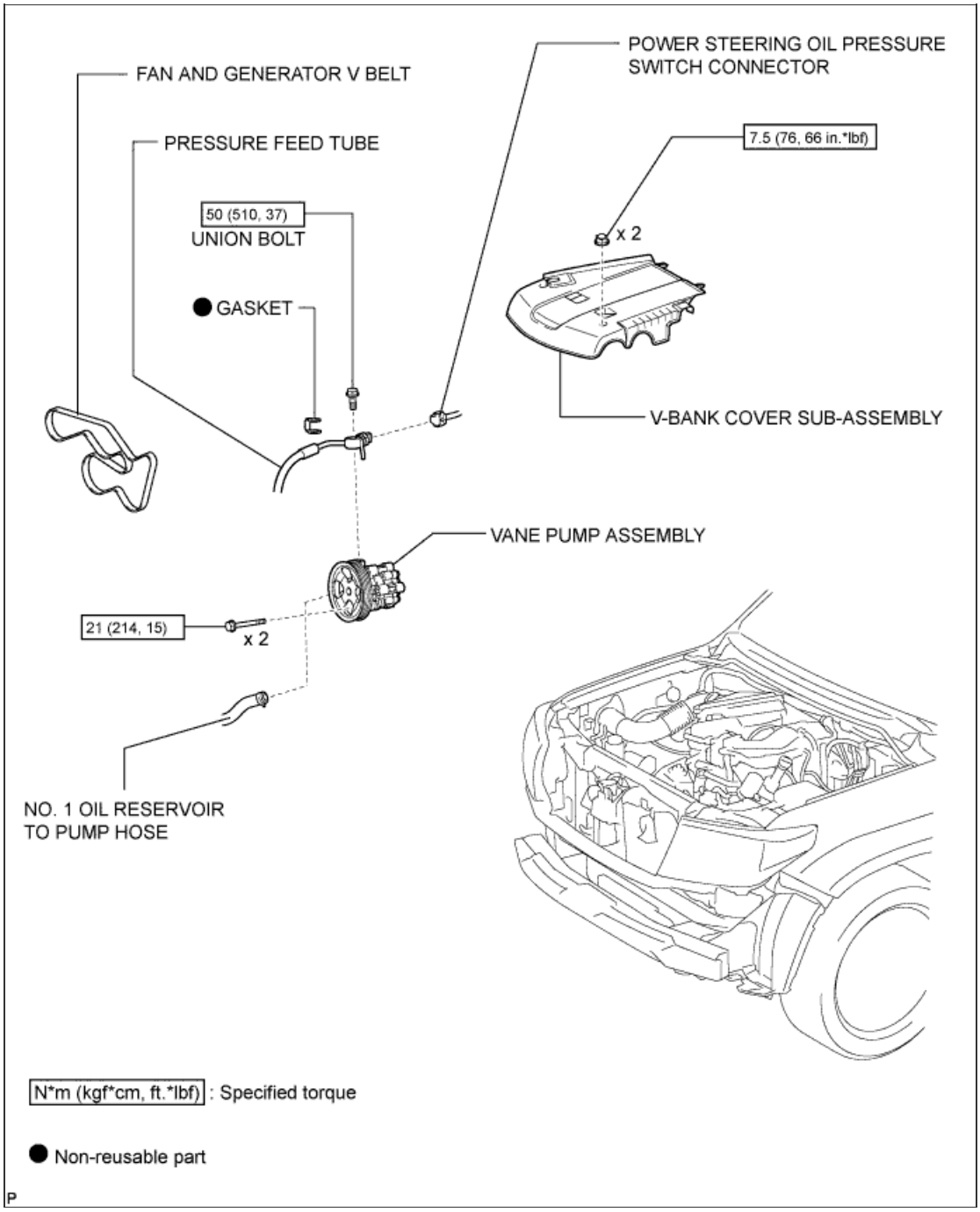
*a	Front view of wire harness connector (to Power Steering ECU)

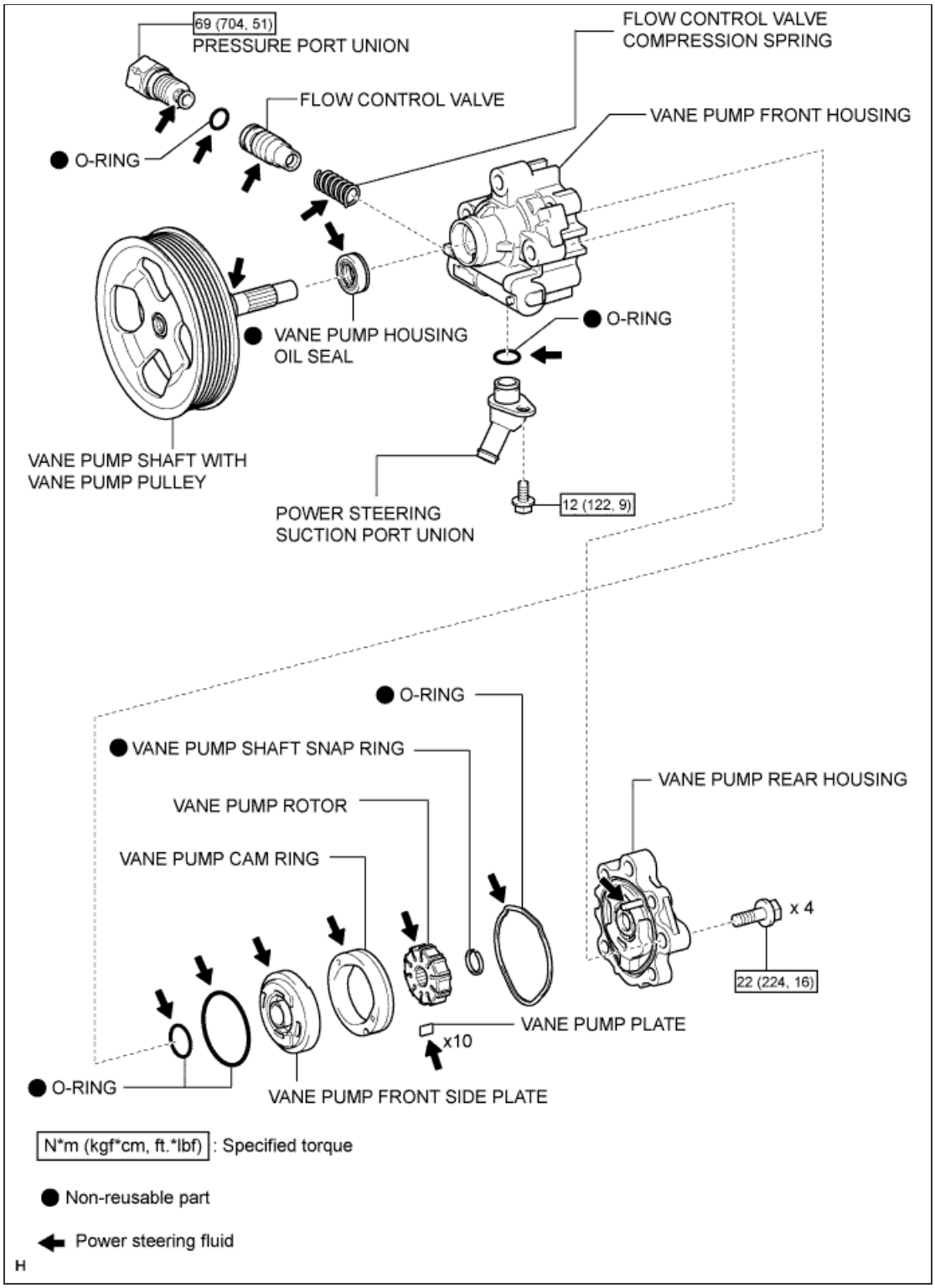
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE (Click here)

for Preparation Click here




69 (704, 51)
PRESSURE PORT UNION
FLOW CONTROL VALVE
COMPRESSION SPRING
FLOW CONTROL VALVE
VANE PUMP FRONT HOUSING
O-RING
VANE PUMP HOUSING
OIL SEAL
O-RING
VANE PUMP SHAFT WITH
VANE PUMP PULLEY
POWER STEERING
SUCTION PORT UNION
12 (122, 9)
O-RING
VANE PUMP SHAFT SNAP RING
VANE PUMP REAR HOUSING
VANE PUMP ROTOR
VANE PUMP CAM RING
x 4
22 (224, 16)
VANE PUMP PLATE
x10
O-RING
VANE PUMP FRONT SIDE PLATE
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Power steering fluid
H

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

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

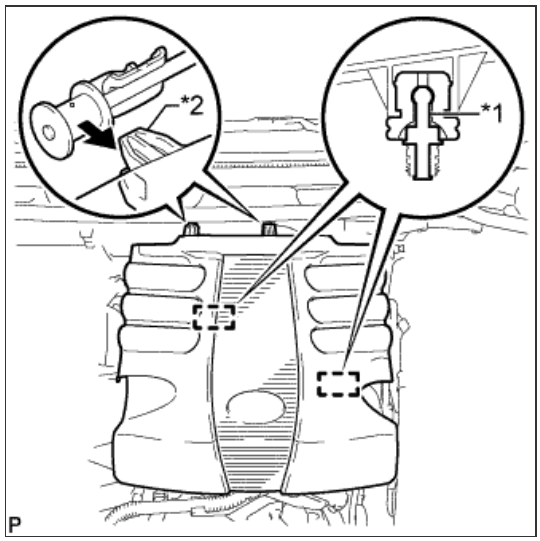
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

3. REMOVE V-BANK COVER SUB-ASSEMBLY

a. Raise the front of the V-bank cover to detach the 2 pins. Then remove the 2 V-bank cover hooks from the bracket, and remove the V-bank cover.

Text in Illustration

*1	Pin
*2	Hook



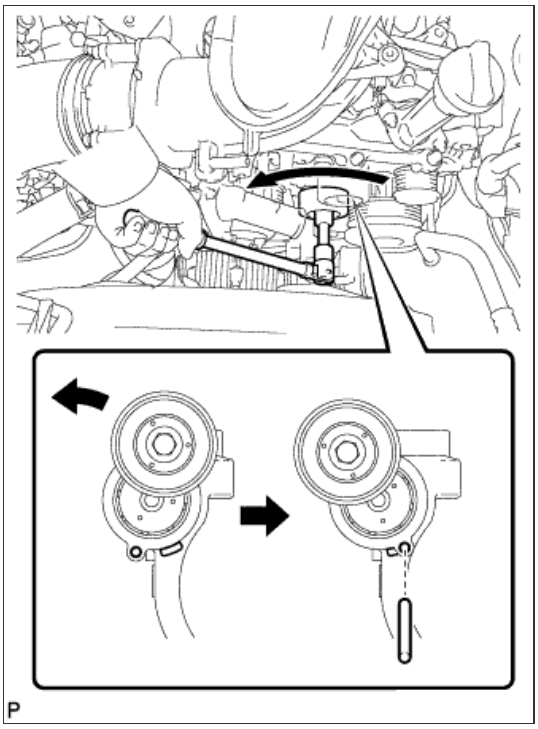
4. REMOVE FAN AND GENERATOR V BELT

a. While turning the belt tensioner counterclockwise, align the service hole for the belt tensioner and the belt tensioner fixing position, and then insert a bar with a diameter of 6 mm (0.236 in.) into the service hole to fix the belt tensioner in place.

HINT:

The pulley bolt for the belt tensioner has a left-hand thread.

b. Remove the V belt.

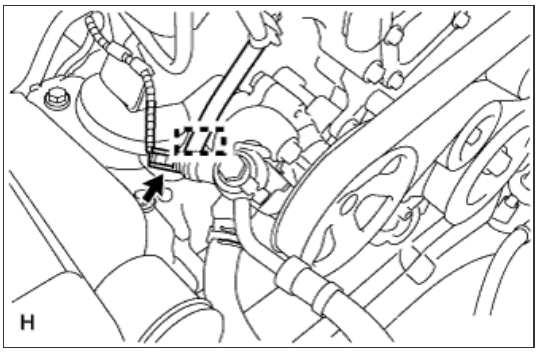


5. DRAIN POWER STEERING FLUID

6. DISCONNECT POWER STEERING OIL PRESSURE SWITCH CONNECTOR

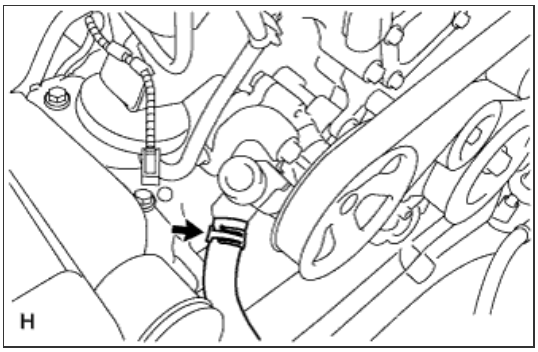
a. Disconnect the connector.

b. Detach the wire harness clamp from the bracket.



7. DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

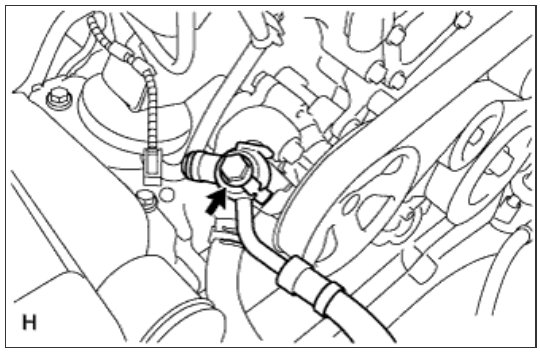
a. Slide the clip and disconnect the No.1 oil reservoir to pump hose from the vane pump.



8. DISCONNECT PRESSURE FEED TUBE

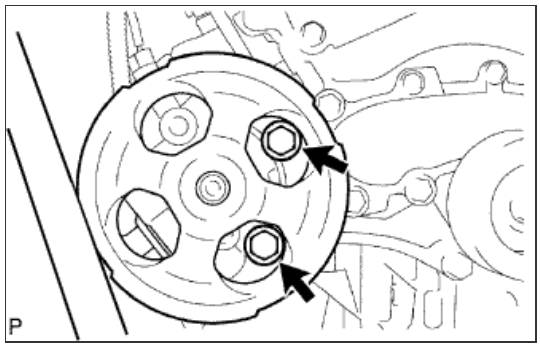
a. Remove the union bolt and disconnect the pressure feed tube.

b. Remove the gasket.



9. REMOVE VANE PUMP ASSEMBLY

a. Remove the 2 bolts and vane pump.

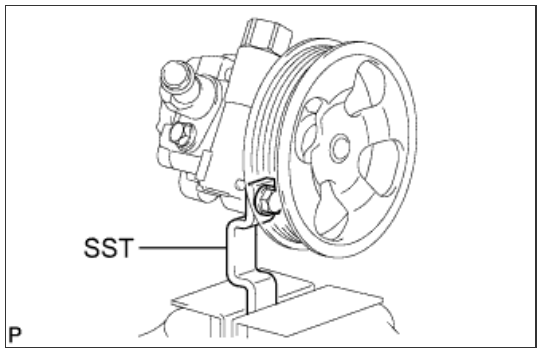


for Preparation Click here

1. FIX VANE PUMP ASSEMBLY

a. Using SST, fix the vane pump in a vise.

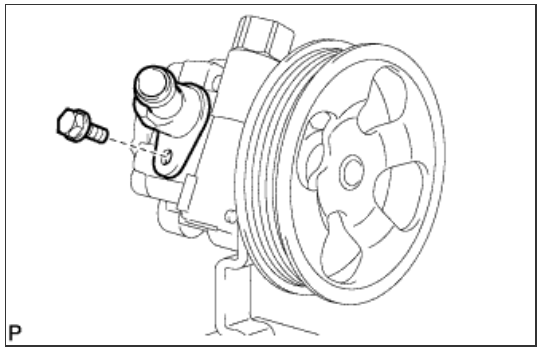
SST
09630-00014 (09631-00132)



2. REMOVE POWER STEERING SUCTION PORT UNION

a. Remove the bolt and suction port union from the vane pump.

b. Using a screwdriver, remove the O-ring from the suction port union.

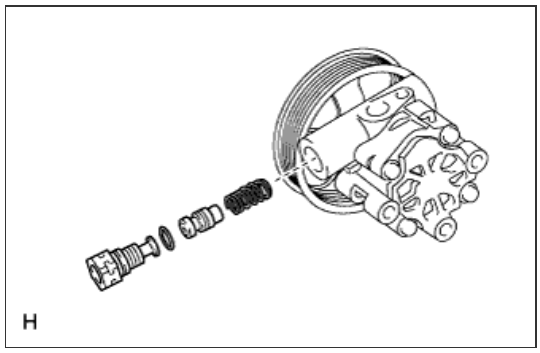


3. REMOVE FLOW CONTROL VALVE

a. Remove the pressure port union.

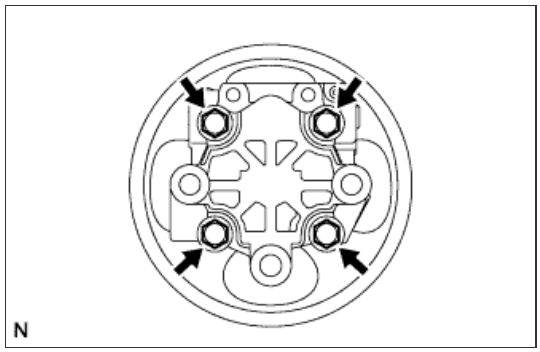
b. Remove the O-ring from the pressure port union.

c. Remove the flow control valve and compression spring.



4. REMOVE VANE PUMP REAR HOUSING

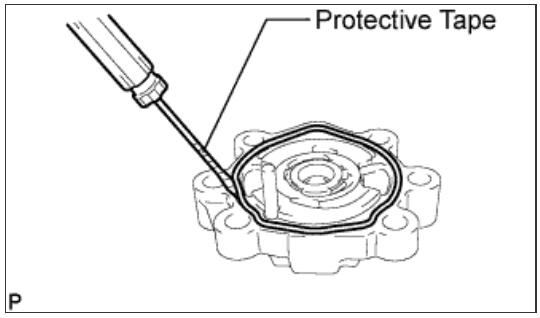
a. Remove the 4 bolts and rear housing from the front housing.



b. Using a screwdriver, remove the O-ring from the rear housing.

HINT:

Tape the screwdriver tip before use.



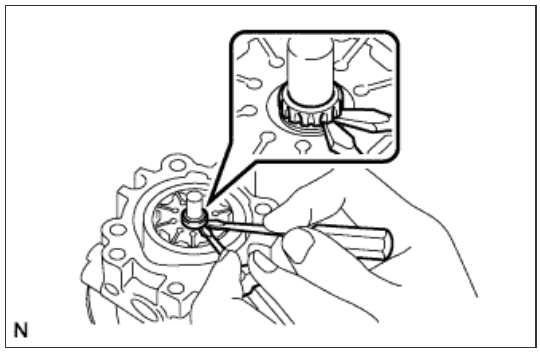
5. REMOVE VANE PUMP SHAFT WITH VANE PUMP PULLEY

a. Using 2 screwdrivers, remove the snap ring from the vane pump shaft.

b. Remove the vane pump shaft with vane pump pulley.

NOTICE:

Be careful not to drop or damage the vane pump shaft with vane pump pulley. If it is damaged, replace the vane pump assembly.



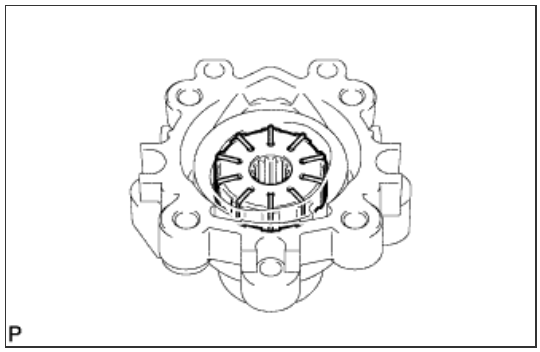
6. REMOVE VANE PUMP ROTOR

a. Remove the 10 vane pump plates.

NOTICE:

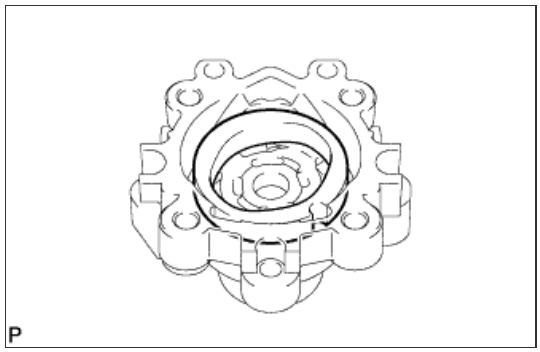
Take care not to drop the vane pump plate.

b. Remove the vane pump rotor.



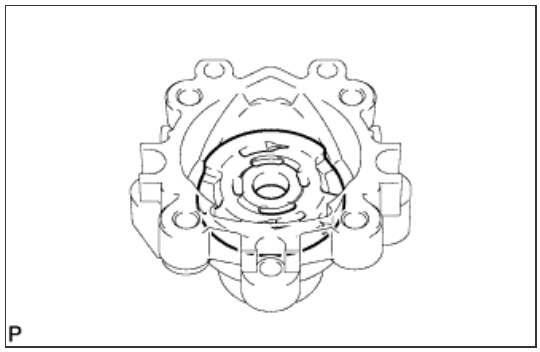
7. REMOVE VANE PUMP CAM RING

a. Remove the cam ring from the front housing.



8. REMOVE VANE PUMP FRONT SIDE PLATE

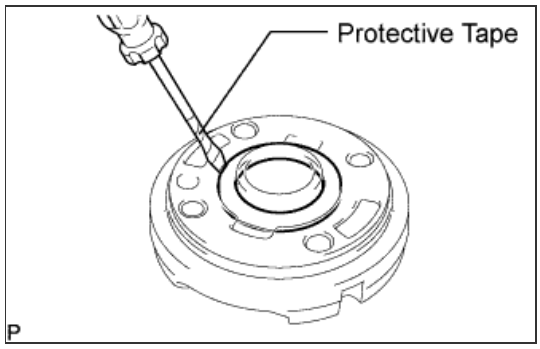
a. Remove the front side plate from the front housing.



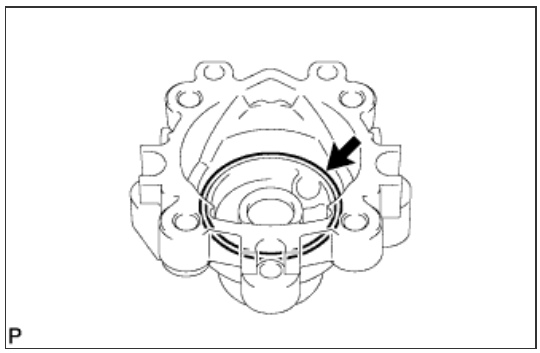
b. Using a screwdriver, remove the O-ring from the front side plate.

HINT:

Tape the screwdriver tip before use.



c. Remove the O-ring from the front housing.

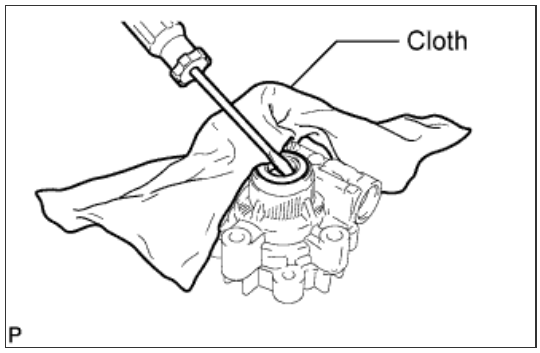


9. REMOVE VANE PUMP HOUSING OIL SEAL

a. Using a screwdriver and piece of cloth, pry out the oil seal.

NOTICE:

Be careful not to damage the front housing.


Cloth
P

for Preparation Click here

1. INSPECT VANE PUMP SHAFT AND BUSH IN VANE PUMP FRONT HOUSING

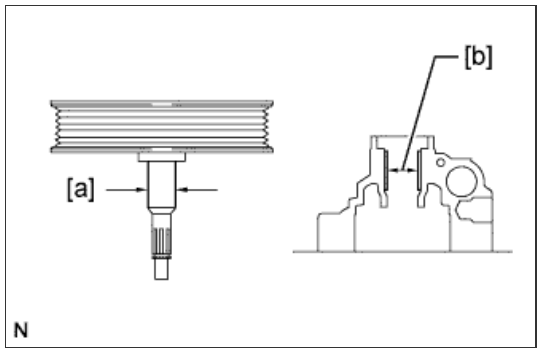
a. Using a micrometer, measure the outer diameter [a] of the vane pump shaft.

b. Using a vernier caliper, measure the inner diameter [b] of the vane pump front housing bush.

c. Calculate the oil clearance.
Oil clearance = Inner diameter of the bush [b] - Outer diameter of the shaft [a]

Maximum oil clearance:
0.07 mm (0.00276 in.)

If the oil clearance is more than the maximum, replace the vane pump assembly.

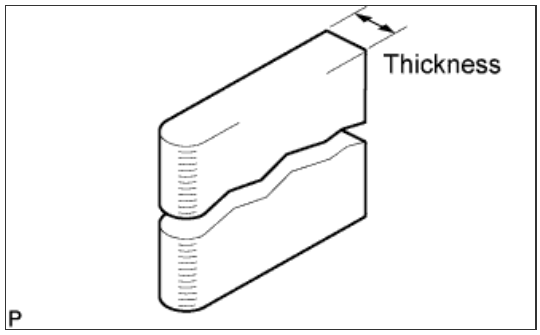


2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATE

a. Using a micrometer, measure the thickness of the vane pump plates.

Standard thickness:
1.405 to 1.411 mm (0.0553 to 0.0556 in.)

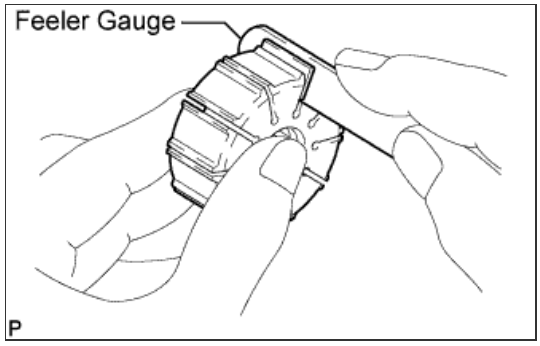
If the thickness is not as specified, replace the vane pump assembly.



b. Using a feeler gauge, measure the clearance between the side face of the vane pump rotor groove and the vane pump plate.

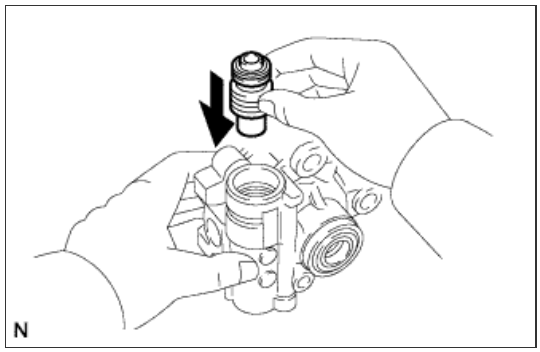
Maximum clearance:
0.03 mm (0.00118 in.)

If the clearance is more than the maximum, replace the vane pump assembly.

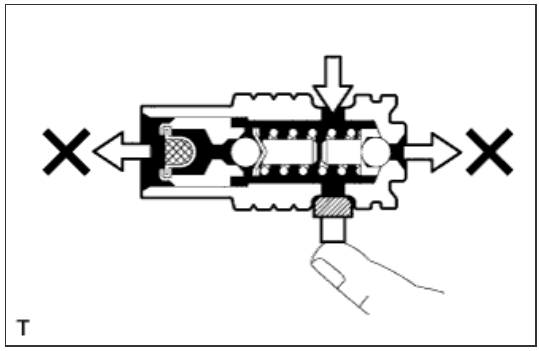


3. INSPECT FLOW CONTROL VALVE ASSEMBLY

a. Coat the flow control valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



b. Check the flow control valve for leakage. Close one of the holes and apply 390 to 490 kPa (4.0 to 5.0 kgf/cm^2, 57 to 71 psi) of compressed air into the opposite side hole, and confirm that air does not come out from the end hole.
If air leaks, replace the vane pump assembly.

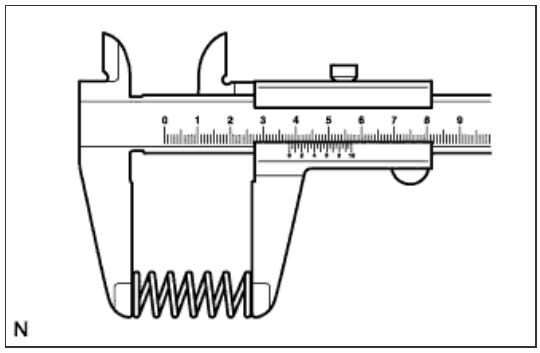


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

a. Using a vernier caliper, measure the free length of the compression spring.

Minimum free length:
31.3 mm (1.23 in.)

If the length is less than the minimum, replace the vane pump assembly.



5. INSPECT PRESSURE PORT UNION

a. Visually check the pressure port union for fluid leaks.
If there is a leak, replace the vane pump assembly.

6. INSPECT TOTAL PRELOAD

a. Check that the pump rotates smoothly without abnormal noise.

b. Temporarily install a service bolt.

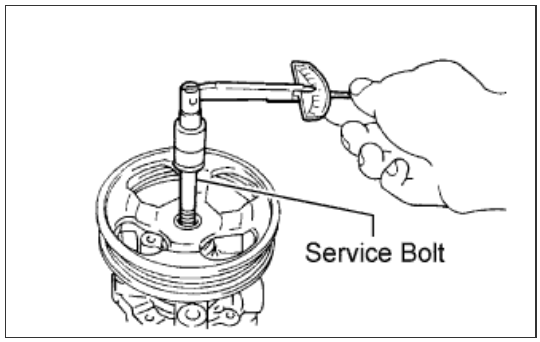
Recommended service bolt:
Thread diameter:
10 mm (0.394 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

c. Using a torque wrench, measure the pump rotating torque.

Standard rotating torque:

0.3 N*m (3 kgf*cm, 2 in.*lbf) or less

If the rotating torque is not as specified, check the vane pump housing oil seal.



for Preparation Click here

NOTICE:

When installing parts, coat the parts indicated by arrows with power steering fluid (Click here).

1. INSTALL VANE PUMP HOUSING OIL SEAL

a. Coat the lip of a new oil seal with power steering fluid.

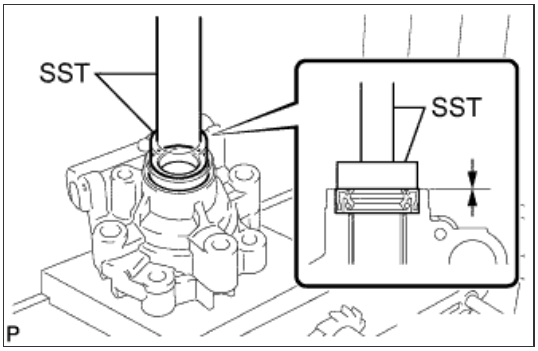
b. Using SST and a press, press in the oil seal.

SST

09950-60010 (09951-00280)
09950-70010 (09951-07100)

NOTICE:

Make sure that the oil seal is installed facing in the correct direction as shown in the illustration.



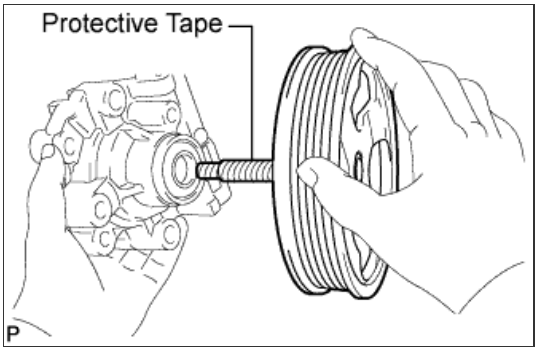
2. INSTALL VANE PUMP SHAFT WITH VANE PUMP PULLEY

a. Coat the inside surface of the bushing in the vane pump front housing with power steering fluid.

b. Gradually insert the vane pump shaft with vane pump pulley.

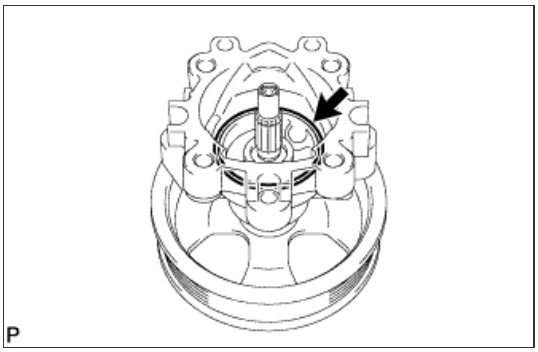
NOTICE:

- **Do not damage the lip of the oil seal in the front housing.**
- **Wrap protective tape around the spline of the vane pump shaft with vane pump pulley in order to prevent damage to the oil seal.**

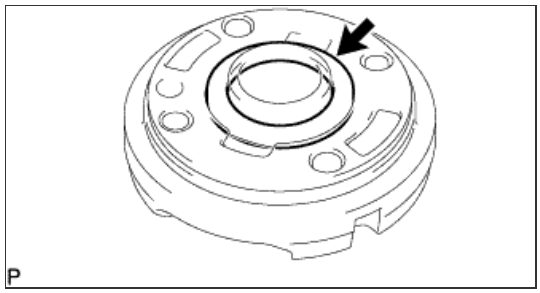


3. INSTALL VANE PUMP FRONT SIDE PLATE

a. Coat a new O-ring with power steering fluid and install it into the front housing.



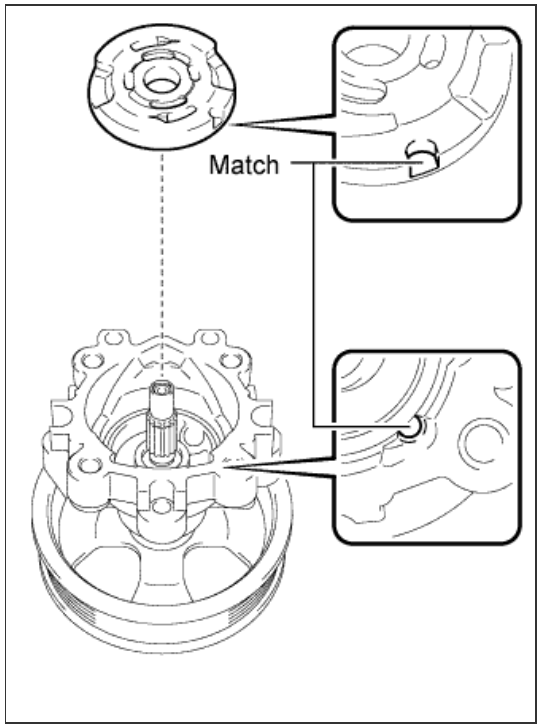
b. Coat a new O-ring with power steering fluid and install it onto the front side plate.



c. Align the notch of the front side plate with the notch of the front housing, and install the front side plate.

NOTICE:

Make sure that the front side plate is installed facing in the correct direction.

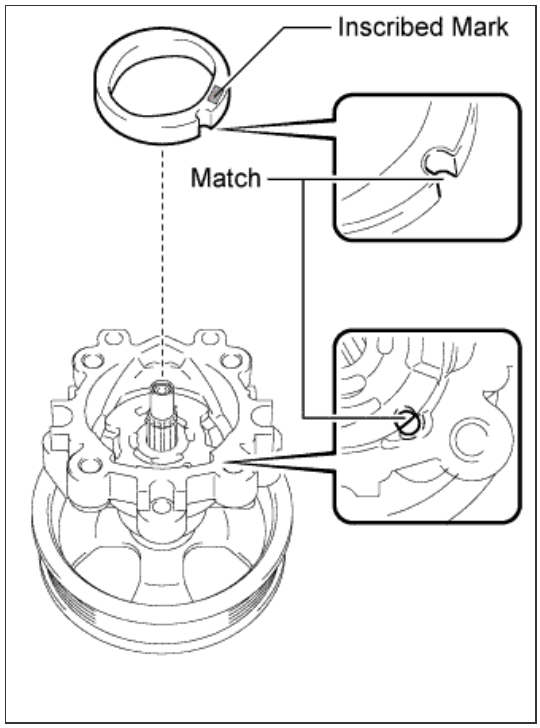


4. INSTALL VANE PUMP CAM RING

a. Align the notch of the cam ring with the notch of the front side plate, and install the cam ring with the inscribed mark facing upward.

NOTICE:

Make sure that the cam ring is installed facing in the correct direction.



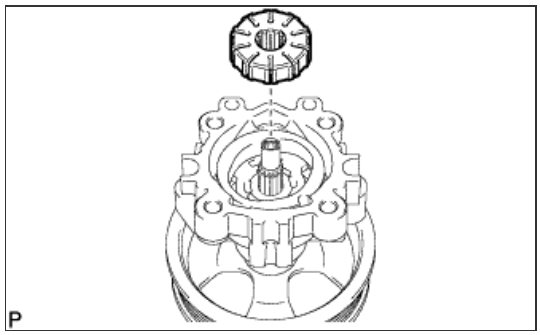
5. INSTALL VANE PUMP ROTOR

a. Install the vane pump rotor.

HINT:

The vane pump rotor can be installed in both directions.

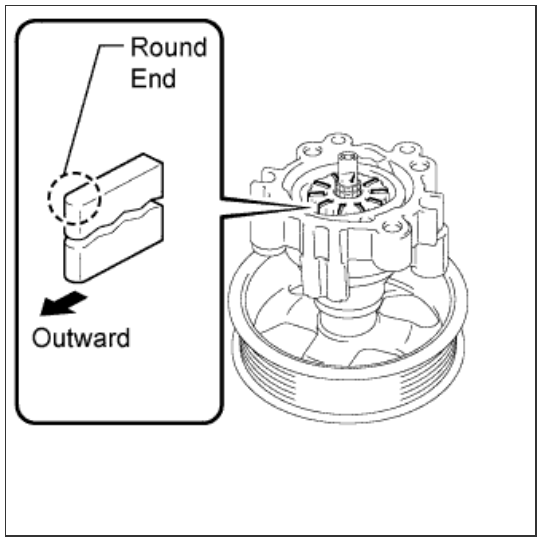
b. Coat the 10 vane pump plates with power steering fluid.



c. Install the vane pump plates with the round end facing outward.

NOTICE:

Make sure that the vane pump plates are installed facing in the correct direction.

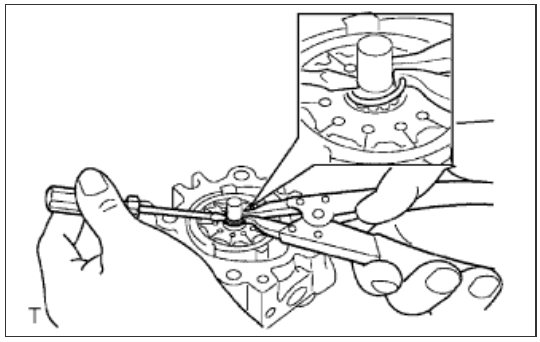


6. INSTALL VANE PUMP SHAFT SNAP RING

a. Using a screwdriver and snap ring expander, install a new shaft snap ring onto the vane pump shaft.

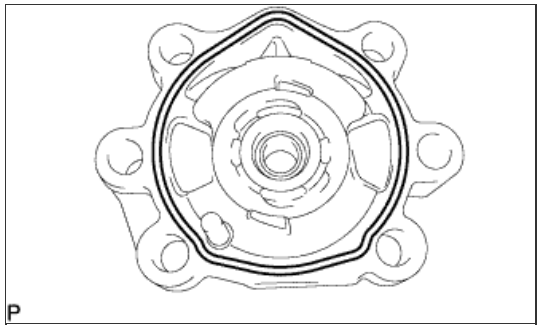
NOTICE:

- **Do not expand the shaft snap ring any further than needed.**
- **Make sure that the shaft snap ring is completely fit into the groove.**
- **Do not damage the vane pump rotor and shaft.**



7. INSTALL VANE PUMP REAR HOUSING

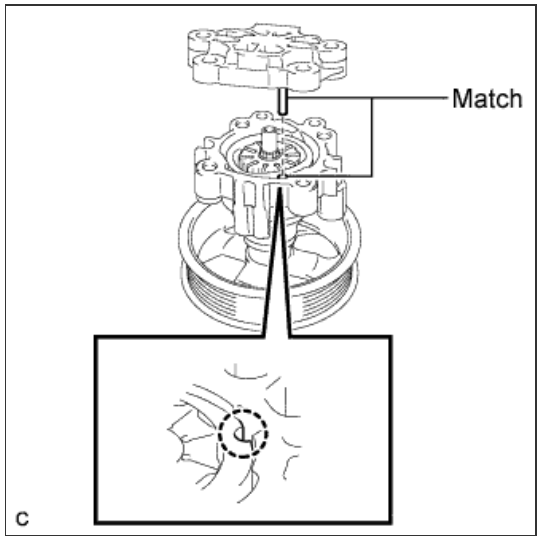
a. Coat a new O-ring with power steering fluid and install it onto the rear housing.



b. Align the straight pin of the rear housing with the notches of the cam ring, front side plate, and front housing.

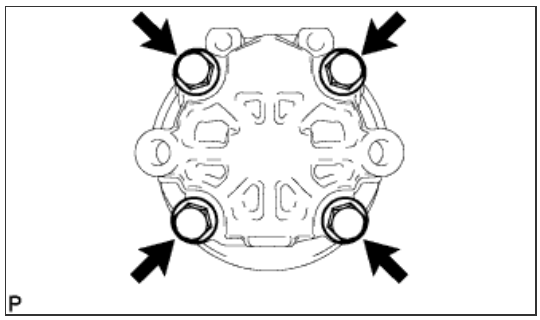
NOTICE:

Make sure that the O-ring is not protruding anywhere when installing the vane pump rear housing.



c. Install the rear housing with the 4 bolts.

Torque:
22 N*m{ 224 kgf*cm , 16 ft.*lbf }



8. INSPECT TOTAL PRELOAD

a. Check that the pump rotates smoothly without abnormal noise.

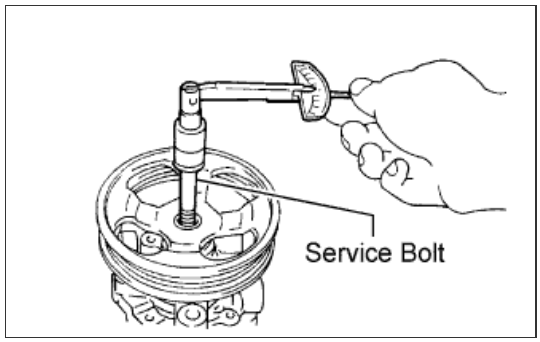
b. Temporarily install a service bolt.

Recommended service bolt:
Thread diameter:
10 mm (0.394 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

c. Using a torque wrench, measure the pump rotating torque.

Standard rotating torque:
0.3 N*m (3 kgf*cm, 2 in.*lbf) or less

If the rotating torque is not as specified, check the vane pump housing oil seal.



9. INSTALL FLOW CONTROL VALVE ASSEMBLY

a. Coat the flow control valve with power steering fluid.

b. Install the compression spring and flow control valve to the front housing.

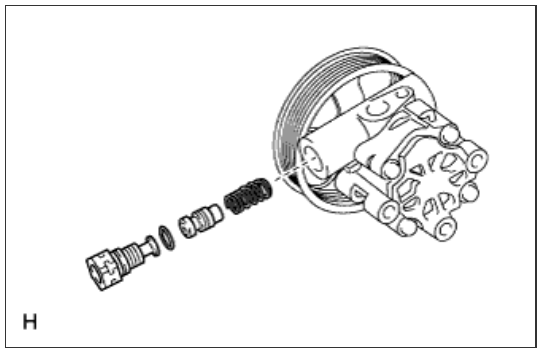
NOTICE:

Do not mistake the direction of the control valve.

c. Coat a new O-ring with power steering fluid and install it onto the pressure port union.

d. Install the pressure port union to the front housing.

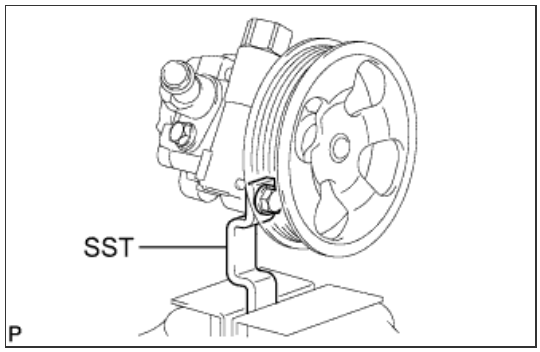
Torque:
69 N*m{ 704 kgf*cm , 51 ft.*lbf }



10. FIX VANE PUMP ASSEMBLY

a. Using SST, fix the vane pump in a vise.

SST
09630-00014 (09631-00132)

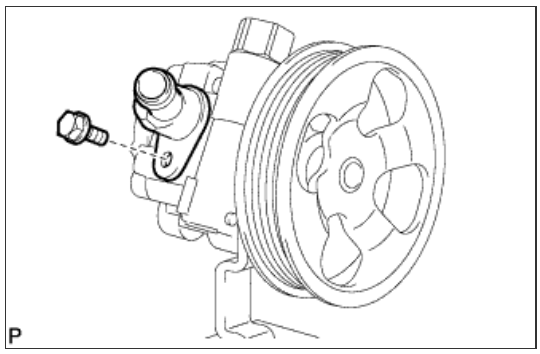


11. INSTALL POWER STEERING SUCTION PORT UNION

a. Coat a new O-ring with power steering fluid and install it to the suction port union.

b. Install the suction port union to the vane pump with the bolt.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }

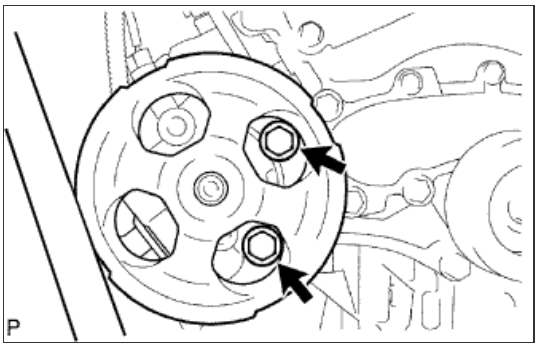


for Preparation Click here

1. INSTALL VANE PUMP ASSEMBLY

a. Install the vane pump with the 2 bolts.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }

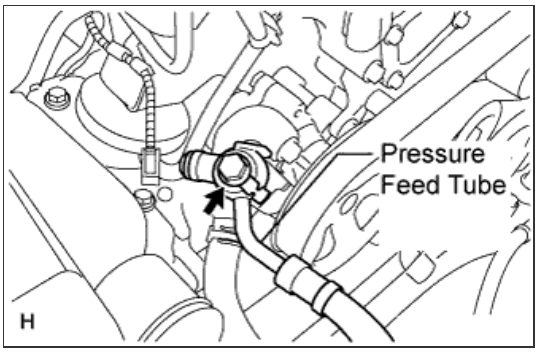


2. CONNECT PRESSURE FEED TUBE

a. Install a new gasket to the pressure feed tube.

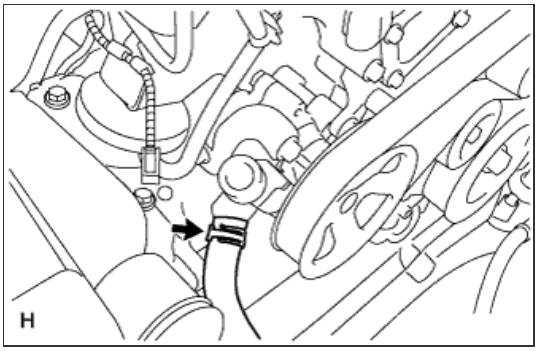
b. Connect the pressure feed tube and install the union bolt.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }



3. CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

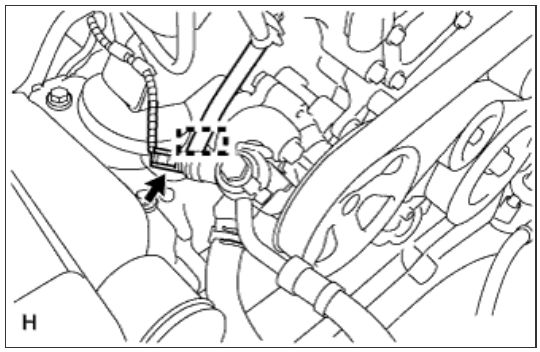
a. Connect the No.1 oil reservoir to pump hose to the vane pump assembly with the clip.



4. CONNECT POWER STEERING OIL PRESSURE SWITCH CONNECTOR

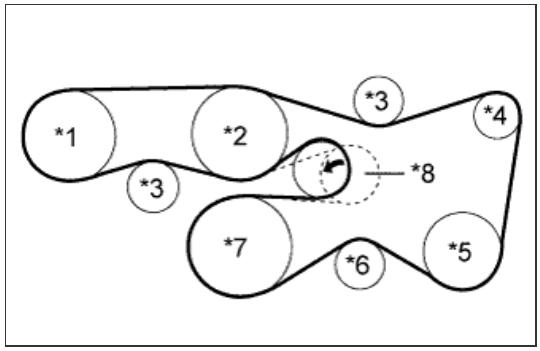
a. Connect the connector.

b. Attach the wire harness clamp to the bracket.



5. INSTALL FAN AND GENERATOR V BELT

a. Set the V belt onto every part.



Text in Illustration

*1	Vane Pump
*2	Water Pump
*3	No. 2 Idler
*4	Generator
*5	Cooler Compressor or Idler Pulley
*6	No. 1 Idler
*7	Crankshaft
*8	V-ribbed Belt Tensioner

b. While turning the belt tensioner counterclockwise, remove the pin.

NOTICE:

Make sure that the V belt is properly installed to each pulley.

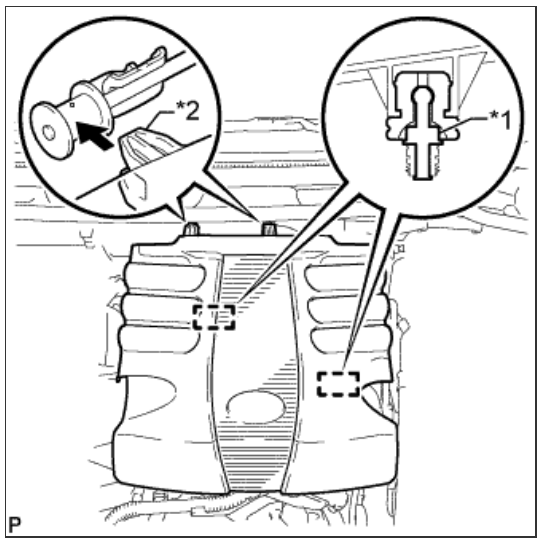
c. Check that the belt fits properly in the ribbed grooves.

HINT:

Make sure to check by hand that the belt has not slipped out of the grooves on the bottom of the pulley.

6. INSTALL V-BANK COVER SUB-ASSEMBLY

a. Attach the 2 V-bank cover hooks to the bracket. Then align the 2 V-bank cover grommets with the 2 pins and press down on the V-bank cover to attach the pins.



Text in Illustration

*1	Pin
*2	Hook

7. INSTALL FRONT WHEEL RH

8. ADD POWER STEERING FLUID

9. BLEED POWER STEERING FLUID

a. Check the fluid level.

b. Jack up the front of the vehicle and support it with stands.

c. Turn the steering wheel.

i. With the engine stopped, turn the wheel slowly from lock to lock several times.

d. Lower the vehicle.

e. Start the engine.

f. Idle the engine for a few minutes.

g. Turn the steering wheel.

i. With the engine idling, turn the wheel left or right to the full lock position and keep it there for 2 to 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 to 3 seconds. *1

ii. Repeat *1 several times.

NOTICE:

For vehicles with VGRS, if the steering wheel is turned from lock to lock repeatedly, the system may stop operating and the amount of rotation before the steering wheel locks may increase due to operation of the overheating prevention function. When the system temperature drops, the system operation automatically returns to normal.

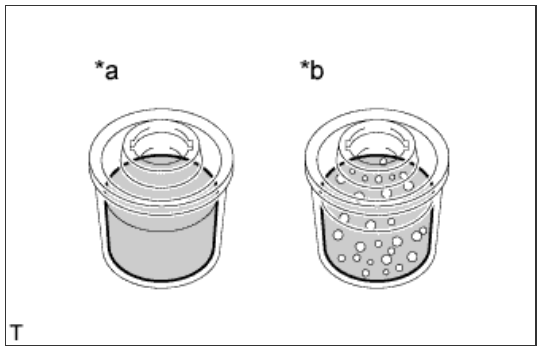
h. Stop the engine.

i. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

If the system has to be bled twice because of foaming or emulsification, check for fluid leaks in the system.



j. Check the fluid level.

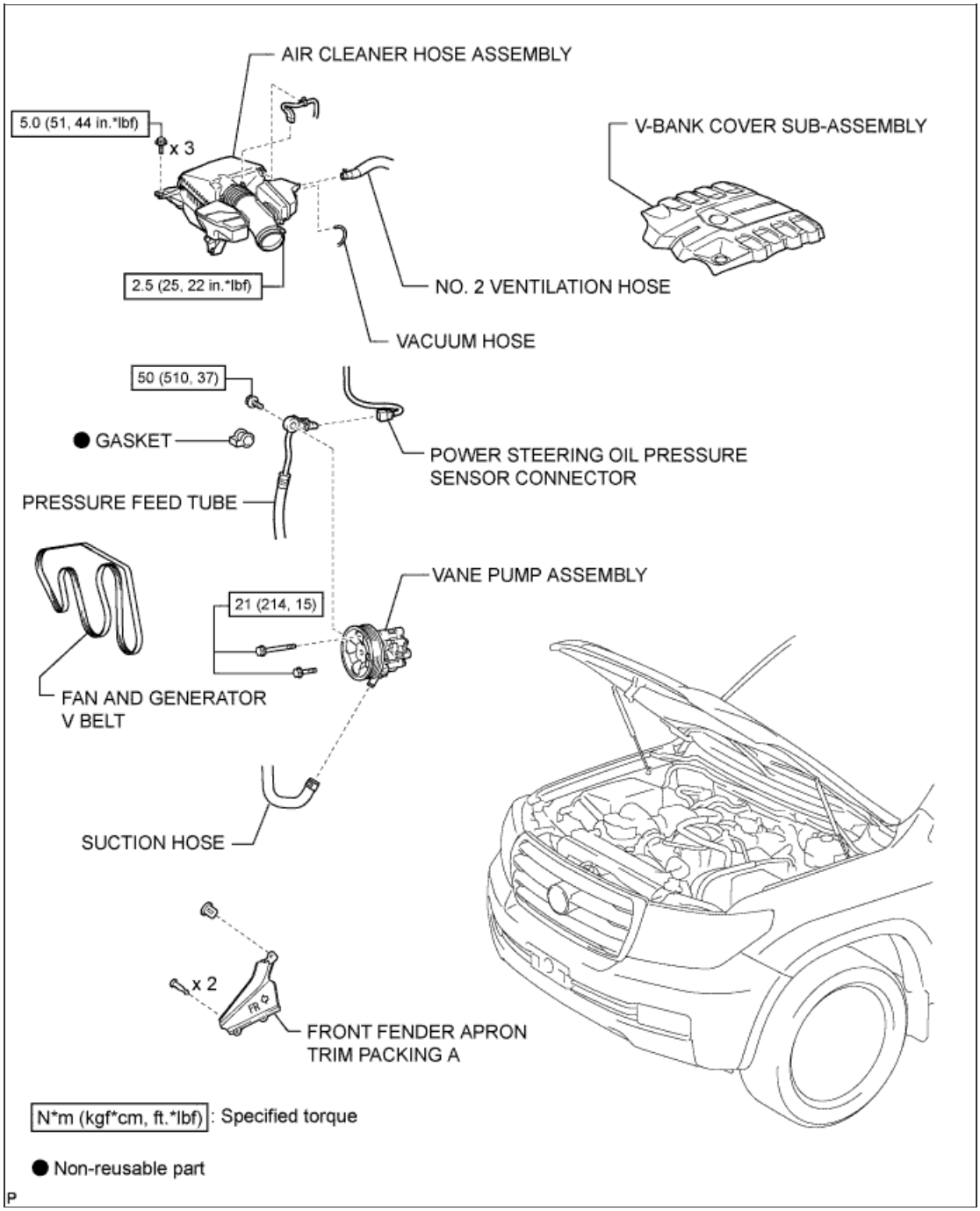
10. INSPECT FOR POWER STEERING FLUID LEAK

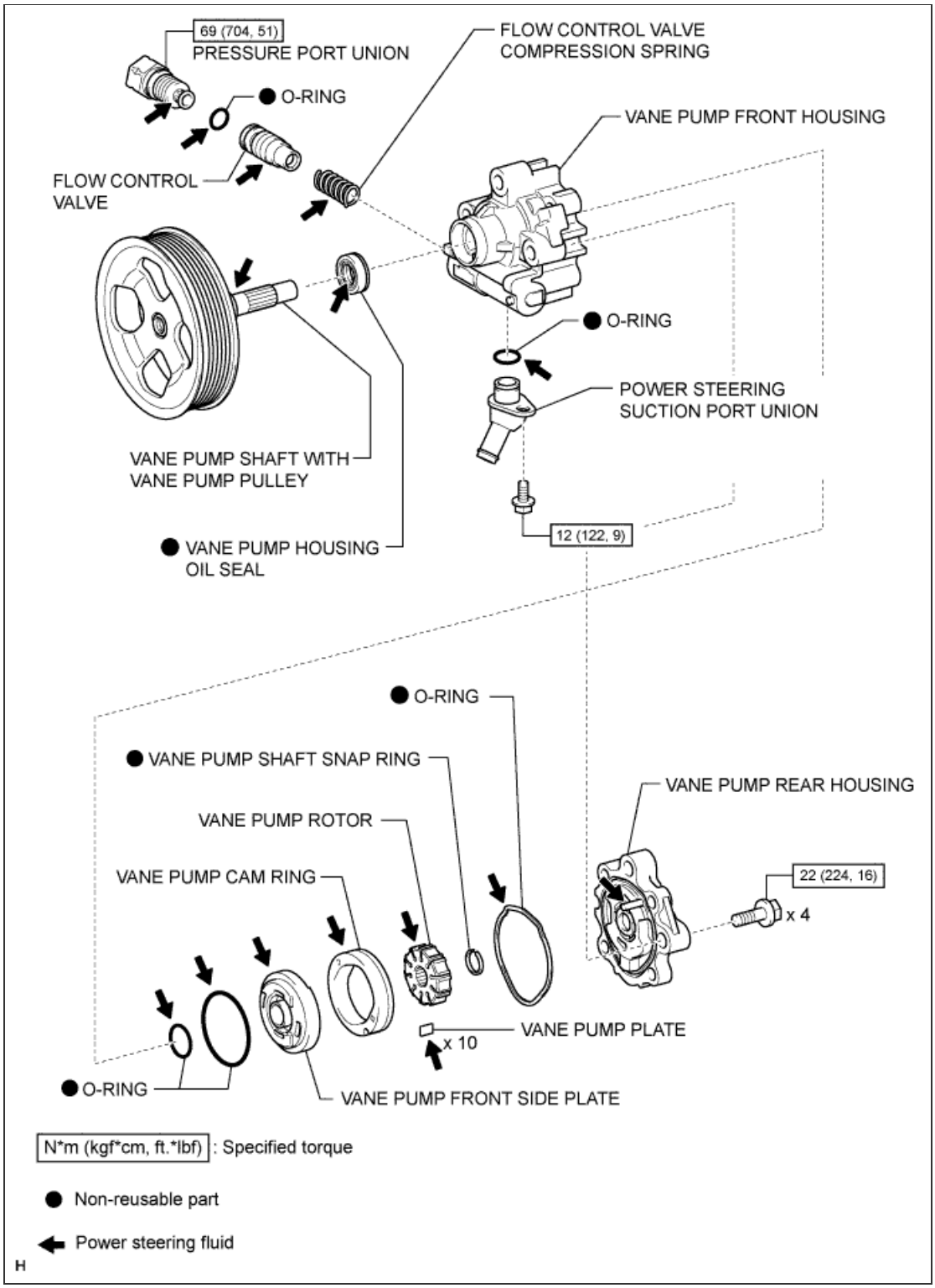
11. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here




69 (704, 51)
PRESSURE PORT UNION
O-RING
FLOW CONTROL VALVE
COMPRESSION SPRING
VANE PUMP FRONT HOUSING
FLOW CONTROL VALVE
O-RING
POWER STEERING SUCTION PORT UNION
VANE PUMP SHAFT WITH VANE PUMP PULLEY
12 (122, 9)
VANE PUMP HOUSING OIL SEAL
O-RING
VANE PUMP SHAFT SNAP RING
VANE PUMP REAR HOUSING
VANE PUMP ROTOR
VANE PUMP CAM RING
22 (224, 16)
x 4
VANE PUMP PLATE
x 10
O-RING
VANE PUMP FRONT SIDE PLATE
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Power steering fluid
H

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

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

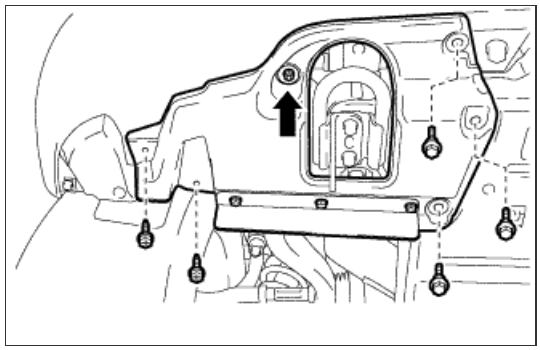
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

3. REMOVE FRONT WHEEL RH

4. REMOVE FRONT FENDER APRON TRIM PACKING A

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 RH.

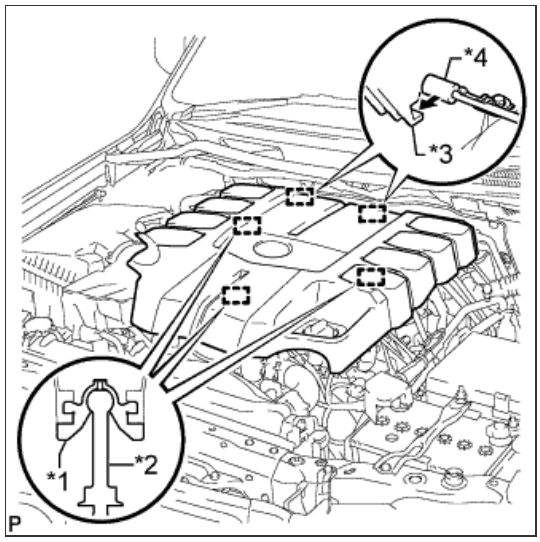


5. REMOVE V-BANK COVER SUB-ASSEMBLY

a. Raise the front of the V-bank cover to detach the 3 pins. Then remove the 2 V-bank cover hooks from the bracket, and remove the V-bank cover.

Text in Illustration

*1	Grommet
*2	Pin
*3	Hook
*4	Bracket

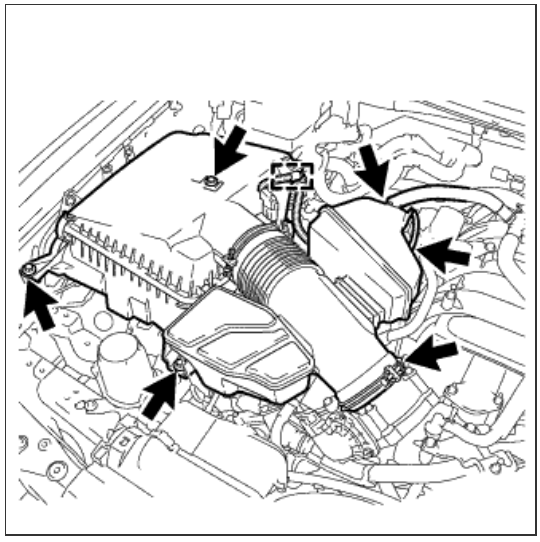


6. REMOVE AIR CLEANER AND HOSE

a. Disconnect the No. 2 PCV hose and No. 1 air hose.

b. Disconnect the mass air flow meter connector and detach the clamp.

c. Remove the 3 bolts and loosen the hose clamp, and then remove the air cleaner and hose.



7. REMOVE FAN AND GENERATOR V BELT

a. While turning the belt tensioner counterclockwise, align the service hole for the belt tensioner and the belt tensioner fixing position, and then insert a bar with a diameter of 5 mm (0.197 in.) into the service hole to fix the belt tensioner in place.

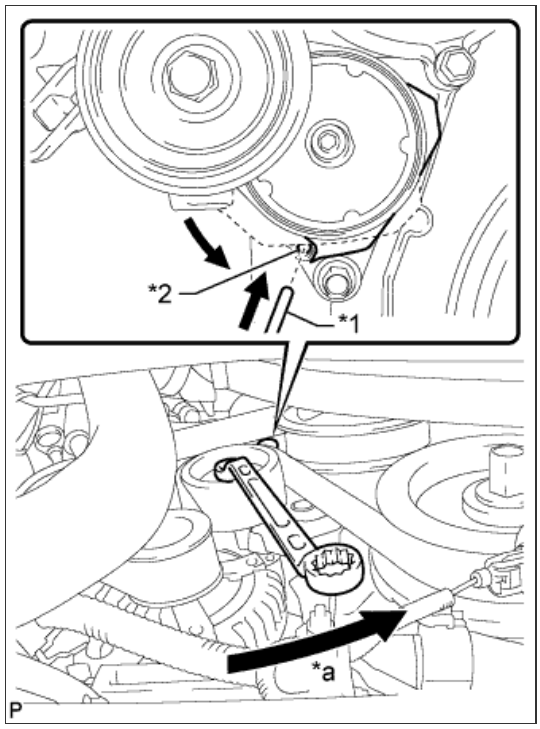
Text in Illustration

*1	Bar
*2	Service Hole
*a	Turn

HINT:

The pulley bolt for the belt tensioner has a left-hand thread.

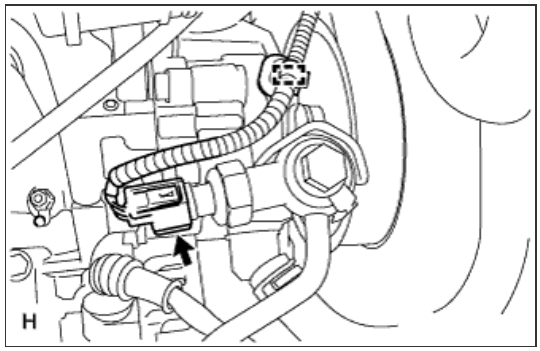
b. Remove the fan and generator V belt.



8. DRAIN POWER STEERING FLUID

9. DISCONNECT POWER STEERING OIL PRESSURE SENSOR CONNECTOR

a. Detach the wire harness clamp and disconnect the connector.



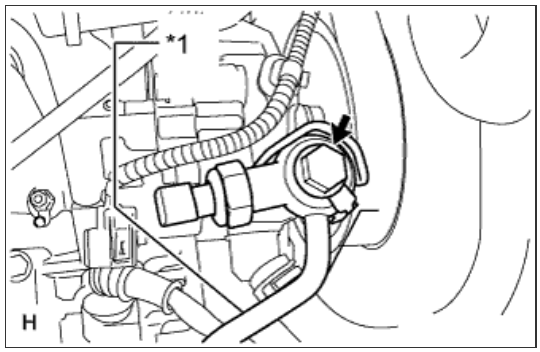
10. DISCONNECT PRESSURE FEED TUBE

a. Remove the bolt and disconnect the pressure feed tube.

Text in Illustration

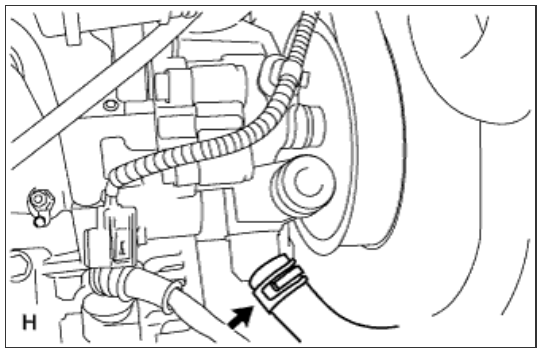
*1	Pressure Feed Tube

b. Remove the gasket.



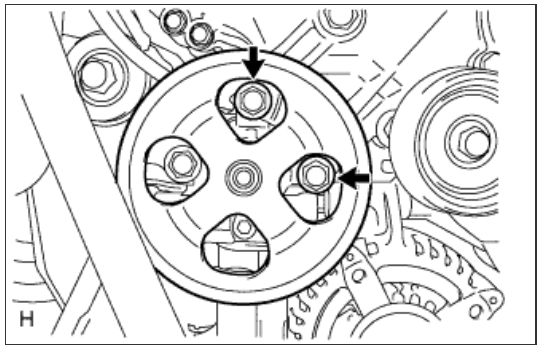
11. DISCONNECT SUCTION HOSE

a. Slide the clip and disconnect the suction hose from the vane pump.



12. REMOVE VANE PUMP ASSEMBLY

a. Remove the 2 bolts and vane pump.

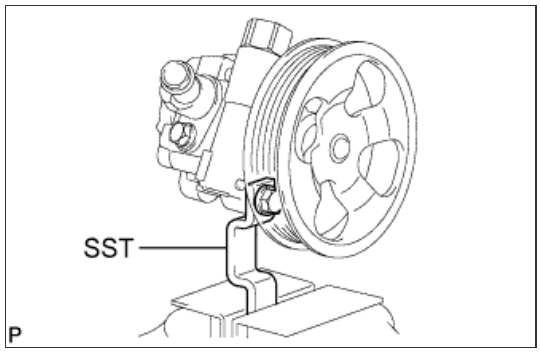


for Preparation Click here

1. FIX VANE PUMP ASSEMBLY

a. Using SST, fix the vane pump in a vise.

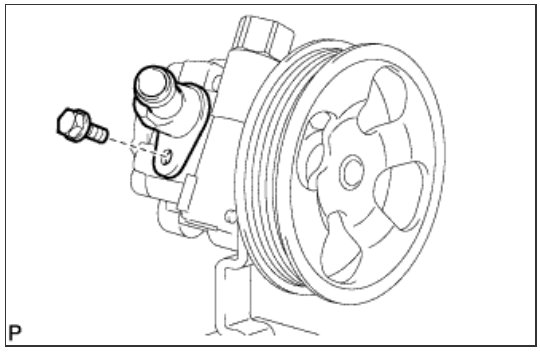
SST
09630-00014 (09631-00132)



2. REMOVE POWER STEERING SUCTION PORT UNION

a. Remove the bolt and suction port union from the vane pump.

b. Using a screwdriver, remove the O-ring from the suction port union.

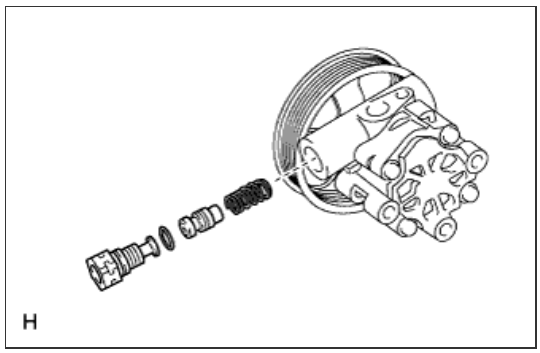


3. REMOVE FLOW CONTROL VALVE

a. Remove the pressure port union.

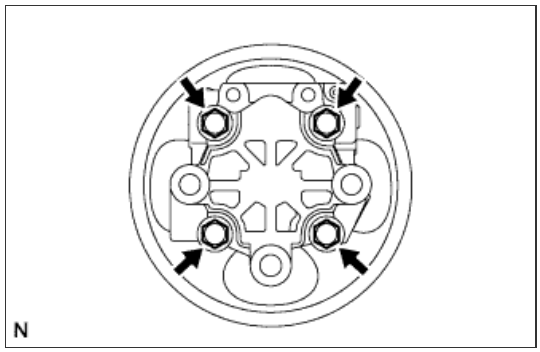
b. Remove the O-ring from the pressure port union.

c. Remove the flow control valve and compression spring.



4. REMOVE VANE PUMP REAR HOUSING

a. Remove the 4 bolts and rear housing from the front housing.



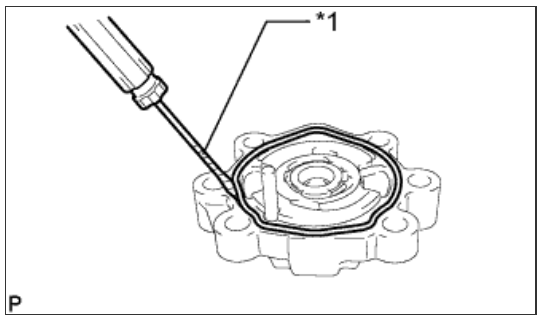
b. Using a screwdriver, remove the O-ring from the rear housing.

Text in Illustration

*1	Protective Tape

HINT:

Tape the screwdriver tip before use.



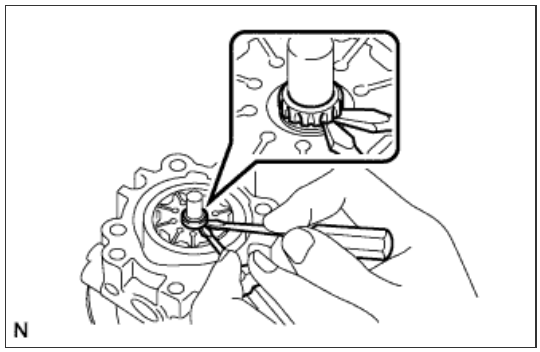
5. REMOVE VANE PUMP SHAFT WITH VANE PUMP PULLEY

a. Using 2 screwdrivers, remove the snap ring from the vane pump shaft.

b. Remove the vane pump shaft with vane pump pulley.

NOTICE:

Be careful not to drop or damage the vane pump shaft with vane pump pulley. If it is damaged, replace the vane pump assembly.



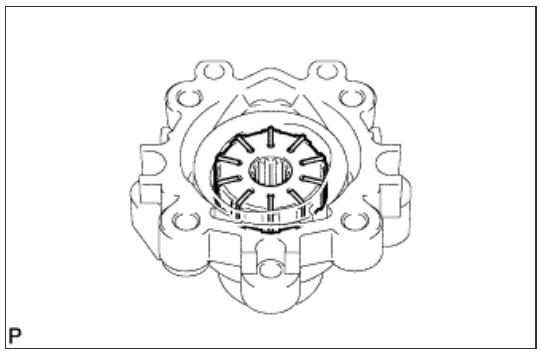
6. REMOVE VANE PUMP ROTOR

a. Remove the 10 vane pump plates.

NOTICE:

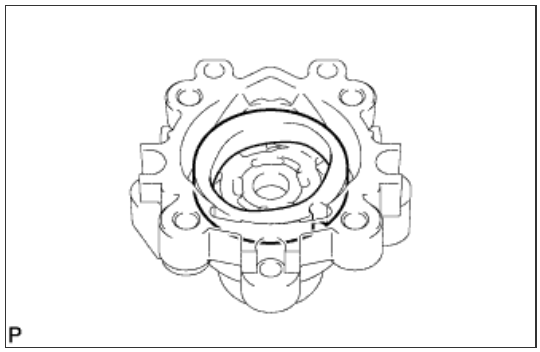
Take care not to drop the vane pump plate.

b. Remove the vane pump rotor.



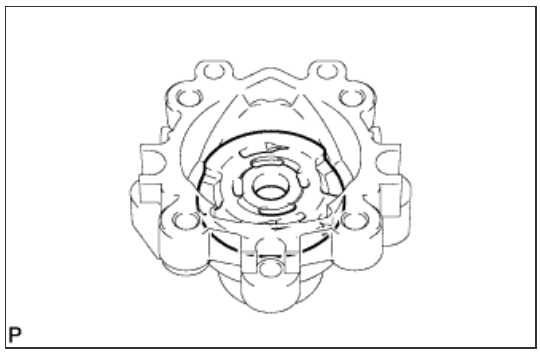
7. REMOVE VANE PUMP CAM RING

a. Remove the cam ring from the front housing.



8. REMOVE VANE PUMP FRONT SIDE PLATE

a. Remove the front side plate from the front housing.



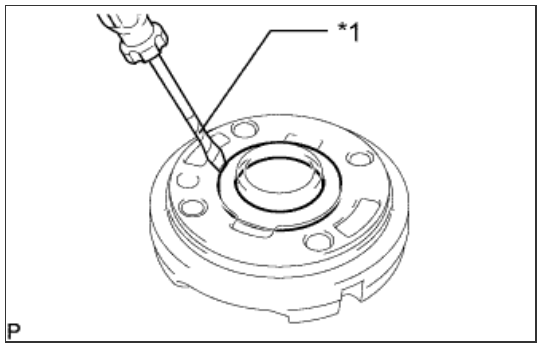
b. Using a screwdriver, remove the O-ring from the front side plate.

Text in Illustration

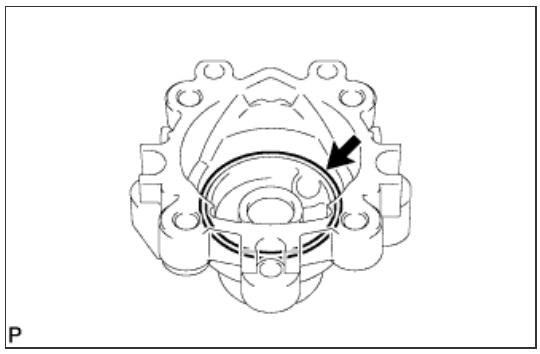
*1	Protective Tape

HINT:

Tape the screwdriver tip before use.



c. Remove the O-ring from the front housing.



9. REMOVE VANE PUMP HOUSING OIL SEAL

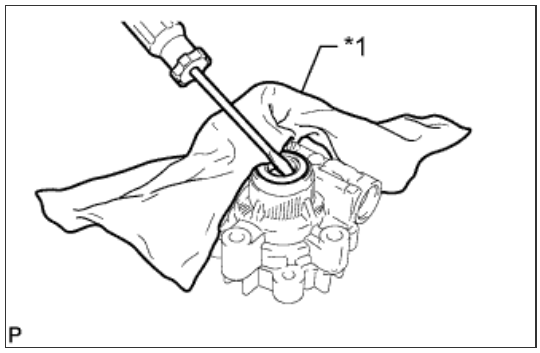
a. Using a screwdriver and piece of cloth, pry out the oil seal.

Text in Illustration

*1	Cloth

NOTICE:

Be careful not to damage the front housing.


*1
P

for Preparation Click here

1. INSPECT VANE PUMP SHAFT AND BUSH IN VANE PUMP FRONT HOUSING

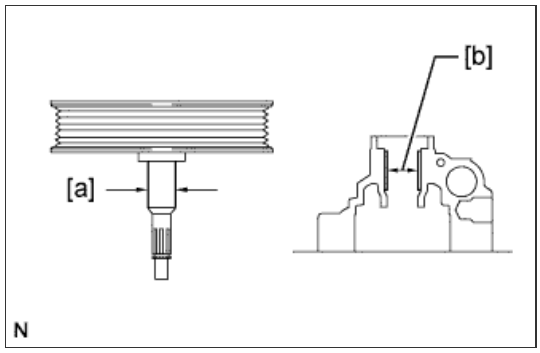
a. Using a micrometer, measure the outer diameter [a] of the vane pump shaft.

b. Using a vernier caliper, measure the inner diameter [b] of the vane pump front housing bush.

c. Calculate the oil clearance.
Oil clearance = Inner diameter of the bush [b] - Outer diameter of the shaft [a]

Maximum oil clearance:
0.07 mm (0.00276 in.)

If the oil clearance is more than the maximum, replace the vane pump assembly.



2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATE

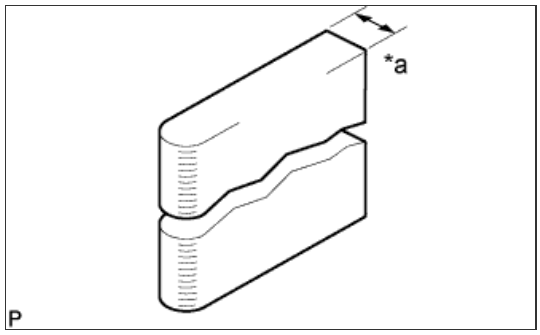
a. Using a micrometer, measure the thickness of the vane pump plates.

Standard thickness:
1.405 to 1.411 mm (0.0553 to 0.0556 in.)

Text in Illustration

*a	Thickness

If the thickness is not as specified, replace the vane pump assembly.



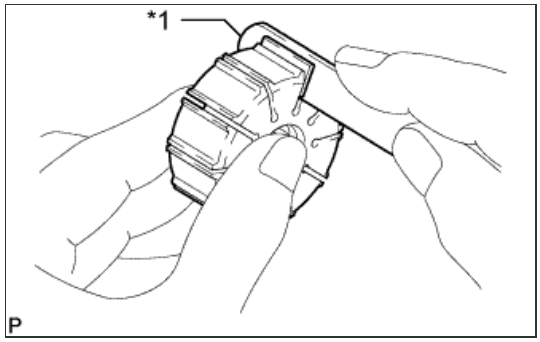
b. Using a feeler gauge, measure the clearance between the side face of the vane pump rotor groove and the vane pump plate.

Maximum clearance:
0.03 mm (0.00118 in.)

Text in Illustration

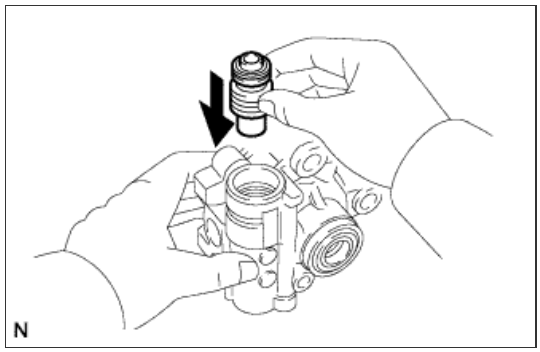
*1	Feeler Gauge

If the clearance is more than the maximum, replace the vane pump assembly.

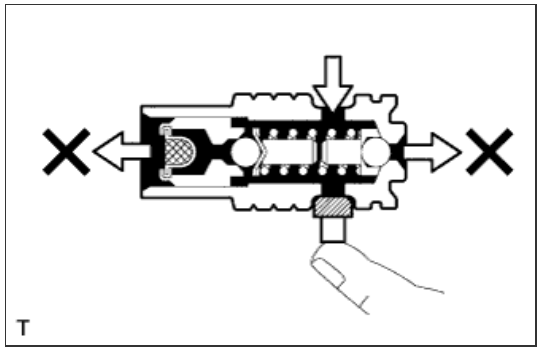


3. INSPECT FLOW CONTROL VALVE ASSEMBLY

a. Coat the flow control valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



b. Check the flow control valve for leakage. Close one of the holes and apply 392 to 490 kPa (4.0 to 4.9 kgf/cm^2, 57 to 71 psi) of compressed air into the opposite side hole, and confirm that air does not come out from the end hole.
If air leaks, replace the vane pump assembly.

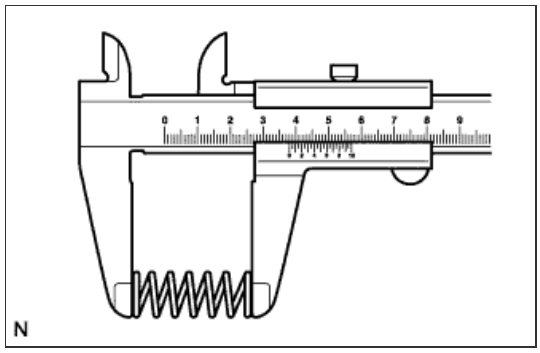


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

a. Using a vernier caliper, measure the free length of the compression spring.

Minimum free length:
31.3 mm (1.23 in.)

If the length is less than the minimum, replace the vane pump assembly.



5. INSPECT PRESSURE PORT UNION

a. Visually check the pressure port union for fluid leaks.
If there is a leak, replace the vane pump assembly.

6. INSPECT TOTAL PRELOAD

a. Check that the pump rotates smoothly without abnormal noise.

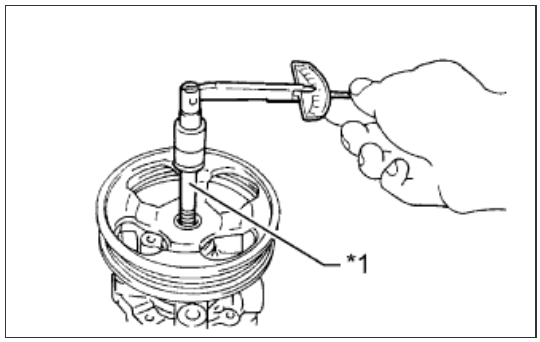
b. Temporarily install a service bolt.

Recommended service bolt:
Thread diameter:
10 mm (0.394 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

c. Using a torque wrench, measure the pump rotating torque.

Standard rotating torque:

0.3 N*m (3 kgf*cm, 2 in.*lbf) or less



Text in Illustration

*1	Service Bolt

If the rotating torque is not as specified, check the vane pump housing oil seal.

for Preparation Click here

NOTICE:

When installing parts, coat the parts indicated by arrows with power steering fluid (Click here).

1. INSTALL VANE PUMP HOUSING OIL SEAL

a. Coat the lip of a new oil seal with power steering fluid.

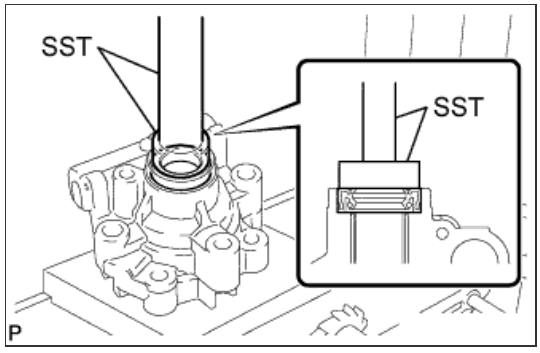
b. Using SST and a press, press in the oil seal.

SST

09950-60010 (09951-00280)
09950-70010 (09951-07100)

NOTICE:

Make sure that the oil seal is installed facing in the correct direction as shown in the illustration.



2. INSTALL VANE PUMP SHAFT WITH VANE PUMP PULLEY

a. Coat the inside surface of the bushing in the vane pump front housing with power steering fluid.

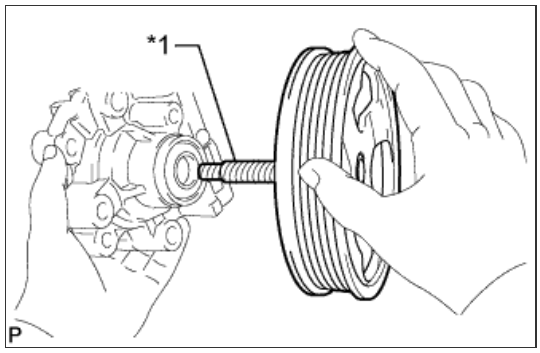
b. Gradually insert the vane pump shaft with vane pump pulley.

Text in Illustration

*1	Protective Tape

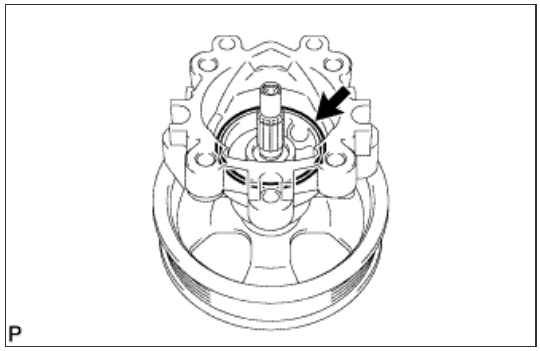
NOTICE:

- **Do not damage the lip of the oil seal in the front housing.**
- **Wrap protective tape around the spline of the vane pump shaft with vane pump pulley in order to prevent damage to the oil seal.**

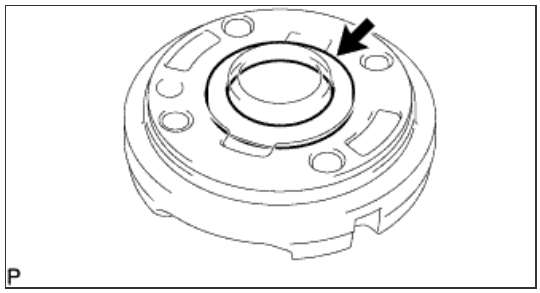


3. INSTALL VANE PUMP FRONT SIDE PLATE

a. Coat a new O-ring with power steering fluid and install it into the front housing.



b. Coat a new O-ring with power steering fluid and install it onto the front side plate.



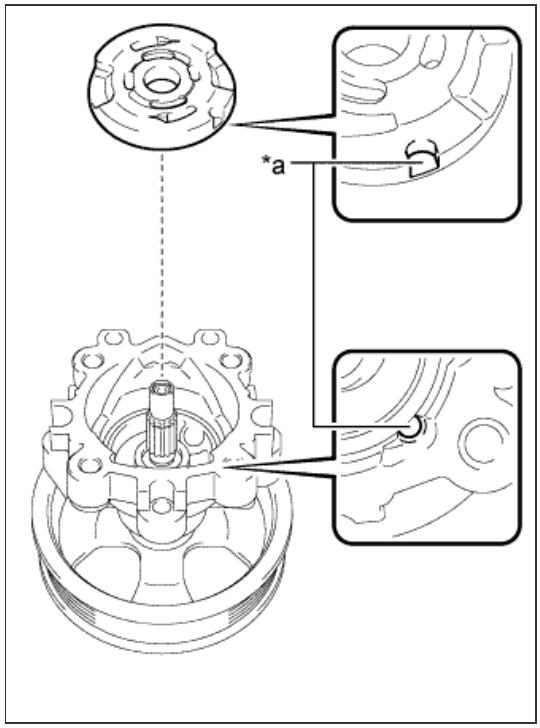
c. Align the notch of the front side plate with the notch of the front housing, and install the front side plate.

Text in Illustration

*a	Align

NOTICE:

Make sure that the front side plate is installed facing in the correct direction.



4. INSTALL VANE PUMP CAM RING

a. Coat the vane pump cam ring with power steering fluid.

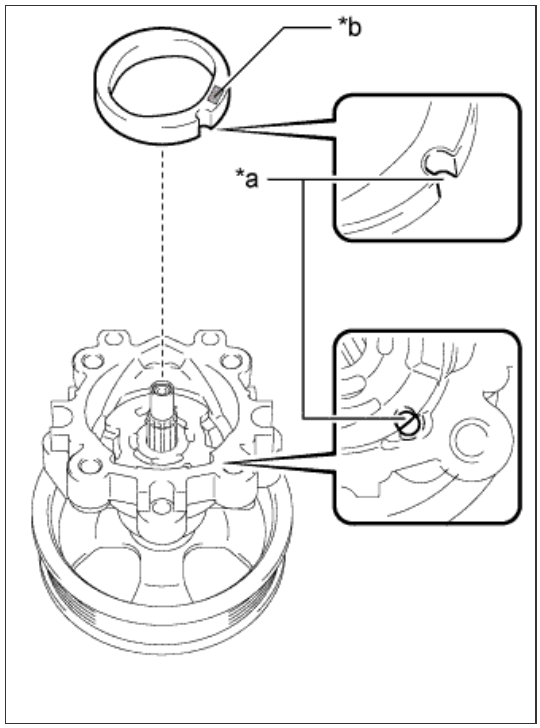
b. Align the notch of the cam ring with the notch of the front side plate, and install the cam ring with the inscribed mark facing upward.

Text in Illustration

*a	Align
*b	Inscribed Mark

NOTICE:

Make sure that the cam ring is installed facing in the correct direction.



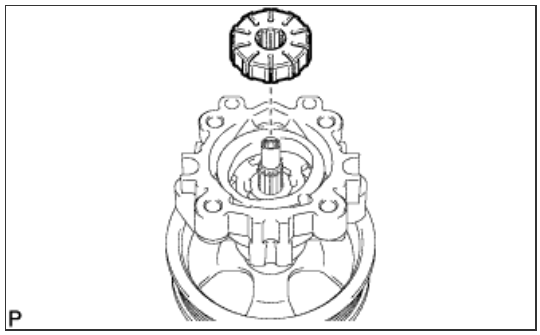
5. INSTALL VANE PUMP ROTOR

a. Coat the vane pump rotor with power steering fluid.

b. Install the vane pump rotor.

HINT:

The vane pump rotor can be installed in both directions.

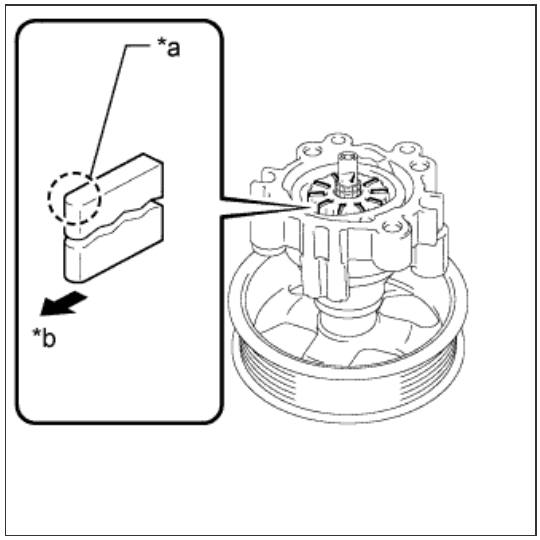


c. Coat the 10 vane pump plates with power steering fluid.

d. Install the vane pump plates with the round end facing outward.

Text in Illustration

*a	Round End
*b	Outward



NOTICE:

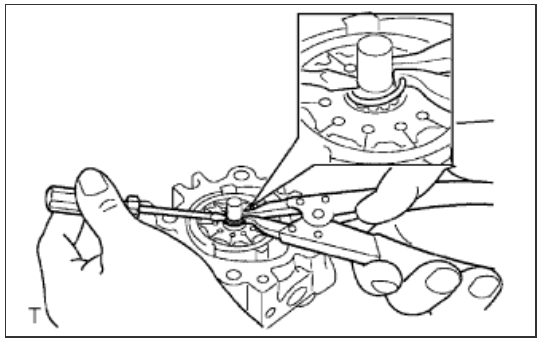
Make sure that the vane pump plates are installed facing in the correct direction.

6. INSTALL VANE PUMP SHAFT SNAP RING

a. Using a screwdriver and snap ring expander, install a new shaft snap ring onto the vane pump shaft.

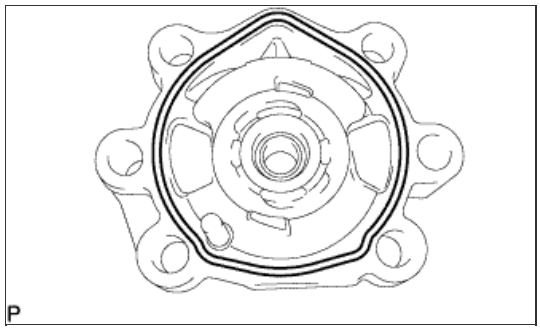
NOTICE:

- **Do not expand the shaft snap ring any further than needed.**
- **Make sure that the shaft snap ring is completely fit into the groove.**
- **Do not damage the vane pump rotor and shaft.**



7. INSTALL VANE PUMP REAR HOUSING

a. Coat a new O-ring with power steering fluid and install it onto the rear housing.



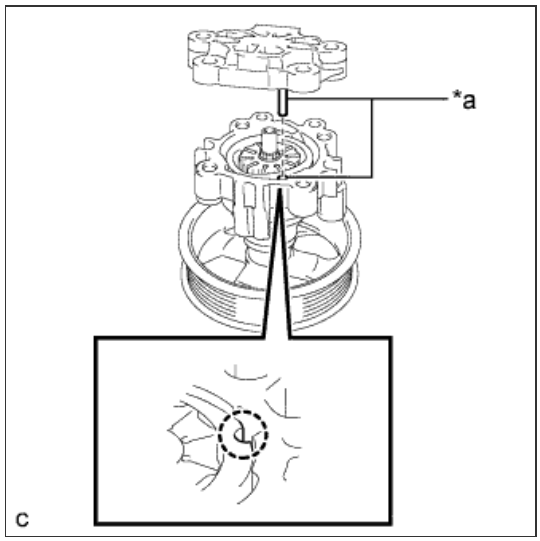
b. Align the straight pin of the rear housing with the notches of the cam ring, front side plate and front housing.

Text in Illustration

*a	Align

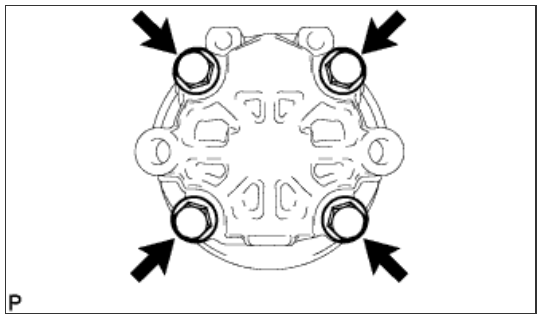
NOTICE:

Make sure that the O-ring is not protruding anywhere when installing the vane pump rear housing.



c. Install the rear housing with the 4 bolts.

Torque:
22 N*m{ 224 kgf*cm , 16 ft.*lbf }



8. INSPECT TOTAL PRELOAD

a. Check that the pump rotates smoothly without abnormal noise.

b. Temporarily install a service bolt.

Recommended service bolt:
Thread diameter:
10 mm (0.394 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

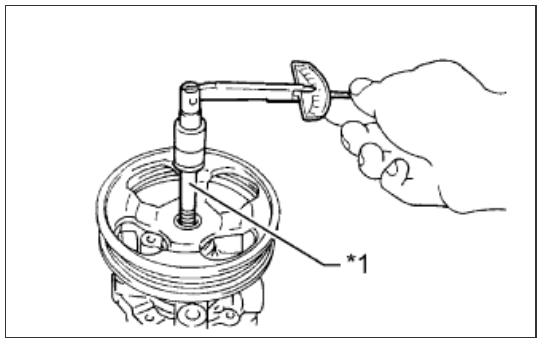
c. Using a torque wrench, measure the pump rotating torque.

Standard rotating torque:
0.3 N*m (3 kgf*cm, 2 in.*lbf) or less

Text in Illustration

*1	Service Bolt

If the rotating torque is not as specified, check the vane pump housing oil seal.



9. INSTALL FLOW CONTROL VALVE ASSEMBLY

a. Coat the flow control valve, pressure port union and spring with power steering fluid.

b. Install the compression spring and flow control valve to the front housing.

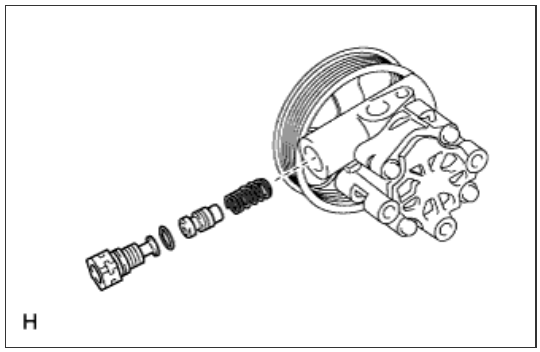
NOTICE:

Do not mistake the direction of the control valve.

c. Coat a new O-ring with power steering fluid and install it onto the pressure port union.

d. Install the pressure port union to the front housing.

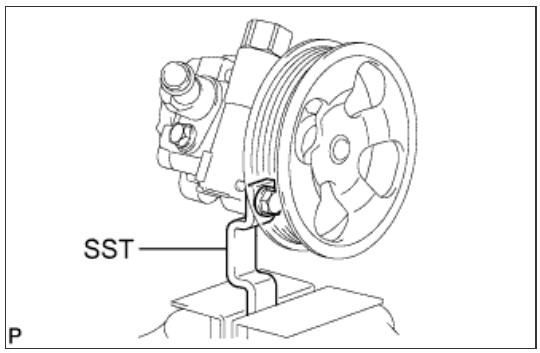
Torque:
69 N*m{ 704 kgf*cm , 51 ft.*lbf }



10. FIX VANE PUMP ASSEMBLY

a. Using SST, fix the vane pump in a vise.

SST
09630-00014 (09631-00132)

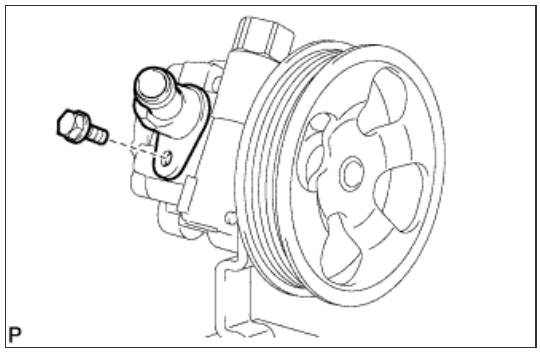


11. INSTALL POWER STEERING SUCTION PORT UNION

a. Coat a new O-ring with power steering fluid and install it to the suction port union.

b. Install the suction port union to the vane pump with the bolt.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }


P

for Preparation Click here

1. INSTALL VANE PUMP ASSEMBLY

a. Install the vane pump with the 2 bolts.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }

2. CONNECT SUCTION HOSE

a. Connect the suction hose to the vane pump assembly with the clip.

3. CONNECT PRESSURE FEED TUBE

a. Install a new gasket to the pressure feed tube.

b. Connect the pressure feed tube with the union bolt.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }

4. CONNECT POWER STEERING OIL PRESSURE SENSOR CONNECTOR

a. Connect the connector.

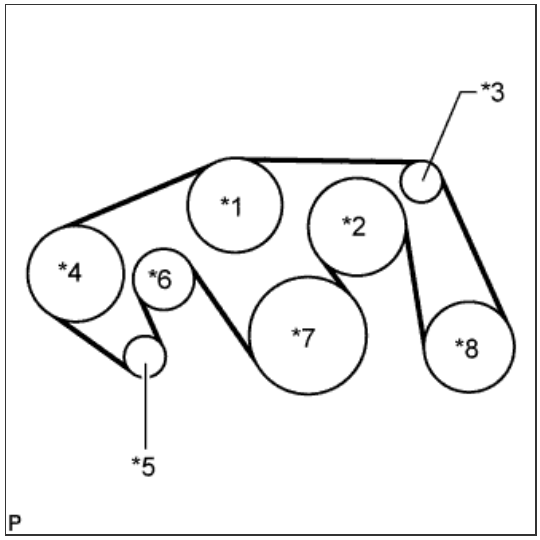
b. Attach the wire harness clamp.

5. INSTALL FAN AND GENERATOR V BELT

a. Set the fan and generator V belt onto every part.

Text in Illustration

*1	Water Pump Pulley
*2	Fan Pulley
*3	No. 1 Idler Pulley
*4	Vane Pump Pulley
*5	Generator Pulley
*6	V-ribbed Belt Tensioner
*7	Crankshaft Pulley
*8	Cooler Compressor Pulley



b. While turning the belt tensioner counterclockwise, remove the pin.

NOTICE:

Make sure that the fan and generator V belt is properly set on each pulley.

c. Check that the belt fits properly in the ribbed grooves.

HINT:

Make sure to check by hand that the belt has not slipped out of the grooves on the bottom of the pulley.

6. INSTALL AIR CLEANER AND HOSE

a. Install the air cleaner and hose with the 3 bolts, and then tighten the hose clamp.

Torque:
for bolt:
5.0 N*m{ 51 kgf*cm , 44 in.*lbf }
for hose clamp:
2.5 N*m{ 25 kgf*cm , 22 in.*lbf }

b. Attach the clamp and connect the mass air flow meter connector.

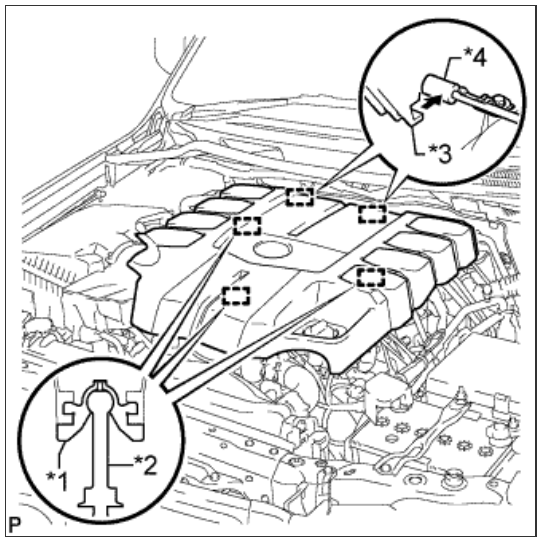
c. Connect the No. 2 PCV hose and No. 1 air hose.

7. INSTALL V-BANK COVER SUB-ASSEMBLY

a. Attach the 2 V-bank cover hooks to the bracket. Then align the 3 V-bank cover grommets with the 3 pins, and press down on the V-bank cover to attach the pins.

Text in Illustration

*1	Grommet
*2	Pin
*3	Hook
*4	Bracket



8. INSTALL FRONT FENDER APRON TRIM PACKING A

a. w/ KDSS
Install the front fender apron trim packing B with the 3 clips.

b. w/o KDSS
Install the front fender apron trim packing B with the 4 clips.

9. INSTALL FRONT WHEEL RH

Torque:
for Aluminum Wheel:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }
for Steel Wheel:
209 N*m{ 2131 kgf*cm , 154 ft.*lbf }

10. ADD POWER STEERING FLUID

11. BLEED POWER STEERING FLUID

a. Check the fluid level.

b. Jack up the front of the vehicle and support it with stands.

c. Turn the steering wheel.

i. With the engine stopped, turn the wheel slowly from lock to lock several times.

d. Lower the vehicle.

e. Start the engine.

f. Idle the engine for a few minutes.

g. Turn the steering wheel.

i. With the engine idling, turn the wheel left or right to the full lock position and keep it there for 2 to 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 to 3 seconds. *1

ii. Repeat *1 several times.

NOTICE:

For vehicles with VGRS, if the steering wheel is turned from lock to lock repeatedly, the system may stop operating and the amount of rotation before the steering wheel locks may increase due to operation of the overheating prevention function. When the system temperature drops, the system operation automatically returns to normal.

h. Stop the engine.

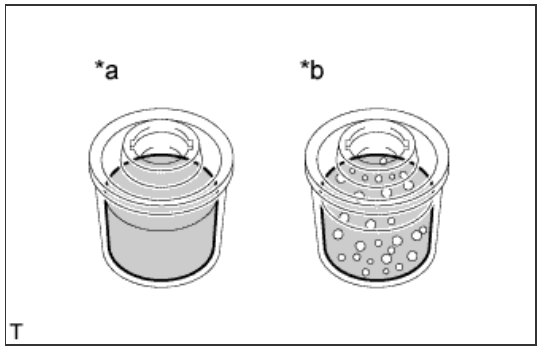
i. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

If the system has to be bled twice because of foaming or emulsification, check for fluid leaks in the system.

j. Check the fluid level.



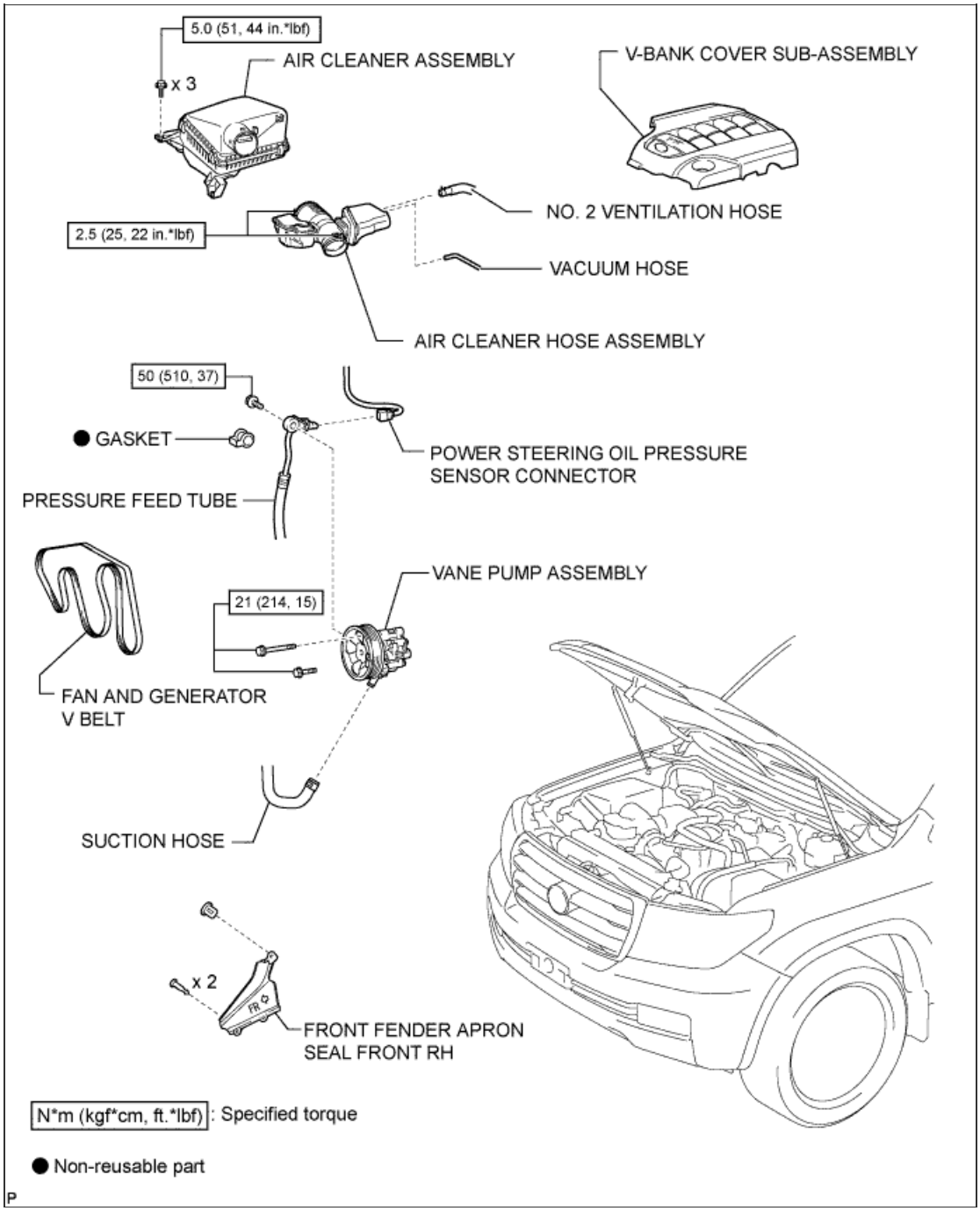
12. INSPECT FOR POWER STEERING FLUID LEAK

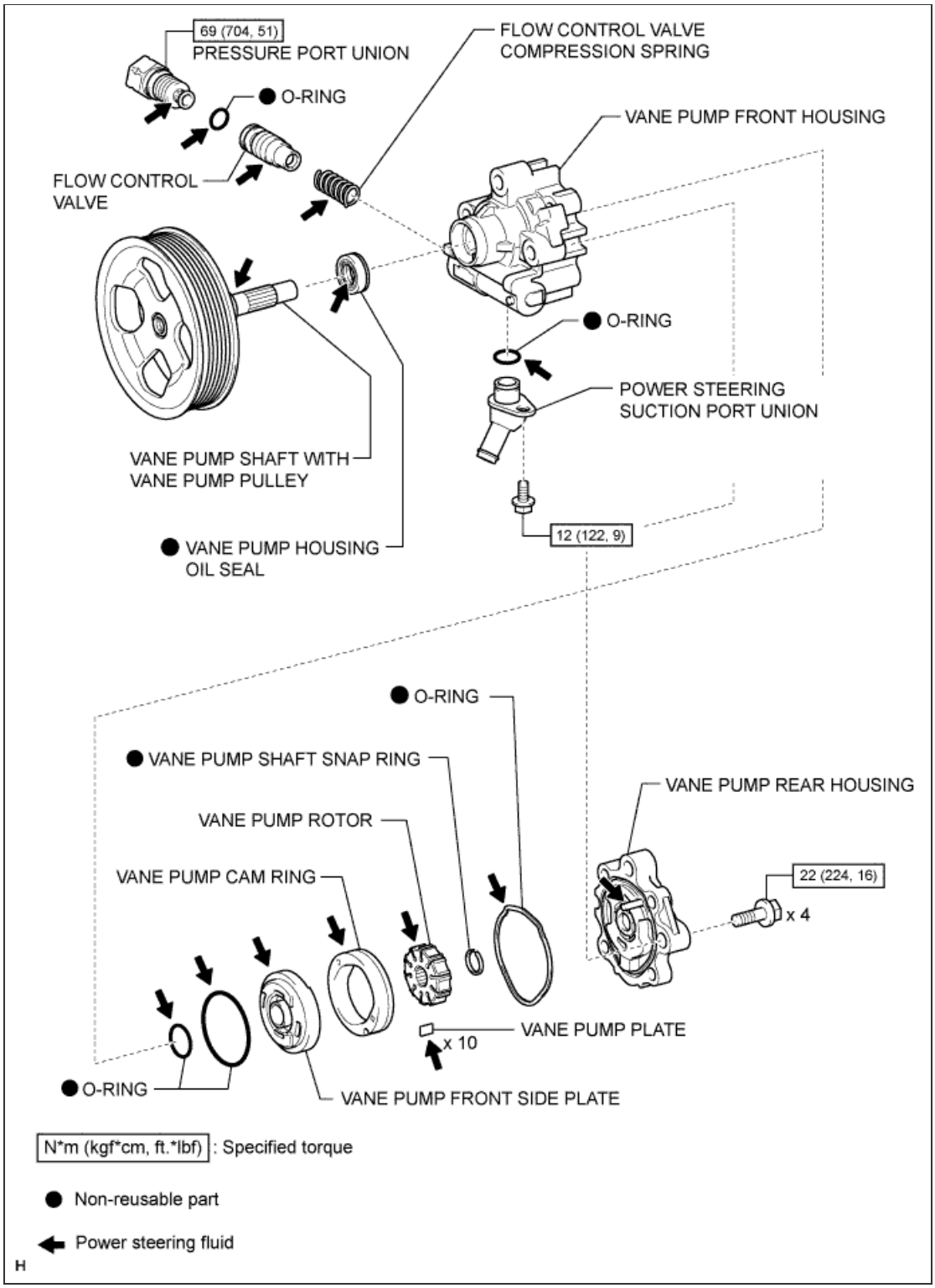
13. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here




69 (704, 51)
PRESSURE PORT UNION
O-RING
FLOW CONTROL VALVE
COMPRESSION SPRING
VANE PUMP FRONT HOUSING
FLOW CONTROL VALVE
O-RING
POWER STEERING SUCTION PORT UNION
VANE PUMP SHAFT WITH VANE PUMP PULLEY
12 (122, 9)
VANE PUMP HOUSING OIL SEAL
O-RING
VANE PUMP SHAFT SNAP RING
VANE PUMP REAR HOUSING
VANE PUMP ROTOR
VANE PUMP CAM RING
22 (224, 16)
x 4
VANE PUMP PLATE
x 10
O-RING
VANE PUMP FRONT SIDE PLATE
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Power steering fluid
H

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

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

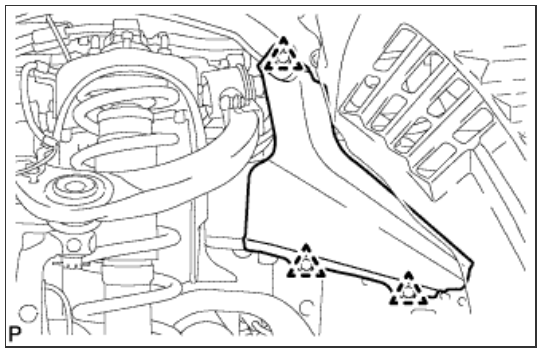
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

3. REMOVE FRONT WHEEL RH

4. REMOVE FRONT FENDER APRON TRIM PACKING A

a. Using a clip remover, remove the 3 clips and fender apron seal.

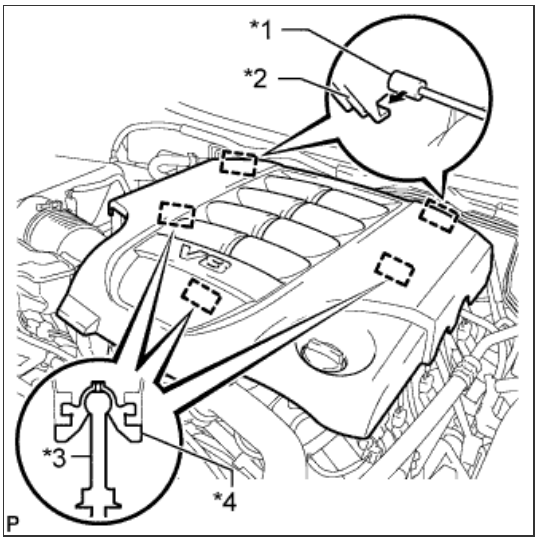


5. REMOVE V-BANK COVER SUB-ASSEMBLY

a. Raise the front of the V-bank cover to detach the 3 pins. Then remove the 2 V-bank cover hooks from the bracket, and remove the V-bank cover.

Text in Illustration

*1	Bracket
*2	Hook
*3	Pin
*4	Grommet

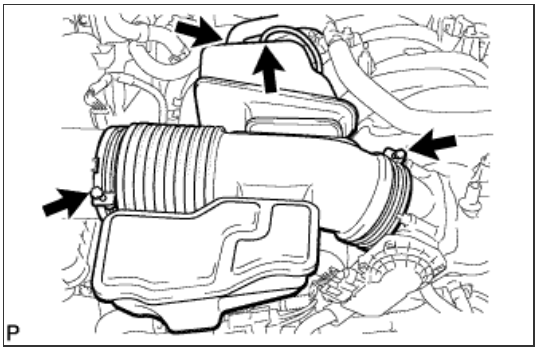


6. REMOVE AIR CLEANER HOSE ASSEMBLY

a. Disconnect the vacuum hose and No. 2 ventilation hose.

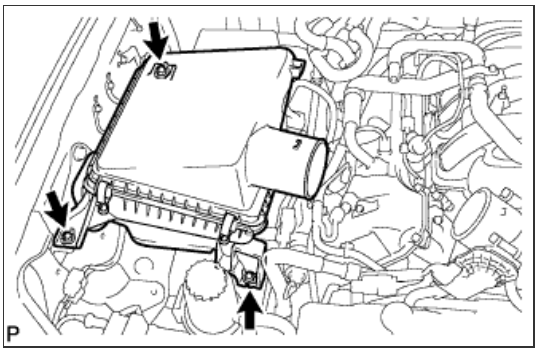
b. Loosen the 2 hose clamps.

c. Remove the air cleaner hose.



7. REMOVE AIR CLEANER ASSEMBLY

a. Remove the 3 bolts and air cleaner.



8. REMOVE FAN AND GENERATOR V BELT

a. While turning the belt tensioner counterclockwise, align the service hole for the belt tensioner and the belt tensioner fixing position, and then insert a bar of 5 mm (0.197 in.) into the service hole to fix the belt tensioner in place.

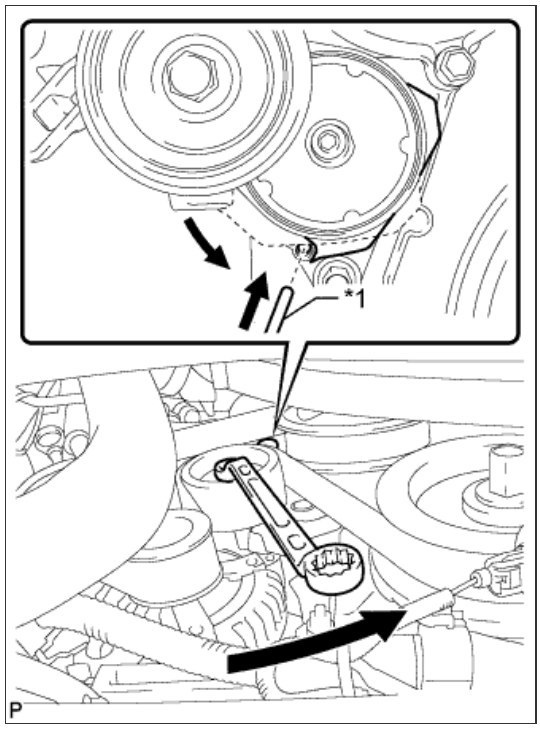
Text in Illustration

*1	Bar

HINT:

The pulley bolt for the belt tensioner has a left-hand thread.

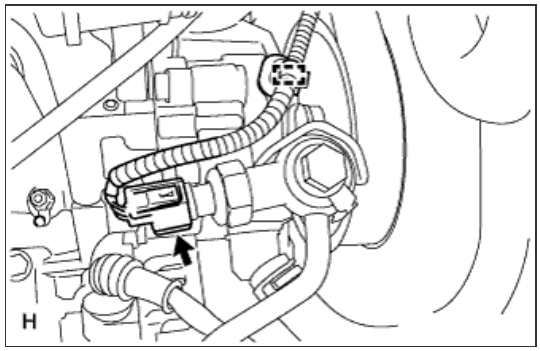
b. Remove the V belt.



9. DRAIN POWER STEERING FLUID

10. DISCONNECT POWER STEERING OIL PRESSURE SENSOR CONNECTOR

a. Detach the wire harness clamp and disconnect the connector.



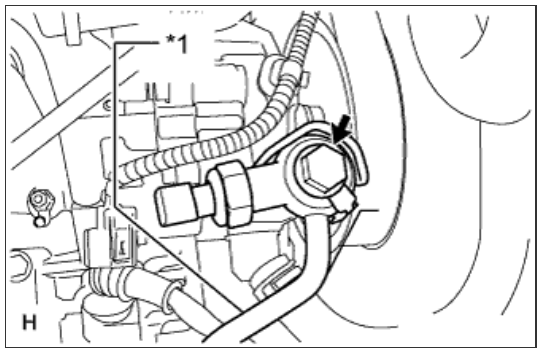
11. DISCONNECT PRESSURE FEED TUBE

a. Remove the bolt and disconnect the pressure feed tube.

Text in Illustration

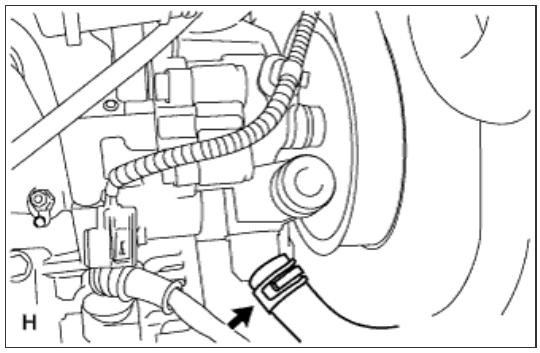
*1	Pressure feed tube

b. Remove the gasket.



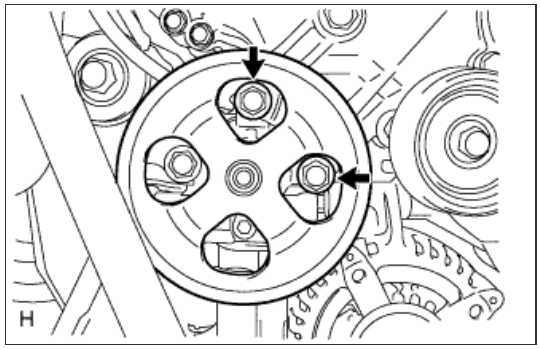
12. DISCONNECT SUCTION HOSE

a. Slide the clip and disconnect the suction hose from the vane pump.



13. REMOVE VANE PUMP ASSEMBLY

a. Remove the 2 bolts and vane pump.

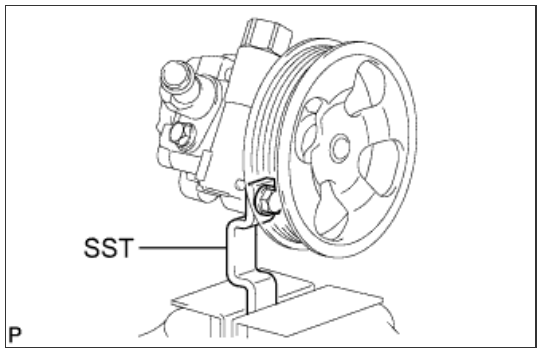


for Preparation Click here

1. FIX VANE PUMP ASSEMBLY

a. Using SST, fix the vane pump in a vise.

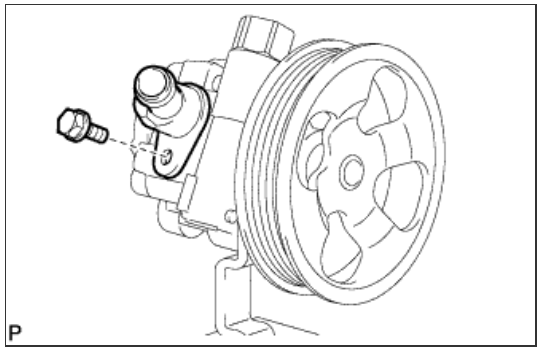
SST
09630-00014 (09631-00132)



2. REMOVE POWER STEERING SUCTION PORT UNION

a. Remove the bolt and suction port union from the vane pump.

b. Using a screwdriver, remove the O-ring from the suction port union.

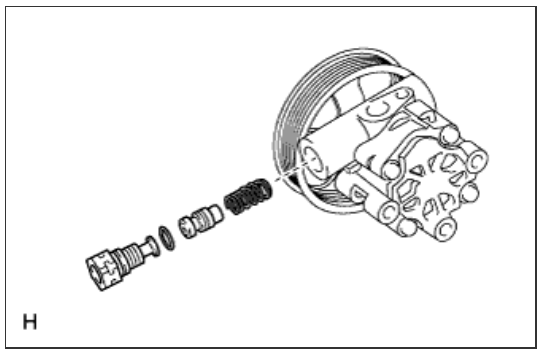


3. REMOVE FLOW CONTROL VALVE

a. Remove the pressure port union.

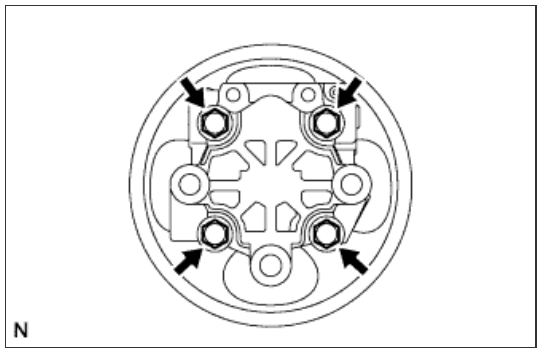
b. Remove the O-ring from the pressure port union.

c. Remove the flow control valve and compression spring.



4. REMOVE VANE PUMP REAR HOUSING

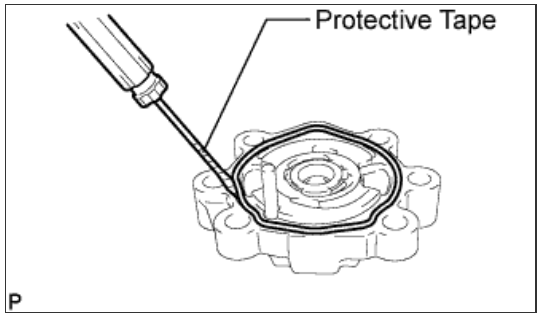
a. Remove the 4 bolts and rear housing from the front housing.



b. Using a screwdriver, remove the O-ring from the rear housing.

HINT:

Tape the screwdriver tip before use.



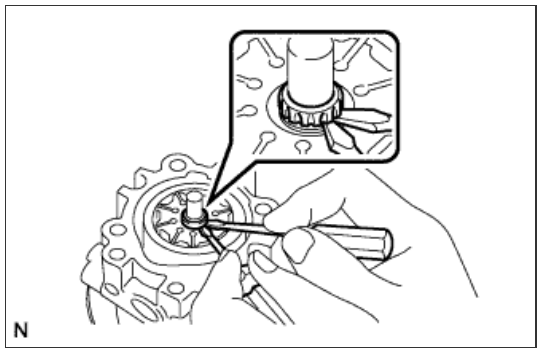
5. REMOVE VANE PUMP SHAFT WITH VANE PUMP PULLEY

a. Using 2 screwdrivers, remove the snap ring from the vane pump shaft.

b. Remove the vane pump shaft with vane pump pulley.

NOTICE:

Be careful not to drop or damage the vane pump shaft with vane pump pulley. If it is damaged, replace the vane pump assembly.



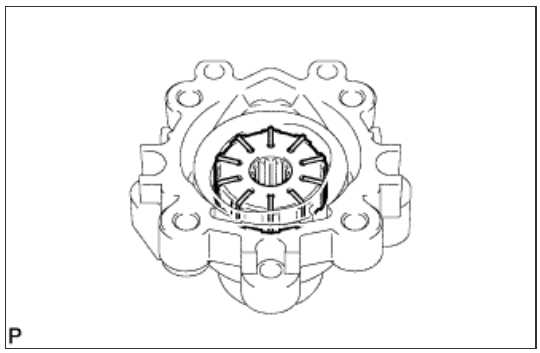
6. REMOVE VANE PUMP ROTOR

a. Remove the 10 vane pump plates.

NOTICE:

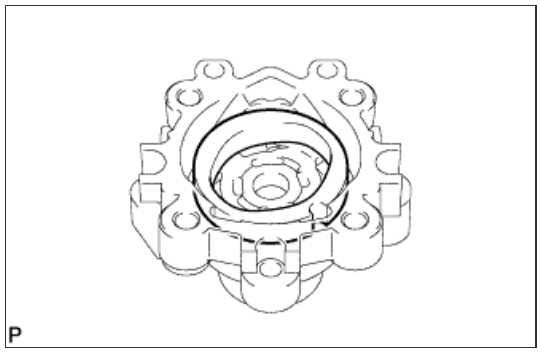
Take care not to drop the vane pump plate.

b. Remove the vane pump rotor.



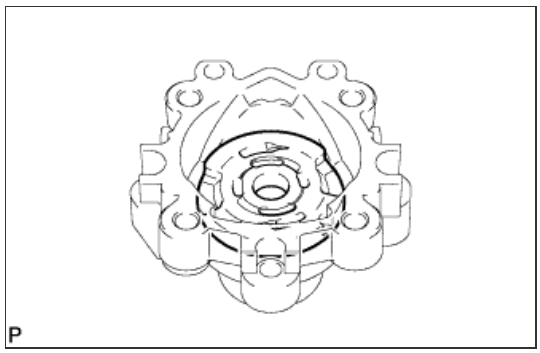
7. REMOVE VANE PUMP CAM RING

a. Remove the cam ring from the front housing.



8. REMOVE VANE PUMP FRONT SIDE PLATE

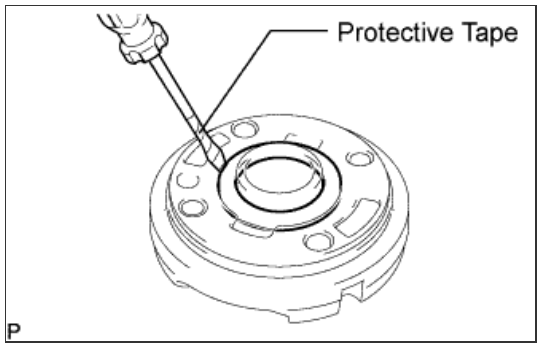
a. Remove the front side plate from the front housing.



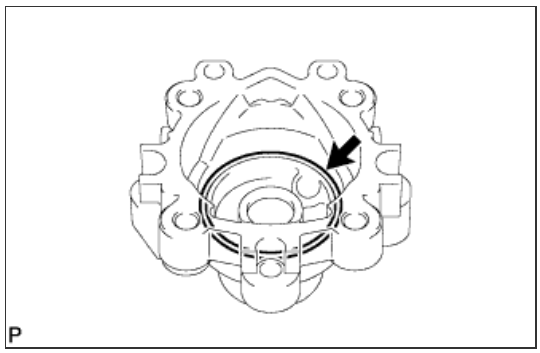
b. Using a screwdriver, remove the O-ring from the front side plate.

HINT:

Tape the screwdriver tip before use.



c. Remove the O-ring from the front housing.

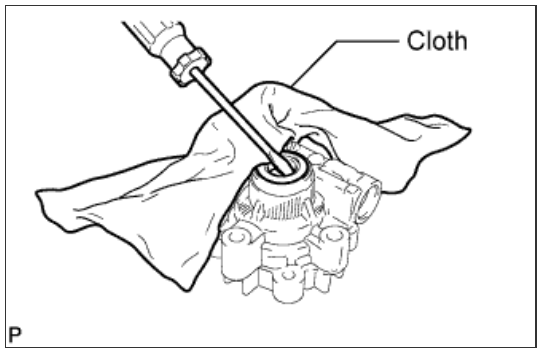


9. REMOVE VANE PUMP HOUSING OIL SEAL

a. Using a screwdriver and piece of cloth, pry out the oil seal.

NOTICE:

Be careful not to damage the front housing.


Cloth
P

for Preparation Click here

1. INSPECT VANE PUMP SHAFT AND BUSH IN VANE PUMP FRONT HOUSING

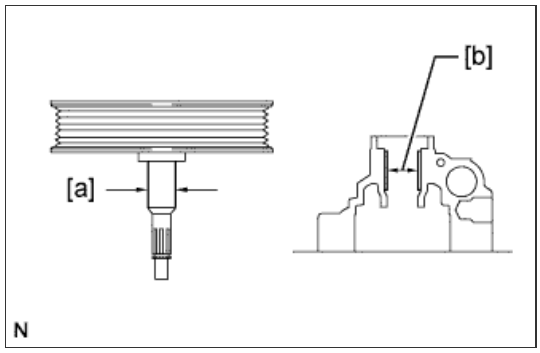
a. Using a micrometer, measure the outer diameter [a] of the vane pump shaft.

b. Using a vernier caliper, measure the inner diameter [b] of the vane pump front housing bush.

c. Calculate the oil clearance.
Oil clearance = Inner diameter of the bush [b] - Outer diameter of the shaft [a]

Maximum oil clearance:
0.07 mm (0.00276 in.)

If the oil clearance is more than the maximum, replace the vane pump assembly.

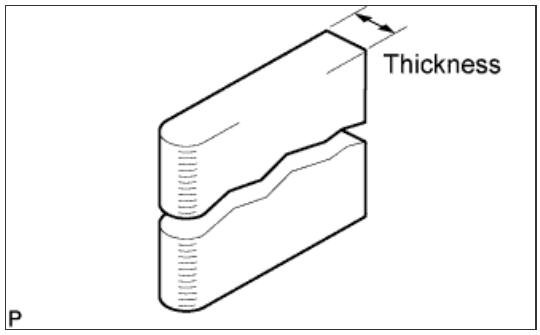


2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATE

a. Using a micrometer, measure the thickness of the vane pump plates.

Standard thickness:
1.405 to 1.411 mm (0.0553 to 0.0556 in.)

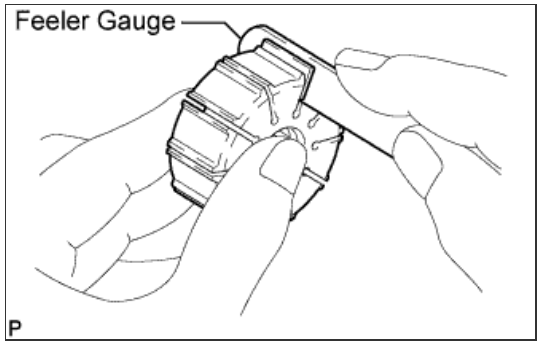
If the thickness is not as specified, replace the vane pump assembly.



b. Using a feeler gauge, measure the clearance between the side face of the vane pump rotor groove and the vane pump plate.

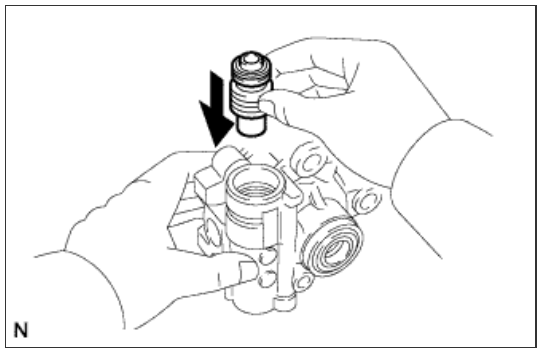
Maximum clearance:
0.03 mm (0.00118 in.)

If the clearance is more than the maximum, replace the vane pump assembly.

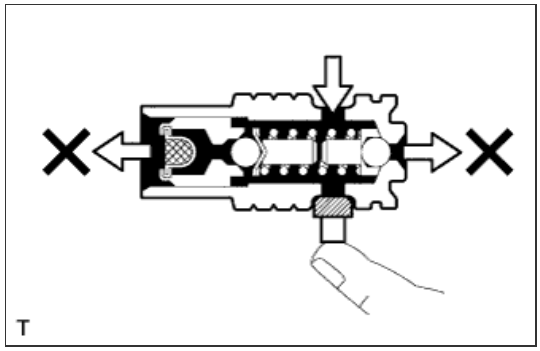


3. INSPECT FLOW CONTROL VALVE ASSEMBLY

a. Coat the flow control valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



b. Check the flow control valve for leakage. Close one of the holes and apply 392 to 490 kPa (4.0 to 5.0 kgf/cm^2, 57 to 71 psi) of compressed air into the opposite side hole, and confirm that air does not come out from the end hole.
If air leaks, replace the vane pump assembly.

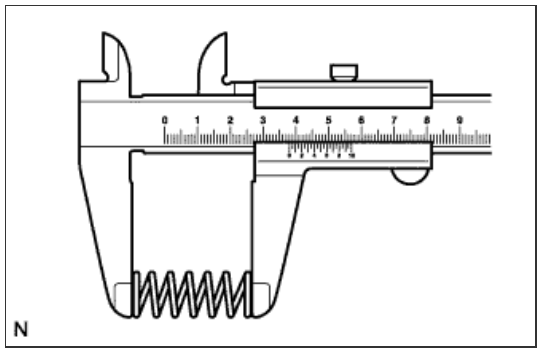


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

a. Using a vernier caliper, measure the free length of the compression spring.

Minimum free length:
31.3 mm (1.23 in.)

If the length is less than the minimum, replace the vane pump assembly.



5. INSPECT PRESSURE PORT UNION

a. Visually check the pressure port union for fluid leaks.
If there is a leak, replace the vane pump assembly.

6. INSPECT TOTAL PRELOAD

a. Check that the pump rotates smoothly without abnormal noise.

b. Temporarily install a service bolt.

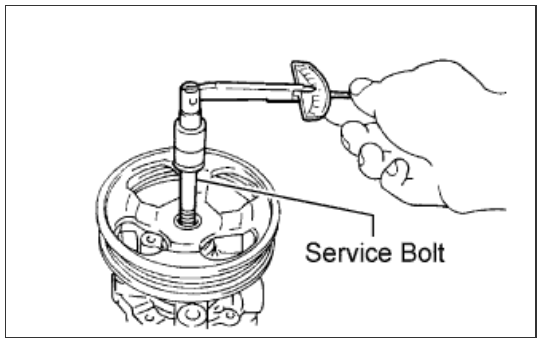
Recommended service bolt:
Thread diameter:
10 mm (0.394 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

c. Using a torque wrench, measure the pump rotating torque.

Standard rotating torque:

0.3 N*m (3 kgf*cm, 2 in.*lbf) or less

If the rotating torque is not as specified, check the vane pump housing oil seal.



for Preparation Click here

NOTICE:

When installing parts, coat the parts indicated by arrows with power steering fluid (Click here).

1. INSTALL VANE PUMP HOUSING OIL SEAL

a. Coat the lip of a new oil seal with power steering fluid.

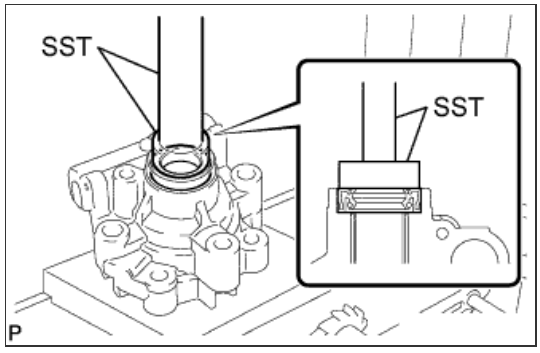
b. Using SST and a press, press in the oil seal.

SST

09950-60010 (09951-00280)
09950-70010 (09951-07100)

NOTICE:

Make sure that the oil seal is installed facing in the correct direction as shown in the illustration.



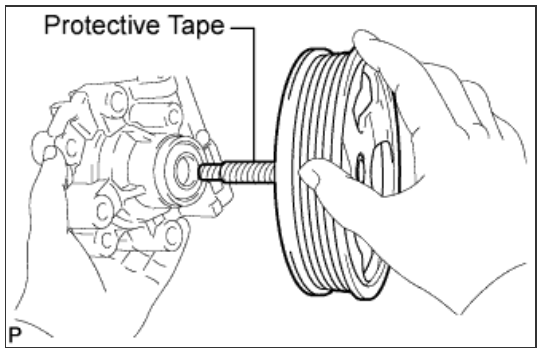
2. INSTALL VANE PUMP SHAFT WITH VANE PUMP PULLEY

a. Coat the inside surface of the bushing in the vane pump front housing with power steering fluid.

b. Gradually insert the vane pump shaft with vane pump pulley.

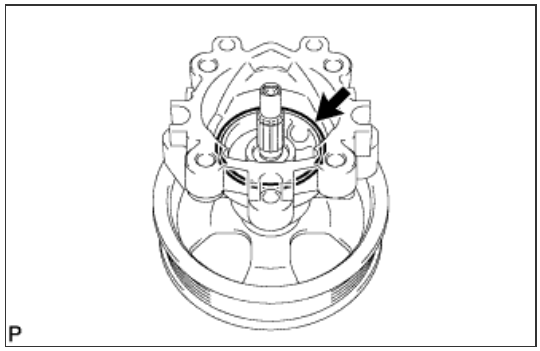
NOTICE:

- **Do not damage the lip of the oil seal in the front housing.**
- **Wrap protective tape around the spline of the vane pump shaft with vane pump pulley in order to prevent damage to the oil seal.**

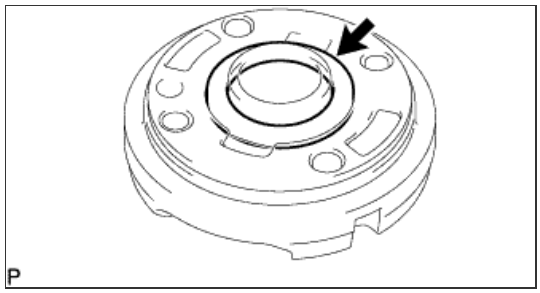


3. INSTALL VANE PUMP FRONT SIDE PLATE

a. Coat a new O-ring with power steering fluid and install it into the front housing.



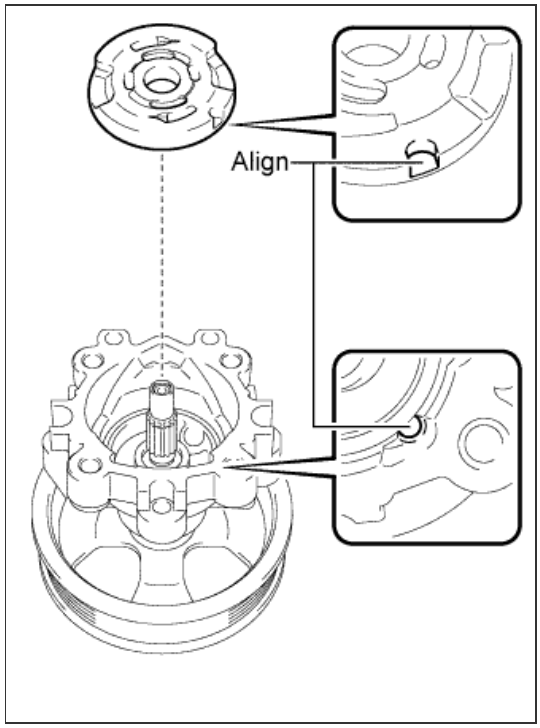
b. Coat a new O-ring with power steering fluid and install it onto the front side plate.



c. Align the notch of the front side plate with the notch of the front housing, and install the front side plate.

NOTICE:

Make sure that the front side plate is installed facing in the correct direction.

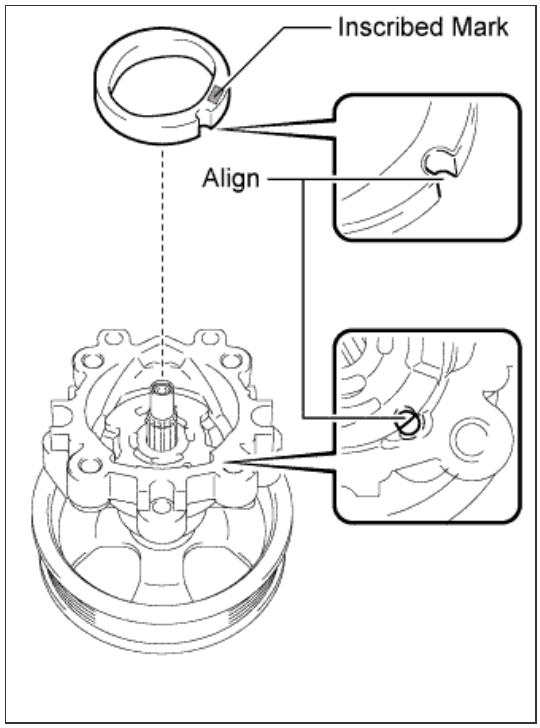


4. INSTALL VANE PUMP CAM RING

a. Align the notch of the cam ring with the notch of the front side plate, and install the cam ring with the inscribed mark facing upward.

NOTICE:

Make sure that the cam ring is installed facing in the correct direction.



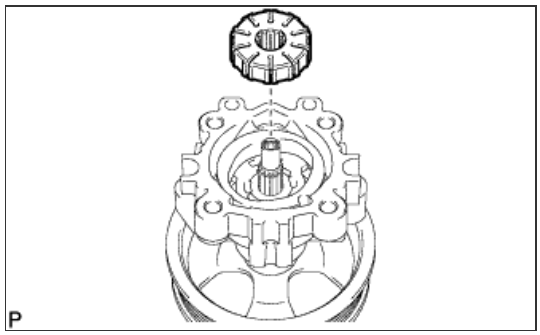
5. INSTALL VANE PUMP ROTOR

a. Install the vane pump rotor.

HINT:

The vane pump rotor can be installed in both directions.

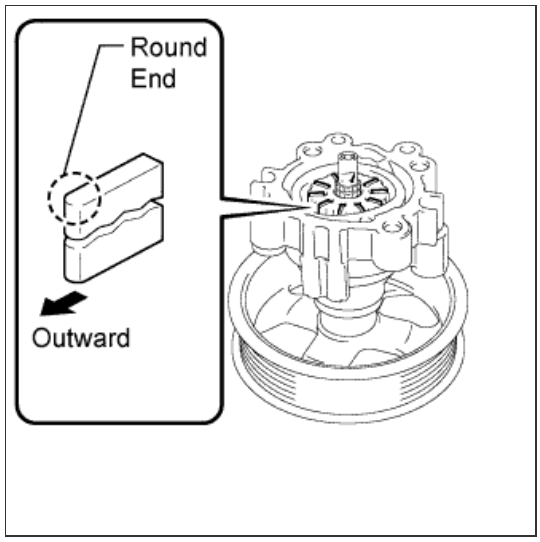
b. Coat the 10 vane pump plates with power steering fluid.



c. Install the vane pump plates with the round end facing outward.

NOTICE:

Make sure that the vane pump plates are installed facing in the correct direction.

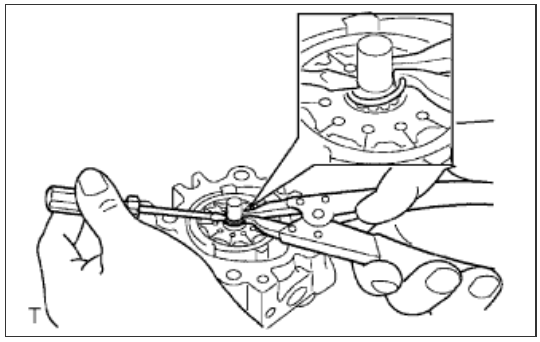


6. INSTALL VANE PUMP SHAFT SNAP RING

a. Using a screwdriver and snap ring expander, install a new shaft snap ring onto the vane pump shaft.

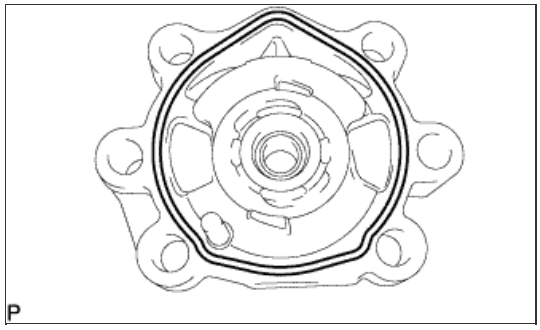
NOTICE:

- **Do not expand the shaft snap ring any further than needed.**
- **Make sure that the shaft snap ring is completely fit into the groove.**
- **Do not damage the vane pump rotor and shaft.**



7. INSTALL VANE PUMP REAR HOUSING

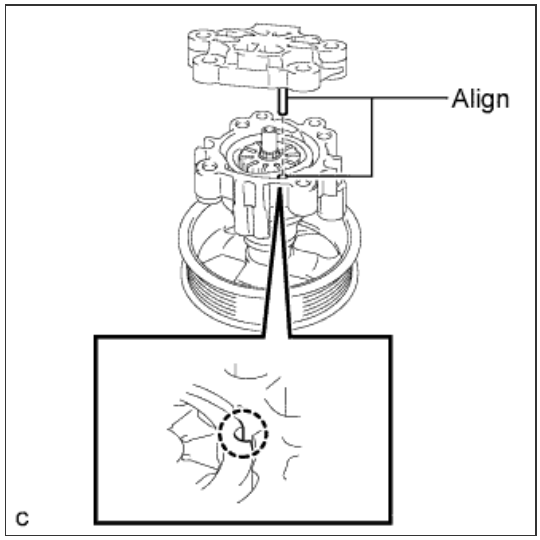
a. Coat a new O-ring with power steering fluid and install it onto the rear housing.



b. Align the straight pin of the rear housing with the notches of the cam ring, front side plate and front housing.

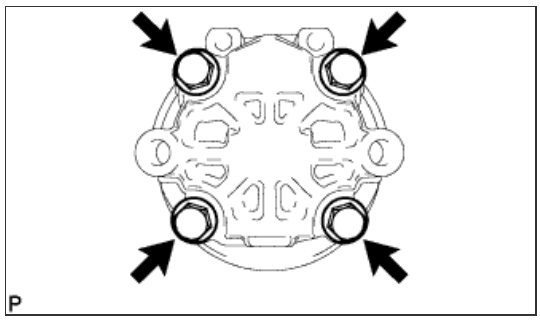
NOTICE:

Make sure that the O-ring is not protruding anywhere when installing the vane pump rear housing.



c. Install the rear housing with the 4 bolts.

Torque:
22 N*m{ 224 kgf*cm , 16 ft.*lbf }



8. INSPECT TOTAL PRELOAD

a. Check that the pump rotates smoothly without abnormal noise.

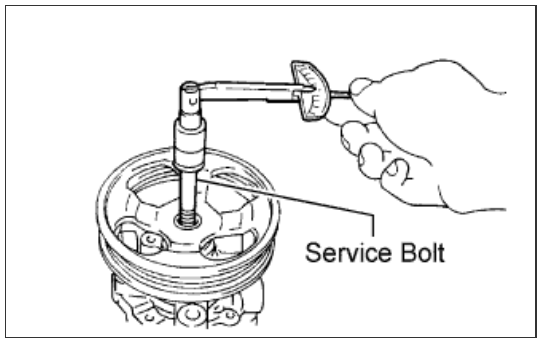
b. Temporarily install a service bolt.

Recommended service bolt:
Thread diameter:
10 mm (0.394 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

c. Using a torque wrench, measure the pump rotating torque.

Standard rotating torque:
0.3 N*m (3 kgf*cm, 2 in.*lbf) or less

If the rotating torque is not as specified, check the vane pump housing oil seal.



9. INSTALL FLOW CONTROL VALVE ASSEMBLY

a. Coat the flow control valve with power steering fluid.

b. Install the compression spring and flow control valve to the front housing.

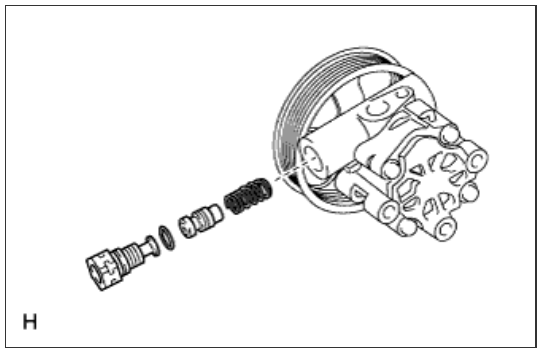
NOTICE:

Do not mistake the direction of the control valve.

c. Coat a new O-ring with power steering fluid and install it onto the pressure port union.

d. Install the pressure port union to the front housing.

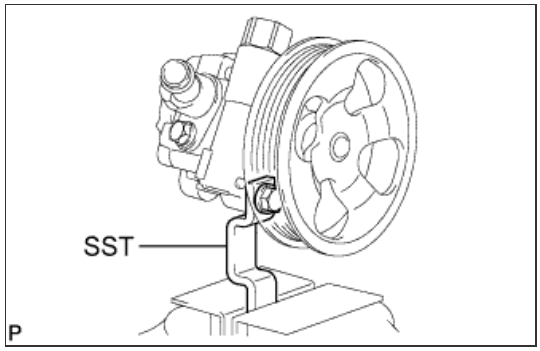
Torque:
69 N*m{ 704 kgf*cm , 51 ft.*lbf }



10. FIX VANE PUMP ASSEMBLY

a. Using SST, fix the vane pump in a vise.

SST
09630-00014 (09631-00132)

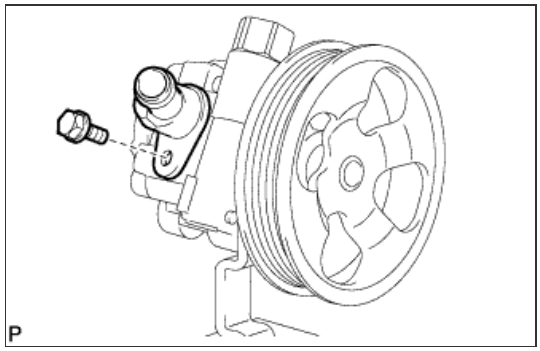


11. INSTALL POWER STEERING SUCTION PORT UNION

a. Coat a new O-ring with power steering fluid and install it to the suction port union.

b. Install the suction port union to the vane pump with the bolt.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }



for Preparation Click here

1. INSTALL VANE PUMP ASSEMBLY

a. Install the vane pump with the 2 bolts.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }

2. CONNECT SUCTION HOSE

a. Connect the suction hose to the vane pump assembly with the clip.

3. CONNECT PRESSURE FEED TUBE

a. Install a new gasket to the pressure feed tube.

b. Connect the pressure feed tube with the union bolt.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }

4. CONNECT POWER STEERING OIL PRESSURE SENSOR CONNECTOR

a. Connect the connector.

b. Attach the wire harness clamp.

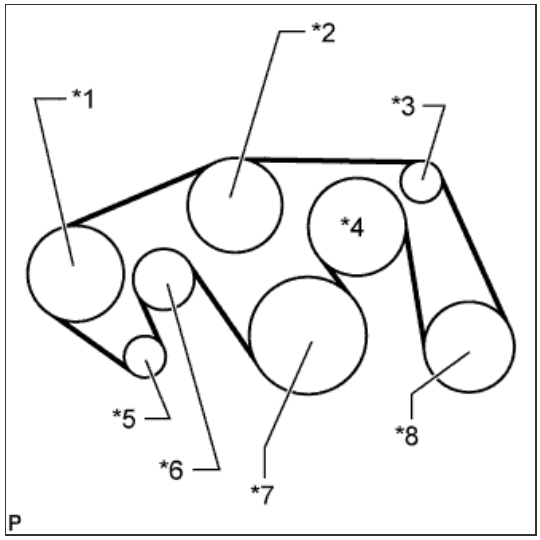
5. INSTALL FAN AND GENERATOR V BELT

a. Set the V belt onto every part.

b. While turning the belt tensioner counterclockwise, remove the bar.

Text in Illustration

*1	Vane Pump
*2	Water Pump
*3	No. 1 Idler
*4	Fan
*5	Generator
*6	Belt Tensioner
*7	Crankshaft
*8	Cooler Compressor



NOTICE:

Make sure that the V belt is properly set to each pulley.

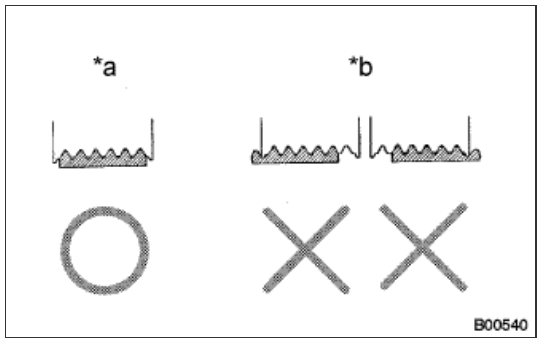
c. After installing the belt, check that it fits properly in the ribbed grooves.

Text in Illustration

*a	CORRECT
*b	INCORRECT

HINT:

Make sure to check by hand that the belt has not slipped out of the grooves on the bottom of the pulley.



6. INSTALL AIR CLEANER ASSEMBLY

a. Install the air cleaner with the 3 bolts.

Torque:
5.0 N*m{ 51 kgf*cm , 44 in.*lbf }

7. INSTALL AIR CLEANER HOSE ASSEMBLY

a. Install the air cleaner hose so that the protrusion of the air cleaner cap aligns with the groove of the hose as shown in the illustration.

Text in Illustration

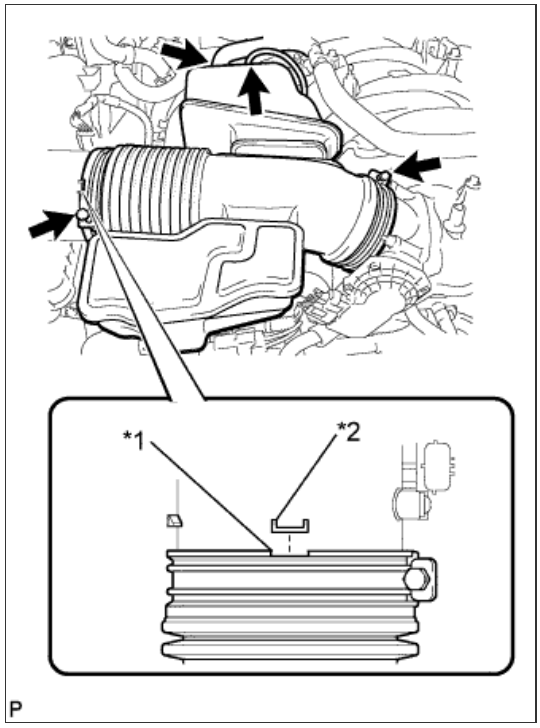
*1	Groove
*2	Protrusion

b. Tighten the 2 clamps.

Torque:
2.5 N*m{ 25 kgf*cm , 22 in.*lbf }

c. Connect the vacuum hose.

d. Connect the No. 2 ventilation hose.

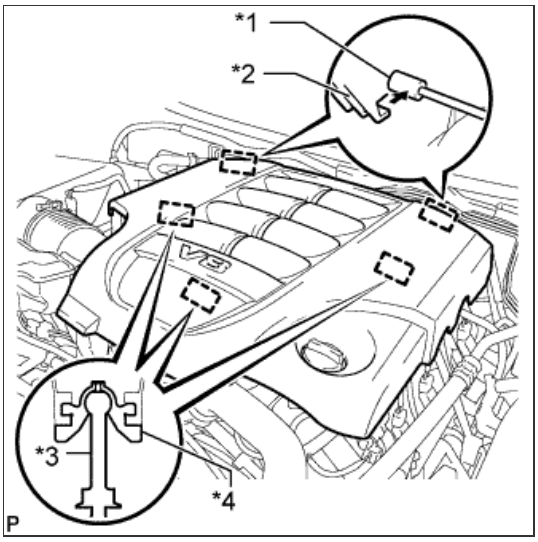


8. INSTALL V-BANK COVER SUB-ASSEMBLY

a. Attach the 2 V-bank cover hooks to the bracket. Then align the 3 V-bank cover grommets with the 3 pins, and press down on the V-bank cover to attach the pins.

Text in Illustration

*1	Bracket
*2	Hook
*3	Pin
*4	Grommet



9. INSTALL FRONT FENDER APRON TRIM PACKING A

a. Install the fender apron seal with the 3 clips.

10. INSTALL FRONT WHEEL RH

Torque:
for Aluminum Wheel:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }
for Steel Wheel:
209 N*m{ 2131 kgf*cm , 154 ft.*lbf }

11. ADD POWER STEERING FLUID

12. BLEED POWER STEERING FLUID

a. Check the fluid level.

b. Jack up the front of the vehicle and support it with stands.

c. Turn the steering wheel.

i. With the engine stopped, turn the wheel slowly from lock to lock several times.

d. Lower the vehicle.

e. Start the engine.

f. Idle the engine for a few minutes.

g. Turn the steering wheel.

i. With the engine idling, turn the wheel left or right to the full lock position and keep it there for 2 to 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 to 3 seconds. *1

ii. Repeat *1 several times.

NOTICE:

For vehicles with VGRS, if the steering wheel is turned from lock to lock repeatedly, the system may stop operating and the amount of rotation before the steering wheel locks may increase due to operation of the overheating prevention function. When the system temperature drops, the system operation automatically returns to normal.

h. Stop the engine.

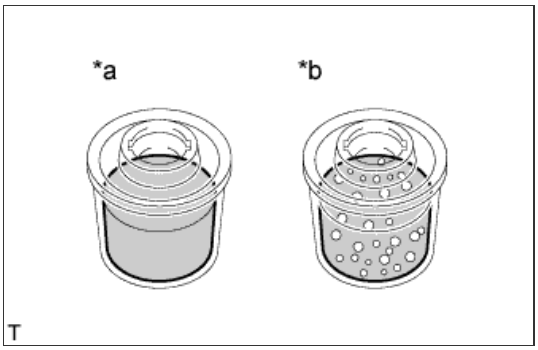
i. Check for foaming or emulsification.

i. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

If the system has to be bled twice because of foaming or emulsification, check for fluid leaks in the system.



j. Check the fluid level.

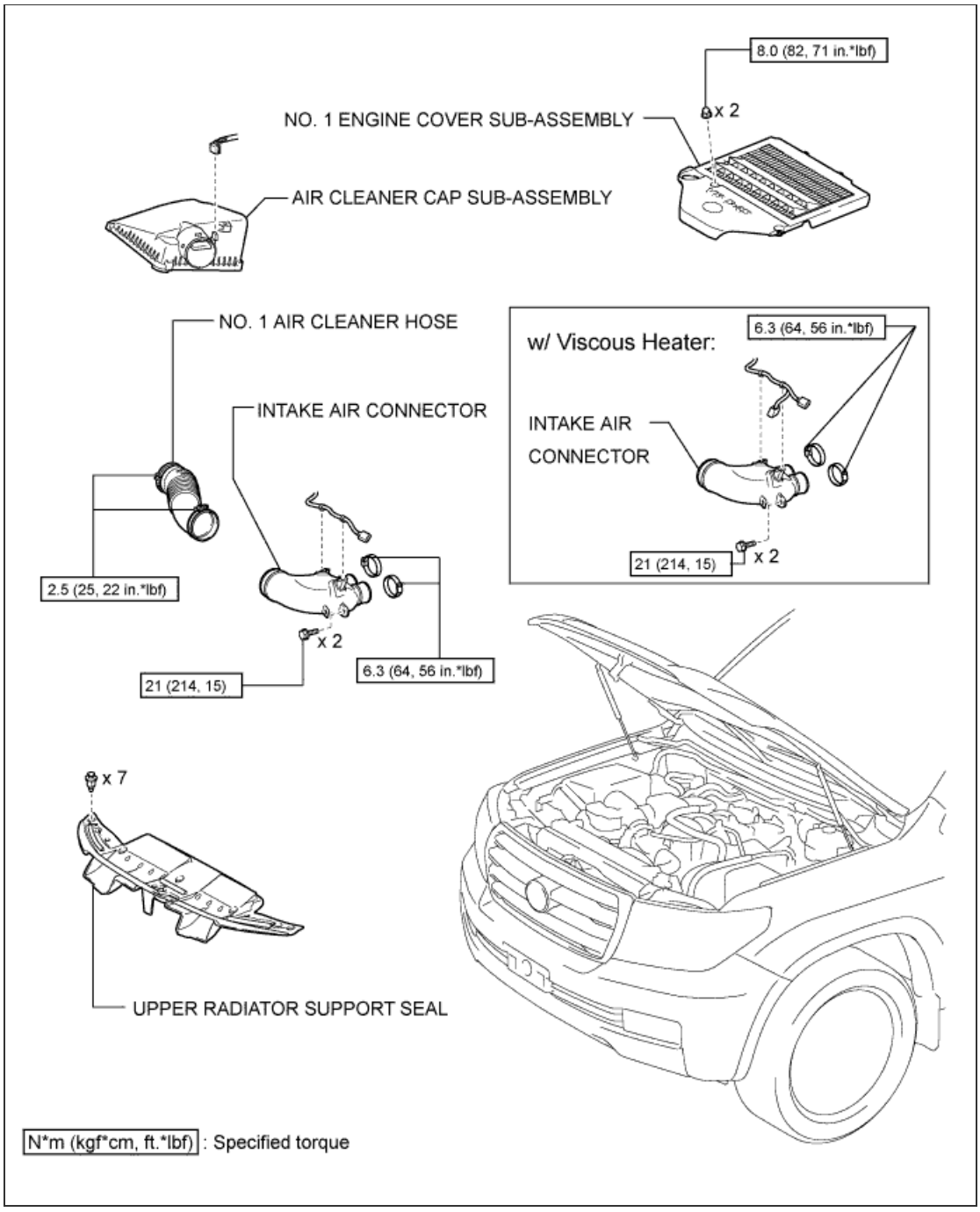
13. INSPECT FOR POWER STEERING FLUID LEAK

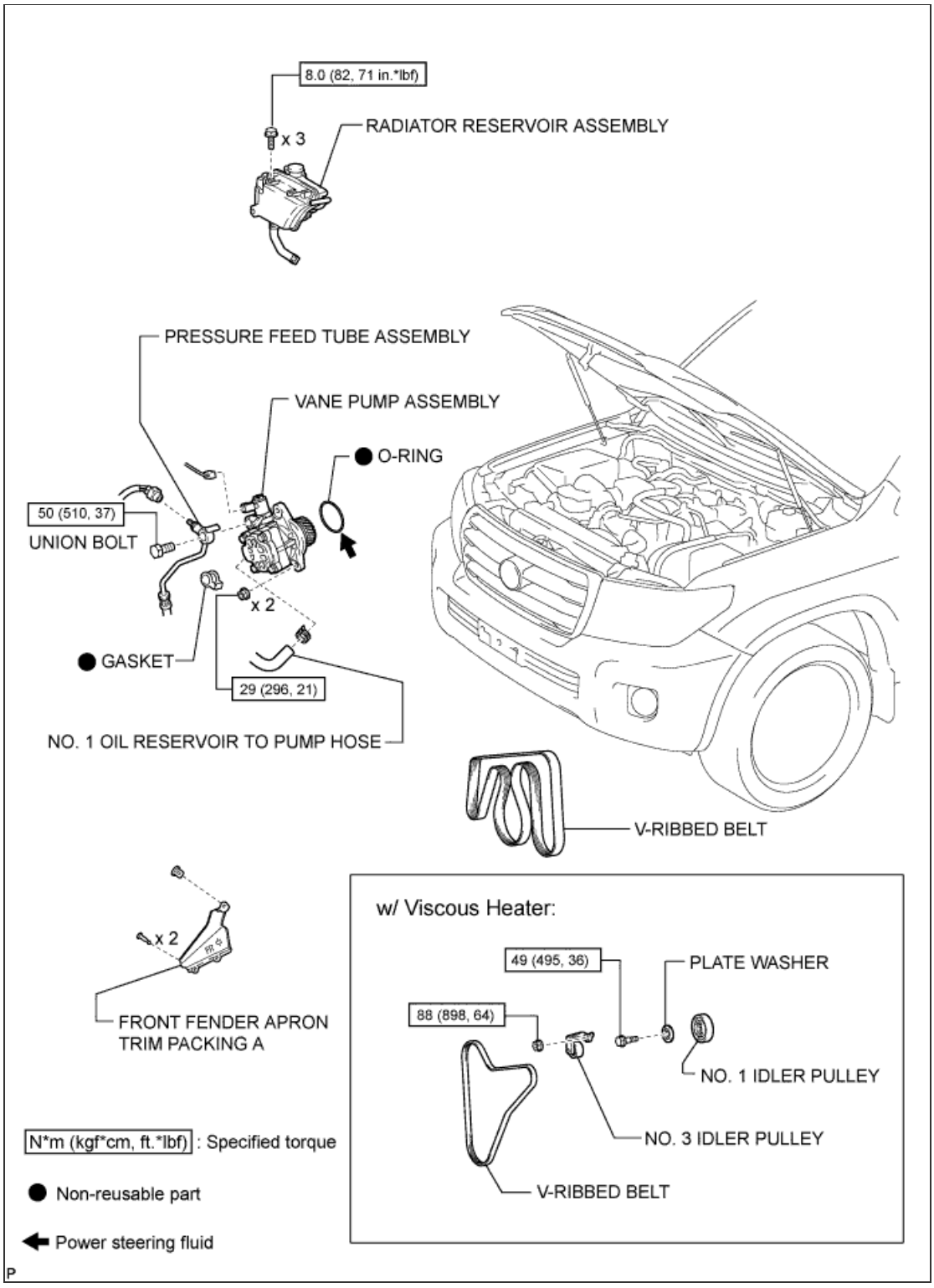
14. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

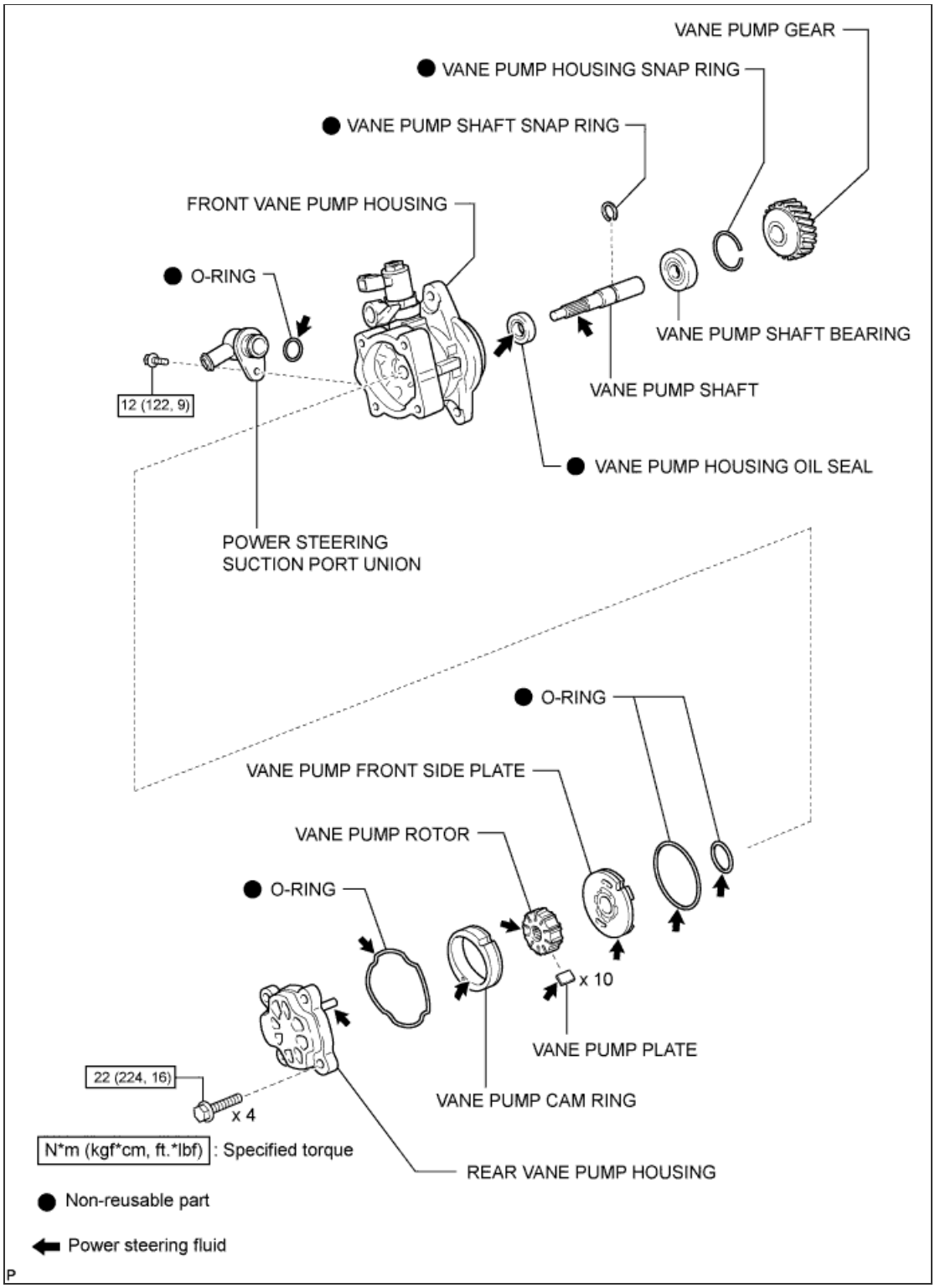
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here




8.0 (82, 71 in.*lbf)
x 3
RADIATOR RESERVOIR ASSEMBLY
PRESSURE FEED TUBE ASSEMBLY
VANE PUMP ASSEMBLY
O-RING
50 (510, 37)
UNION BOLT
x 2
GASKET
29 (296, 21)
NO. 1 OIL RESERVOIR TO PUMP HOSE
V-RIBBED BELT
x 2
FRONT FENDER APRON TRIM PACKING A
w/ Viscous Heater:
49 (495, 36)
PLATE WASHER
88 (898, 64)
NO. 1 IDLER PULLEY
NO. 3 IDLER PULLEY
V-RIBBED BELT
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Power steering fluid
P


VANE PUMP GEAR
VANE PUMP HOUSING SNAP RING
VANE PUMP SHAFT SNAP RING
FRONT VANE PUMP HOUSING
O-RING
VANE PUMP SHAFT BEARING
12 (122, 9)
VANE PUMP SHAFT
VANE PUMP HOUSING OIL SEAL
POWER STEERING
SUCTION PORT UNION
O-RING
VANE PUMP FRONT SIDE PLATE
VANE PUMP ROTOR
O-RING
x 10
VANE PUMP PLATE
22 (224, 16)
x 4
VANE PUMP CAM RING
N*m (kgf*cm, ft.*lbf) : Specified torque
REAR VANE PUMP HOUSING
Non-reusable part
Power steering fluid
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

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

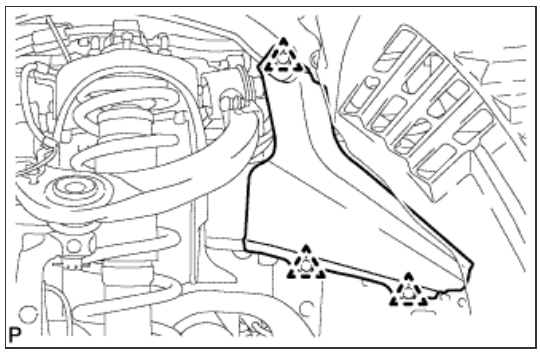
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

3. REMOVE UPPER RADIATOR SUPPORT SEAL

a. Remove the 7 clips and upper radiator support seal.

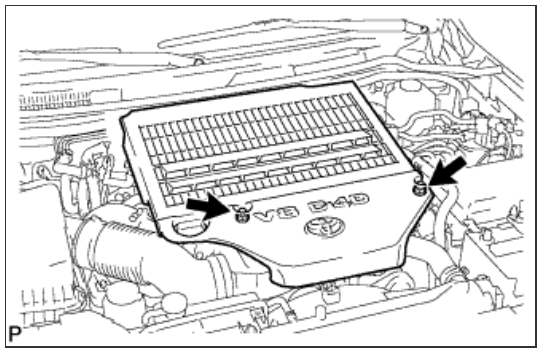
4. REMOVE FRONT FENDER APRON TRIM PACKING A

a. Remove the 3 clips and front fender apron seal front RH.



5. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY

a. Remove the 2 nuts and No. 1 engine cover.

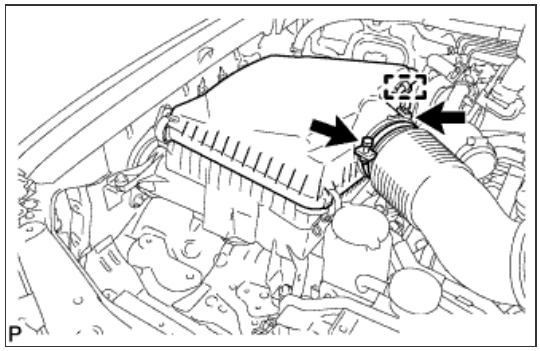


6. REMOVE AIR CLEANER CAP SUB-ASSEMBLY

a. Loosen the hose clamp.

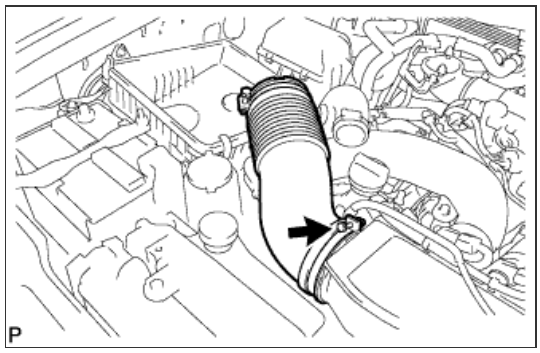
b. Disconnect the mass air flow meter connector and using a clip remover, detach the wire harness clamp from the air cleaner cap.

c. Detach the 4 clamps and remove the air cleaner cap.



7. REMOVE NO. 1 AIR CLEANER HOSE

a. Loosen the hose clamp and remove the No. 1 air cleaner hose.



8. REMOVE INTAKE AIR CONNECTOR

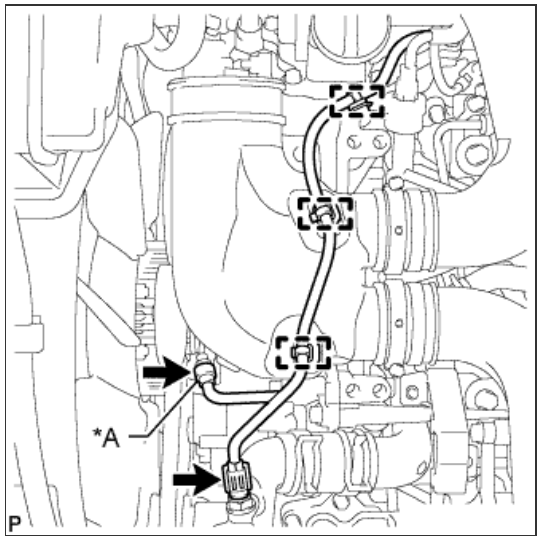
a. w/ Viscous Heater:
Disconnect the 2 connectors from the viscous with magnet clutch heater and water temperature sensor.

Text in Illustration

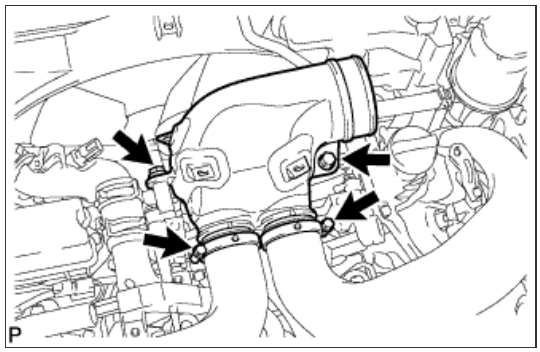
*A	w/ Viscous Heater

b. w/o Viscous Heater:
Disconnect the connector from the water temperature sensor.

c. Using a clip remover, detach the 3 wire harness clamps.



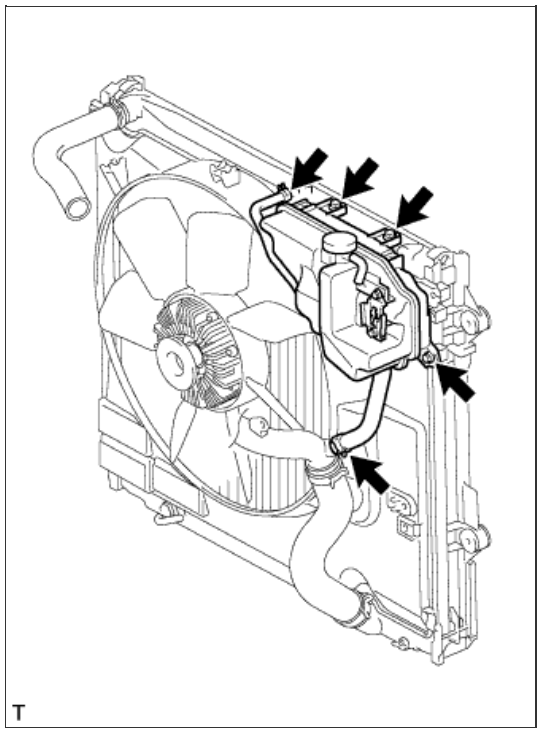
d. Loosen the 2 hose clamps and remove the 2 bolts and intake air connector.



9. REMOVE RADIATOR RESERVOIR ASSEMBLY

a. Disconnect the 2 hoses.

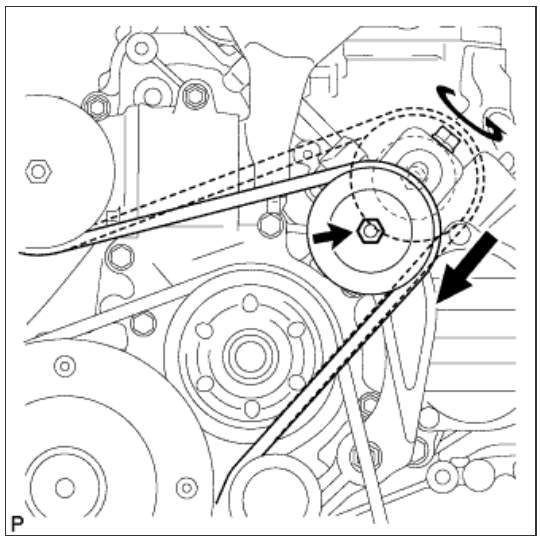
b. Remove the 3 bolts and radiator reservoir.



10. REMOVE V-RIBBED BELT (w/ Viscous Heater)

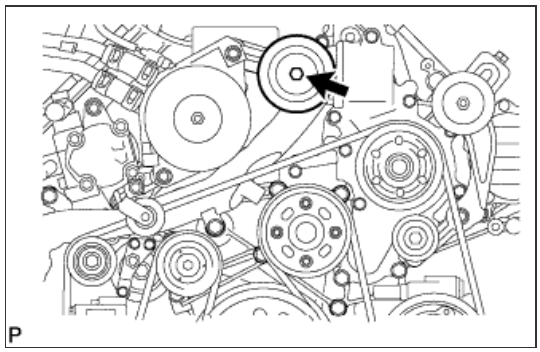
a. Loosen the lock nut and turn the bolt counterclockwise.

b. Remove the V-ribbed belt.



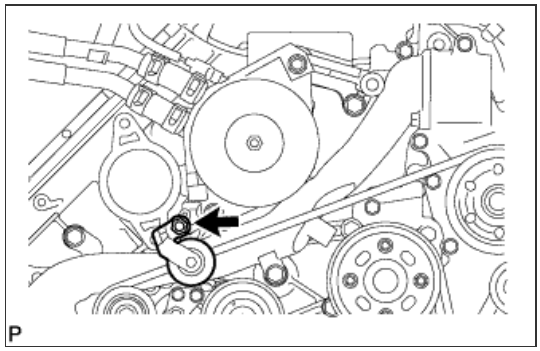
11. REMOVE NO. 1 IDLER PULLEY (w/ Viscous Heater)

a. Remove the bolt, cover, No. 1 idler pulley and collar.



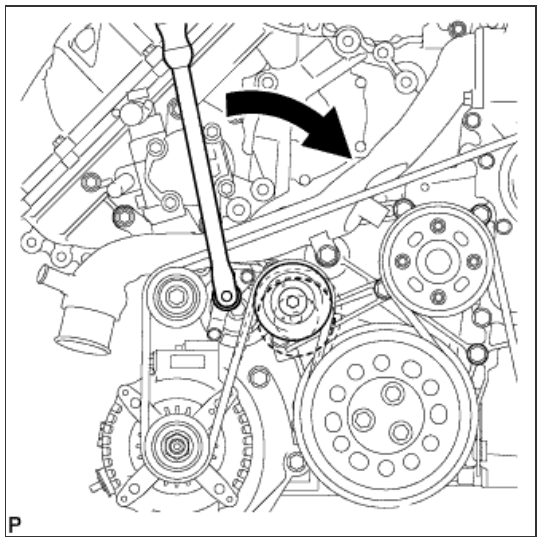
12. REMOVE NO. 3 IDLER PULLEY (w/ Viscous Heater)

a. Remove the nut and No. 3 idler pulley.



13. REMOVE V-RIBBED BELT

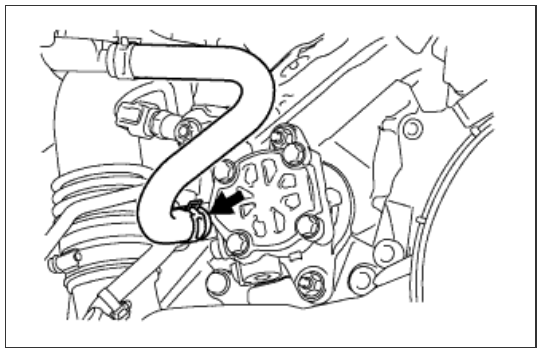
a. Using a wrench to the V-ribbed belt tensioner bracket, turn the wrench clockwise and remove the V-ribbed belt.



14. DRAIN POWER STEERING FLUID

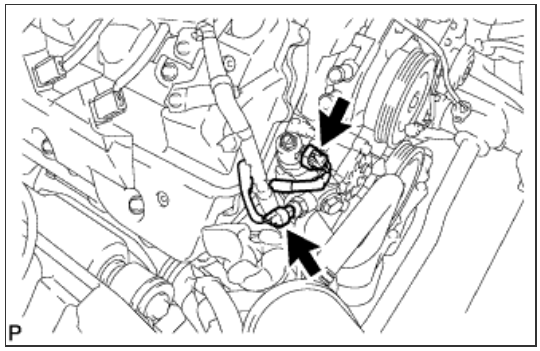
15. DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

a. Slide the clip and disconnect the No. 1 oil reservoir to pump hose from the vane pump.



16. DISCONNECT POWER STEERING OIL PRESSURE SWITCH CONNECTOR

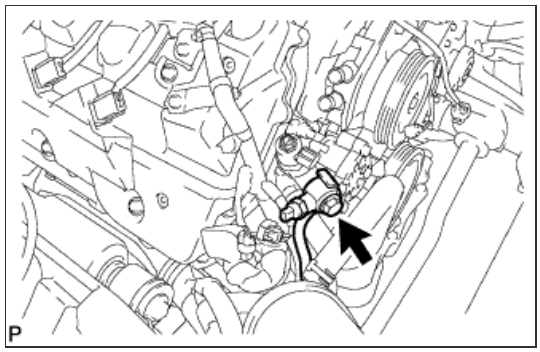
a. Disconnect the 2 connectors.



17. REMOVE PRESSURE FEED TUBE ASSEMBLY

a. Remove the union bolt, union and disconnect the pressure feed tube.

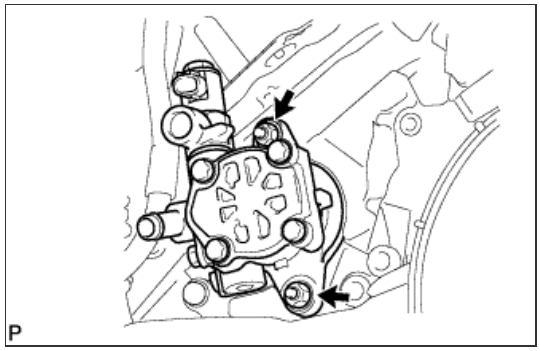
b. Remove the gasket.



18. REMOVE VANE PUMP ASSEMBLY

a. Remove the 2 nuts and vane pump.

b. Remove the O-ring from the vane pump.



for Preparation Click here

NOTICE:

When using a vise, do not overtighten it.

1. REMOVE POWER STEERING SUCTION PORT UNION

a. Remove the bolt and suction port union from the vane pump.

b. Using a screwdriver, remove the O-ring from the suction port union.

2. REMOVE VANE PUMP GEAR

a. Using soft jaws on a vise, clamp the vane pump.

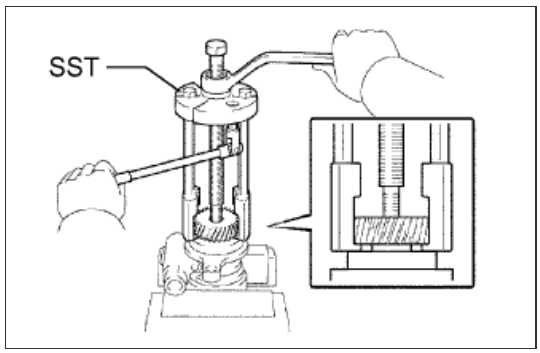
NOTICE:

Be careful not to damage the vane pump.

b. Using SST, remove the gear.

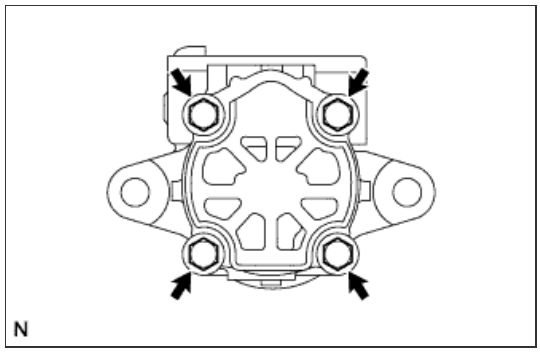
SST

09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03011)



3. REMOVE REAR VANE PUMP HOUSING

a. Remove the 4 bolts and rear housing from the front housing.



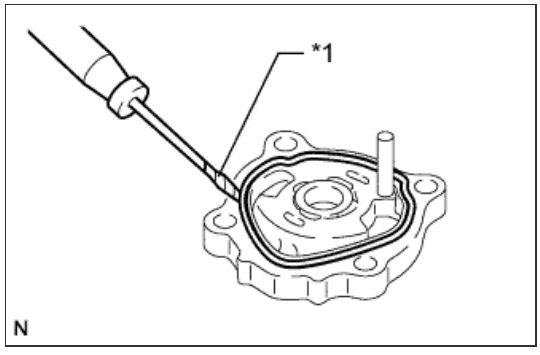
b. Using a screwdriver, remove the O-ring from the rear housing.

Text in Illustration

*1	Protective Tape

HINT:

Tape the screwdriver tip before use.



4. REMOVE VANE PUMP ROTOR, 10 VANE PUMP PLATES AND VANE PUMP CAM RING

a. Remove the 10 vane pump plates.

NOTICE:

Take care not to drop the vane pump plates.

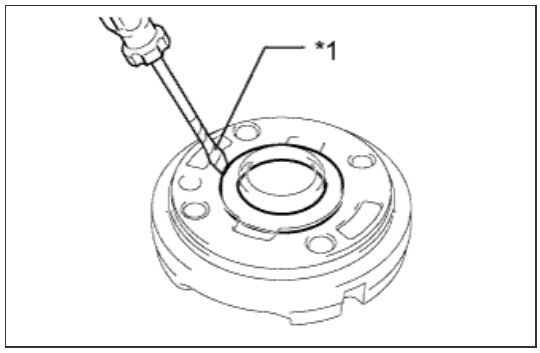
b. Remove the rotor.

c. Remove the cam ring from the front housing.

5. REMOVE VANE PUMP FRONT SIDE PLATE

a. Remove the front side plate from the front housing.

b. Using a screwdriver, remove the O-ring from the front side plate.



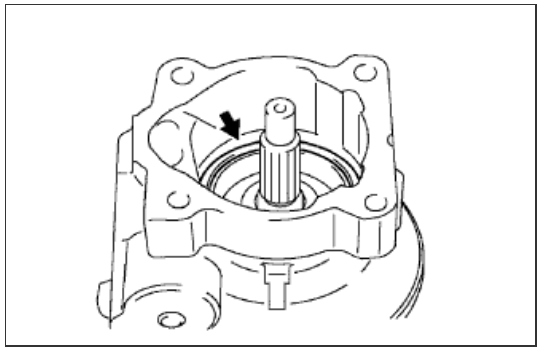
HINT:

Tape the screwdriver tip before use.

Text in Illustration

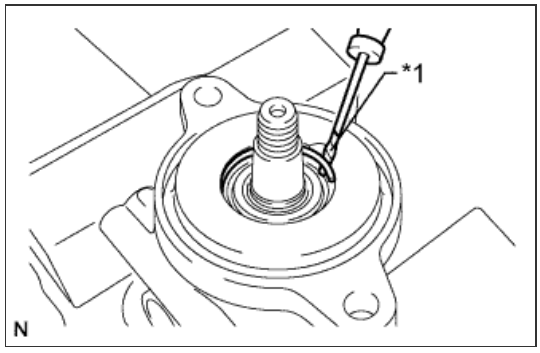
*1	Protective Tape

c. Remove the O-ring from the front housing.



6. REMOVE VANE PUMP SHAFT WITH VANE PUMP SHAFT BEARING

a. Using a screwdriver, remove the snap ring.



Text in Illustration

*1	Protective Tape

NOTICE:

Be careful not to damage the front housing.

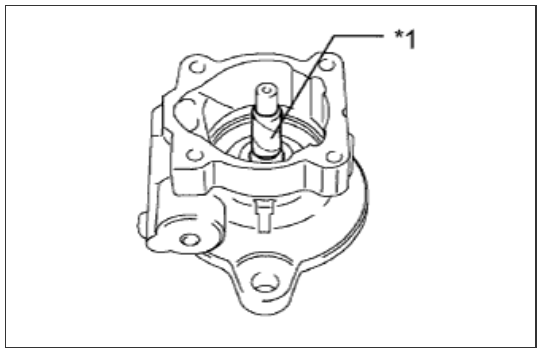
HINT:

Tape the screwdriver tip before use.

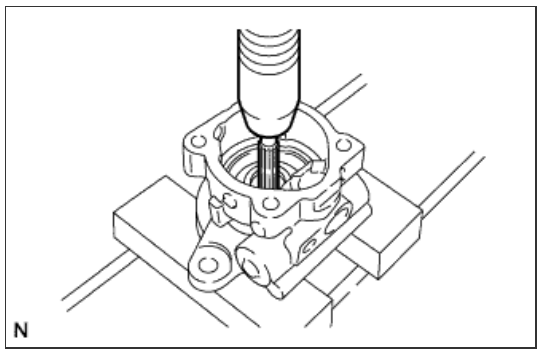
b. Tape the serrated part of the vane pump shaft.

Text in Illustration

*1	Protective Tape



c. Using a press, press out the shaft with bearing.

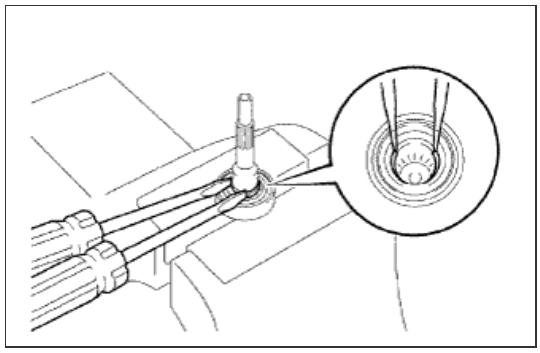


7. REMOVE VANE PUMP SHAFT BEARING

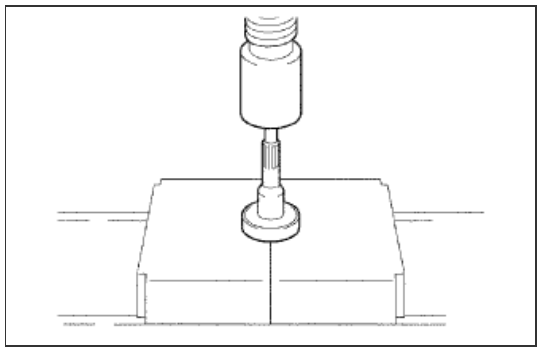
a. Using 2 screwdrivers, remove the snap ring from the shaft.

NOTICE:

Be careful not to damage the shaft.



b. Using a press, press out the bearing from the shaft.



8. REMOVE VANE PUMP HOUSING OIL SEAL

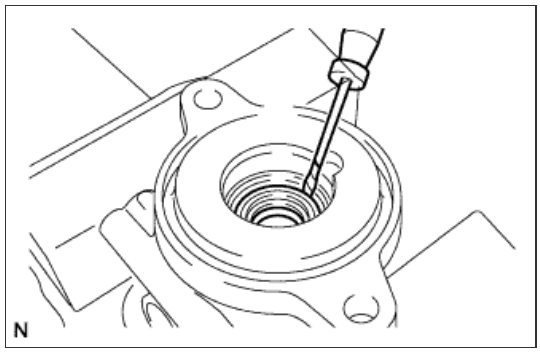
a. Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the front housing.

HINT:

Tape the screwdriver tip before use.



for Preparation Click here

1. CHECK OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND VANE PUMP REAR HOUSING BUSHING

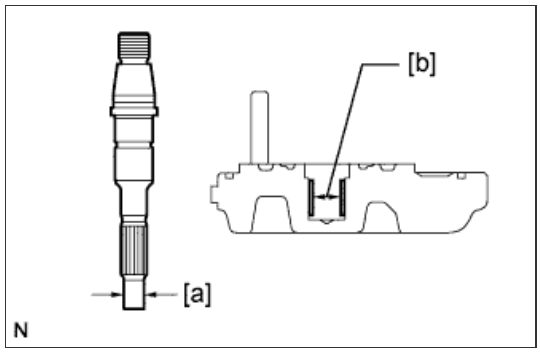
a. Using a micrometer, measure the outer diameter [a] of the shaft.

b. Using a vernier caliper, measure the inner diameter [b] of the rear housing bush.

c. Calculate the oil clearance.
Oil clearance = Inner diameter of the bush [b] - Outer diameter of the shaft [a]

Maximum oil clearance:
0.08 mm (0.00315 in.)

If the oil clearance is more than the maximum, replace the vane pump assembly.



2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATES

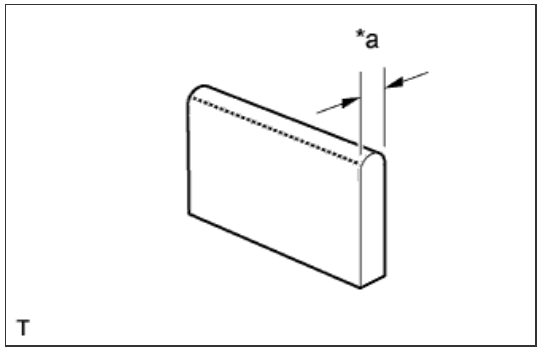
a. Using a micrometer, measure the thickness of the 10 vane pump plates.

Text in Illustration

*a	Thickness

Standard thickness:
1.405 to 1.411 mm (0.0553 to 0.0556 in.)

If the thickness is not as specified, replace the vane pump assembly.



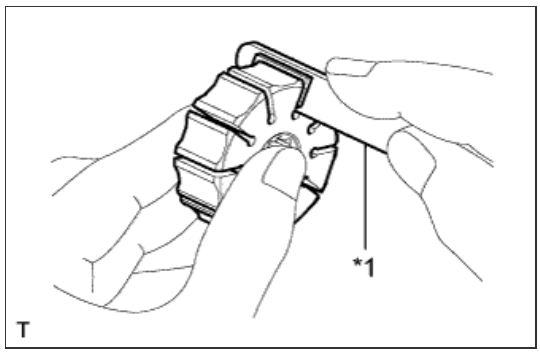
b. Using a feeler gauge, measure the clearance between the side face of the rotor groove and the plate.

Text in Illustration

*1	Protective Tape

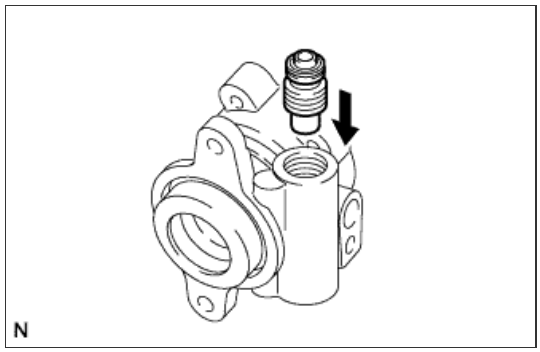
Maximum clearance:
0.03 mm (0.00118 in.)

If the clearance is more than the maximum, replace the vane pump assembly.



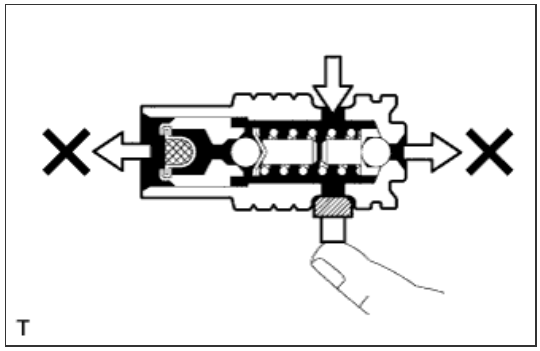
3. INSPECT FLOW CONTROL VALVE

a. Coat the flow control valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



b. Check the flow control valve for leakage.

i. Close one of the holes and apply 390 to 490 kPa (4.0 to 4.9 kgf/cm ^{2}, 57 to 71 psi) of compressed air into the opposite side hole, and confirm that air does not come out from the end holes.
If air leaks, replace the vane pump assembly.

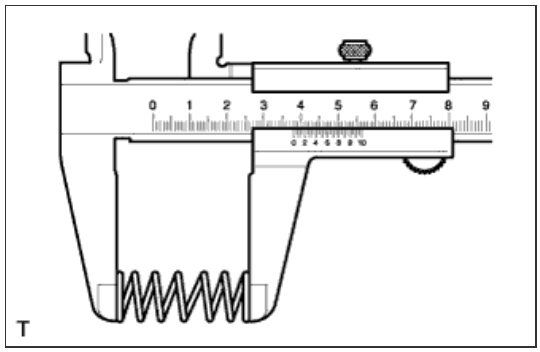


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

a. Using a vernier caliper, measure the free length of the compression spring.

Minimum free length:
31.3 mm (1.23 in.)

If the length is less than the minimum, replace the vane pump assembly.



5. INSPECT PRESSURE PORT UNION

a. Visually check the pressure port union for fluid leaks.
If there is a leak, replace the vane pump assembly.

for Preparation Click here

NOTICE:

When installing parts, coat the parts indicated by arrows with power steering fluid (Click here).

1. INSTALL VANE PUMP HOUSING OIL SEAL

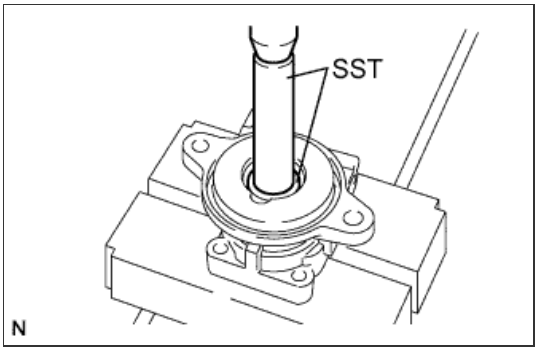
a. Coat the lip of a new oil seal with power steering fluid.

b. Using SST and a press, press in the oil seal.

SST
09950-60010 (09951-00320)
09950-70010 (09951-07150)

NOTICE:

- **Do not mistake the direction of the oil seal.**
- **Do not damage the oil seal.**

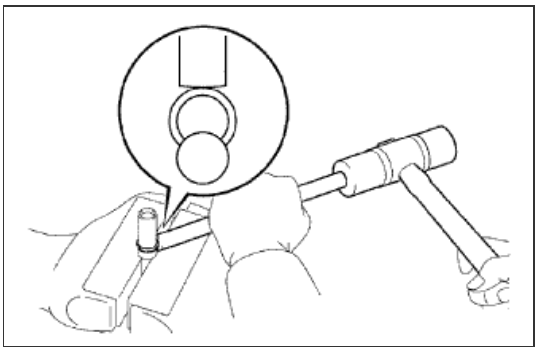


2. INSTALL VANE PUMP SHAFT BEARING

a. Using a brass bar and hammer, tap on a new snap ring.

NOTICE:

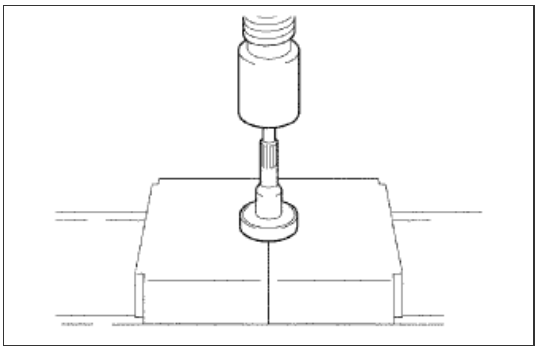
Be careful not to damage the shaft.



b. Using a press, press in the shaft into a new bearing.

NOTICE:

Be careful not to damage the bearing.



3. INSTALL VANE PUMP SHAFT WITH VANE PUMP SHAFT BEARING

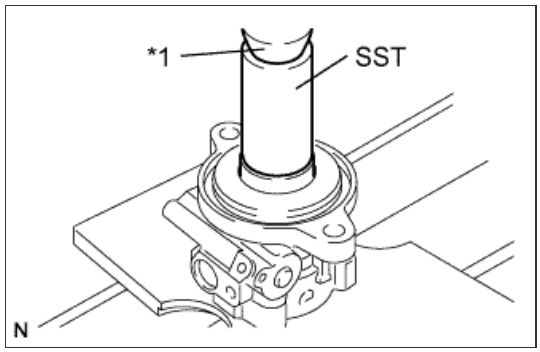
a. Temporarily install the rear housing to the front housing.

b. Using SST and a press, press in the shaft with bearing into the front housing.

SST
09632-36010

Text in Illustration

*1	Press

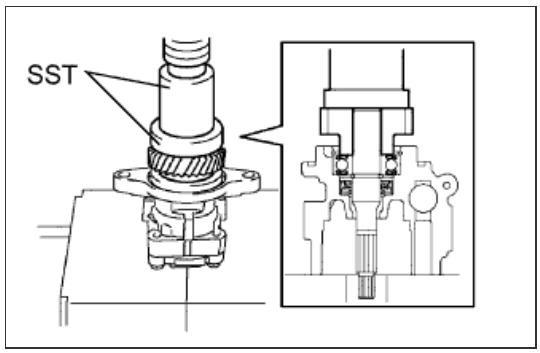


c. Using a screwdriver, install a new snap ring into the front housing.

4. INSTALL VANE PUMP GEAR

a. Using SST and a press, press in the gear to the shaft.

SST
09950-60010 (09951-00420)
09950-70010 (09951-07150)

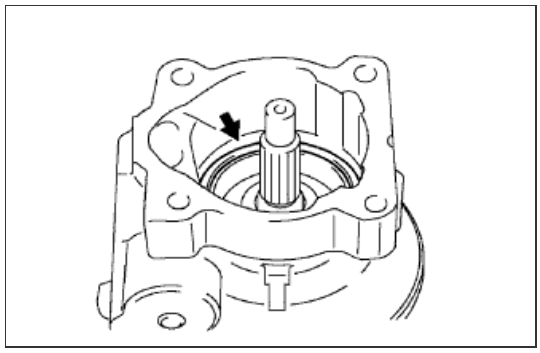


b. Remove the rear housing from the front housing.

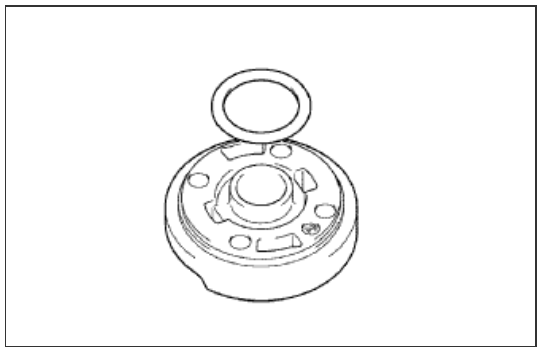
5. INSTALL VANE PUMP FRONT SIDE PLATE

a. Coat a new O-ring with power steering fluid and install it into the front housing.

b. Coat the front side plate with power steering fluid.



c. Coat a new O-ring with power steering fluid and install it onto the front side plate.



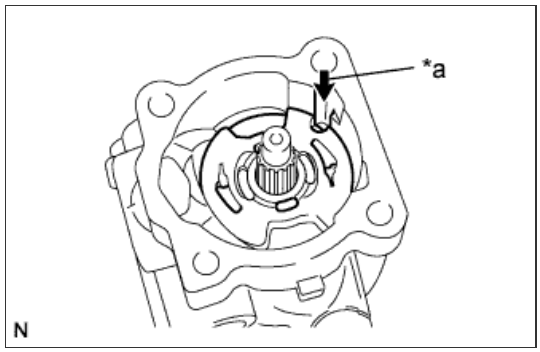
d. Align the notch of the front side plate with the notch of the front housing, and install the front side plate.

Text in Illustration

*a	Align

NOTICE:

Make sure that the front side plate is installed facing in the correct direction.



6. INSTALL VANE PUMP CAM RING

a. Coat the vane pump cam ring with power steering fluid

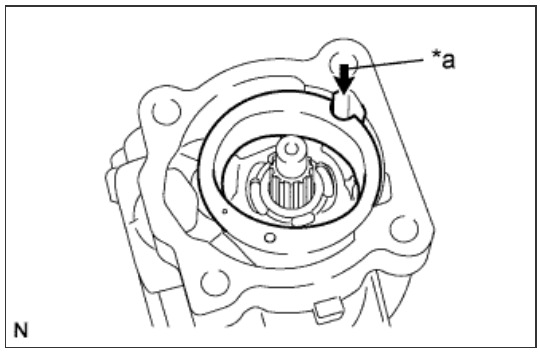
b. Align the notch of the cam ring with the notch of the front side plate, and install the cam ring with the inscribed mark facing upward.

Text in Illustration

*a	Align

NOTICE:

Make sure that the cam ring is installed facing in the correct direction.



7. INSTALL VANE PUMP ROTOR AND VANE PUMP PLATE

a. Install the rotor with the inscribed mark facing upward.

b. Coat the 10 vane pump plates with power steering fluid.

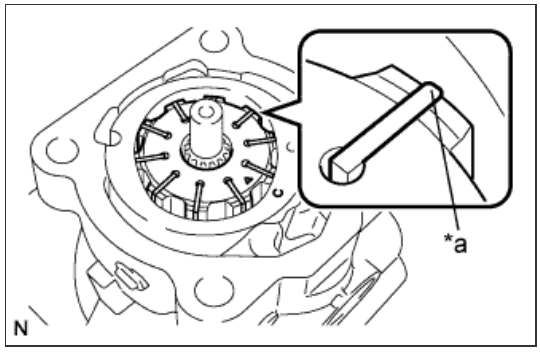
c. Install the 10 vane pump plates with the round end facing upward.

Text in Illustration

*a	Round End

NOTICE:

Make sure that the 10 vane pump plates are installed facing in the correct direction.



8. INSTALL REAR VANE PUMP HOUSING

a. Coat a new O-ring with power steering fluid and install it onto the rear housing.

b. Coat the straight pin of the rear vane pump housing with power steering fluid.

c. Align the straight pin of the rear vane pump housing with the notches of the cam ring, front side plate and front housing.

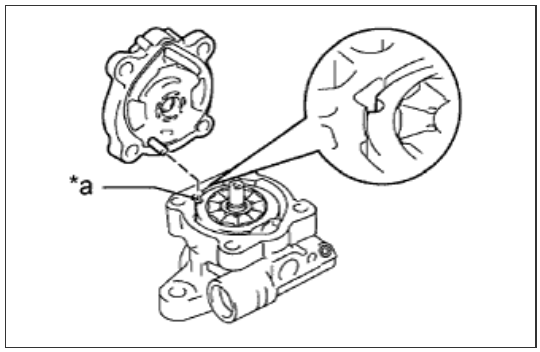
Text in Illustration

*a	Align

NOTICE:

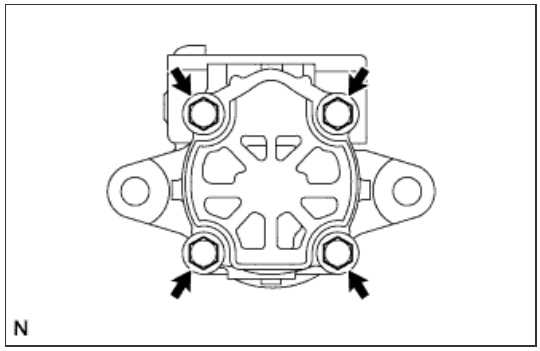
Make sure that the O-ring is not protruding anywhere when installing the vane

pump rear housing.



d. Install the rear housing with the 4 bolts.

Torque:
22 N*m{ 224 kgf*cm , 16 ft.*lbf }



9. INSTALL POWER STEERING SUCTION PORT UNION

a. Coat a new O-ring with power steering fluid and install it to the suction port union.

b. Install the suction port union to the vane pump with the bolt.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }

10. INSPECT TOTAL PRELOAD

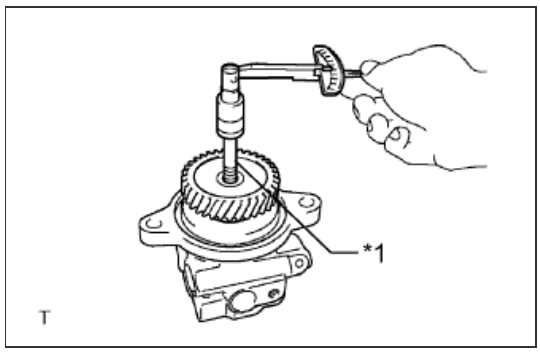
a. Check that the pump rotates smoothly without abnormal noise.

b. Temporarily install a service bolt.

Recommended service bolt:
Thread diameter:
10 mm (0.394 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

c. Using a torque wrench, measure the pump rotating torque.

Standard rotating torque:
0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf) or less



Text in Illustration

*1	Service Bolt

If the rotating torque is not as specified, check the oil seal.

for Preparation Click here

1. INSTALL VANE PUMP ASSEMBLY

a. Coat a new O-ring with power steering fluid and install it to the vane pump.

b. Install the vane pump with the 2 nuts.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }

2. CONNECT PRESSURE FEED TUBE ASSEMBLY

a. Install a new gasket to the pressure feed tube.

b. Install the pressure feed tube and union with the union bolt.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }

HINT:

Make sure that the stopper of the tube touches the vane pump body as shown in the illustration before tightening the bolt.

3. CONNECT POWER STEERING OIL PRESSURE SWITCH CONNECTOR

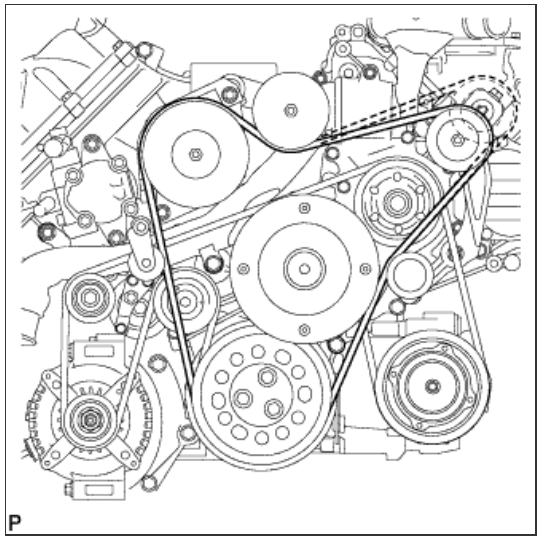
a. Connect the 2 connectors.

4. CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

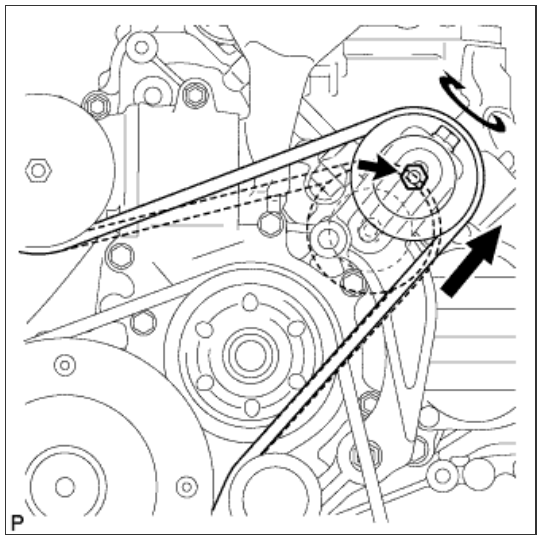
a. Connect the pump hose to the vane pump with the clip.

5. INSTALL V-RIBBED BELT

a. Install the V-ribbed belt as shown in the illustration.



b. Temporarily install the lock nut, and turn the bolt clockwise.



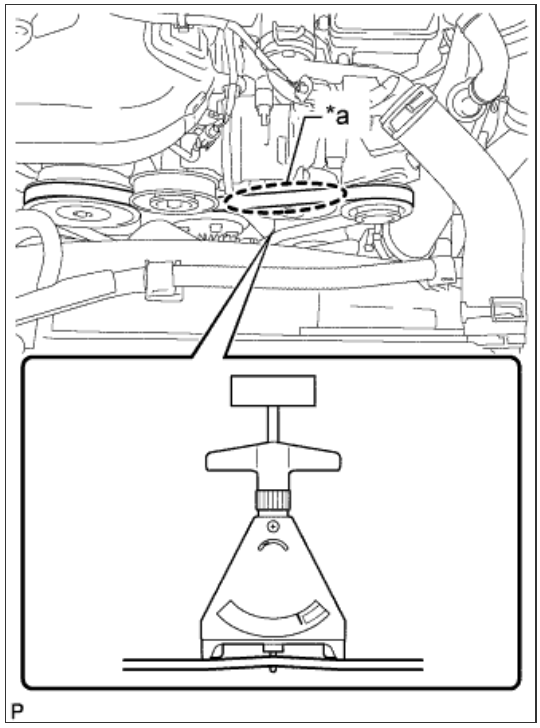
c. Using a belt tension gauge, inspect the belt tension.

Standard Belt Tension:

Item	Condition	Specified Condition
New belt	5 to 35°C (41 to 95°F)	550 to 800 N (56 to 82 kgf, 123.6 to 179.8 lbf)
Used belt	5 to 35°C (41 to 95°F)	300 to 500 N (31 to 51 kgf, 67.4 to 112.4 lbf)

Text in Illustration

*a	Measuring Point

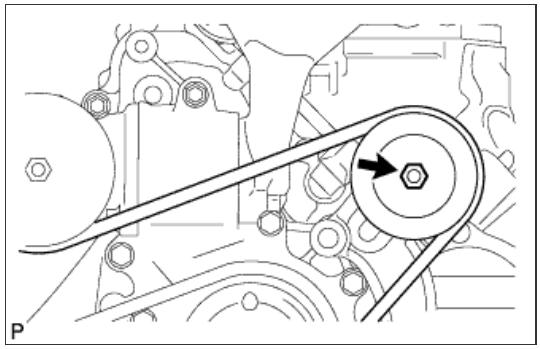


HINT:

- **When measuring the tension of a new belt, measure the tension immediately after installing it to the engine but before starting the engine.**
- **A "new belt" is a belt which has been used for less than 5 minutes on a running engine.**
- **A "used belt" is a belt which has been used on a running engine for 5 minutes or more.**
- **After installing a new belt, run the engine for approximately 5 minutes and then recheck the tension.**

d. Tighten the nut.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }

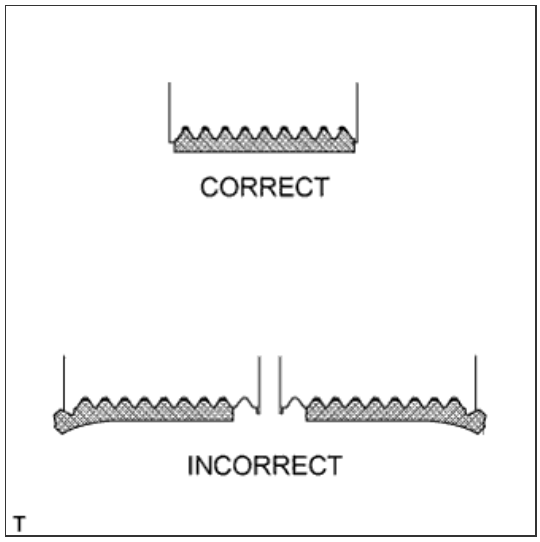


e. Check that the belt fits properly in the ribbed grooves.

HINT:

Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

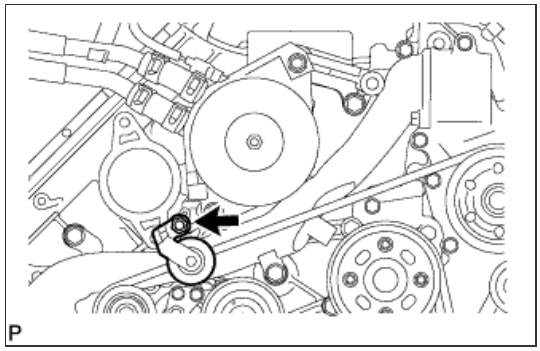
If it has slipped out, replace the V-ribbed belt. Install a new V-ribbed belt.



6. INSTALL NO. 3 IDLER PULLEY (w/ Viscous Heater)

a. Align the No. 3 idler pulley bracket knock pin and No. 1 idler pulley bracket knock pin hole and install the No. 3 idler pulley with the nut.

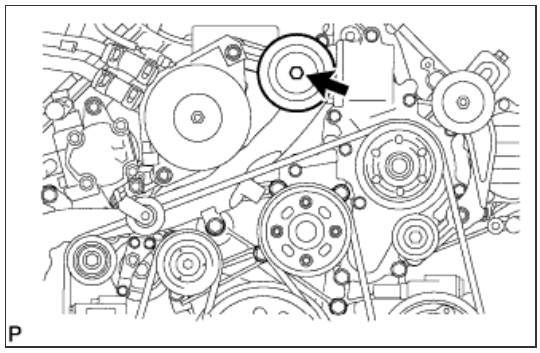
Torque:
88 N*m{ 898 kgf*cm , 64 ft.*lbf }



7. INSTALL NO. 1 IDLER PULLEY (w/ Viscous Heater)

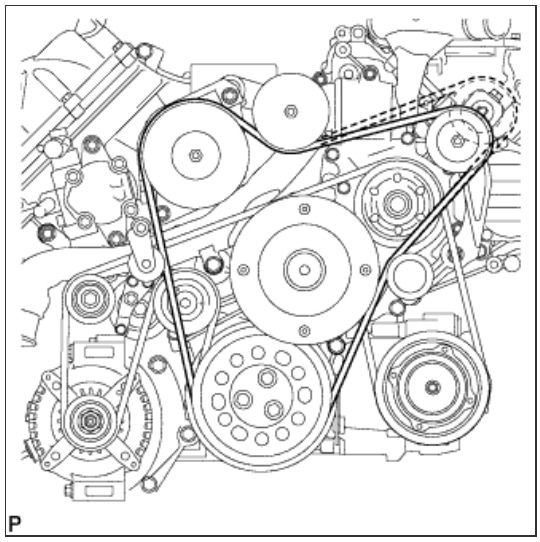
a. Install the collar, No. 1 idler pulley and cover with the bolt.

Torque:
49 N*m{ 495 kgf*cm , 36 ft.*lbf }

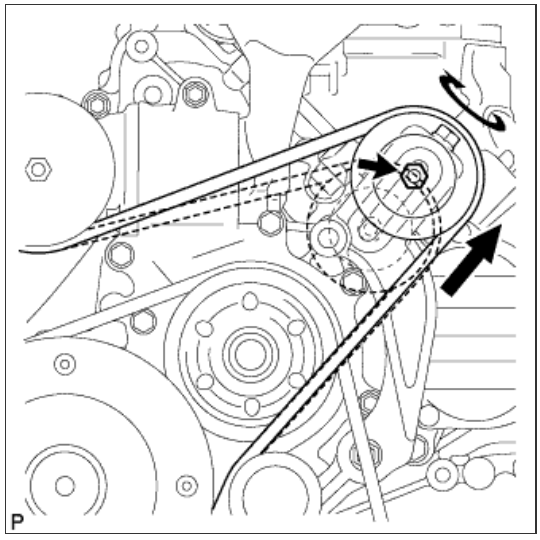


8. INSTALL V-RIBBED BELT (w/ Viscous Heater)

a. Install the V-ribbed belt as shown in the illustration.



b. Temporarily install the lock nut, and turn the bolt clockwise.



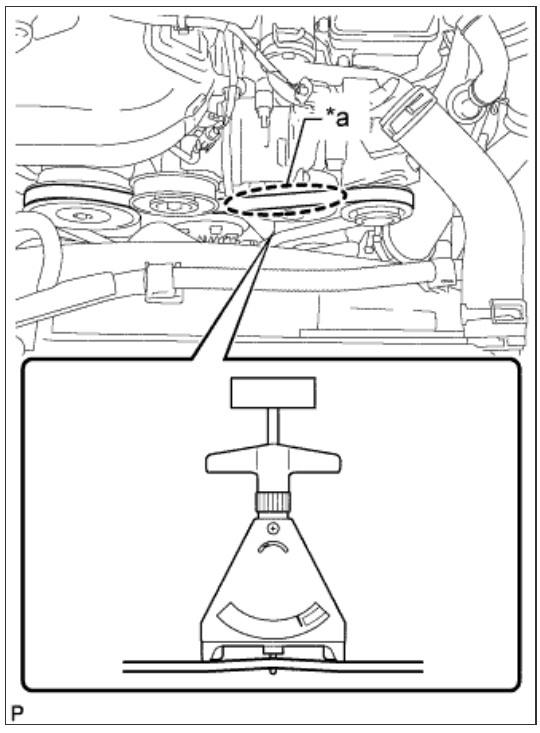
c. Using a belt tension gauge, inspect the belt tension.

Standard Belt Tension:

Item	Condition	Specified Condition
New belt	5 to 35°C (41 to 95°F)	550 to 800 N (56 to 82 kgf, 123.6 to 179.8 lbf)
Used belt	5 to 35°C (41 to 95°F)	300 to 500 N (31 to 51 kgf, 67.4 to 112.4 lbf)

Text in Illustration

*a	Measuring Point

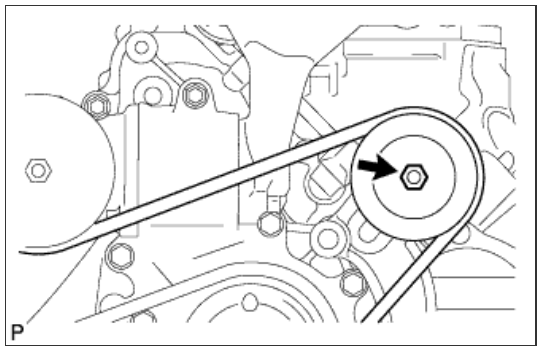


HINT:

- **When measuring the tension of a new belt, measure the tension immediately after installing it to the engine but before starting the engine.**
- **A "new belt" is a belt which has been used for less than 5 minutes on a running engine.**
- **A "used belt" is a belt which has been used on a running engine for 5 minutes or more.**
- **After installing a new belt, run the engine for approximately 5 minutes and then recheck the tension.**

d. Tighten the nut.

Torque:
40 N*m{ 408 kgf*cm , 30 ft.*lbf }

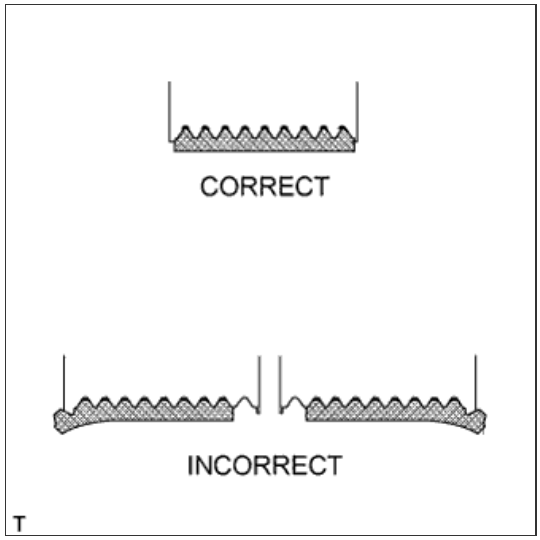


e. Check that the belt fits properly in the ribbed grooves.

HINT:

Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

If it has slipped out, replace the V-ribbed belt. Install a new V-ribbed belt.



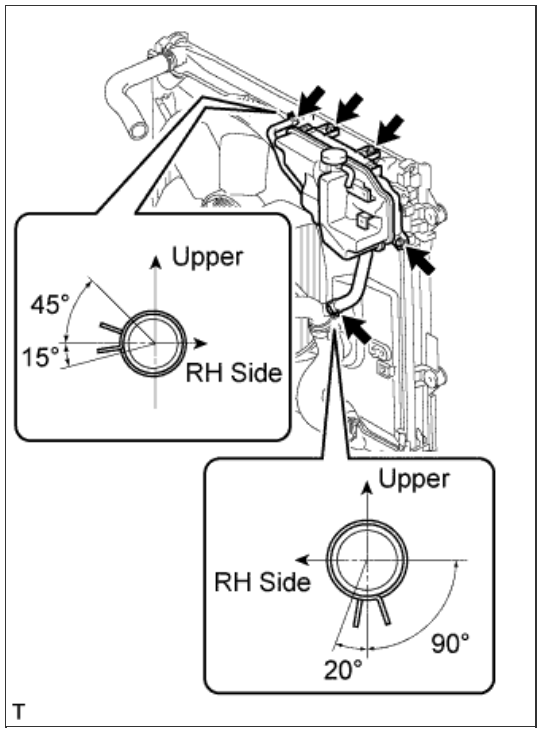
9. INSTALL RADIATOR RESERVOIR ASSEMBLY

a. Install the radiator reservoir with the 3 bolts.

b. Connect the 2 hoses to the upper radiator tank and water inlet.

HINT:

Make sure the directions of the hose clamps are as shown in the illustration.



10. INSTALL INTAKE AIR CONNECTOR

a. Connect the intake air connector to the No. 1 and No. 2 air cleaner pipes.

b. Install the connector with the 2 bolts.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }

c. Tighten the 2 hose clamps.

Torque:
6.3 N*m{ 64 kgf*cm , 56 in.*lbf }

d. Attach the 3 wire harness clamps.

e. w/o Viscous Heater:
Connect the connector to the water temperature sensor.

f. w/ Viscous Heater:
Connect the 2 connectors to the water temperature sensor and viscous with magnet clutch heater.

11. TEMPORARILY INSTALL NO. 1 AIR CLEANER HOSE

a. Temporarily install the air cleaner hose to the intake air connector.

12. INSTALL AIR CLEANER CAP SUB-ASSEMBLY

a. Connect the air cleaner cap to the air cleaner hose, and install the air cleaner cap with the 4 clamps.

b. Connect the mass air flow meter connector and attach the wire harness clamp to the air cleaner cap.

c. Attach the wire harness clamp.

d. Align the protrusion of the air cleaner cap and the concave portion of the air cleaner hose.

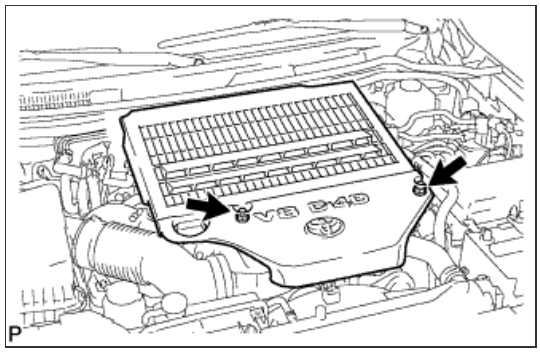
e. Tighten the 2 hose clamps.

Torque:
2.5 N*m{ 25 kgf*cm , 22 in.*lbf }

13. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY

a. Install the engine cover with the 2 nuts.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }



14. INSTALL UPPER RADIATOR SUPPORT SEAL

a. Install the upper radiator support seal with the 7 clips.

15. INSTALL FRONT FENDER APRON TRIM PACKING A

a. Install the front fender apron seal front RH with the 3 clips.

16. ADD POWER STEERING FLUID

17. BLEED POWER STEERING FLUID

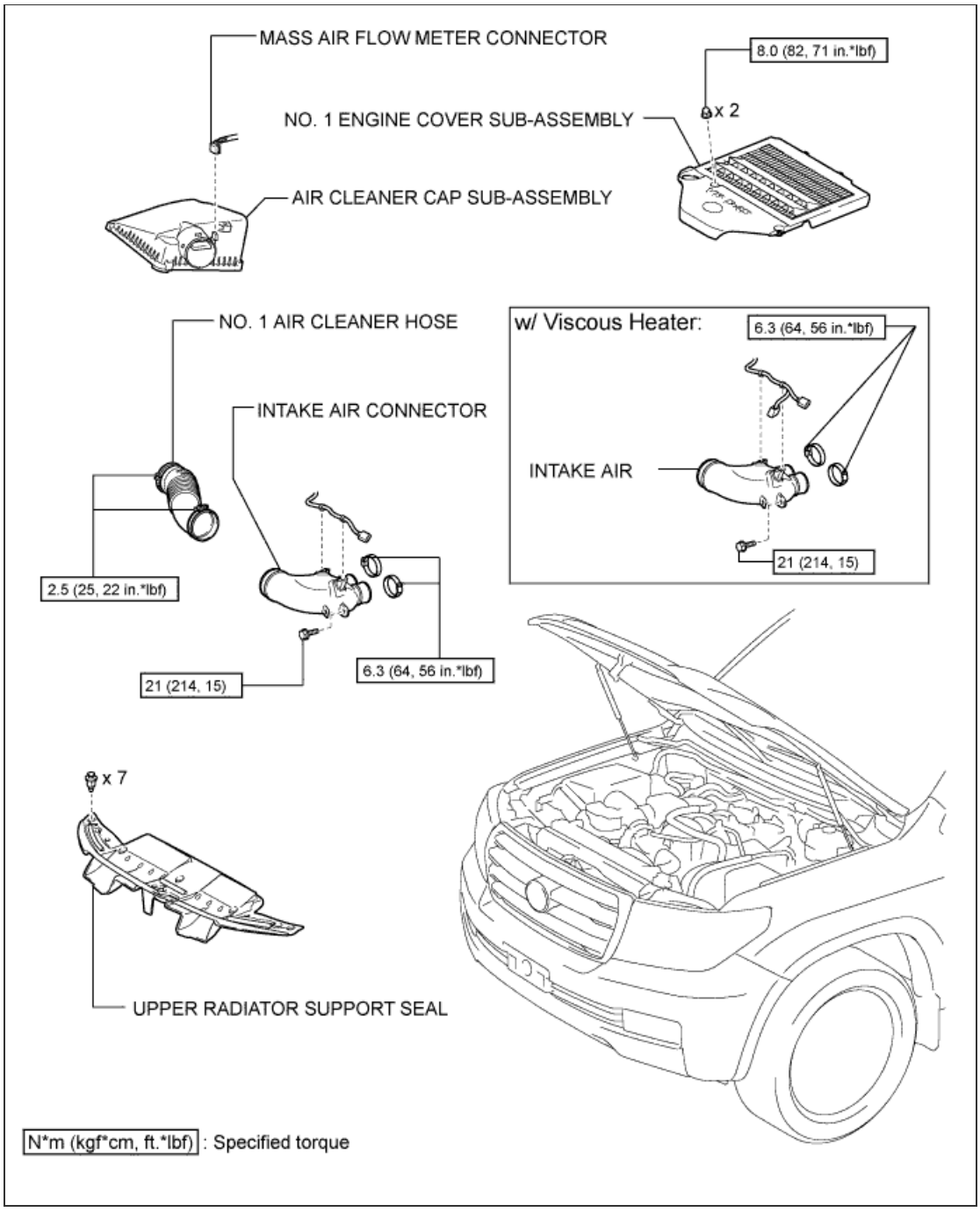
18. INSPECT FOR POWER STEERING FLUID LEAK

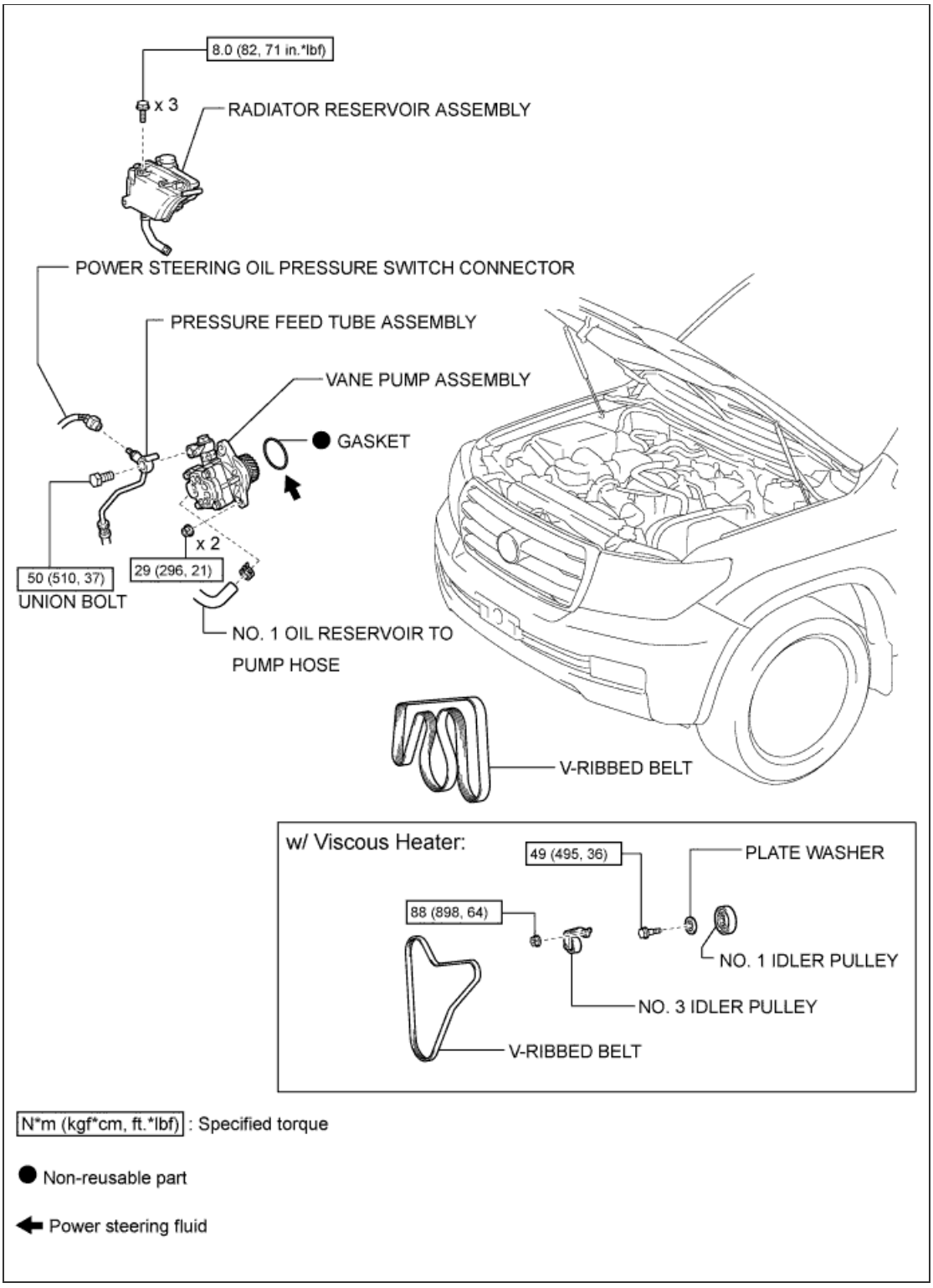
19. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here

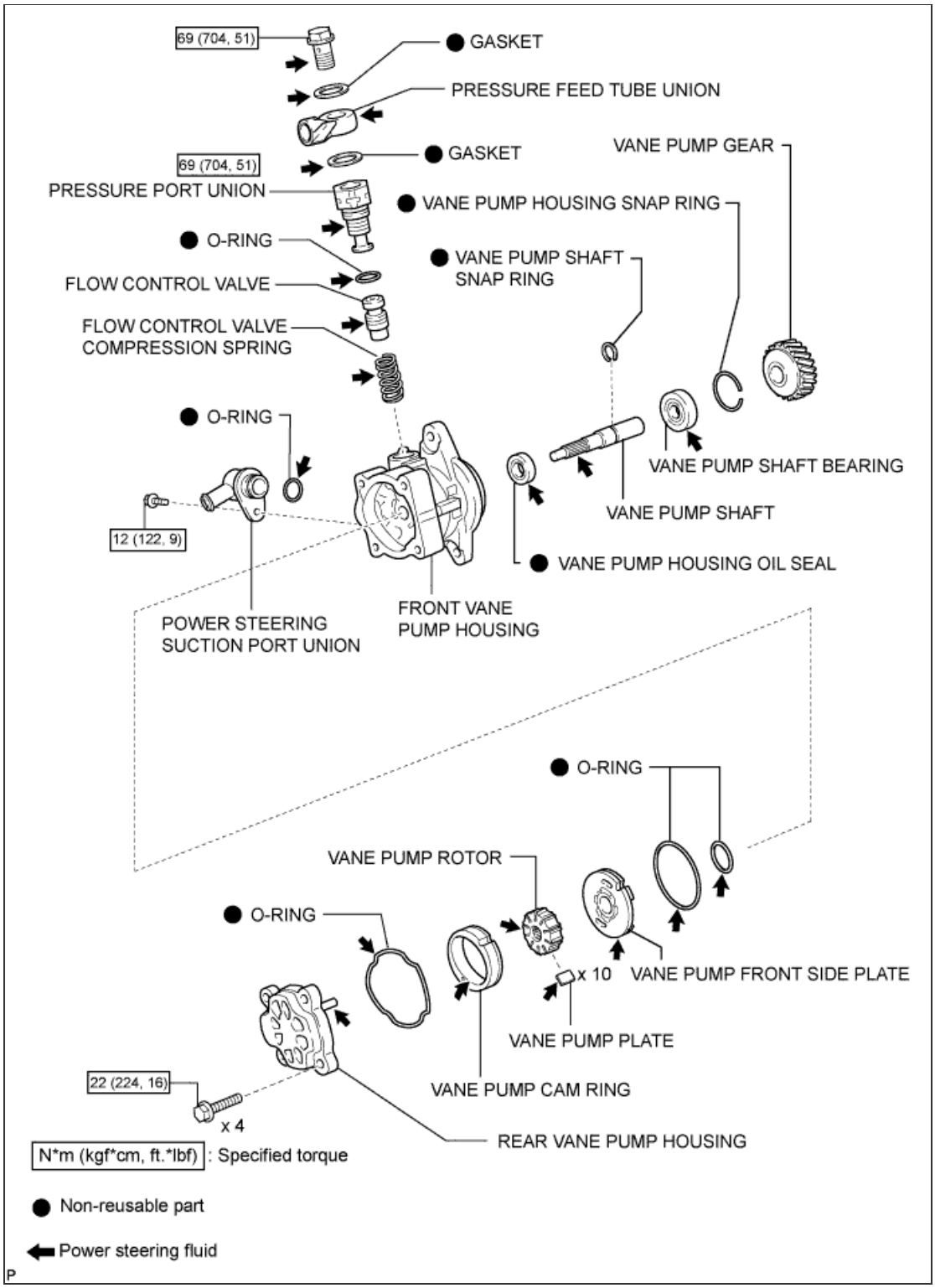




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

← Power steering fluid


69 (704, 51)
GASKET
PRESSURE FEED TUBE UNION
GASKET
69 (704, 51)
PRESSURE PORT UNION
O-RING
FLOW CONTROL VALVE
FLOW CONTROL VALVE COMPRESSION SPRING
VANE PUMP GEAR
VANE PUMP HOUSING SNAP RING
VANE PUMP SHAFT SNAP RING
O-RING
VANE PUMP SHAFT BEARING
VANE PUMP SHAFT
12 (122, 9)
VANE PUMP HOUSING OIL SEAL
POWER STEERING SUCTION PORT UNION
FRONT VANE PUMP HOUSING
O-RING
VANE PUMP ROTOR
O-RING
x 10
VANE PUMP FRONT SIDE PLATE
VANE PUMP PLATE
VANE PUMP CAM RING
22 (224, 16)
x 4
REAR VANE PUMP HOUSING
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Power steering fluid
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

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

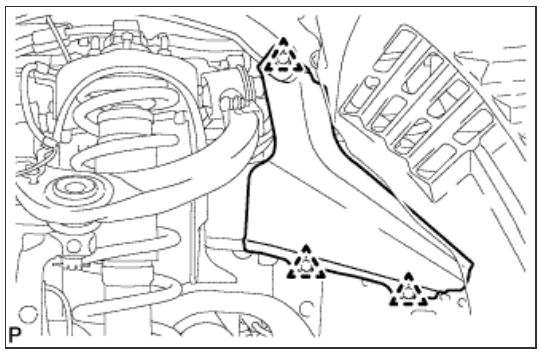
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

3. REMOVE UPPER RADIATOR SUPPORT SEAL

a. Remove the 7 clips and upper radiator support seal.

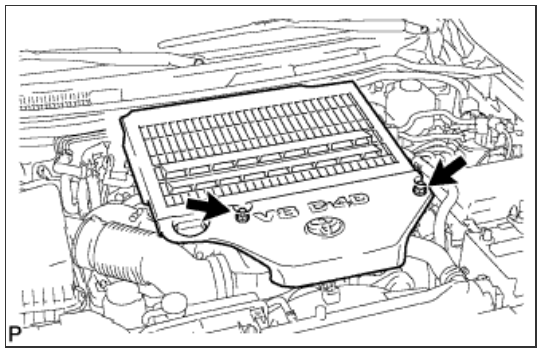
4. REMOVE FRONT FENDER APRON TRIM PACKING A

a. Remove the 3 clips and front fender apron seal front RH.



5. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY

a. Remove the 2 nuts and No. 1 engine cover.

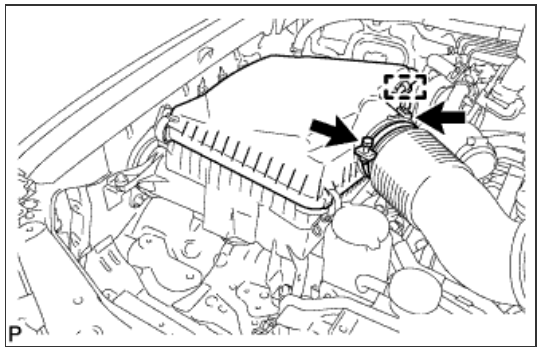


6. REMOVE AIR CLEANER CAP SUB-ASSEMBLY

a. Loosen the hose clamp.

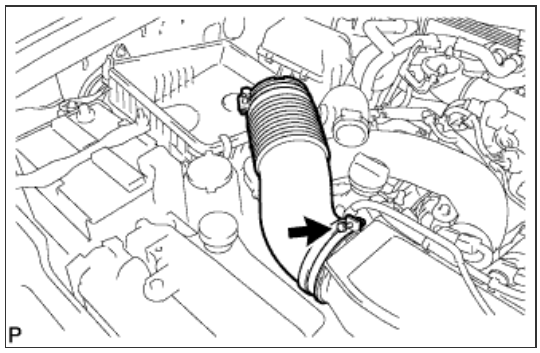
b. Disconnect the mass air flow meter connector and using a clip remover, detach the wire harness clamp from the air cleaner cap.

c. Detach the 4 clamps and remove the air cleaner cap.



7. REMOVE NO. 1 AIR CLEANER HOSE

a. Loosen the hose clamp and remove the No. 1 air cleaner hose.



8. REMOVE INTAKE AIR CONNECTOR

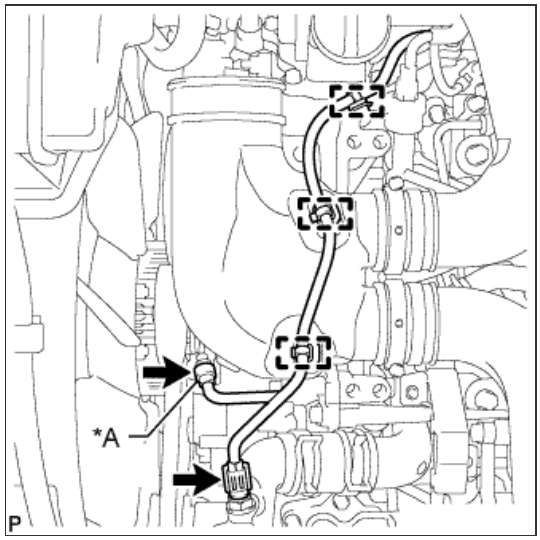
a. w/ Viscous Heater:
Disconnect the 2 connectors from the viscous with magnet clutch heater and water temperature sensor.

Text in Illustration

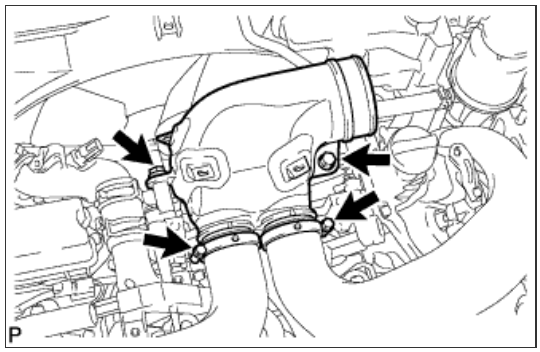
*A	w/ Viscous Heater

b. w/o Viscous Heater:
Disconnect the connector from the water temperature sensor.

c. Using a clip remover, detach the 3 wire harness clamps.



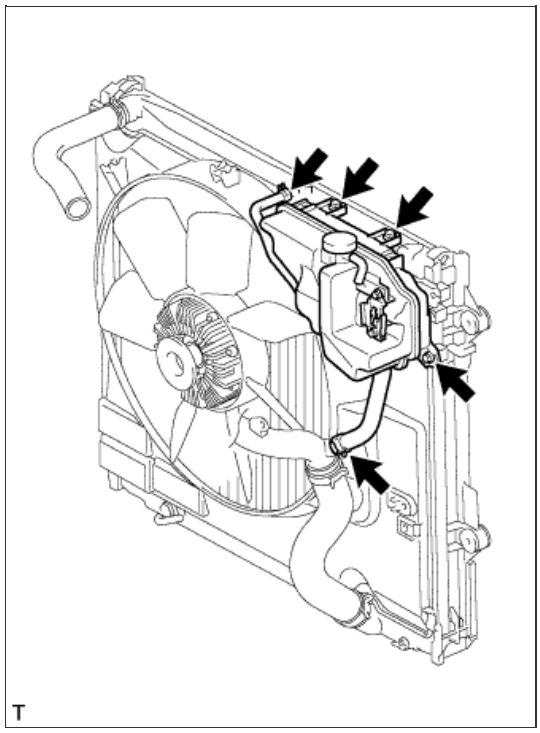
d. Loosen the 2 hose clamps and remove the 2 bolts and intake air connector.



9. REMOVE RADIATOR RESERVOIR ASSEMBLY

a. Disconnect the 2 hoses.

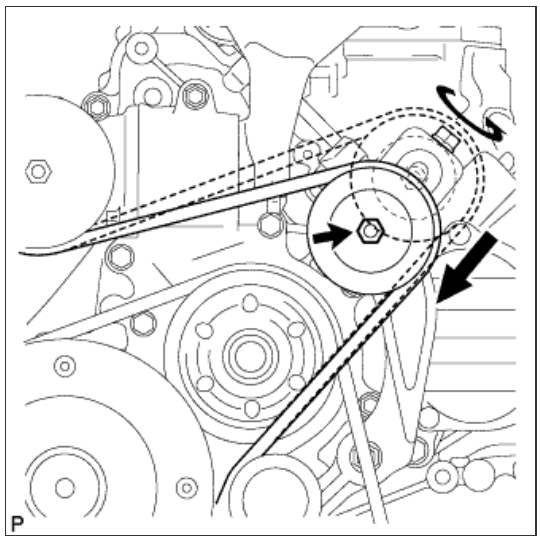
b. Remove the 3 bolts and radiator reservoir.



10. REMOVE V-RIBBED BELT (w/ Viscous Heater)

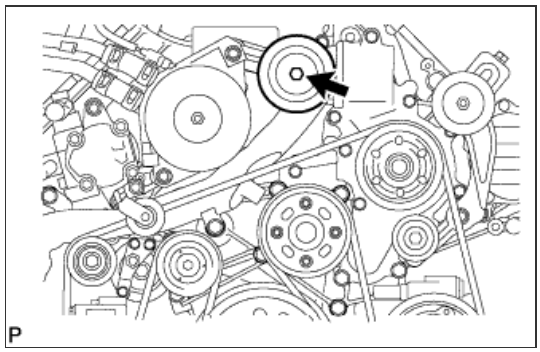
a. Loosen the lock nut and turn the bolt counterclockwise.

b. Remove the V-ribbed belt.



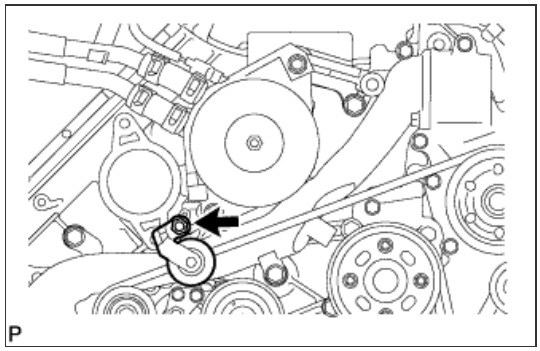
11. REMOVE NO. 1 IDLER PULLEY (w/ Viscous Heater)

a. Remove the bolt, cover, No. 1 idler pulley and collar.



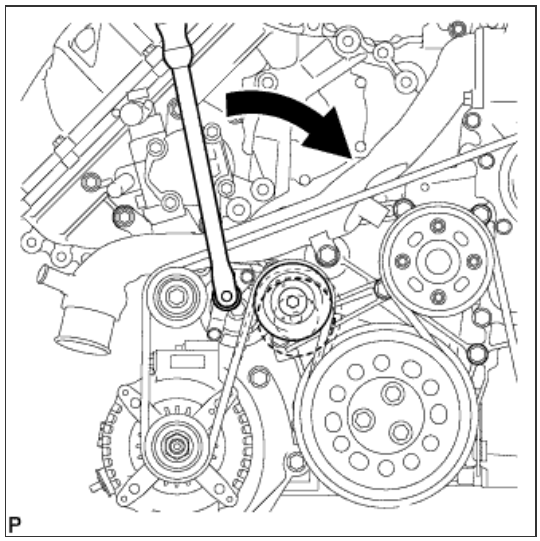
12. REMOVE NO. 3 IDLER PULLEY (w/ Viscous Heater)

a. Remove the nut and No. 3 idler pulley.



13. REMOVE V-RIBBED BELT

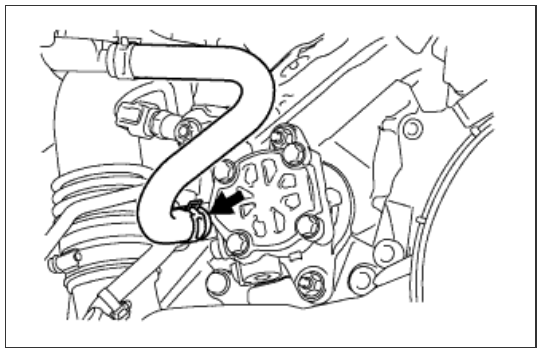
a. Using a wrench to the V-ribbed belt tensioner bracket, turn the wrench clockwise and remove the V-ribbed belt.



14. DRAIN POWER STEERING FLUID

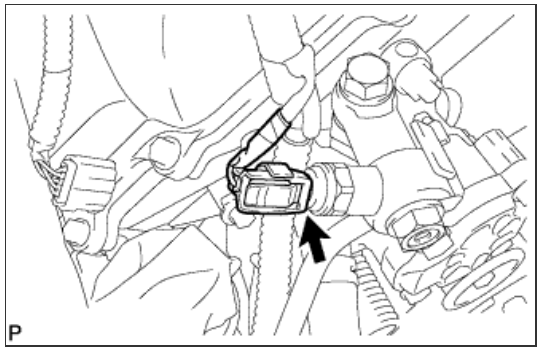
15. DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

a. Slide the clip and disconnect the No. 1 oil reservoir to pump hose from the vane pump.



16. DISCONNECT POWER STEERING OIL PRESSURE SWITCH CONNECTOR

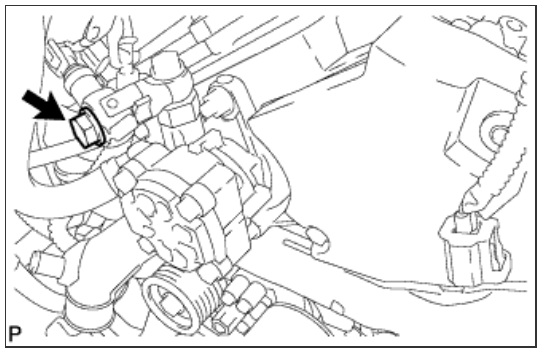
a. Disconnect the connector.



17. REMOVE PRESSURE FEED TUBE ASSEMBLY

a. Remove the union bolt, union and disconnect the pressure feed tube.

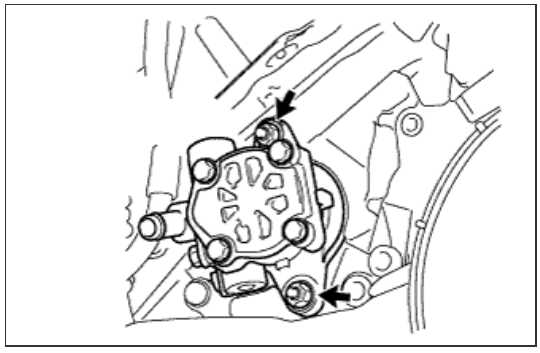
b. Remove the gasket.



18. REMOVE VANE PUMP ASSEMBLY

a. Remove the 2 nuts and vane pump.

b. Remove the O-ring from the vane pump.



for Preparation Click here

NOTICE:

When using a vise, do not overtighten it.

1. REMOVE POWER STEERING SUCTION PORT UNION

a. Remove the bolt and suction port union from the vane pump.

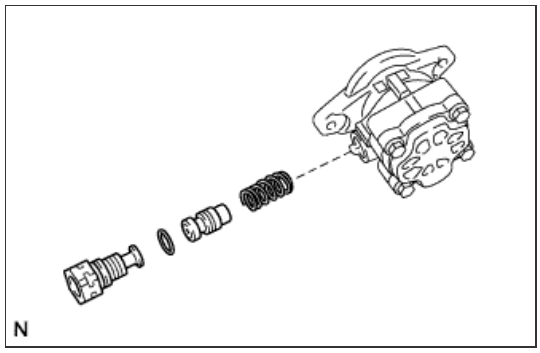
b. Using a screwdriver, remove the O-ring from the suction port union.

2. REMOVE FLOW CONTROL VALVE

a. Remove the pressure port union.

b. Remove the O-ring from the pressure port union.

c. Remove the flow control valve and compression spring.



3. REMOVE VANE PUMP GEAR

a. Using soft jaws on a vise, clamp the vane pump.

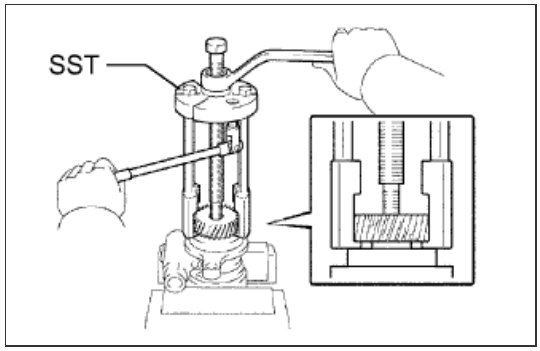
NOTICE:

Be careful not to damage the vane pump.

b. Using SST, remove the gear.

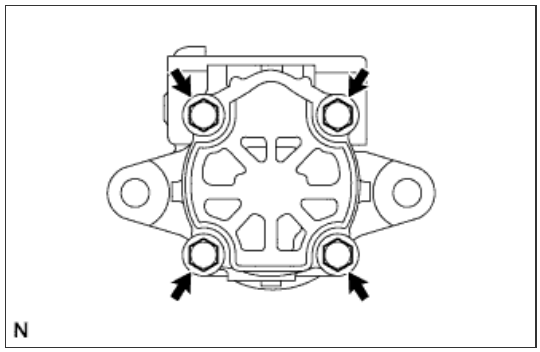
SST

09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03011)



4. REMOVE REAR VANE PUMP HOUSING

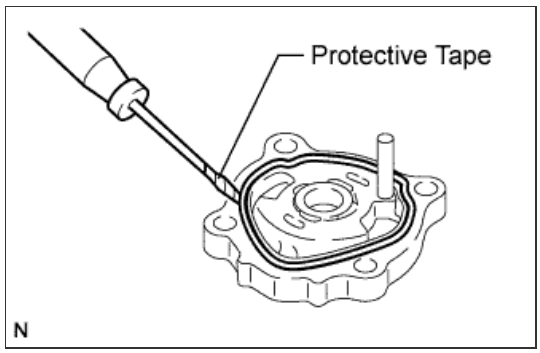
a. Remove the 4 bolts and rear housing from the front housing.



b. Using a screwdriver, remove the O-ring from the rear housing.

HINT:

Tape the screwdriver tip before use.



5. REMOVE VANE PUMP ROTOR, 10 VANE PUMP PLATES AND VANE PUMP CAM RING

a. Remove the 10 vane pump plates.

NOTICE:

Take care not to drop the vane pump plates.

b. Remove the rotor.

c. Remove the cam ring from the front housing.

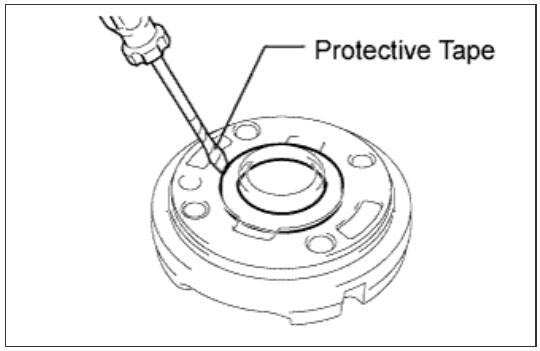
6. REMOVE VANE PUMP FRONT SIDE PLATE

a. Remove the front side plate from the front housing.

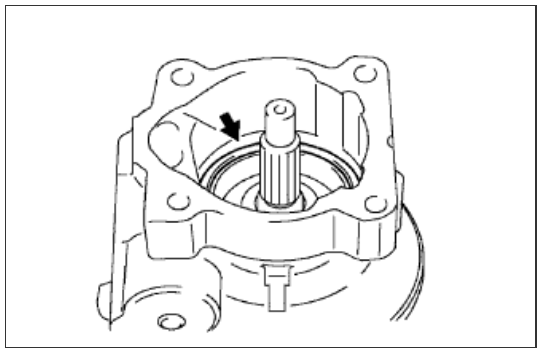
b. Using a screwdriver, remove the O-ring from the front side plate.

HINT:

Tape the screwdriver tip before use.



c. Remove the O-ring from the front housing.



7. REMOVE VANE PUMP SHAFT WITH VANE PUMP SHAFT BEARING

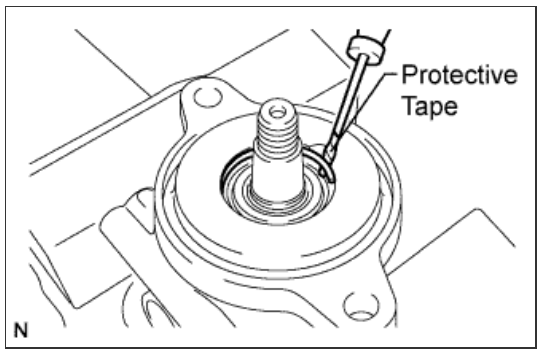
a. Using a screwdriver, remove the snap ring.

NOTICE:

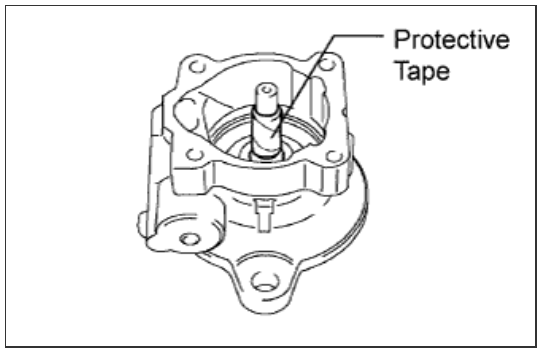
Be careful not to damage the front housing.

HINT:

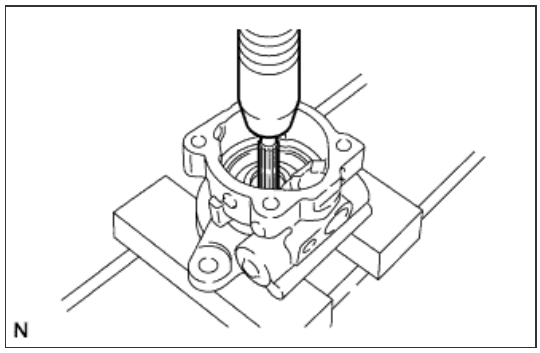
Tape the screwdriver tip before use.



b. Tape the serrated part of the vane pump shaft.



c. Using a press, press out the shaft with bearing.

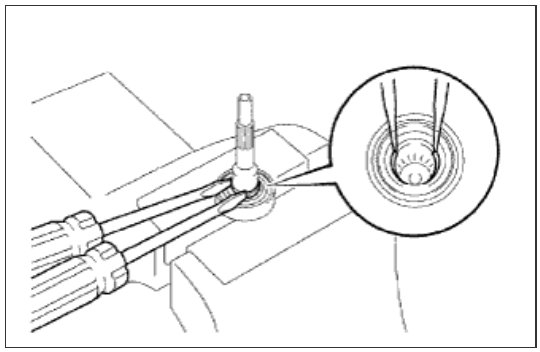


8. REMOVE VANE PUMP SHAFT BEARING

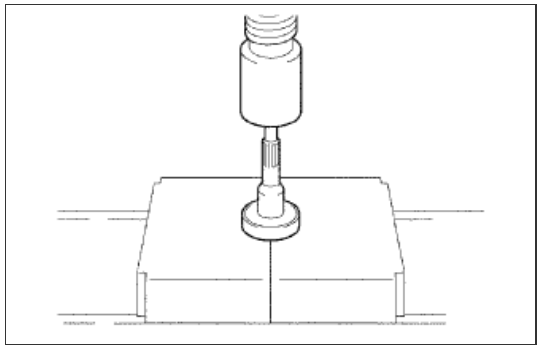
a. Using 2 screwdrivers, remove the snap ring from the shaft.

NOTICE:

Be careful not to damage the shaft.



b. Using a press, press out the bearing from the shaft.



9. REMOVE VANE PUMP HOUSING OIL SEAL

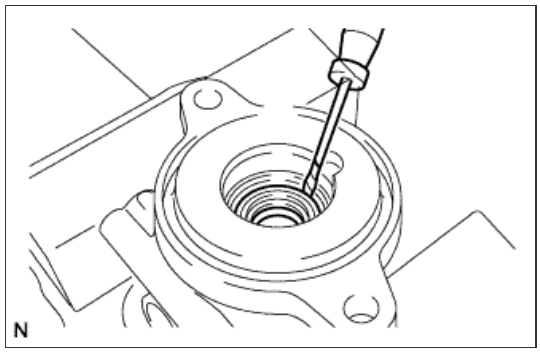
a. Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the front housing.

HINT:

Tape the screwdriver tip before use.



for Preparation Click here

1. CHECK OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND VANE PUMP REAR HOUSING BUSHING

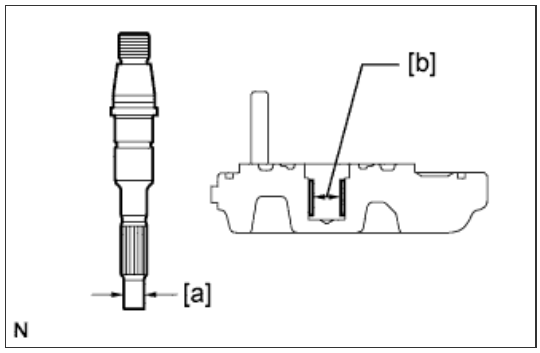
a. Using a micrometer, measure the outer diameter [a] of the shaft.

b. Using a vernier caliper, measure the inner diameter [b] of the rear housing bush.

c. Calculate the oil clearance.
Oil clearance = Inner diameter of the bush [b] - Outer diameter of the shaft [a]

Maximum oil clearance:
0.08 mm (0.00315 in.)

If the oil clearance is more than the maximum, replace the vane pump assembly.

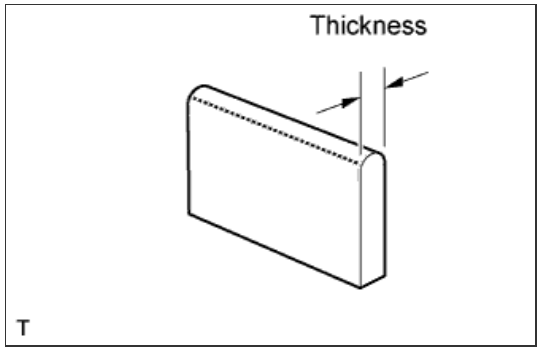


2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATES

a. Using a micrometer, measure the thickness of the 10 vane pump plates.

Standard thickness:
1.405 to 1.411 mm (0.0554 to 0.0556 in.)

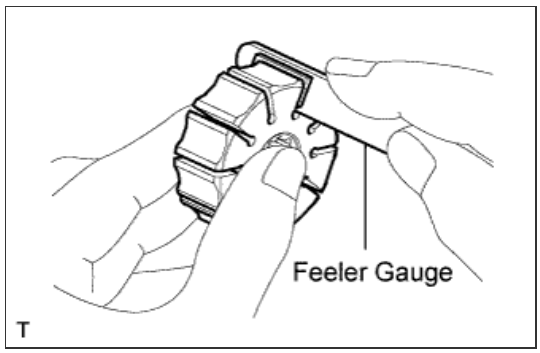
If the thickness is not as specified, replace the vane pump assembly.



b. Using a feeler gauge, measure the clearance between the side face of the rotor groove and the plate.

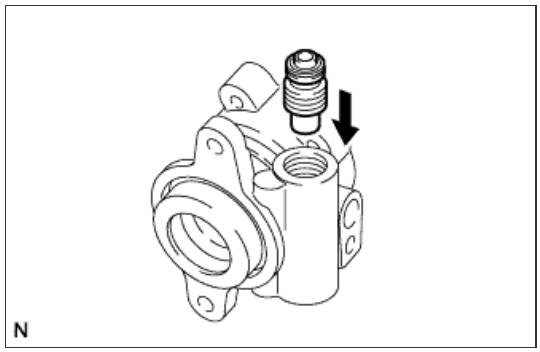
Maximum clearance:
0.03 mm (0.00118 in.)

If the clearance is more than the maximum, replace the vane pump assembly.



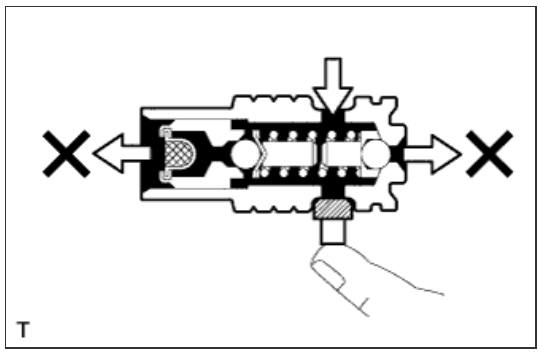
3. INSPECT FLOW CONTROL VALVE

a. Coat the flow control valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



b. Check the flow control valve for leakage.

i. Close one of the holes and apply 390 to 490 kPa (4.0 to 5.0 kgf/cm ^{2}, 57 to 71 psi) of compressed air into the opposite side hole, and confirm that air does not come out from the end holes.
If air leaks, replace the vane pump assembly.

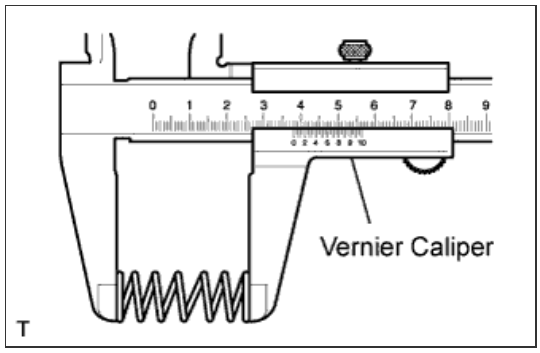


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

a. Using a vernier caliper, measure the free length of the compression spring.

Minimum free length:
31.3 mm (1.23 in.)

If the length is less than the minimum, replace the vane pump assembly.



5. INSPECT PRESSURE PORT UNION

a. Visually check the pressure port union for fluid leaks.
If there is a leak, replace the vane pump assembly.

for Preparation Click here

NOTICE:

When installing parts, coat the parts indicated by arrows with power steering fluid (Click here).

1. INSTALL VANE PUMP HOUSING OIL SEAL

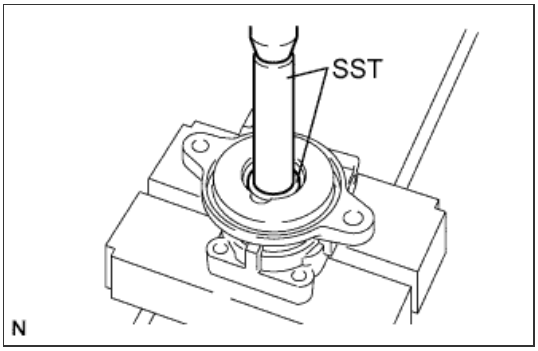
a. Coat the lip of a new oil seal with power steering fluid.

b. Using SST and a press, press in the oil seal.

SST
09950-60010 (09951-00320)
09950-70010 (09951-07150)

NOTICE:

- **Do not mistake the direction of the oil seal.**
- **Do not damage the oil seal.**

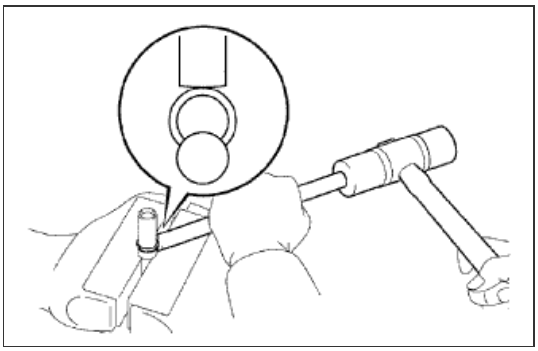


2. INSTALL VANE PUMP SHAFT BEARING

a. Using a brass bar and hammer, tap on a new snap ring.

NOTICE:

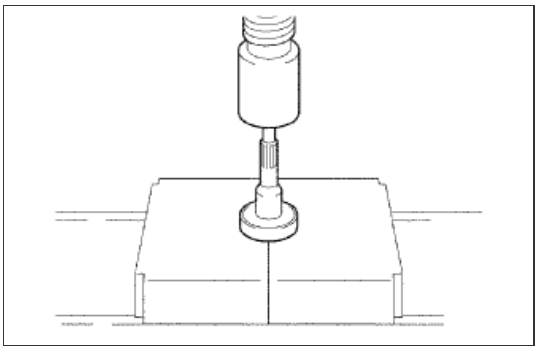
Be careful not to damage the shaft.



b. Using a press, press in the shaft into the bearing.

NOTICE:

Be careful not to damage the bearing.

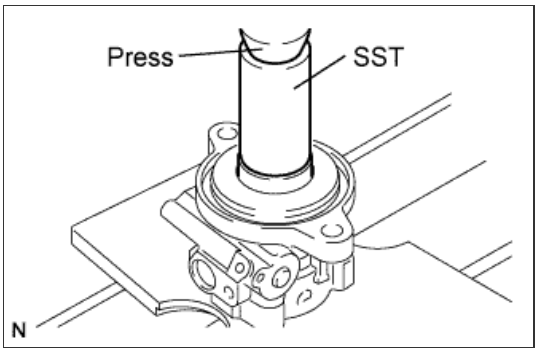


3. INSTALL VANE PUMP SHAFT WITH VANE PUMP SHAFT BEARING

a. Temporarily install the rear housing to the front housing.

b. Using SST and a press, press in the shaft with bearing into the front housing.

SST
09632-36010

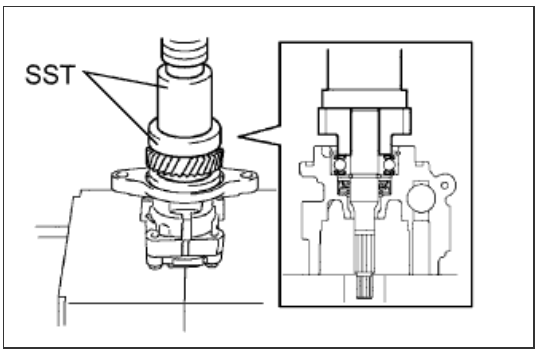


c. Using a screwdriver, install a new snap ring into the front housing.

4. INSTALL VANE PUMP GEAR

a. Using SST and a press, press in the gear to the shaft.

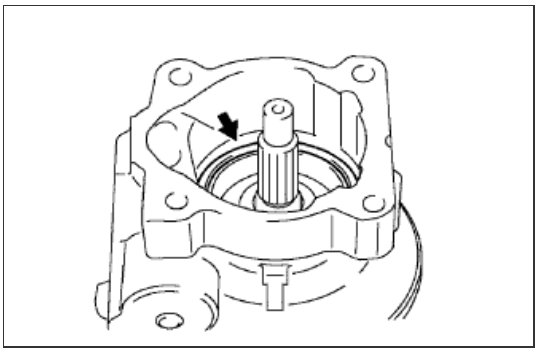
SST
09950-60010 (09951-00420)
09950-70010 (09951-07150)



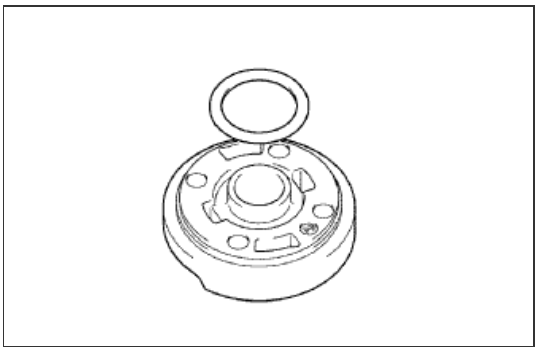
b. Remove the rear housing from the front housing.

5. INSTALL VANE PUMP FRONT SIDE PLATE

a. Coat a new O-ring with power steering fluid and install it into the front housing.



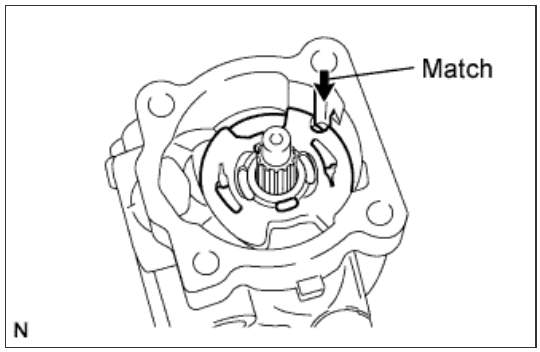
b. Coat a new O-ring with power steering fluid and install it onto the front side plate.



c. Align the notch of the front side plate with the notch of the front housing, and install the front side plate.

NOTICE:

Make sure that the front side plate is installed facing in the correct direction.

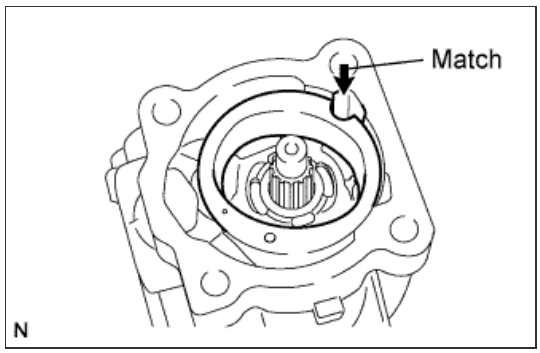


6. INSTALL VANE PUMP CAM RING

a. Align the notch of the cam ring with the notch of the front side plate, and install the cam ring with the inscribed mark facing upward.

NOTICE:

Make sure that the cam ring is installed facing in the correct direction.



7. INSTALL VANE PUMP ROTOR AND VANE PUMP PLATE

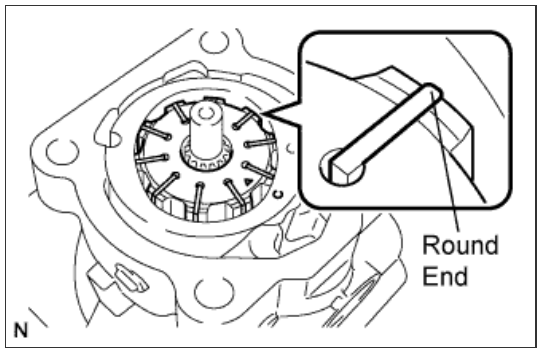
a. Install the rotor with the inscribed mark facing upward.

b. Coat the 10 vane pump plates with power steering fluid.

c. Install the 10 vane pump plates with the round end facing upward.

NOTICE:

Make sure that the 10 vane pump plates are installed facing in the correct direction.



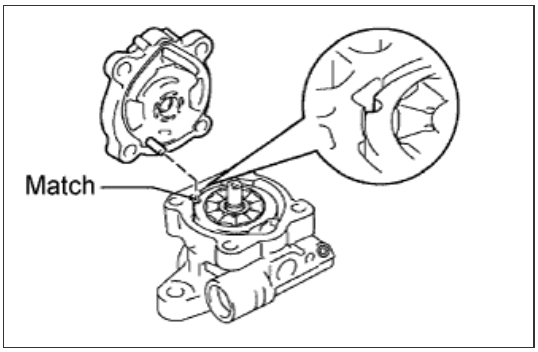
8. INSTALL REAR VANE PUMP HOUSING

a. Coat a new O-ring with power steering fluid and install it onto the rear housing.

b. Align the straight pin of the rear housing with the notches of the cam ring, front side plate and front housing.

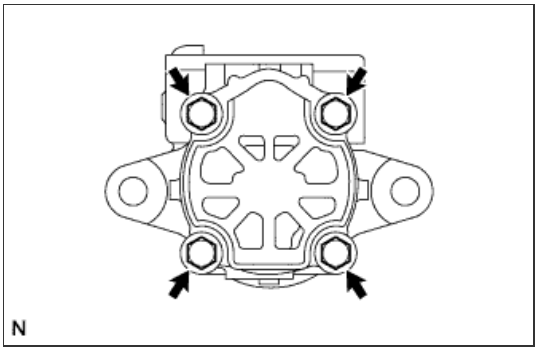
NOTICE:

Make sure that the O-ring is not protruding anywhere when installing the vane pump rear housing.



c. Install the rear housing with the 4 bolts.

Torque:
22 N*m{ 224 kgf*cm , 16 ft.*lbf }



9. INSTALL FLOW CONTROL VALVE

a. Coat the flow control valve with power steering fluid.

b. Install the compression spring and flow control valve to the front housing.

NOTICE:

Do not mistake the direction of the control valve.

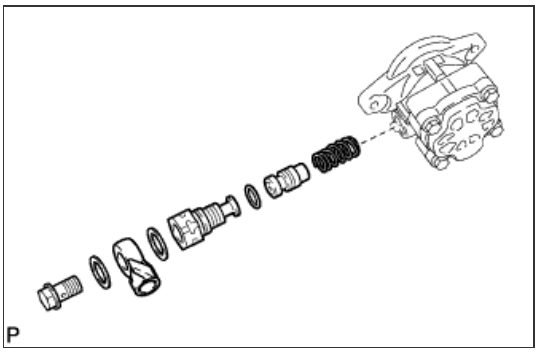
c. Coat a new O-ring with power steering fluid and install it onto the pressure port union.

d. Install the pressure port union to the front housing.

Torque:
69 N*m{ 704 kgf*cm , 51 ft.*lbf }

e. Install the pressure feed union with the bolt to the pressure port union.

Torque:
69 N*m{ 704 kgf*cm , 51 ft.*lbf }



10. INSTALL POWER STEERING SUCTION PORT UNION

a. Coat a new O-ring with power steering fluid and install it to the suction port union.

b. Install the suction port union to the vane pump with the bolt.

Torque:
12 N*m{ 122 kgf*cm , 9 ft.*lbf }

11. INSPECT TOTAL PRELOAD

a. Check that the pump rotates smoothly without abnormal noise.

b. Temporarily install a service bolt.

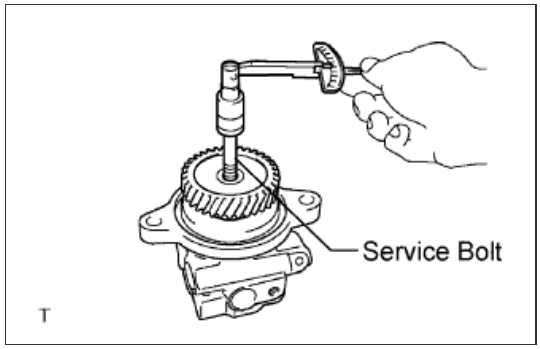
Recommended service bolt:
Thread diameter:
10 mm (0.394 in.)

Thread pitch:
1.25 mm (0.0493 in.)
Bolt length:
50 mm (1.97 in.)

c. Using a torque wrench, measure the pump rotating torque.

Standard rotating torque:
0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf) or less

If the rotating torque is not as specified, check the oil seal.



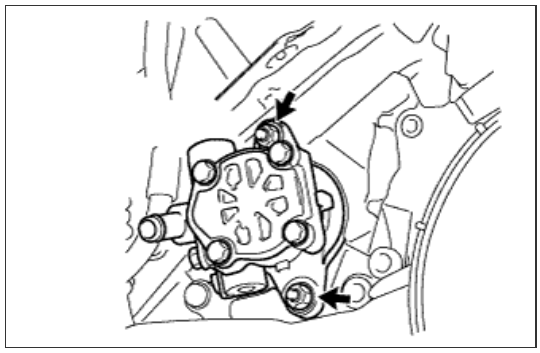
for Preparation Click here

1. INSTALL VANE PUMP ASSEMBLY

a. Coat a new O-ring with power steering fluid and install it to the vane pump.

b. Install the vane pump with the 2 nuts.

Torque:
29 N*m{ 296 kgf*cm , 21 ft.*lbf }



2. CONNECT PRESSURE FEED TUBE ASSEMBLY

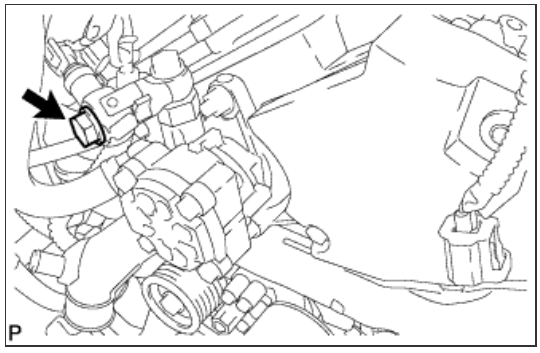
a. Install a new gasket to the pressure feed tube.

b. Install the pressure feed tube and union with the union bolt.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }

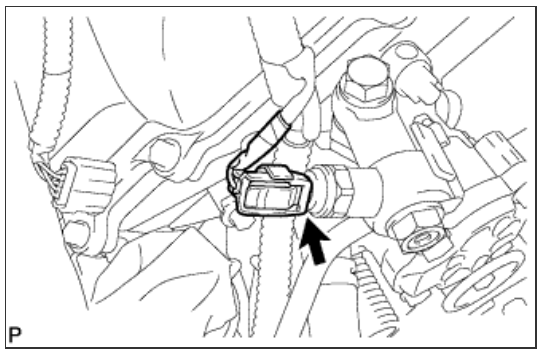
HINT:

Make sure that the stopper of the tube touches the vane pump body as shown in the illustration before tightening the bolt.



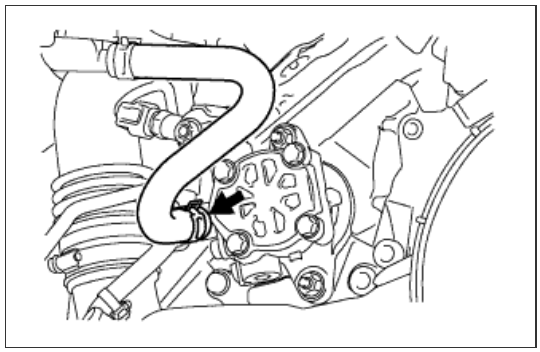
3. CONNECT POWER STEERING OIL PRESSURE SWITCH CONNECTOR

a. Connect the connector.



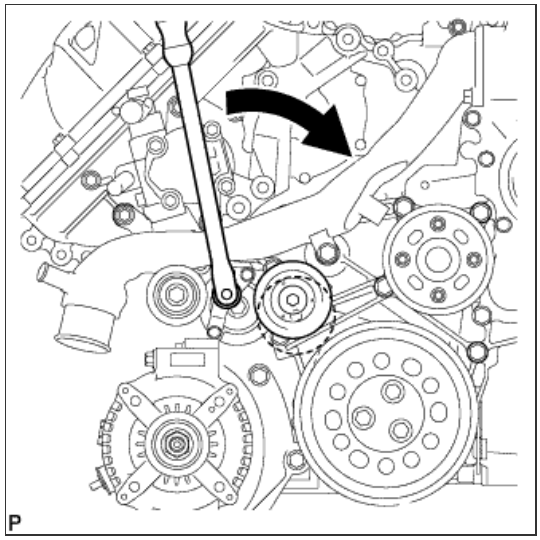
4. CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

a. Connect the pump hose to the vane pump with the clip.

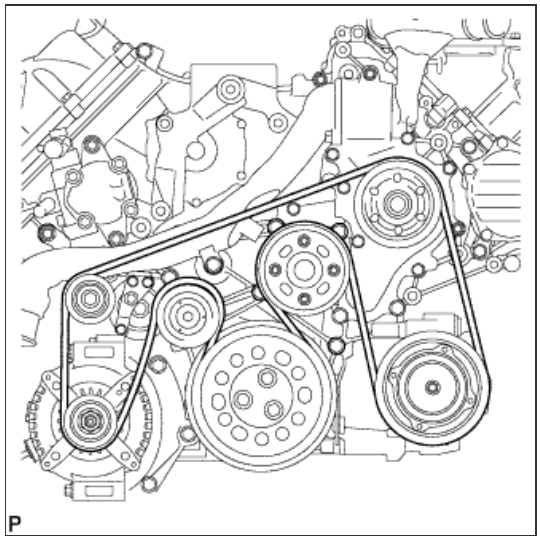


5. INSTALL V-RIBBED BELT

a. Attach a wrench to the V-ribbed belt tensioner bracket and turn the wrench clockwise.



b. Install the V-ribbed belt as shown in the illustration.

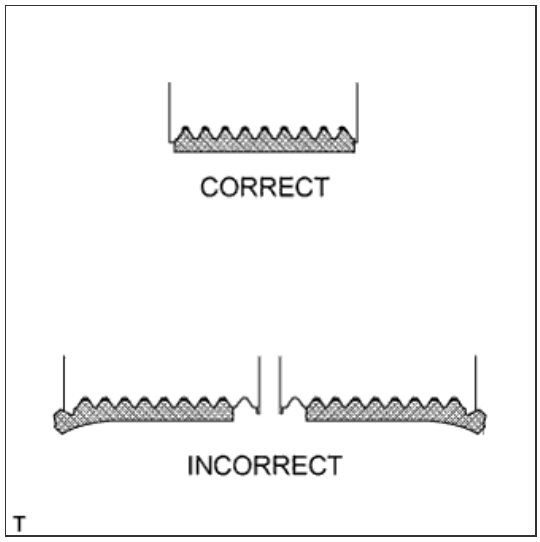


c. Check that the belt fits properly in the ribbed grooves.

HINT:

Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

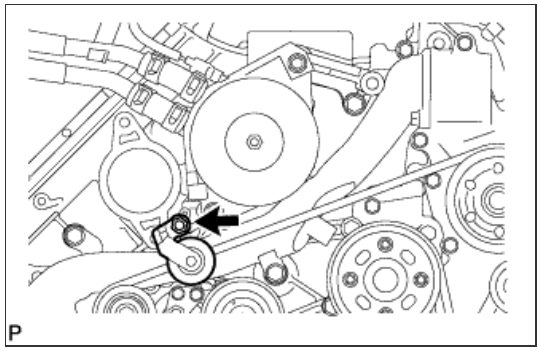
If it has slipped out, replace the V-ribbed belt. Install a new V-ribbed belt.



6. INSTALL NO. 3 IDLER PULLEY (w/ Viscous Heater)

a. Align the No. 3 idler pulley bracket knock pin and No. 1 idler pulley bracket knock pin hole and install the No. 3 idler pulley with the nut.

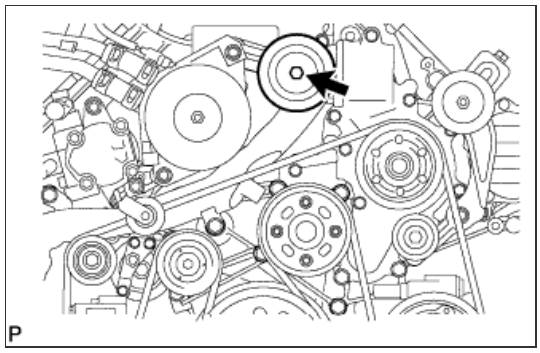
Torque:
88 N*m{ 898 kgf*cm , 64 ft.*lbf }



7. INSTALL NO. 1 IDLER PULLEY (w/ Viscous Heater)

a. Install the collar, No. 1 idler pulley and cover with the bolt.

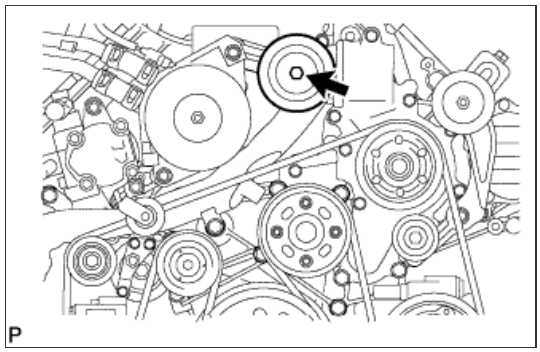
Torque:
49 N*m{ 495 kgf*cm , 36 ft.*lbf }



8. INSTALL V-RIBBED BELT (w/ Viscous Heater)

a. Install the collar, No. 1 idler pulley and cover with the bolt.

Torque:
49 N*m{ 495 kgf*cm , 36 ft.*lbf }



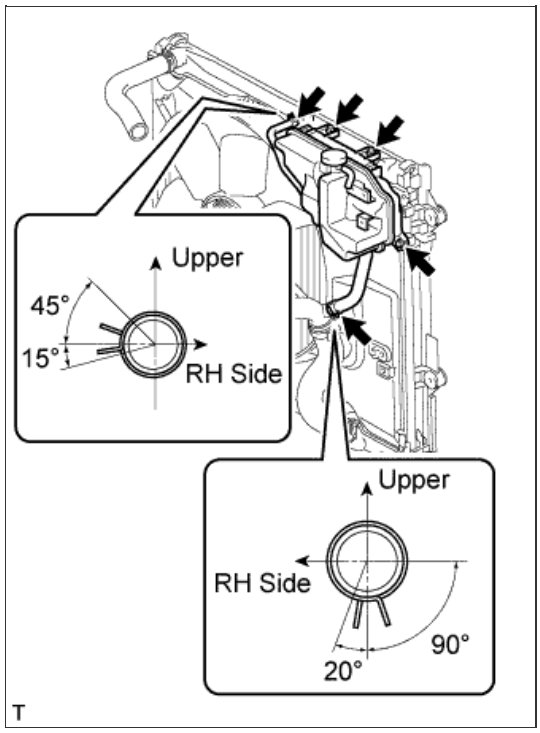
9. INSTALL RADIATOR RESERVOIR ASSEMBLY

a. Install the radiator reservoir with the 3 bolts.

b. Connect the 2 hoses to the upper radiator tank and water inlet.

HINT:

Make sure the directions of the hose clamps are as shown in the illustration.



10. INSTALL INTAKE AIR CONNECTOR

a. Connect the intake air connector to the No. 1 and No. 2 air cleaner pipes.

b. Install the connector with the 2 bolts.

Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }

c. Tighten the 2 hose clamps.

Torque:
6.3 N*m{ 64 kgf*cm , 56 in.*lbf }

d. Attach the 3 wire harness clamps.

e. w/o Viscous Heater:
Connect the connector to the water temperature sensor.

f. w/ Viscous Heater:
Connect the 2 connectors to the water temperature sensor and viscous with magnet clutch heater.

11. TEMPORARILY INSTALL NO. 1 AIR CLEANER HOSE

a. Temporarily install the air cleaner hose to the intake air connector.

12. INSTALL AIR CLEANER CAP SUB-ASSEMBLY

a. Connect the air cleaner cap to the air cleaner hose, and install the air cleaner cap with the 4 clamps.

b. Connect the mass air flow meter connector and attach the wire harness clamp to the air cleaner cap.

c. Attach the wire harness clamp.

d. Align the protrusion of the air cleaner cap and the concave portion of the air cleaner hose.

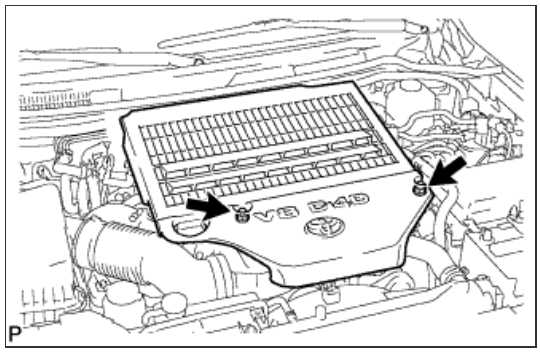
e. Tighten the 2 hose clamps.

Torque:
2.5 N*m{ 25 kgf*cm , 22 in.*lbf }

13. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY

a. Install the engine cover with the 2 nuts.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }



14. INSTALL UPPER RADIATOR SUPPORT SEAL

a. Install the upper radiator support seal with the 7 clips.

15. INSTALL FRONT FENDER APRON TRIM PACKING A

a. Install the front fender apron seal front RH with the 3 clips.

16. ADD POWER STEERING FLUID

17. BLEED POWER STEERING FLUID

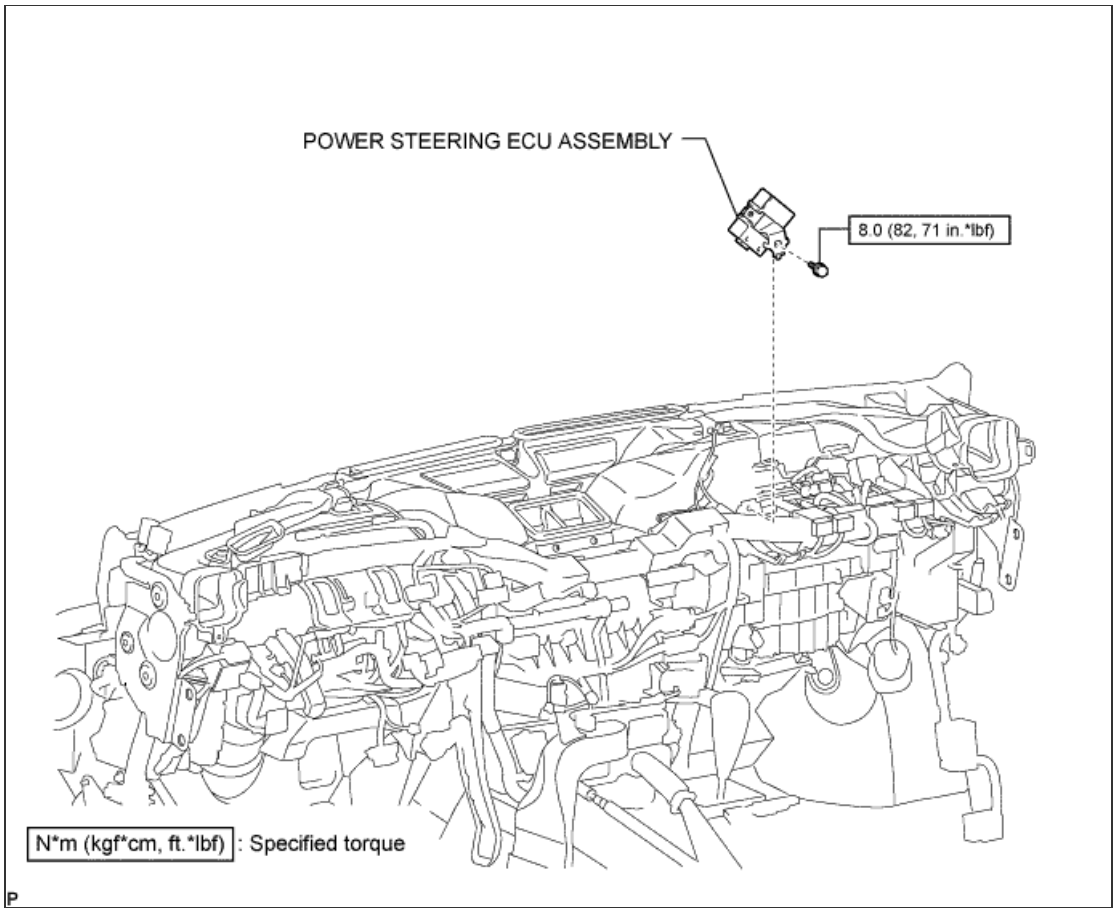
18. INSPECT FOR POWER STEERING FLUID LEAK

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).

for Preparation [Click here]



for Preparation Click here

HINT:

- **Use the same procedure RHD and LHD vehicles.**
- **The procedure listed below is for LHD vehicles.**

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

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).

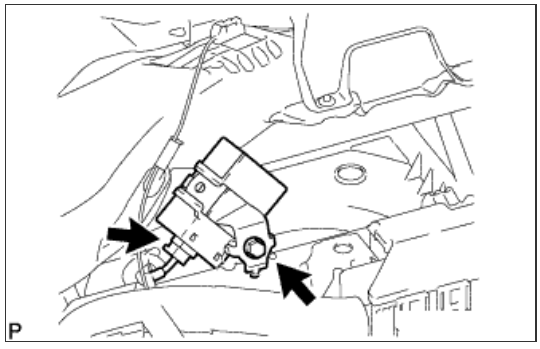
3. REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY

(Click here)

4. REMOVE POWER STEERING ECU ASSEMBLY

a. Remove the bolt

b. Disconnect the connector remove the power steering ECU.



for Preparation Click here

1. INSTALL POWER STEERING ECU ASSEMBLY

a. Connect the connector.

b. Install the power steering ECU with the bolt.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

2. INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY

(Click here)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

4. CHECK SRS WARNING LIGHT

(Click here)

for Preparation Click here

1.TROUBLESHOOTING PRECAUTIONS

a. If the problem is caused by a poor connection of a terminal or poor installation of a part, reconnecting the terminal, or removing and reinstalling the part may solve the problem, or may temporarily return the system to normal.

b. To determine the cause of the problem, check for DTCs or confirm the vehicle operating conditions when the problem occurred and note them down before disconnecting connectors or removing parts.

c. Be sure to check for DTCs in other systems as the problem may be caused by a malfunction in another system.

d. DTCs may be stored in the vehicle stability control system due to Variable Gear Ratio Steering (VGRS) system inspections. Check for DTCs in the vehicle stability control system and clear any output codes after inspecting the VGRS system.

e. When the engine switch is turned on (IG)/off, the system start-up/stop operation is performed. At this time, a small operating sound can be heard and the steering wheel turns slightly.

f. If "Invalid" is displayed for "Straight Angle Valid Flag" in the Data List, the VGRS system does not operate.

g. If the steering wheel is turned left and right with the engine switch off, a noise can be heard. However, this is not a malfunction.

2.HANDLING AND OPERATING PRECAUTIONS

a. Removal and installation of the steering control ECU, steering actuator, and each sensor must be performed with the engine switch off unless specified.

b. If the steering control ECU, steering actuator, or a sensor is removed and installed, perform the test mode inspection, check for DTCs, and confirm that the normal system code is output.

c. If the engine switch is turned on (IG) with the steering control ECU connector disconnected, DTCs may be stored in the vehicle stability control system. Check for DTCs in those systems and clear any output codes after completing repairs.

3.PRECAUTIONS FOR REPLACEMENT OF STEERING SYSTEM PARTS

a. If the steering control ECU or steering actuator is replaced, perform actuator angle neutral point calibration and initialization.

b. The steering control ECU cannot be disassembled or repaired. If there is any problem with the steering control ECU, replace it with a new one.

4.PRECAUTIONS FOR STEERING WHEEL OFF-CENTER

NOTICE:

If the steering wheel is still off-center after completing steering angle sensor initialization (Click here), perform VGRS system calibration (Click here).

HINT:

- **The steering wheel may become off-center under any of the following conditions. These conditions do not indicate a malfunction.**
  1. **The steering wheel is turned when the engine switch is off.**
  2. **The steering wheel is turned quickly.**
  3. **The steering wheel is turned to the left or right lock position.**
- **If the steering wheel is off-center, drive the vehicle at 35 km/h (22 mph) or more for 5 seconds or more, or turn the steering wheel to the left and right with the vehicle stopped or while driving at low speeds. This may center the steering wheel.**
- **If one of the situations under "Conditions Under Which VGRS System Does Not Operate" occurs, the steering wheel may temporarily become off-centered.**

5.CONDITIONS UNDER WHICH VGRS SYSTEM DOES NOT OPERATE

a. The VGRS system does not operate under any of the following conditions:

i. The power supply voltage is low or too high.

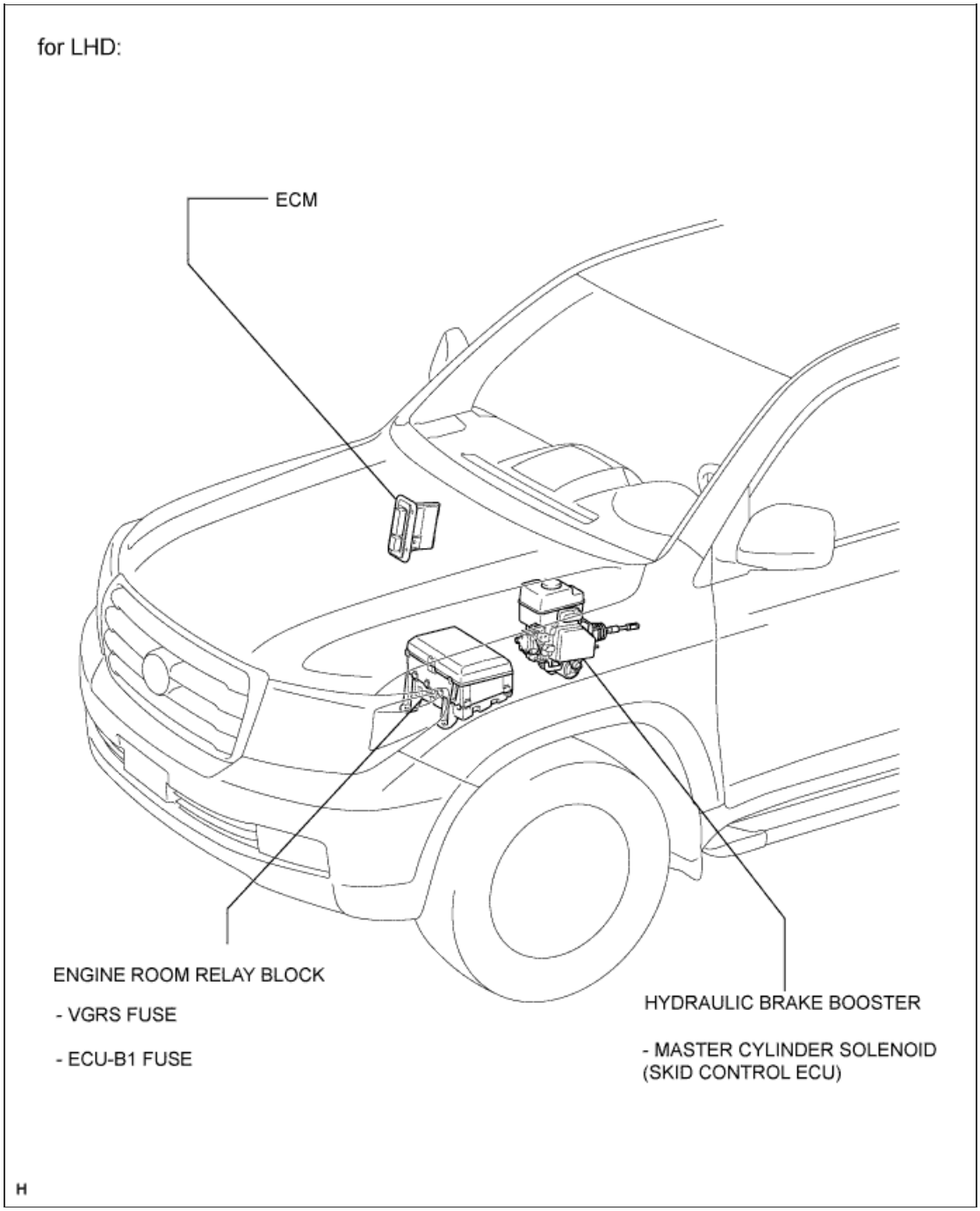
ii. A fail-safe function is operating to protect the system from overheating. System control is suspended to prevent the motor in the steering actuator and the steering control ECU from overheating. If the temperatures of the motor and ECU drop, the system will return to normal.

iii. The vehicle is exposed to extremely low temperatures. If the ambient temperature becomes approximately -30°C (-22°F), system control will be suspended.

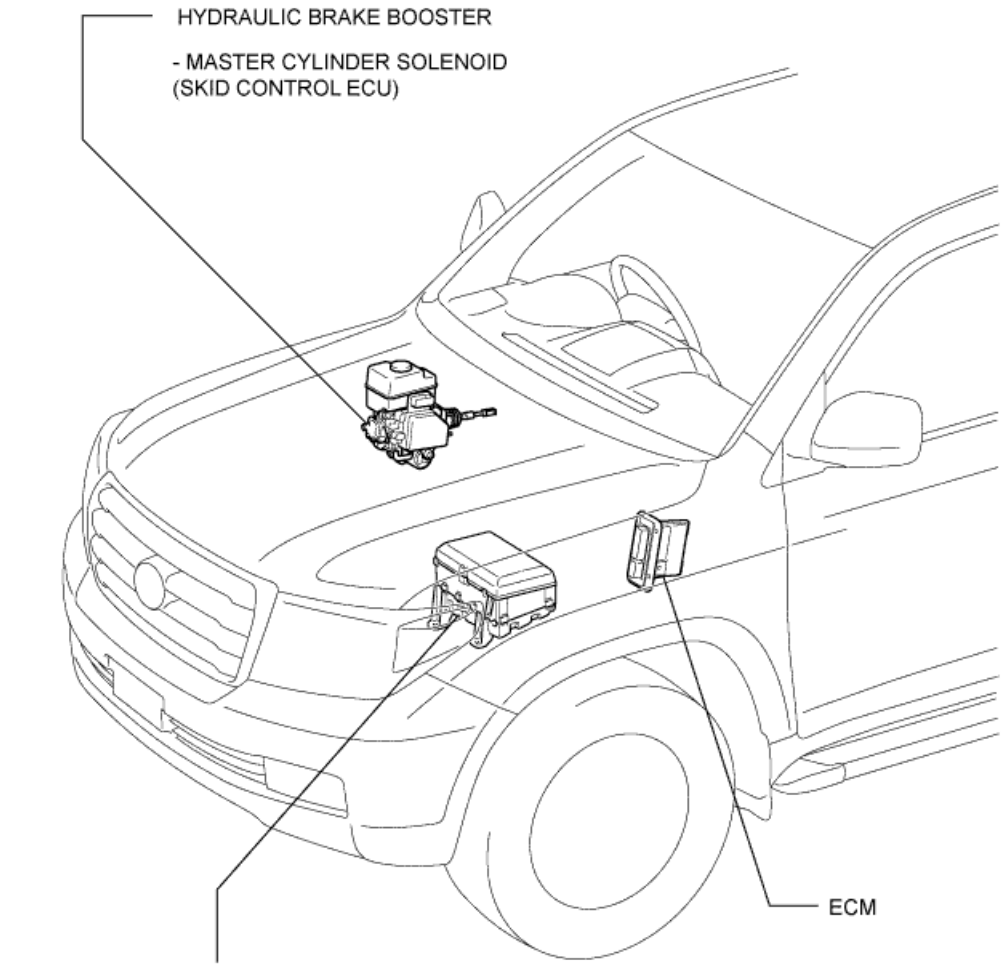
NOTICE:

If any of the above occur, perform steering angle sensor initialization (Click here).

for Preparation Click here

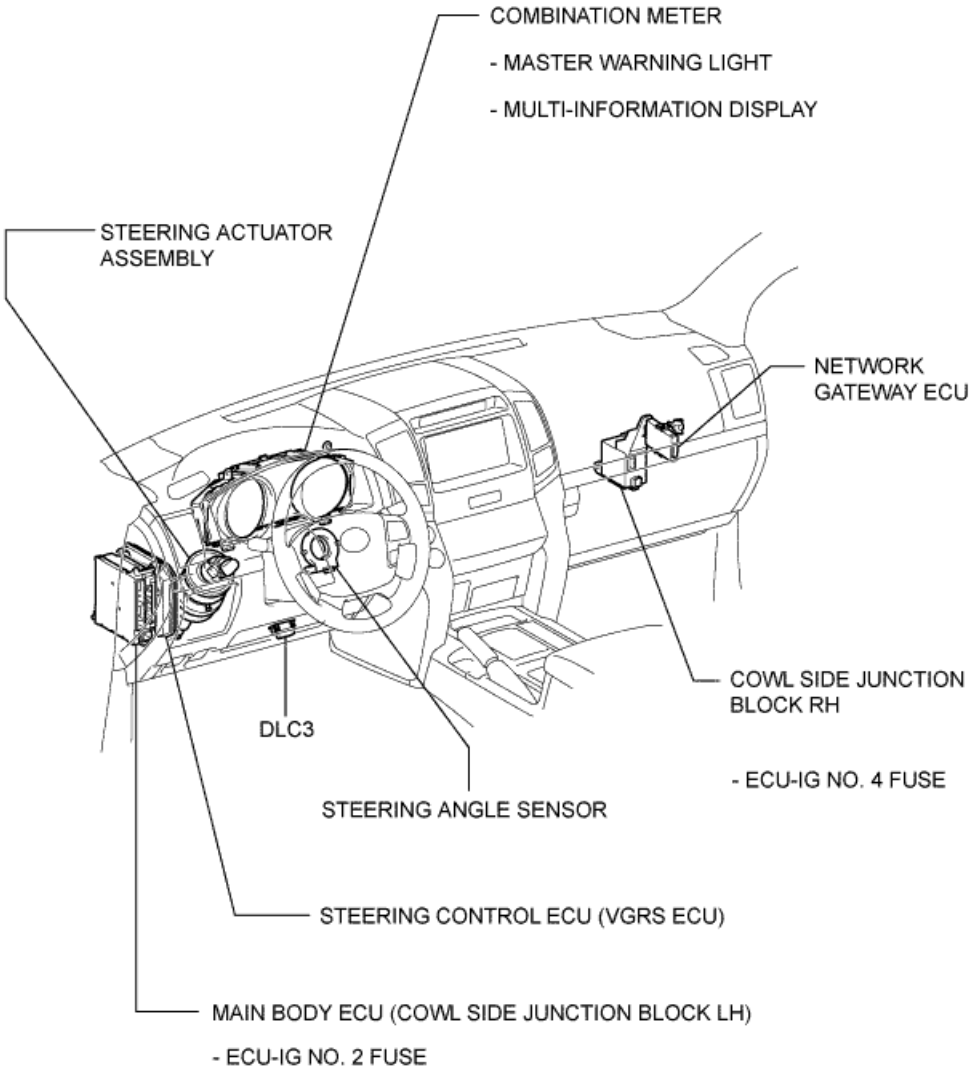


for RHD:

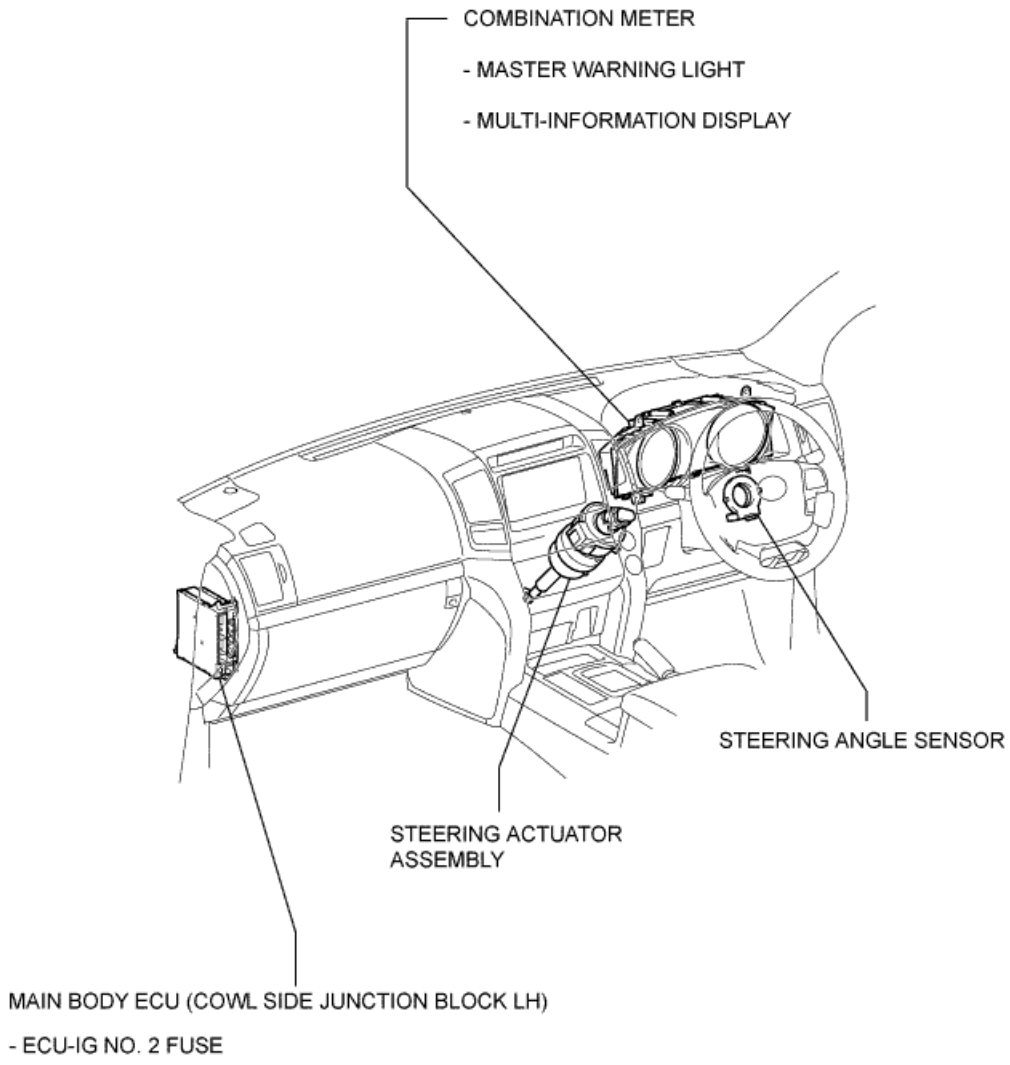

HYDRAULIC BRAKE BOOSTER
- MASTER CYLINDER SOLENOID
(SKID CONTROL ECU)
ECM
ENGINE ROOM RELAY BLOCK
- VGRS FUSE
- ECU-B1 FUSE

H

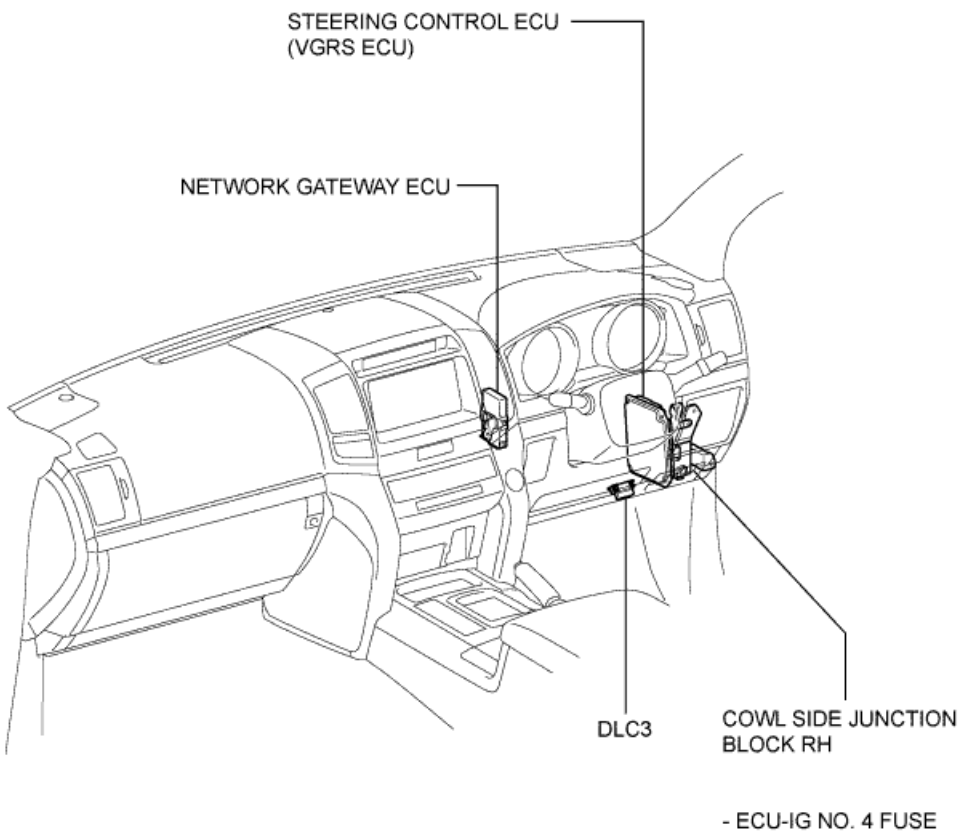
for LHD:


COMBINATION METER
- MASTER WARNING LIGHT
- MULTI-INFORMATION DISPLAY
STEERING ACTUATOR ASSEMBLY
NETWORK GATEWAY ECU
COWL SIDE JUNCTION BLOCK RH
- ECU-IG NO. 4 FUSE
DLC3
STEERING ANGLE SENSOR
STEERING CONTROL ECU (VGRS ECU)
MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)
- ECU-IG NO. 2 FUSE

for RHD:

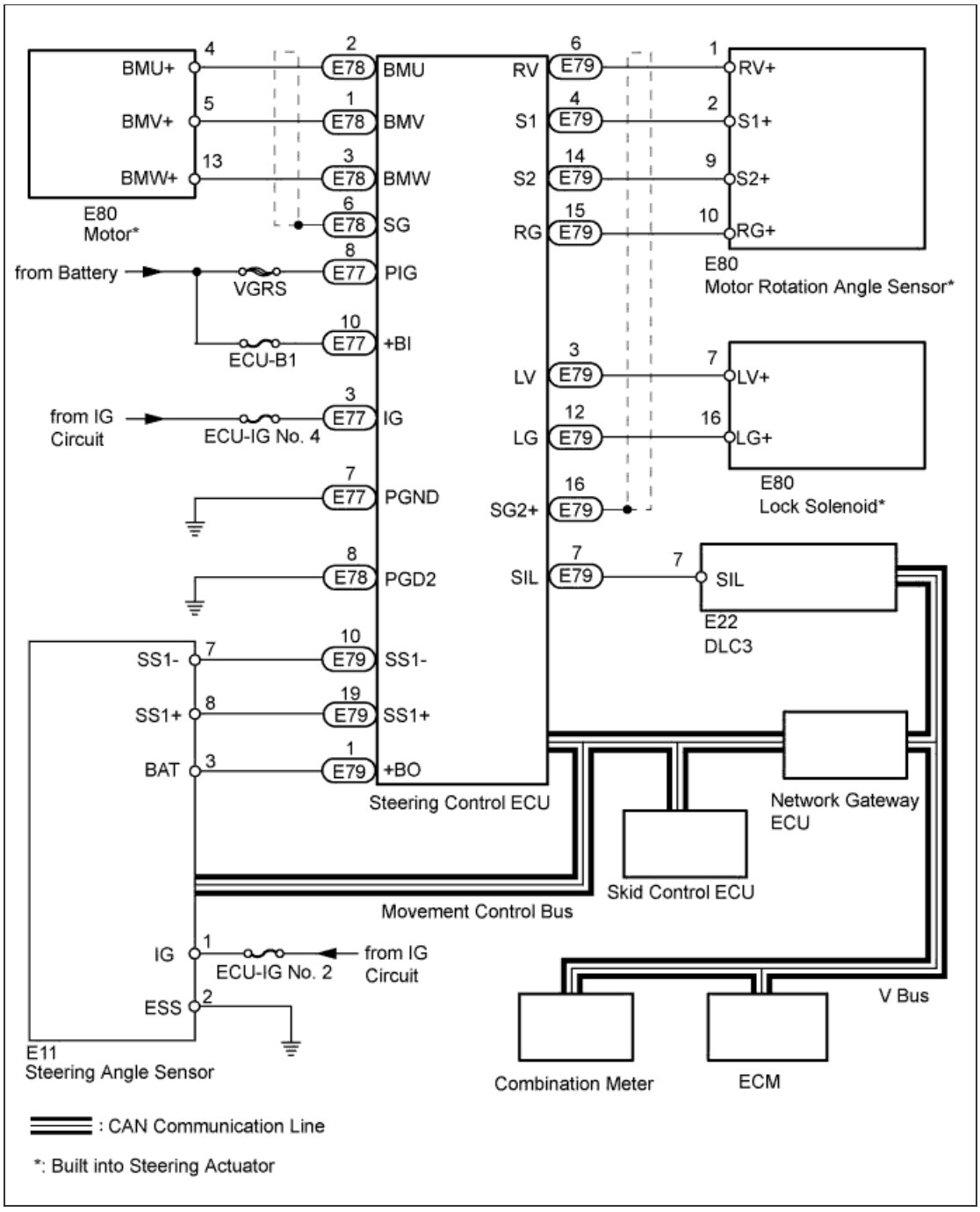

COMBINATION METER
- MASTER WARNING LIGHT
- MULTI-INFORMATION DISPLAY
STEERING ANGLE SENSOR
STEERING ACTUATOR ASSEMBLY
MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)
- ECU-IG NO. 2 FUSE

for RHD:



- ECU-IG NO. 4 FUSE

for Preparation Click here



Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signals	Communication Method
Steering Angle Sensor	Steering Control ECU	• Steering wheel angle signal • Tire angle (during straight-ahead driving) signal	CAN
Steering Angle Sensor	Steering Control ECU	• Steering wheel angle signal	Serial communication
Skid Control ECU	Steering Control ECU	• Vehicle speed signal • Steering cooperative control level signal	CAN
Steering Control ECU	Skid Control ECU	• Steering actuator operating angle signal	CAN
		• Warning information signal	

Steering Control ECU	Combination Meter		CAN

for Preparation Click here

GENERAL DESCRIPTION

a. The Variable Gear Ratio Steering (VGRS) system controls the steering angle in accordance with vehicle speed. The system is controlled by the steering control ECU which operates the steering actuator mounted on the steering intermediate shaft. The operating angle of the steering actuator is added to the steering angle of the pinion gear in order to vary the turning angle of the front wheels in accordance with vehicle speed.

b. When the VGRS system is operating normally, the steering wheel can be turned approximately 2.7 turns from lock to lock, with the engine running and the vehicle stopped.

c. If a malfunction occurs in the VGRS system, steering actuator operation will immediately stop and the input and output shafts will be directly connected to enable the conventional steering mechanism to operate, maintaining the steering function (fail-safe). At the same time, the master warning light will come on to inform the driver of the malfunction.

FUNCTIONS OF COMPONENTS

a. Functions of VGRS system components

Component	Function
Steering Control ECU	Calculates the steering gear ratio based on vehicle speed signals, steering wheel angle and steering wheel angle speed. Drives the steering actuator based on calculation results of steering cooperative control received from the skid control ECU, and steering gear ratio control.
Steering Actuator	Drives the motor using the output current from the steering control ECU to change the output shaft angle.
Rotation Angle Sensor (Built into Steering Actuator)	Outputs the motor rotation angle to the steering control ECU.
Steering Angle Sensor	Outputs the steering wheel angle to the steering control ECU.
Master Warning Light	Located in the combination meter. Comes on in accordance with system conditions to inform the driver of system malfunctions.
Multi-information Display	Located in the combination meter. Displays a warning message to inform the driver of system malfunctions.

for Preparation Click here

HINT:

- **Use the following procedures to troubleshoot the variable gear ratio steering system.**
- ***: Use the intelligent tester.**

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

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

NEXT

3.CHECK CAN COMMUNICATION SYSTEM*

a. Using the intelligent tester, check if the CAN communication system is functioning normally (Click here for LHD, Click here for RHD).

Result

Result	Proceed to
DTC is not output	A
DTC is output (for LHD)	B
DTC is output (for RHD)	C

B. → GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (**Click here**)

C. → GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (**Click here**)

A

4.CHECK DTC*

a. Check for DTCs (Click here).

b. Clear the DTCs (Click here).

c. Recheck for DTCs (Click here).

i. Simulate the malfunction and check if the DTCs are output again (Click here).

Result

Result	Proceed to
DTC is output	A
DTC is not output	B
DTCs are not output, and the malfunction cannot be simulated or checked.	C

B. → GO TO STEP 9

C. SYMPTOM SIMULATION

A

5.DTC CHART

NEXT

6.CIRCUIT INSPECTION

NEXT

7.REPAIR

NEXT

8.CONFIRMATION TEST

NEXT

END

9.PROBLEM SYMPTOMS TABLE

NEXT

10.CIRCUIT INSPECTION

NEXT

11.CONFIRMATION TEST

NEXT

END

for Preparation Click here

STEERING ANGLE SENSOR INITIALIZATION (to obtain a tire angle (during straight-ahead driving) signal)

a. Turn the engine switch on (IG), and check that the master warning light illuminates for a few seconds.

NOTICE:

If the warning light remains on, repair the applicable system.

b. Drive the vehicle on a straight road at 35 km/h (22 mph) or more for 5 seconds or more.

HINT:

- **At this point, the steering wheel will still remain off-center by 5 to 10°.**
- **In this step, the neutral position of the steering wheel is restored from the steering control ECU memory.**

c. Confirm that steering angle sensor initialization is completed (using the tester).

i. Enter the VGRS menu using the tester. Select "Straight Angle Valid Flag" from "Data List". Check if the steering angle sensor has obtained a tire angle (during straight-ahead driving) signal.

Standard:
"Valid" is displayed on the tester screen.

d. Confirm that steering angle sensor initialization is completed (not using the tester).

i. Stop the vehicle (engine running).

ii. Slowly turn the steering wheel from lock to lock.

iii. If it turns approximately 2.7 turns, steering angle sensor initialization is completed. If it turns approximately 3.2 turns, steering angle sensor initialization is not completed.

NOTICE:

If the steering wheel turns approximately 3.2 turns, drive the vehicle on a straight road at 35 km/h (22 mph) or more for 5 seconds or more. Then confirm the initialization again.

for Preparation Click here

NOTICE:

Use this procedure to center the steering wheel if:

- **The steering actuator assembly has been replaced.**
- **The steering control ECU has been replaced.**
- **The steering column or steering intermediate shaft has been disconnected.**
- **The steering wheel is still off-center after completing the steering angle sensor initialization.**

VGRS SYSTEM CALIBRATION PROCEDURE (WHEN USING SST CHECK WIRE)

1.FACE TIRES STRAIGHT AHEAD

NOTICE:

Drive the vehicle to confirm that the steering wheel is centered.

NEXT

2.CHECK DTC

a. Check for DTCs (Click here).

Result

Result	Proceed to
DTC C1591/51 is not output	A
DTC C1591/51 is output	B

B. → Go to step 4

A

3.PERFORM ACTUATOR ANGLE INITIALIZATION

SST

09843-18040

NOTICE:

If the procedures from *1 to *2 are not completed within 1 minute, or if errors are made during these procedures, perform the initialization again from the beginning.

a. Start the engine.

b. Center the steering wheel.

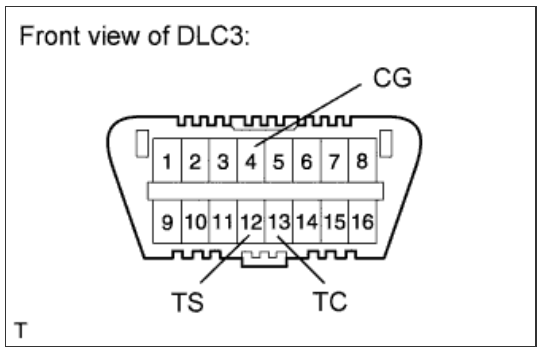
c. Using SST, connect terminals 12 (TS) and 4 (CG), and 13 (TC) and 4 (CG) of the DLC3.*1

d. Disconnect SST from terminal 12 (TS) of the DLC3, and turn the steering wheel to the left 180° or more.

e. Connect SST to terminal 12 (TS) of the DLC3.

f. Disconnect SST from terminal 13 (TC) of the DLC3, and turn the steering wheel to the right 180° or more.

g. Connect SST to terminal 13 (TC) of the DLC3.*2



HINT:

If the master warning light comes on, DTC C1591/51 is stored.

h. Disconnect SST from the DLC3.

i. Turn the engine switch off.

NEXT

4.FACE TIRES STRAIGHT AHEAD

a. Confirm that the steering wheel is centered when facing the tires straight ahead.

NOTICE:

Drive the vehicle to confirm that the steering wheel is centered.

Result

Result	Proceed to
Steering wheel is off-center	A
Steering wheel is centered	B

B. Go to step 8

A

5.UNLOCK STEERING ACTUATOR

NOTICE:

Make sure the engine is not running.

a. Turn the engine switch off.

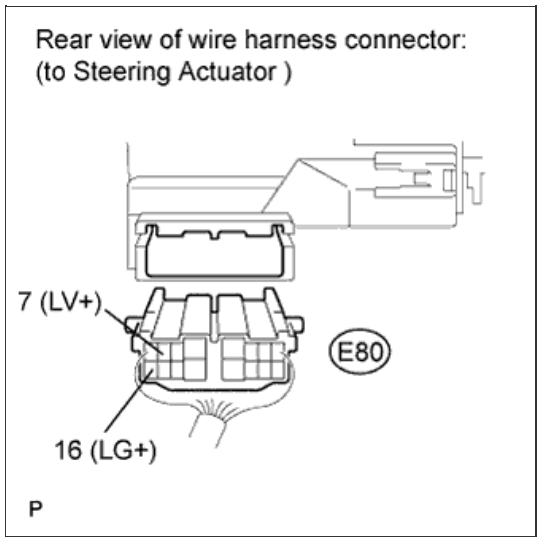
b. Disconnect the cable from the negative (-) battery terminal.

c. Disconnect the E80 connector from the steering actuator.

d. Connect a jumper wire from terminal 7 (LV+) of the steering actuator to the positive (+) 12 V battery terminal and another jumper wire from terminal 16 (LG+) of the steering actuator to the negative (-) 12 V battery terminal.

NOTICE:

Do not apply voltage for more than 3 minutes.



NEXT

6.STEERING CENTER ADJUSTMENT

a. Center the steering wheel.

NOTICE:

If the centering of the spiral cable was not confirmed when the steering wheel was installed, confirm the centering of the spiral cable (Click

here).

NEXT

7.LOCK STEERING ACTUATOR

a. Disconnect the positive (+) and negative (-) 12 V battery jumper wires from the steering actuator.

b. Connect the E80 connector to the steering actuator.

c. Connect the cable to the negative (-) battery terminal.

d. Turn the steering wheel approximately 3° to the left and right. Confirm that the reaction force can be felt.

NOTICE:

- **If the above procedures are not followed correctly, a DTC will be stored. If a DTC is stored, perform the above procedures again and then check for DTCs.**
- **Perform these procedures with the engine switch off.**

NEXT

8.ADJUST ACTUATOR ANGLE

HINT:

Activating and ending test mode will complete actuator angle adjustment.

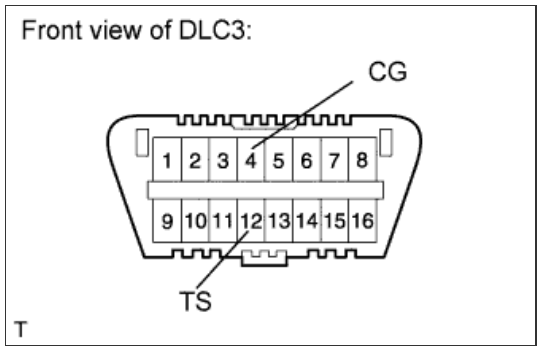
a. Make sure the engine switch is off.

NOTICE:

Do not touch the steering wheel during these procedures.

b. Using SST, connect terminals 12 (TS) and 4 (CG) of the DLC3.

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c. Turn the engine switch on (IG).

d. Confirm that "VGRS Test Mode" is displayed on the multi-information display when test mode is activated.

HINT:

Wait approximately 5 seconds.

e. Turn the engine switch off.

f. Disconnect SST from terminals 12 (TS) and 4 (CG) of the DLC3.

g. Turn the engine switch on (IG) again.

NEXT

9.CHECK MASTER WARNING LIGHT

a. Confirm that the master warning light is off.

b. Turn the engine switch off, then on (IG).

c. Confirm that the master warning light is operating normally.

NEXT

10.CHECK STEERING WHEEL OPERATION

a. Start the engine.

b. Perform the steering angle sensor initialization (Click here).

c. Turn the steering wheel from lock to lock and check that it rotates approximately 2.7 turns.

d. Drive the vehicle and confirm that the steering wheel is centered.

NEXT

END

VGRS SYSTEM CALIBRATION PROCEDURE (WHEN USING INTELLIGENT TESTER)

1.FACE TIRES STRAIGHT AHEAD

NOTICE:

Drive the vehicle to confirm that the steering wheel is centered.

NEXT

2.PERFORM VGRS SYSTEM CALIBRATION

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the tester on.

d. Enter the following menus: Chassis / VGRS / Utility / Steering Angle Adjust.
Then, press "Next".

e. Follow the instructions on the tester, and press "Next".

NOTICE:

Press the "Next" key even if DTC C15B4/71 is output.

f. Follow the instructions on the tester, and press "Next".

g. Follow the instructions on the tester, and press "Next".

NOTICE:

Ensure that the engine switch is off.

h. Follow the instructions on the tester, and press "Next".

i. Follow the instructions on the tester, and press "Next".

NOTICE:

If the centering of the spiral cable was not confirmed when the steering wheel was installed, confirm the centering of the spiral cable (Click here).

j. Follow the instructions on the tester, and press "Next".

NOTICE:

Do not touch the steering wheel during these procedures.

k. Follow the instructions on the tester, and press "Next".

l. Follow the instructions on the tester, and press "Next".

NOTICE:

Do not touch the steering wheel during these procedures.

m. "NOW CALIBRATING" is displayed and the display switches automatically to the next screen.

NOTICE:

Do not touch the steering wheel during these procedures.

n. "Steering Angle Adjust is complete." is displayed. Then, check that the VGRS system calibration is completed normally.

o. Select "Exit" to return the display to the "MENU" screen.

NEXT

3.CHECK MASTER WARNING LIGHT

a. Confirm that the master warning light is off.

b. Turn the engine switch off.

c. Disconnect the intelligent tester from the DLC3.

d. Turn the engine switch on (IG).

e. Confirm that the master warning light is operating normally.

NEXT

4.CHECK STEERING WHEEL OPERATION

a. Start the engine.

b. Perform the steering angle sensor initialization (Click here).

c. Turn the steering wheel from lock to lock and check that it rotates approximately 2.7 turns.

d. Drive the vehicle and confirm that the steering wheel is centered.

NEXT

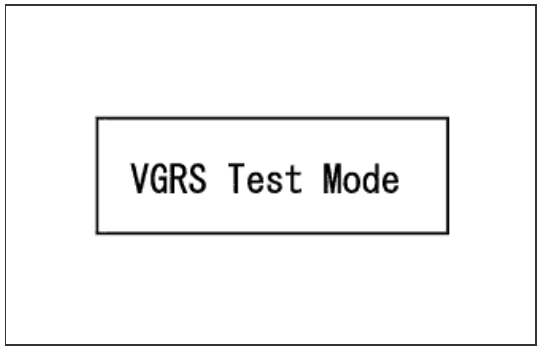
END

for Preparation Click here

TEST MODE (VGRS SENSOR SIGNAL CHECK)

HINT:

- **When the system enters test mode, "VGRS Test Mode" is displayed on the multi-information display.**
- **Before entering test mode, check and repair any malfunctions indicated by the present DTCs of the VGRS system.**
- **By switching from normal mode to test mode, the steering angle sensor can be read.**
- **When entering test mode, the steering control ECU sets all the test mode DTCs first.**
- **When the mode is switched from test mode to normal mode, all the test mode DTCs will be cleared.**



a. Check the test mode DTCs (using the tester).

i. Turn the engine switch off.

ii. Connect the intelligent tester to the DLC3.

iii. Turn the engine switch on (IG) and turn the tester on.

iv. Read the test mode DTCs by following the prompts on the tester screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

b. Clear the test mode DTCs (using the tester).

i. Turn the engine switch off.

ii. Connect the intelligent tester to the DLC3.

iii. Turn the engine switch on (IG) and turn the tester on.

iv. Switch the system from test mode to normal mode by following the directions on the tester screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

c. Check the test mode DTCs (using SST check wire).

NOTICE:

Perform these procedures with the vehicle stopped.

i. Turn the engine switch off.

ii. Using SST, connect terminals 12 (TS) and 4 (CG) of the DLC3.

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iii. Turn the engine switch on (IG).

iv. Read 2-digit test mode DTCs from the multi-information display.

d. Clear the test mode DTCs (using SST check wire).

i. Turn the engine switch off.

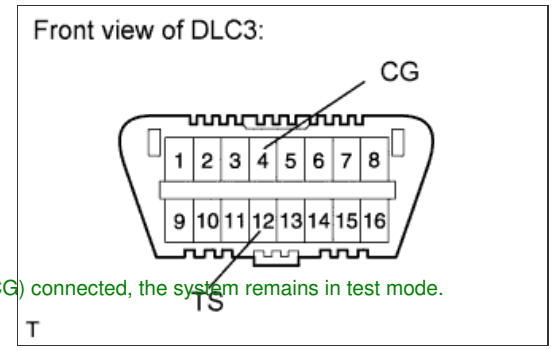
ii. Disconnect SST from the DLC3.

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iii. Turn the engine switch on (IG).

HINT:

If the engine switch is turned on (IG) with terminals 12 (TS) and 4 (CG) connected, the system remains in test mode.



TEST MODE DTC

a. If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, proceed to the DTC chart.

DTC Code	Detection Item	Trouble Area	Proceed to
C15C4/68	A steering signal indicating a tire angle of 36° or more (to the left or right) is input after entering test mode*	• Steering angle sensor • Harness or connector • Steering control ECU	Click here
C15C5/69	A steering signal indicating a motor rotation angle of 36° or more (to the left or right) is input after entering test mode*	• Harness or connector • Steering actuator • Steering control ECU	Click here

HINT:

*: A tire angle of 36° and a motor rotation angle of 36° correspond to the steering wheel angle. The amount of change in tire angle and motor rotation angle is from when the mode is changed to test mode.

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.**

Variable Gear Ratio Steering System

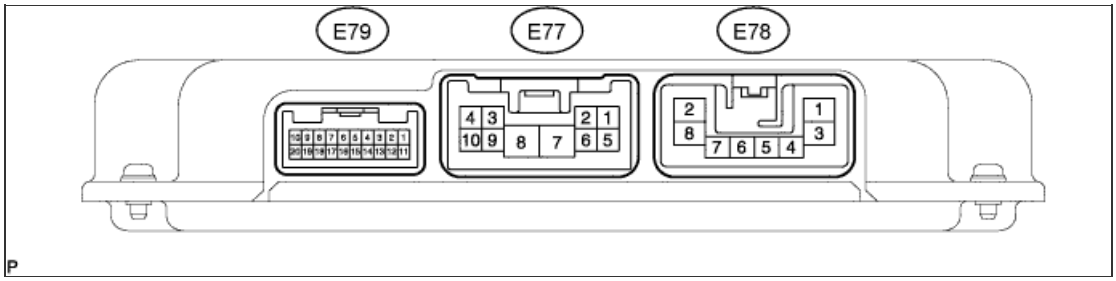
Symptom	Suspected Area	See page
Steering wheel is off-center	Steering wheel is off-center or deviates from neutral position	Click here
VGRS system stops or does not operate	Only if the following are all normal and the problem is still occurring, replace the steering control ECU	Click here
	Actuator temperature is abnormal	Click here
	IG power source circuit	Click here
	IG or PIG power supply circuit	Click here
	Steering system (Hard steering)	Click here
Steering angle differs between left and right	Steering angle differs between left and right	Click here
Steering wheel vibrates or abnormal noise is heard from steering wheel	Steering wheel vibrates or abnormal noise is heard from steering wheel	Click here
Master warning light (VGRS) malfunction	Master warning light circuit	Click here

for Preparation Click here

CHECK STEERING CONTROL ECU

HINT:

Inspect the connectors from the back side while they are connected.



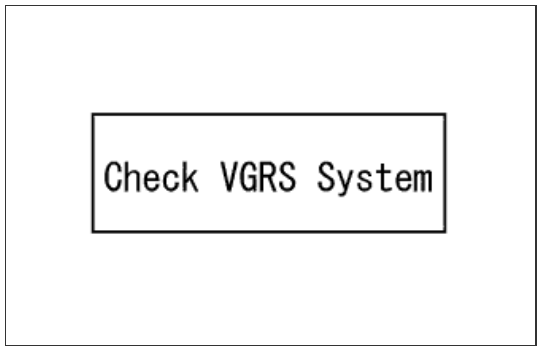
Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
E77-3 (IG) - E77-7 (PGND)	G - W-B	Power supply (ECU-IG No. 4 fuse)	Engine switch on (IG)	11 to 14 V
E77-7 (PGND) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E77-8 (PIG) - E77-7 (PGND)	B - W-B	Power supply (VGRS fuse)	Engine switch on (IG)	11 to 14 V
E77-10 (+BI) - E77-7 (PGND)	R - W-B	Power supply (ECU-B1 fuse)	Always	11 to 14 V
E78-1 (BMV) - E77-7 (PGND)	W - W-B	Steering actuator motor signal (V phase)	Engine running	Sine wave
E78-2 (BMU) - E77-7 (PGND)	B - W-B	Steering actuator motor signal (U phase)	Engine running	Sine wave
E78-3 (BMW) - E77-7 (PGND)	R - W-B	Steering actuator motor signal (W phase)	Engine running	Sine wave
E78-6 (SG) - E78-8 (PGD2)	BR - W-B	Steering actuator motor signal shielded ground	Always	Below 1 Ω
E78-8 (PGD2) - Body ground	W-B - Body ground	Steering control ECU ground	Always	Below 1 Ω
E79-1 (+BO) - E77-7 (PGND)	R - W-B	Steering angle sensor power supply line	Always	11 to 14 V
E79-3 (LV) - E77-7 (PGND)	B - W-B	Power source for steering actuator lock	Engine switch on (IG)	11 to 14 V
E79-4 (S1) - E77-7 (PGND)	R - W-B	Steering actuator motor rotation angle sensor signal	Engine switch on (IG)	Sine wave
E79-6 (RV) - E77-7 (PGND)	W- W-B	Steering actuator resolver excitation output voltage	Engine switch on (IG)	Sine wave
E79-7 (SIL) - E77-7 (PGND)	R - W-B	Diagnostic communication signal	Engine switch on (IG)	Pulse generation
E79-9 (CANH) - E79-20 (CANL)	LG - L	CAN communication	Engine switch on (IG)	Pulse generation
E79-10 (SS1-) - E77-7 (PGND)	GR - W-B	Steering angle sensor signal	Engine running and steering wheel turned	Pulse generation
E79-12 (LG) - E77-7 (PGND)	Y - W-B	Steering actuator lock ground	Engine running	Pulse generation
E79-14 (S2) - E77-7 (PGND)	L - W-B	Steering actuator motor rotation angle sensor signal	Engine switch on (IG)	Sine wave
E79-15 (RG) - E77-7 (PGND)	G - W-B	Steering actuator resolver common ground	Always	Below 1 Ω
E79-16 (SG2+) - E77-7 (PGND)	Shielded - W-B	Shielded ground wire for steering actuator motor rotation angle sensor signal wire and control signal wire	Engine switch on (IG)	Pulse generation

E79-19 (SS1+) - E77-7 (PGND)	L - W-B	Steering angle sensor signal	Engine running and steering wheel turned	3 to 4 V

for Preparation Click here

FUNCTION OF WARNING LIGHT AND MESSAGE

a. If a malfunction occurs during system operation, the master warning light on the combination meter comes on and "Check VGRS System" will be displayed on the multi-information display to inform the driver of the system malfunction.



DTC

a. Normal mode.

i. DTCs are stored in the steering control ECU and read using the tester (Click here).

b. Test mode.

i. By switching from normal mode to test mode, the steering angle sensor can be inspected (Click here).

HINT:

Whether the system is in normal mode or test mode can be checked from the indication on the multi-information display. For details of the indication and how to check, refer to "DTC Check/Clear" (Click here).

CHECK MASTER WARNING LIGHT

a. Turn the engine switch on (IG).

b. Check that the master warning light comes on for 2 seconds.

HINT:

If the master warning light (VGRS) check result is not normal, proceed to troubleshooting of the warning light circuit.

Trouble Area	See Procedure
Master warning light circuit	Click here

for Preparation Click here

CHECK DTC (Using Tester)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the tester on.

d. Enter the following menus: Chassis / VGRS / DTC.

e. Read the DTCs.

CLEAR DTC (Using Tester)

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG) (do not start the engine).

c. Turn the tester on.

d. Enter the following menus: Chassis / VGRS / DTC.

e. Clear the DTCs.

CHECK DTC (Using SST Check Wire)

HINT:

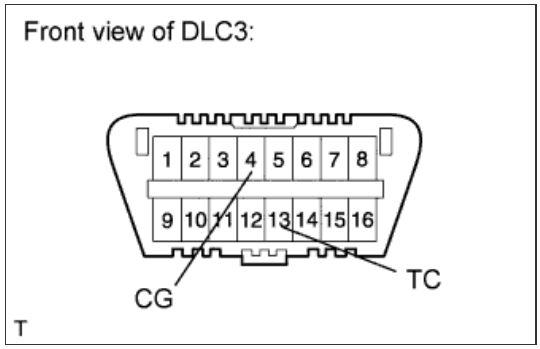
The master warning light comes on in diagnostic mode.

a. Using SST check wire, connect terminals 13 (TC) and 4 (CG) of the DLC3.

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b. Turn the engine switch on (IG).

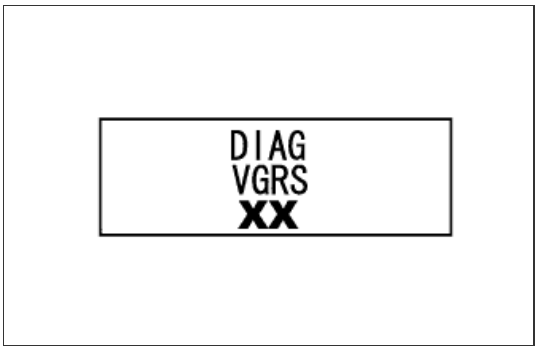
c. "DIAG VGRS" is displayed on the multi-information display and the system starts searching for a malfunction.



d. If the system is normal, "DIAG VGRS OK" is displayed.



e. If the system has a malfunction, "DIAG VGRS xx" is displayed ("xx" is a 2-digit DTC).



CLEAR DTC (Using SST Check Wire)

a. Turn the engine switch on (IG).

b. Using SST check wire, connect and disconnect terminals 13 (TC) and 4 (CG) of the DLC3 4 times within 8 seconds.

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c. Disconnect SST check wire from the DLC3.

NOTICE:

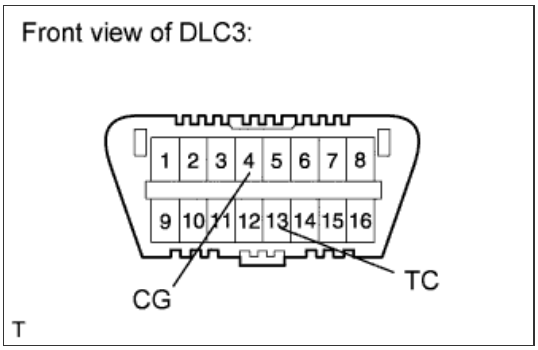
As the stored yaw rate and G sensor value will be cleared by the above operation, it is necessary to obtain the yaw rate and G sensor zero point.

d. Turn the engine switch off.

HINT:

If the problem still exists, DTCs may not be cleared.

e. Obtain the yaw rate and G sensor zero point (Click here).



for Preparation Click here

HINT:

The VGRS system stores data when a trouble code is set which can be viewed using the intelligent tester.

FREEZE FRAME DATA OF STEERING CONTROL ECU

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG) and check the freeze frame data by following the prompts on the tester screen.

VGRS

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Vehicle Speed (Vsc ECU)	Vehicle speed (Skid control ECU)/ Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Actual vehicle speed (Speed indicated on speedometer)	-
Engine ReVolution (Rpm)	Engine speed (rpm)/ Less than 300 or 300 or more	Engine stopped: Less than 300 rpm Engine running: 300 rpm or more	-
Mtr Power Source Cur.	Motor power source actual current/ Min.: 0 A, Max.: 127.5 A	Steering wheel not turned: Below 1 A Steering wheel turned: 1 A or higher	-
PIG-Power Source Volt	PIG power source voltage/ Min.: 0 V, Max.: 25.5 V	Engine switch on (IG): 11 to 14 V	-
IG-Power Source Volt	IG power source voltage/ Min.: 0 V, Max.: 25.5 V	Engine switch on (IG): 11 to 14 V	-
Lock Motor Output Volt	Lock motor output voltage/ Min.: 0 V, Max.: 25.5 V	Engine switch on (IG): 11 to 14 V	-
Command Value Duty	Command duty value for PVM control/ Min.: 0%, Max.: 100%	VGRS system operating: 0 to 100% VGRS system not operating: 0%	-
Actuator Lock Duty Val	Command duty value for actuator lock control/ Min.: 0%, Max.: 100%	Engine switch on (IG): Below 10%	-
Resolver Offset(SIN)	Resolver offset (SIN)/ Min.: 0, V Max.: 25.5 V	Steering wheel turned: 0 to 16 V Steering wheel not turned: 0 V	-
Resolver Offset(COS)	Resolver offset (COS)/ Min.: 0, V Max.: 25.5 V	Steering wheel turned: 0 to 16 V Steering wheel not turned: 0 V	-
Motor Current U	Motor current U/ Min.: -63 A, Max.: 64.5 A	Steering wheel turned: 0 to 64.5 A Steering wheel not turned: 0 A	-
Motor Current V	Motor current V/ Min.: -63 A, Max.: 64.5 A	Steering wheel turned: 0 to 64.5 A Steering wheel not turned: 0 A	-
Motor Current W	Motor current W/ Min.: -63 A, Max.: 64.5 A	Steering wheel turned: 0 to 64.5 A Steering wheel not turned: 0 A	-
Motor Voltage	Motor voltage/ Min.: 0 V, Max.: 51 V	VGRS system operating: 9 to 36 V VGRS system not operating: 0 V	-
Steering Pos 1	Steering position/ Min.: -2047 deg., Max.: 2048.94 deg.	Steering wheel turned to right: Display value changes in negative direction Steering wheel turned to left: Display value changes in positive direction	-
Actuator Position	Actuator position/ Min.: -2047 deg., Max.: 2048.94 deg.	Steering wheel turned: -2047 to 2048.94 deg.	-
Steering Angle Velocity	Steering angle velocity/ Min.: -2047 deg./s, Max.: 2048.94 deg./s	Steering wheel turned to right: Display value changes in negative direction Steering wheel turned to left: Display value changes in positive direction	-
Actuator Target Angle 1	Actuator target angle 1/ Min.: -2047 deg., Max.: 2048.94 deg.	Steering wheel turned: -2047 to 2048.94 deg.	-
Actuator Target Angle 2	Actuator target angle 2/ Min.: -2047 deg., Max.: 2048.94 deg.	Steering wheel turned: -2047 to 2048.94 deg.	-
Actuator ReVolution Spd	Actuator revolution speed/ Min.: -2047 deg./s, Max.: 2048.94 deg./s	Steering wheel turned to right: Display value changes in negative direction Steering wheel turned to left: Display value changes in positive direction	-

Mode State	Mode state/ 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B, 0C, 0D, 0E, 0F or 10	-	-

for Preparation Click here

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.

READ DATA LIST

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the tester on.

d. Enter the following menus: Chassis / VGRS / Data List.

e. According to the display on the tester, read the Data List.

VGRS:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Vehicle Speed (Vsc ECU)	Vehicle speed (Skid control ECU)/ Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Actual vehicle speed (Speed indicated on speedometer)	-
Engine ReVolution (Rpm)	Engine speed (rpm)/ Less than 300 or 300 or more	Engine stopped: Less than 300 rpm Engine running: 300 rpm or more	-
Mtr Power Source Cur.	Motor power source actual current/ Min.: 0 A, Max.: 127.5 A	Steering wheel not turned: Below 1 A Steering wheel turned: 1 A or higher	-
PIG-Power Source Volt	PIG power source voltage/ Min.: 0 V, Max.: 25.5 V	Engine switch on (IG): 11 to 14 V	-
IG-Power Source Volt	IG power source voltage/ Min.: 0 V, Max.: 25.5 V	Engine switch on (IG): 11 to 14 V	-
Terminal Voltage U	Terminal voltage U/ Min.: 0 V, Max.: 25.5 V	VGRS system operating: 0 to 16 V VGRS system not operating: 0 V	Turning the steering wheel changes the value (with the engine running and the VGRS system operating).
Terminal Voltage V	Terminal voltage V/ Min.: 0 V, Max.: 25.5 V	VGRS system operating: 0 to 16 V VGRS system not operating: 0 V	Turning the steering wheel changes the value (with the engine running and the VGRS system operating).
Terminal Voltage W	Terminal voltage W/ Min.: 0 V, Max.: 25.5 V	VGRS system operating: 0 to 16 V VGRS system not operating: 0 V	Turning the steering wheel changes the value (with the engine running and the VGRS system operating).
Lock Motor Output Volt	Lock motor output voltage/ Min.: 0 V, Max.: 25.5 V	Engine switch on (IG): 11 to 14 V	-
Thermistor Temperature	Thermistor temperature/ Min.: -50°C (-58°F), Max.: 205°C (419°F)	-	-
Command Value Duty	Command duty value for PVM control/ Min.: 0%, Max.: 100%	VGRS system operating: 0 to 100% VGRS system not operating: 0%	-
Actuator Lock Duty Val	Command duty value for actuator lock control/ Min.: 0%, Max.: 100%	Engine switch on (IG): Below 10%	-

Straight Angle Valid Flag*1	Straight steering angle valid flag/ Valid or Invalid	Steering angle sensor zero point calibrated: Valid Steering angle sensor zero point not calibrated: Invalid	-
Actuator Estimate Temp	Actuator estimated temperature/ Min.: -50°C (-58°F), Max.: 205°C (419°F)	-	-
Motor Overheat Record*2	Record of continuous overheat preventive control/ Rec or Unrec	Rec or Unrec	-
Motor Lo Power Record*2	Record of low motor power source voltage/ Rec or Unrec	Rec or Unrec	-
Motor Over load Record*2	Record of high motor power source voltage/ Rec or Unrec	Rec or Unrec	-
The Number of DTCs	The number of DTCs/ Max.: 0, Min.: 255	0 to 255	-
Test Mode Status	Test mode status/ Normal mode or Test mode	Normal mode status: Normal mode Test mode status: Test mode	-
Steering Mode	Absorber control switch (AVS switch) position/ Sports or Normal	Absorber control switch position SPORT: Sports Absorber control switch position NORM: Normal	-
Elec Angle Position	Deep-slot electric angle position recorded when actuator angle neutral point adjustment completed normally/ Min.: 0°, Max.: 360°	-	-
Resolver Offset(SIN)	Resolver offset (SIN)/ Min.: 0, V Max.: 25.5 V	Steering wheel turned: 0 to 16 V Steering wheel not turned: 0 V	-
Resolver Offset(COS)	Resolver offset (COS)/ Min.: 0, V Max.: 25.5 V	Steering wheel turned: 0 to 16 V Steering wheel not turned: 0 V	-
Motor Current U	Motor current U/ Min.: -63 A, Max.: 64.5 A	Steering wheel turned: 0 to 64.5 A Steering wheel not turned: 0 A	-
Motor Current V	Motor current V/ Min.: -63 A, Max.: 64.5 A	Steering wheel turned: 0 to 64.5 A Steering wheel not turned: 0 A	-
Motor Current W	Motor current W/ Min.: -63 A, Max.: 64.5 A	Steering wheel turned: 0 to 64.5 A Steering wheel not turned: 0 A	-
Motor Voltage	Motor voltage/ Min.: 0 V, Max.: 51V	VGRS system operating: 9 to 36 V VGRS system not operating: 0 V	-
Steering Pos 1	Steering position/ Min.: -2047 deg., Max.: 2048.94 deg.	Steering wheel turned to right: Display value changes in negative direction Steering wheel turned to left: Display value changes in positive direction	-
Steering Pos 2	Steering position/ Min.: -49150.5 deg., Max.: 49152 deg.	Steering wheel turned to right: Display value changes in negative direction Steering wheel turned to left: Display value changes in positive direction	-
Actuator Position	Actuator position/ Min.: -2047 deg., Max.: 2048.94 deg.	Steering wheel turned: -2047 to 2048.94 deg.	-
Steering Angle	Steering angle velocity/	Steering wheel turned to right: Display value changes in negative direction	-

Velocity	Min.: -2047 deg./s, Max.: 2048.94 deg./s	Steering wheel turned to left: Display value changes in positive direction	
Actuator Target Angle 1	Actuator target angle 1/ Min.: -2047 deg., Max.: 2048.94 deg.	Steering wheel turned: -2047 to 2048.94 deg.	-
Actuator Target Angle 2	Actuator target angle 2/ Min.: -2047 deg., Max.: 2048.94 deg.	Steering wheel turned: -2047 to 2048.94 deg.	-
Actuator ReVolution Spd	Actuator revolution speed/ Min.: -2047 deg./s, Max.: 2048.94 deg./s	Steering wheel turned to right: Display value changes in negative direction Steering wheel turned to left: Display value changes in positive direction	-
Actuator Deviation Ang	Actuator deviation angle/ Min.: -32 rad., Max.: 32 rad.	VGRS system operating: -32 to 32 rad.	-
Mode State	Mode state/ 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B, 0C, 0D, 0E, 0F or 10	-	-

NOTICE:

*1: This data must be "Valid" before proceeding with any steering adjustment. If "Invalid" is displayed, perform the steering angle sensor initialization procedure. If the steering actuator or steering control ECU has been replaced, perform VGRS system calibration (steering angle adjustment).

HINT:

*2: If "Rec" is displayed, enter the VGRS menu on the intelligent tester, select record clearance, and follow the prompts to set to "Unrec".

ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Test 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 intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the tester on.

d. Enter the following menus:
Body / Combination meter / Active Test.

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

Combination Meter:

Tester Display	Test Part	Control Range	Diagnostic Note
Master Warning	Master warning light	OFF/ON	Confirm that the vehicle is stopped and the engine is running.

for Preparation Click here

HINT:

If a trouble code is output during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

Variable Gear Ratio Steering System

DTC Code	Detection Item	See page
C1591/51	Actuator Neutral Position Calibration Undone	Click here
C1592/52	Actuator Neutral Position Calibration Incomplete	Click here
C1593/53	Actuator Standard Position Malfunction	Click here
C1595/55	Lost Communication with Steering Angle Sensor Module	Click here
C15A1/61	Actuator Malfunction	Click here
C15A2/62	Actuator Malfunction	Click here
C15A3/63	Actuator Malfunction	Click here
C15A4/64	Actuator Malfunction	Click here
C15A5/65	Actuator Malfunction	Click here
C15A6/62	Actuator Malfunction	Click here
C15A9/66	Lock Holder Deviation Detection	Click here
C15AA/66	Lock Mechanism Release Incomplete	Click here
C15AB/66	Lock Mechanism Insertion Malfunction	Click here
C15B1/71	ECU Malfunction	Click here
C15B2/72	ECU Malfunction	Click here
C15B3/73	ECU Malfunction	Click here
C15B4/71	ECU Malfunction	Click here
C15C1/74	Steering Angle Sensor Malfunction	Click here
C15C2/74	Steering Angle Sensor B+ Malfunction	Click here
C15C3/75	Brake System Control Module Malfunction	Click here
C15C4/68	Steering Angle Signal (Test Mode DTC)	Click here
C15C5/69	Motor Revolution Angle Signal (Test Mode DTC)	Click here
C15C6/77	IG Power Supply Voltage Malfunction	Click here
C15C7/78	DC Motor Power Source Voltage Malfunction	Click here
C15C8/79	Power Supply Relay Failure	Click here
U0100/56	Lost Communication with ECM / PCM "A"	Click here
U0122/56	Lost Communication with Vehicle Dynamics Control Module	Click here
U0126/56	Lost Communication with Steering Angle Sensor Module	Click here

DTC C1591/51 Actuator Neutral Position Calibration Undone

for Preparation Click here

DESCRIPTION

If the steering control ECU or steering actuator is replaced, or if the tie-rod ends are adjusted, VGRS system calibration is required. If the steering control ECU detects that steering angle adjustment is incomplete, it will store DTC C1591/51.

DTC Code	DTC Detection Condition	Procedure
C1591/51	The steering control ECU detects that steering angle adjustment is incomplete.	There is no malfunction if this DTC is not output again after performing VGRS system calibration.

INSPECTION PROCEDURE

1.CHECK DTC

a. Check for DTCs (Click here).

OK:
DTC C1591/51 only is output.

NG → REPAIR CIRCUIT INDICATED BY DTC OUTPUT

OK

2.PERFORM VGRS SYSTEM CALIBRATION

a. Perform VGRS system calibration (Click here).

NEXT

3.CHECK DTC

a. Check for DTCs (Click here).

Result

Result	Proceed to
DTC is not output.	A
DTC C1592/52 is output.	B
DTC C1593/53 is output.	C

B → GO TO DTC C1592/52 (**Click here**)

C → GO TO DTC C1593/53 (**Click here**)

A

USE SIMULATION METHOD TO CHECK (**Click here**)

DTC C15A5/65 Actuator Malfunction

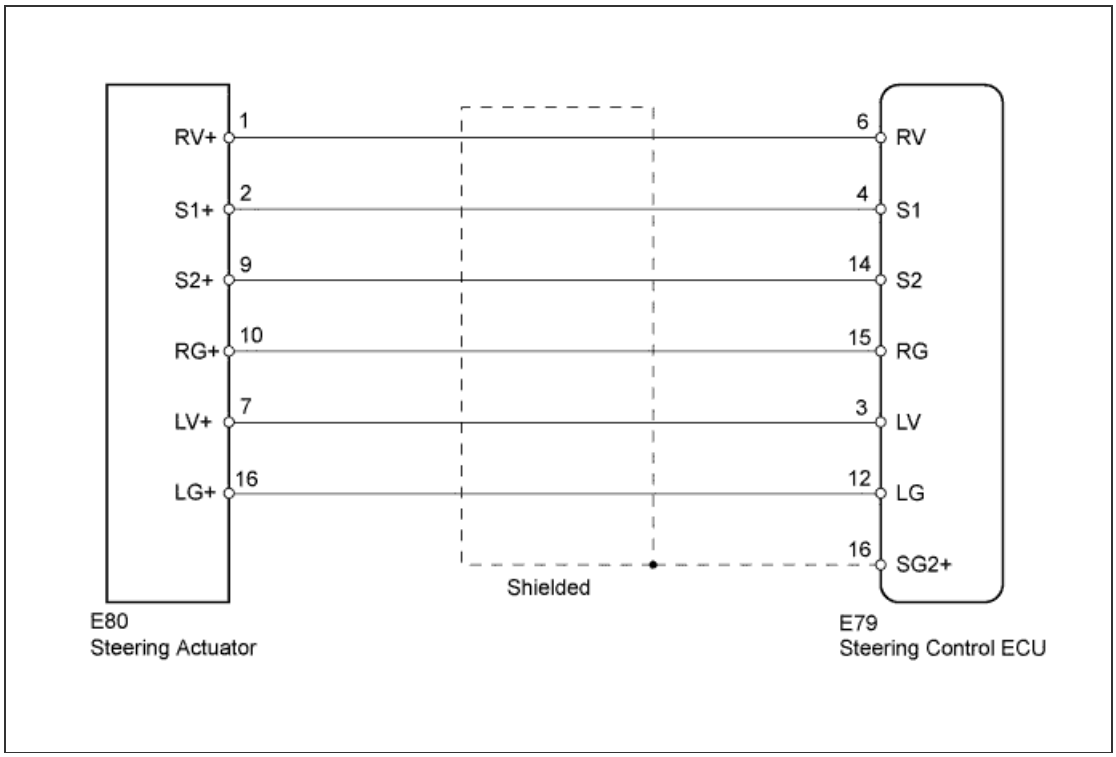
for Preparation Click here

DESCRIPTION

If the steering control ECU detects a malfunction in the lock mechanism, it will turn the master warning light on, store DTC C15A5/65, and stop VGRS operation.

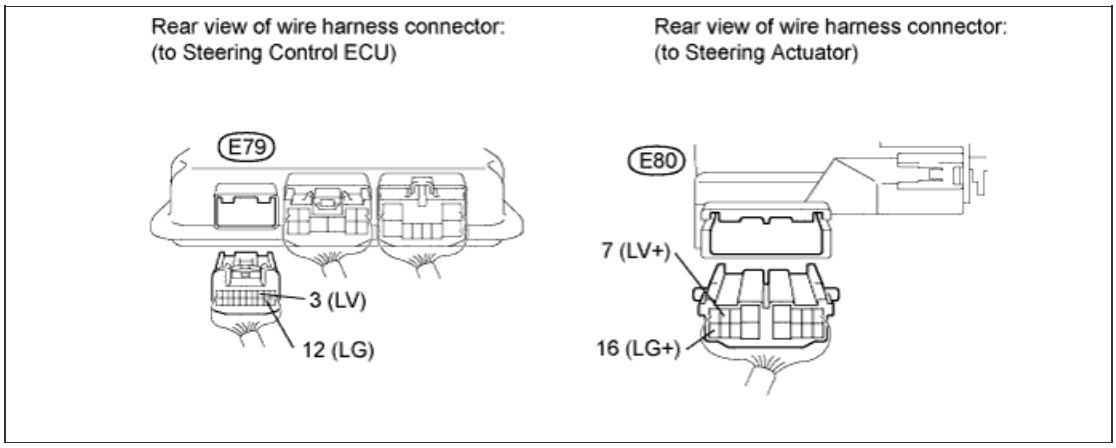
DTC Code	DTC Detection Condition	Trouble Area
C15A5/65	The steering control ECU detects that the LG terminal voltage is abnormal.	• Harness or connector • Steering actuator • Steering control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU - STEERING ACTUATOR)



a. Disconnect the E79 steering control ECU connector.

b. Disconnect the E80 steering actuator connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E79-3 (LV) - E80-7 (LV+)	Always	Below 1 Ω
E79-12 (LG) - E80-16 (LG+)		
E79-3 (LV) - Body ground	Always	10 kΩ or higher
E79-12 (LG) - Body ground		

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E79-3 (LV) - Body ground	Engine switch on (IG)	Below 1 V
E79-12 (LG) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

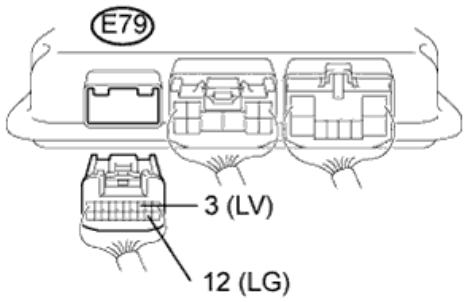
2.CHECK STEERING ACTUATOR (STEERING CONTROL ECU - STEERING ACTUATOR)

a. Disconnect the E79 steering control ECU connector.

b. Reconnect the E80 steering actuator connector.

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

Rear view of wire harness connector:
(to Steering Control ECU)



Standard Resistance:

Tester Connection	Condition	Specified Condition
E79-3 (LV) - E79-12 (LG)	Always	10 to 100 Ω
E79-3 (LV) - Body ground	Always	10 kΩ or higher
E79-12 (LG) - Body ground		

Result

Result Result	Proceed to
NG	A
OK (for LHD)	B
OK (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

DTC C1592/52 Actuator Neutral Position Calibration Incomplete

for Preparation Click here

DESCRIPTION

The steering control ECU first checks the actuator angle neutral position calibration flag after entering test mode. If the ECU detects that steering actuator angle neutral position calibration is incomplete twice, it will store DTC C1592/52.

DTC Code	DTC Detection Condition	Trouble Area
C1592/52	The steering control ECU detects that steering actuator angle neutral position calibration is incomplete twice.	• Steering actuator • Steering control ECU

INSPECTION PROCEDURE

1.CLEAR DTC

a. Clear the DTCs (Click here).

NEXT

2.PERFORM VGRS SYSTEM CALIBRATION

a. Perform VGRS system calibration (Click here).

NEXT

3.CHECK DTC

a. Check for DTCs (Click here).

Result

Result	Proceed to
C1592/52 is output after VGRS system calibration has been performed 3 times or more	A
C15B2/72 is output (for LHD)	B
C15B2/72 is output (for RHD)	C
DTC is not output	D

NOTICE:

If DTC C1592/52 is output even though the VGRS system calibration has been performed, confirm the procedure again, and perform the VGRS system calibration 3 times or more.

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

D → END

A

REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

DTC C15B1/71 ECU Malfunction

DTC C15B2/72 ECU Malfunction

DTC C15B3/73 ECU Malfunction

for Preparation Click here

DESCRIPTION

If the steering control ECU detects an internal malfunction, it will turn the master warning light on, store these DTCs, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15B1/71	The steering control ECU detects an internal malfunction.	Steering control ECU
C15B2/72	The steering control ECU detects an internal malfunction.	Steering control ECU
C15B3/73	The steering control ECU detects an internal temperature error.	Steering control ECU

INSPECTION PROCEDURE

1.REPLACE STEERING CONTROL ECU

a. Replace the steering control ECU (Click here for LHD, Click here for RHD).

NEXT

END

DTC C1593/53 Actuator Standard Position Malfunction

for Preparation Click here

DESCRIPTION

If the steering control ECU detects a steering actuator standard position error, it will store DTC C1593/53.

DTC Code	DTC Detection Condition	Trouble Area
C1593/53	The steering control ECU detects a steering actuator standard position error.	Steering actuator

INSPECTION PROCEDURE

1.CHECK DTC

a. Clear the DTCs (Click here).

b. Recheck for DTCs (Click here).

Result

Result	Proceed to
C1593/53 is not output	OK
C1593/53 is output	NG

NG → **REPLACE STEERING ACTUATOR ASSEMBLY (Click here)**

OK

USE SIMULATION METHOD TO CHECK (Click here)

DTC C15B1/71 ECU Malfunction

DTC C15B2/72 ECU Malfunction

DTC C15B3/73 ECU Malfunction

for Preparation Click here

DESCRIPTION

If the steering control ECU detects an internal malfunction, it will turn the master warning light on, store these DTCs, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15B1/71	The steering control ECU detects an internal malfunction.	Steering control ECU
C15B2/72	The steering control ECU detects an internal malfunction.	Steering control ECU
C15B3/73	The steering control ECU detects an internal temperature error.	Steering control ECU

INSPECTION PROCEDURE

1.REPLACE STEERING CONTROL ECU

a. Replace the steering control ECU (Click here for LHD, Click here for RHD).

NEXT

END

DTC C1595/55 Lost Communication with Steering Angle Sensor Module

DTC C15C4/68 Steering Angle Signal (Test Mode DTC)

for Preparation Click here

DESCRIPTION

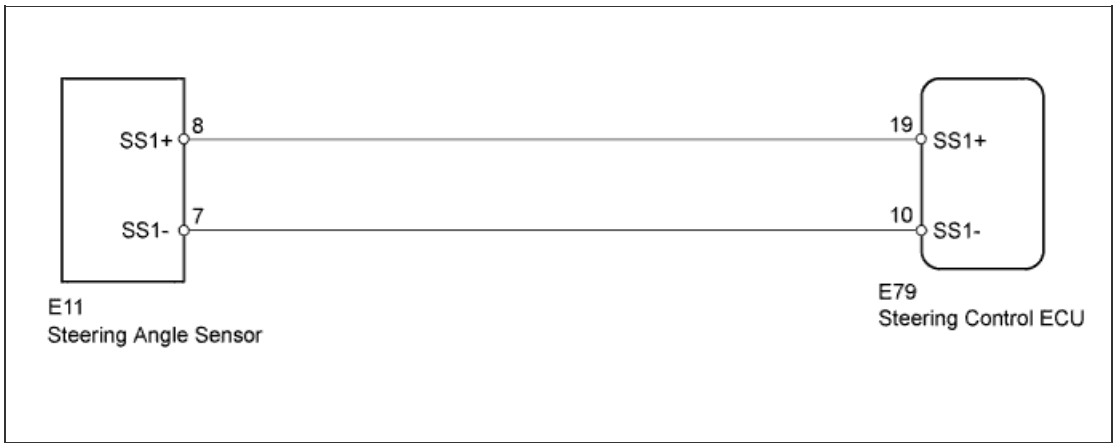
Signal transmission between the steering control ECU and steering angle sensor is performed via serial communication.
If an error occurs between them in serial communication, the ECU will store DTC C1595/55.

DTC Code	DTC Detection Condition	Trouble Area
C1595/55	The steering control ECU detects an error in serial communication between the ECU and steering angle sensor.	• Steering angle sensor • Steering control ECU • Harness or connector
C15C4/68	A steering signal indicating a tire angle of 36° or more (to the left or right) is input after entering test mode.*	• Steering angle sensor • Steering control ECU • Harness or connector

HINT:

*: A tire angle of 36° and a motor rotation angle of 36° correspond to the steering wheel angle. The amount of change in tire angle and motor rotation angle is from when the mode is changed to test mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK DTC (CAN COMMUNICATION SYSTEM)

a. Check for DTCs in the CAN communication system (for LHD: Click here, for RHD: Click here).

Result

Result	Proceed to
DTC is not output	A
DTC is output (for LHD)	B
DTC is output (for RHD)	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

2.CHECK STEERING ANGLE SENSOR

a. Check if a steering angle sensor that complies with the vehicle specifications is installed.

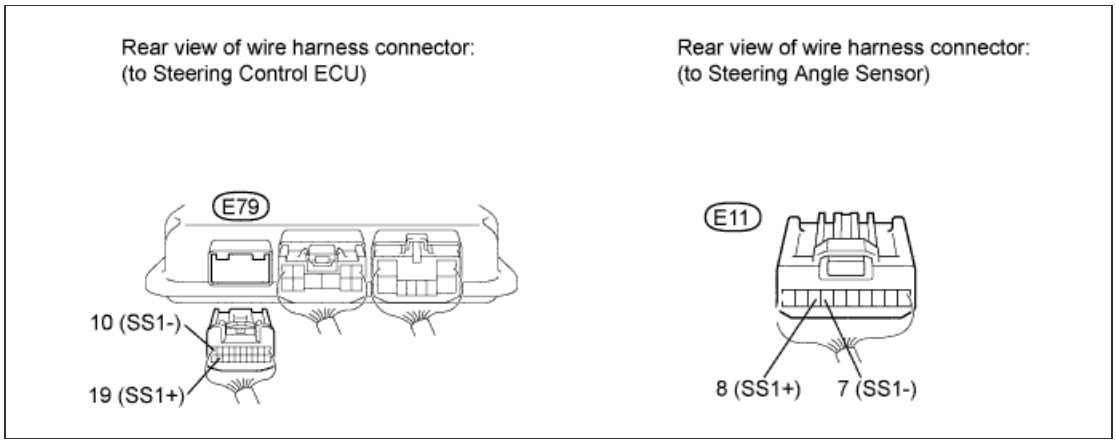
OK:

A steering angle sensor that complies with the vehicle specification is installed.

NG → REPLACE STEERING ANGLE SENSOR (Click here)

OK ↓

3.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU - STEERING ANGLE SENSOR)



a. Disconnect the E79 steering control ECU connector.

b. Disconnect the E11 steering angle sensor connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E79-10 (SS1-) - E11-7 (SS1-)	Always	Below 1 Ω
E79-19 (SS1+) - E11-8 (SS1+)		
E79-19 (SS1+) - Body ground	Always	10 kΩ or higher
E79-10 (SS1-) - Body ground		
E79-19 (SS1+) - E79-10 (SS1-)		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

4.CHECK STEERING ANGLE SENSOR

a. Disconnect the E79 steering control ECU connector.

b. Move the shift lever to N.

c. Jack up the vehicle.

d. Check the waveform of the steering angle sensor using an oscilloscope.

HINT:

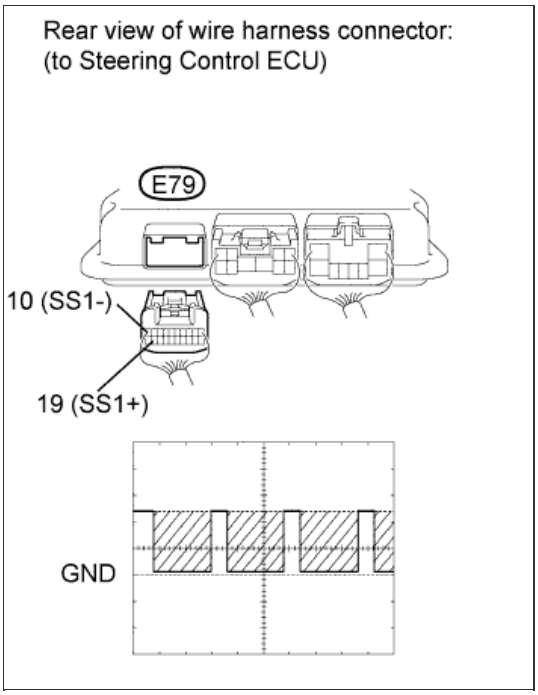
The voltage must be measured with the steering angle sensor connector connected.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E79-19 (SS1+) - E79-10 (SS1-)	Engine switch on (IG), steering wheel rotated slowly	Pulse generation (0 to 5 V)

HINT:

The output voltage should fluctuate up and down similarly to the diagram when the wheel is turned slowly.



Result

Result Result	Proceed to
NG	A
OK (for LHD)	B
OK (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

REPLACE STEERING ANGLE SENSOR (Click here)

DTC C15B1/71 ECU Malfunction

DTC C15B2/72 ECU Malfunction

DTC C15B3/73 ECU Malfunction

for Preparation Click here

DESCRIPTION

If the steering control ECU detects an internal malfunction, it will turn the master warning light on, store these DTCs, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15B1/71	The steering control ECU detects an internal malfunction.	Steering control ECU
C15B2/72	The steering control ECU detects an internal malfunction.	Steering control ECU
C15B3/73	The steering control ECU detects an internal temperature error.	Steering control ECU

INSPECTION PROCEDURE

1.REPLACE STEERING CONTROL ECU

a. Replace the steering control ECU (Click here for LHD, Click here for RHD).

NEXT

END

DTC C1595/55 Lost Communication with Steering Angle Sensor Module

DTC C15C4/68 Steering Angle Signal (Test Mode DTC)

for Preparation Click here

DESCRIPTION

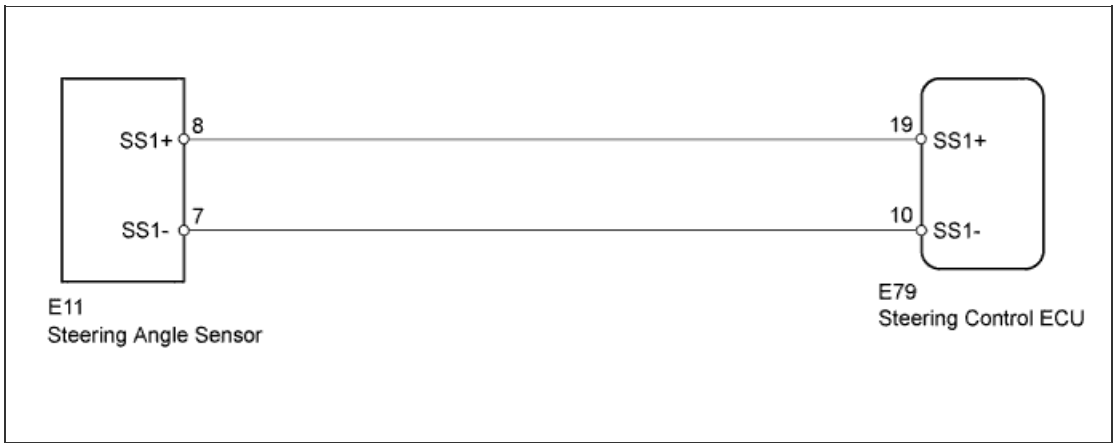
Signal transmission between the steering control ECU and steering angle sensor is performed via serial communication.
If an error occurs between them in serial communication, the ECU will store DTC C1595/55.

DTC Code	DTC Detection Condition	Trouble Area
C1595/55	The steering control ECU detects an error in serial communication between the ECU and steering angle sensor.	• Steering angle sensor • Steering control ECU • Harness or connector
C15C4/68	A steering signal indicating a tire angle of 36° or more (to the left or right) is input after entering test mode.*	• Steering angle sensor • Steering control ECU • Harness or connector

HINT:

*: A tire angle of 36° and a motor rotation angle of 36° correspond to the steering wheel angle. The amount of change in tire angle and motor rotation angle is from when the mode is changed to test mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK DTC (CAN COMMUNICATION SYSTEM)

a. Check for DTCs in the CAN communication system (for LHD: Click here, for RHD: Click here).

Result

Result	Proceed to
DTC is not output	A
DTC is output (for LHD)	B
DTC is output (for RHD)	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

2.CHECK STEERING ANGLE SENSOR

a. Check if a steering angle sensor that complies with the vehicle specifications is installed.

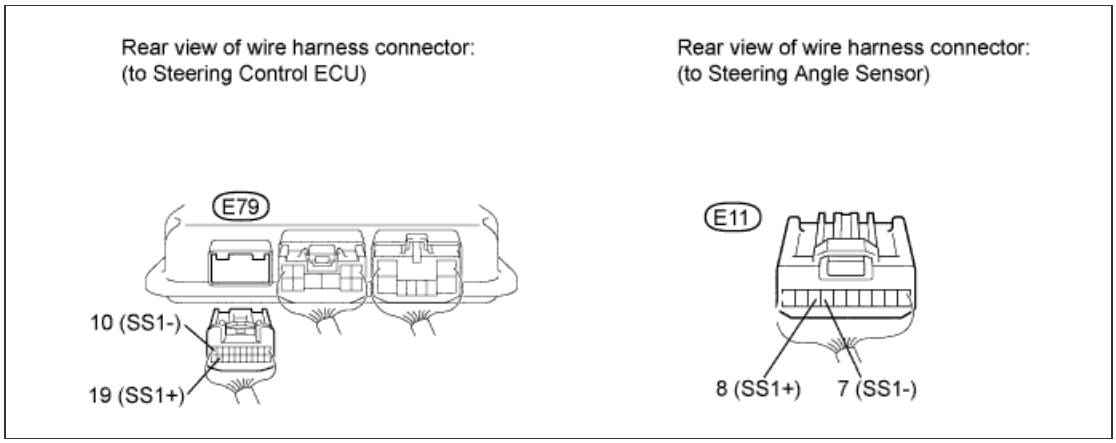
OK:

A steering angle sensor that complies with the vehicle specification is installed.

NG → REPLACE STEERING ANGLE SENSOR (Click here)

OK ↓

3.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU - STEERING ANGLE SENSOR)



a. Disconnect the E79 steering control ECU connector.

b. Disconnect the E11 steering angle sensor connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E79-10 (SS1-) - E11-7 (SS1-)	Always	Below 1 Ω
E79-19 (SS1+) - E11-8 (SS1+)		
E79-19 (SS1+) - Body ground	Always	10 kΩ or higher
E79-10 (SS1-) - Body ground		
E79-19 (SS1+) - E79-10 (SS1-)		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

4.CHECK STEERING ANGLE SENSOR

a. Disconnect the E79 steering control ECU connector.

b. Move the shift lever to N.

c. Jack up the vehicle.

d. Check the waveform of the steering angle sensor using an oscilloscope.

HINT:

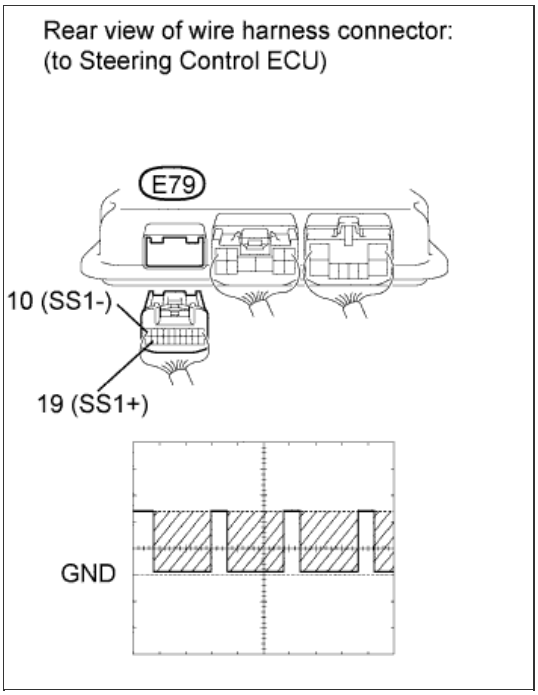
The voltage must be measured with the steering angle sensor connector connected.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E79-19 (SS1+) - E79-10 (SS1-)	Engine switch on (IG), steering wheel rotated slowly	Pulse generation (0 to 5 V)

HINT:

The output voltage should fluctuate up and down similarly to the diagram when the wheel is turned slowly.



Result

Result Result	Proceed to
NG	A
OK (for LHD)	B
OK (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

REPLACE STEERING ANGLE SENSOR (Click here)

DTC C15B4/71 ECU Malfunction

for Preparation Click here

DESCRIPTION

If the steering control ECU detects an internal malfunction, it will turn the master warning light on, store DTC C15B4/71, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15B4/71	The steering control ECU detects an internal malfunction.	Steering control ECU

INSPECTION PROCEDURE

1.CHECK MASTER WARNING LIGHT

a. Check the conditions under which the master warning light comes on.

Result

Result Result	Proceed to
The engine stalled, battery voltage is too low, or the steering control ECU connector is disconnected.	A
Conditions other than above (for LHD).	B
Conditions other than above (for RHD).	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

2.CLEAR DTC

a. Clear the DTCs (Click here).

NEXT

3.PERFORM VGRS SYSTEM CALIBRATION

a. Perform VGRS system calibration (Click here).

NEXT

4.CHECK DTC

a. Check for DTCs (Click here).

Result

Result	Proceed to
DTC is not output	A
C15B4/71 is output (for LHD)	B
C15B4/71 is output (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

DTC C15A1/61 Actuator Malfunction

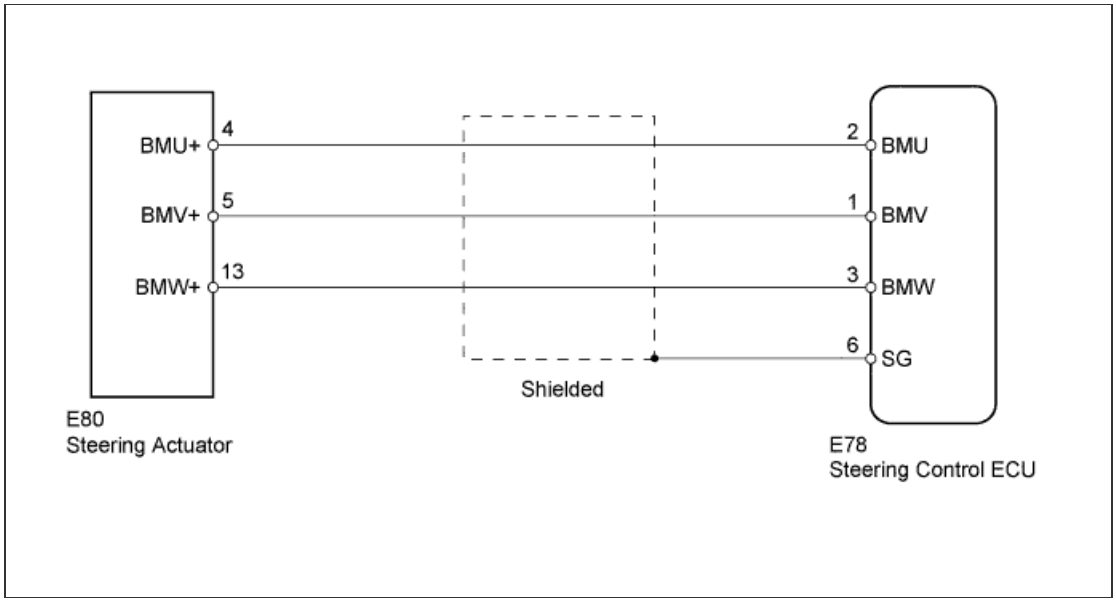
for Preparation Click here

DESCRIPTION

The steering control ECU drives the actuator while the steering wheel is turned to set the gear ratio. It detects the current flowing into the actuator motor driving circuit.
If the steering control ECU detects excessive current, it will store DTC C15A1/61, turn on the master warning light, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15A1/61	Excessive current (exceeding the estimated amount) flows due to a malfunction in the motor drive circuit.	• Harness or connector • Steering actuator • Steering control ECU

WIRING DIAGRAM

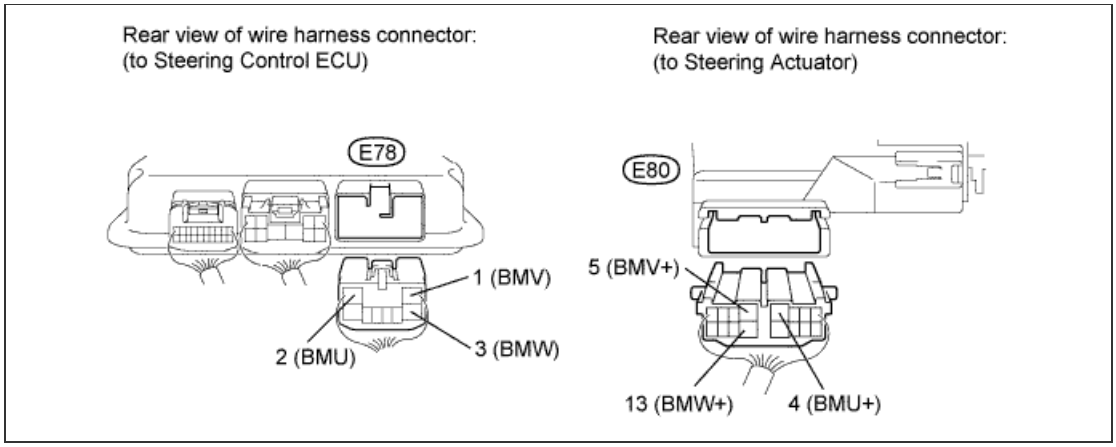


INSPECTION PROCEDURE

HINT:

When DTC C15A2/62 is output, a short circuit inside the steering actuator or inside the steering control ECU is suspected.

1.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU - STEERING ACTUATOR)



a. Disconnect the E78 steering control ECU connector.

b. Disconnect the E80 steering actuator connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E78-1 (BMV) - E78-2 (BMU)	Always	10 kΩ or higher
E78-1 (BMV) - E78-3 (BMW)		
E78-2 (BMU) - E78-3 (BMW)		
E78-1 (BMV) - E80-5 (BMV+)	Always	Below 1 Ω
E78-2 (BMU) - E80-4 (BMU+)		
E78-3 (BMW) - E80-13 (BMW+)		
E78-1 (BMV) - Body ground	Always	10 kΩ or higher
E78-2 (BMU) - Body ground		
E78-3 (BMW) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

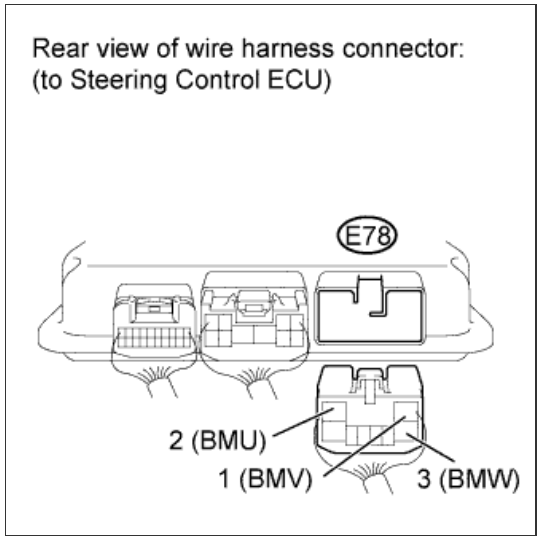
2.CHECK STEERING ACTUATOR

a. Disconnect the E78 steering control ECU connector.

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

HINT:

The resistance must be measured with the steering actuator connector connected.



Standard Resistance:

Tester Connection	Condition	Specified Condition
E78-1 (BMV) - E78-2 (BMU)	Always	Below 1 Ω
E78-1 (BMV) - E78-3 (BMW)		
E78-2 (BMU) - E78-3 (BMW)		
E78-1 (BMV) - Body ground	Always	10 kΩ or higher
E78-2 (BMU) - Body ground		
E78-3 (BMW) - Body ground		

Result

Result Result	Proceed to
NG	A
OK (for LHD)	B
OK (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C

REPLACE STEERING CONTROL ECU (Click here)

A

REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

DTC C15C1/74 Steering Angle Sensor Malfunction

DTC C15C2/74 Steering Angle Sensor B+ Malfunction

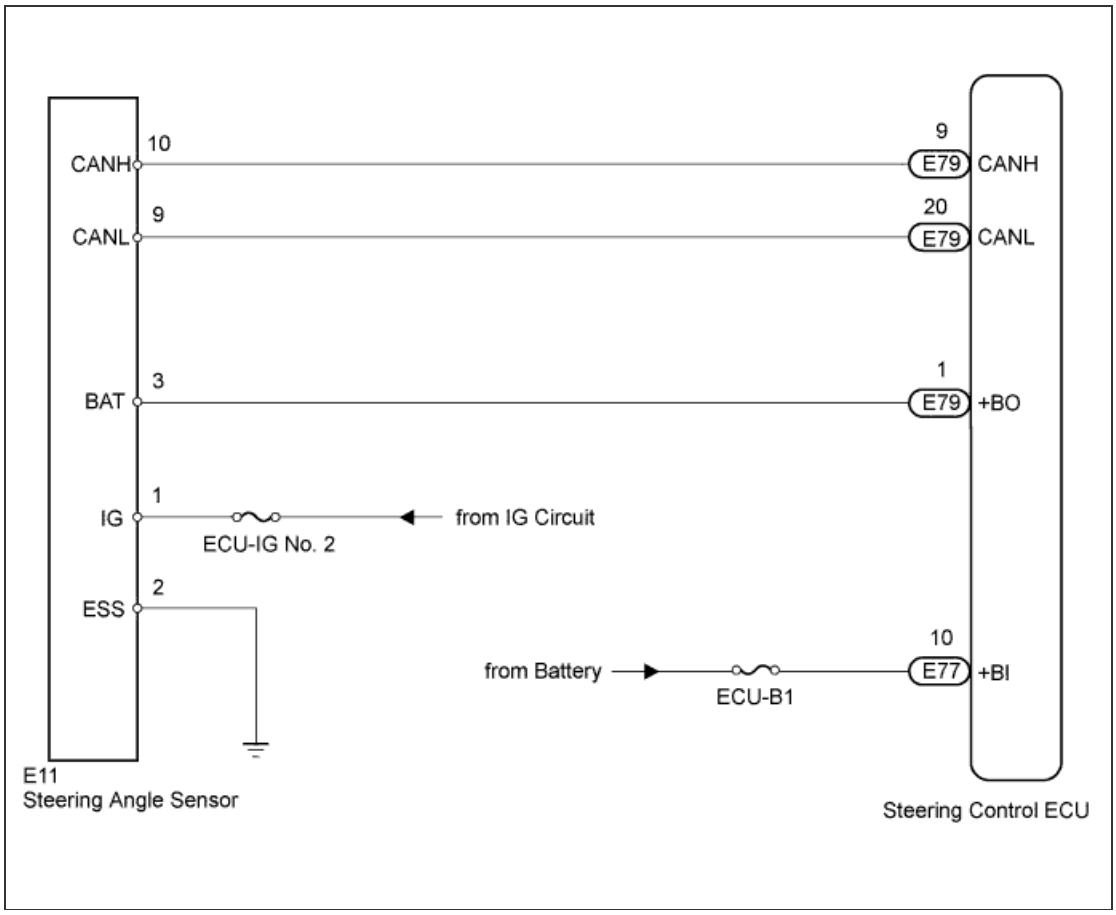
for Preparation Click here

DESCRIPTION

The steering control ECU detects a steering angle sensor malfunction by receiving an error signal from the steering angle sensor via CAN communication. If the steering control ECU detects this error signal, it will turn the master warning light on, store these DTCs, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15C1/74	The steering control ECU receives a steering angle sensor malfunction signal via CAN communication.	• Steering angle sensor • Harness or connector • CAN communication system • Steering control ECU
C15C2/74	The steering control ECU receives a B+ open circuit signal from the steering angle sensor via CAN communication.	• Steering angle sensor • Harness or connector • CAN communication system • Steering control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK DTC (CAN COMMUNICATION SYSTEM)

a. Using the intelligent tester, check if the CAN communication system is functioning normally (Click here for LHD, Click here for RHD).

Result

Result	Proceed to
DTC is not output	A
DTC is output (for LHD)	B
DTC is output (for RHD)	C

B → GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)

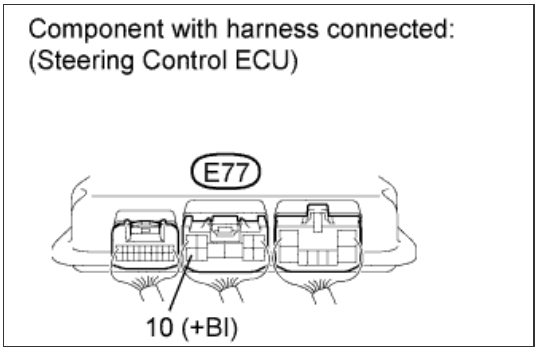
A

2.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU +BI TERMINAL VOLTAGE)

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E77-10 (+BI) - Body ground	Always	11 to 14 V



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.CHECK STEERING CONTROL ECU (+BO TERMINAL VOLTAGE)

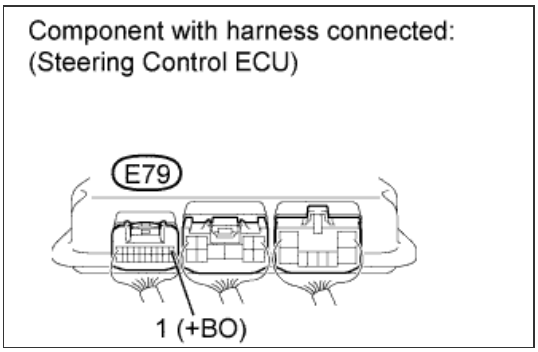
a. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Condition	Specified Condition
E79-1 (+BO) - Body ground	Always	11 to 14 V

Result

Result Result	Proceed to
OK	A
NG (for LHD)	B
NG (for RHD)	C



B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

4.CHECK HARNESS AND CONNECTOR (STEERING ANGLE SENSOR)

a. Disconnect the E11 steering angle sensor connector.

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

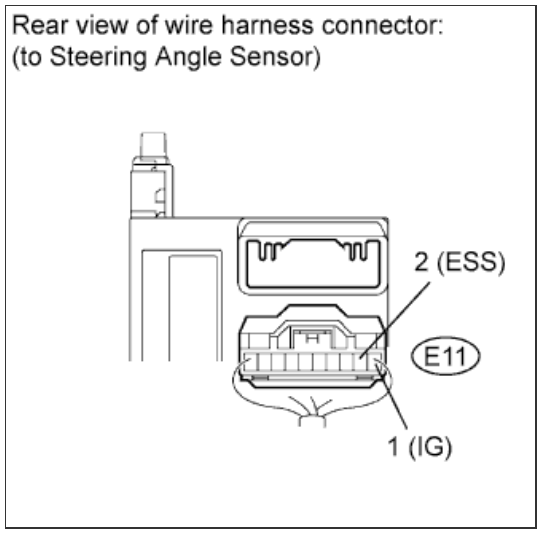
Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E11-1 (IG) - Body ground	Engine switch on (IG)	11 to 14 V

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E11-2 (ESS) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

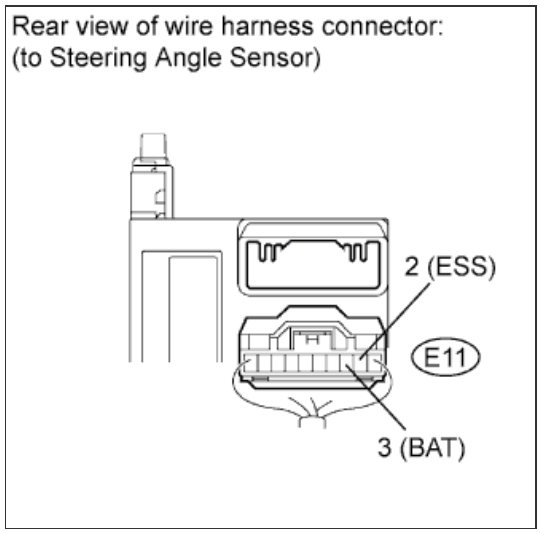
5.CHECK STEERING ANGLE SENSOR

a. Disconnect the E11 steering angle sensor connector.

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E11-3 (BAT) - E11-2 (ESS)	Engine switch on (IG)	11 to 14 V



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE STEERING ANGLE SENSOR (Click here)

DTC C15A2/62 Actuator Malfunction

DTC C15A6/62 Actuator Malfunction

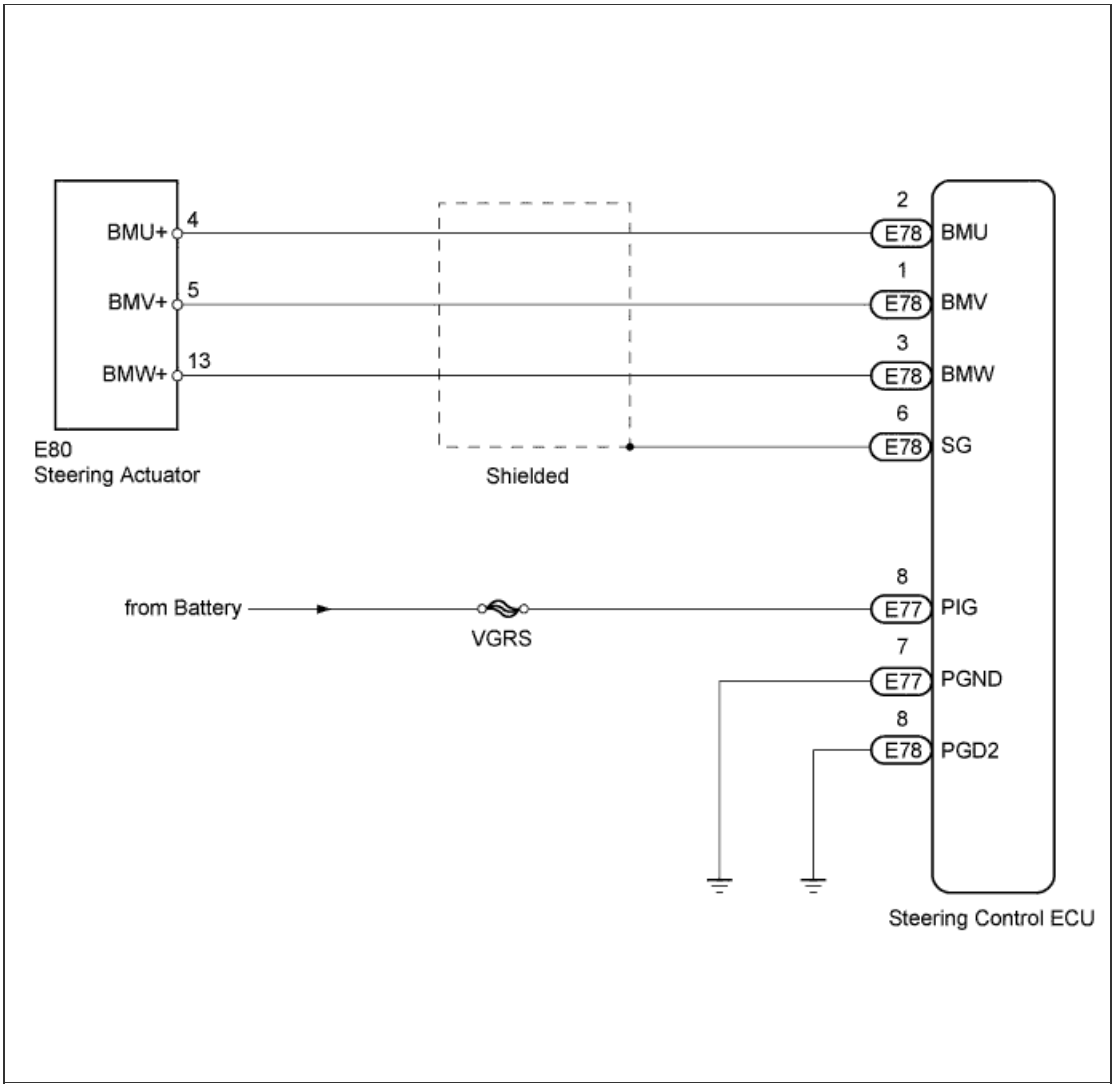
for Preparation Click here

DESCRIPTION

The steering control ECU drives the actuator based on steering angle sensor signals and vehicle speed signals.
If the steering control ECU detects excessive current flowing into the steering actuator, or an internal malfunction, it will turn on the master warning light, store DTC C15A2/62, and stop VGRS operation.
If the steering control ECU detects a malfunction in the motor drive circuit, it will turn the master warning light on, store DTC C15A6/62, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15A2/62	The VGRS system detects a malfunction in the motor drive circuit.	• Harness or connector • Power source circuit • Steering actuator • Steering control ECU
C15A6/62	The actual motor current value greatly differs from the estimated value.	• Power source circuit • Harness or connector • Steering actuator • Steering control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Only the actuator only can be checked in this procedure. If it is normal, the steering control ECU is faulty.

1.CHECK HARNESS AND CONNECTOR (POWER SOURCE CIRCUIT)

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

Standard Resistance:

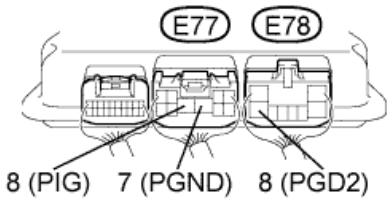
Tester Connection	Condition	Specified Condition
E77-7 (PGND) - Body ground	Always	Below 1 Ω
E78-8 (PGD2) - Body ground		

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E77-8 (PIG) - Body ground	Always	11 to 14 V

Component with harness connected:
(Steering Control ECU)

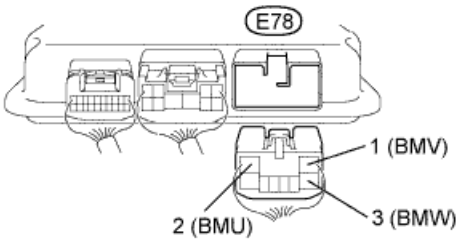


NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

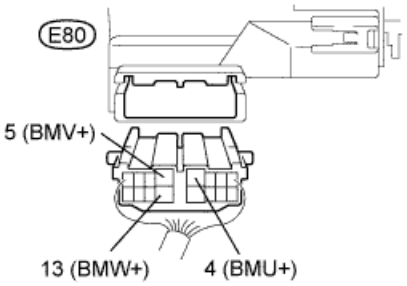
OK

2.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU - STEERING ACTUATOR)

Rear view of wire harness connector:
(to Steering Control ECU)



Rear view of wire harness connector:
(to Steering Actuator)



a. Disconnect the E78 steering control ECU connector.

b. Disconnect the E80 steering actuator connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E78-1 (BMV) - E78-2 (BMU)	Always	10 kΩ or higher
E78-1 (BMV) - E78-3 (BMW)		
E78-2 (BMU) - E78-3 (BMW)		
E78-1 (BMV) - E80-5 (BMV+)	Always	Below 1 Ω
E78-2 (BMU) - E80-4 (BMU+)		
E78-3 (BMW) - E80-13 (BMW+)		
E78-1 (BMV) - Body ground		

E78-2 (BMU) - Body ground	Always	10 kΩ or higher
E78-3 (BMW) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.CHECK STEERING ACTUATOR

a. Disconnect the E78 steering control ECU connector.

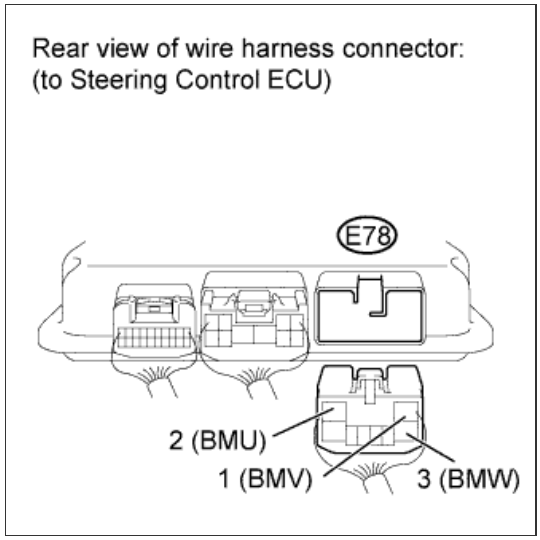
b. Measure the resistance according to the value(s) in the table below.

HINT:

The resistance must be measured with the steering actuator connector connected.

Standard Resistance:

Tester Connection	Condition	Specified Condition
E78-1 (BMV) - E78-2 (BMU)	Always	Below 1 Ω
E78-1 (BMV) - E78-3 (BMW)		
E78-2 (BMU) - E78-3 (BMW)		
E78-1 (BMV) - Body ground	Always	10 kΩ or higher
E78-2 (BMU) - Body ground		
E78-3 (BMW) - Body ground		



NG → REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

OK

4.CHECK DTC

a. Check for DTCs (Click here).

Result

Result	Proceed to
C15A1/61 is output	A
C15A1/61 is not output (for LHD)	B
C15A1/61 is not output (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

DTC C15C1/74 Steering Angle Sensor Malfunction

DTC C15C2/74 Steering Angle Sensor B+ Malfunction

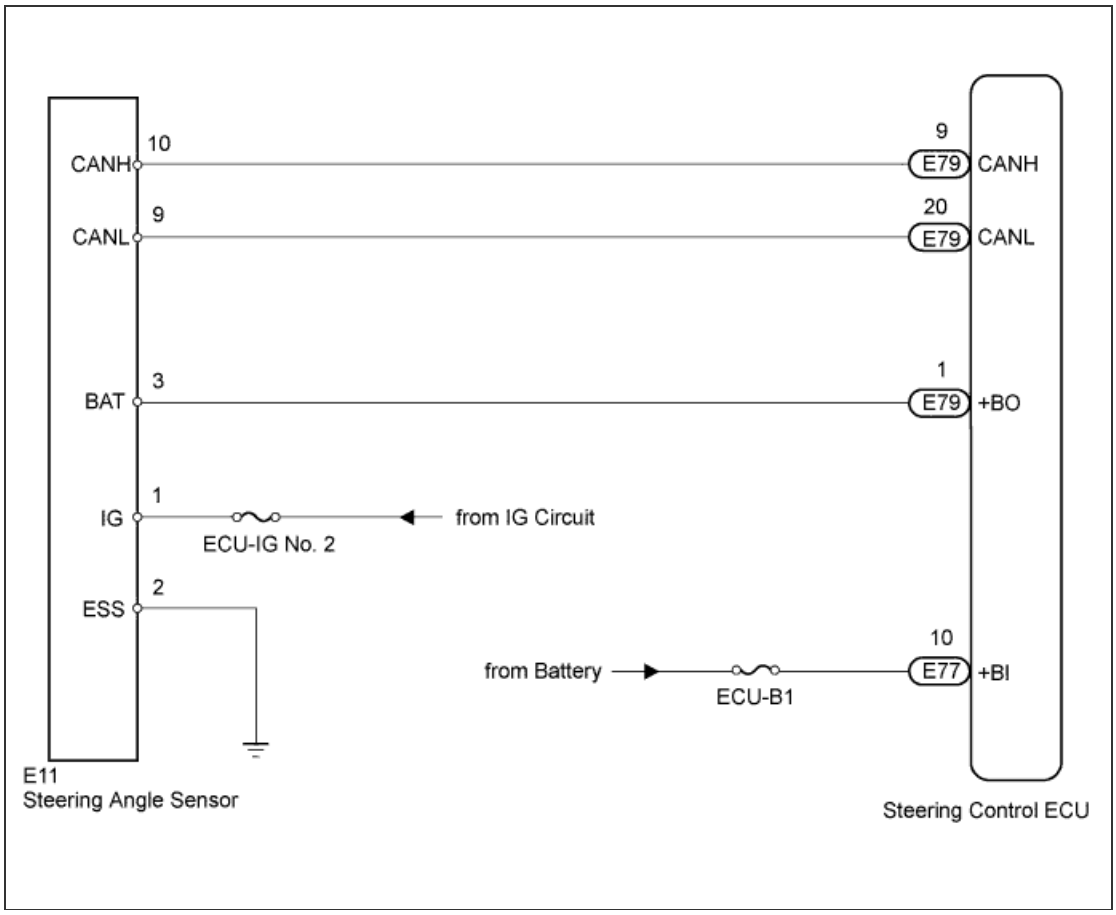
for Preparation Click here

DESCRIPTION

The steering control ECU detects a steering angle sensor malfunction by receiving an error signal from the steering angle sensor via CAN communication. If the steering control ECU detects this error signal, it will turn the master warning light on, store these DTCs, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15C1/74	The steering control ECU receives a steering angle sensor malfunction signal via CAN communication.	• Steering angle sensor • Harness or connector • CAN communication system • Steering control ECU
C15C2/74	The steering control ECU receives a B+ open circuit signal from the steering angle sensor via CAN communication.	• Steering angle sensor • Harness or connector • CAN communication system • Steering control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK DTC (CAN COMMUNICATION SYSTEM)

a. Using the intelligent tester, check if the CAN communication system is functioning normally (Click here for LHD, Click here for RHD).

Result

Result	Proceed to
DTC is not output	A
DTC is output (for LHD)	B
DTC is output (for RHD)	C

B → GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)

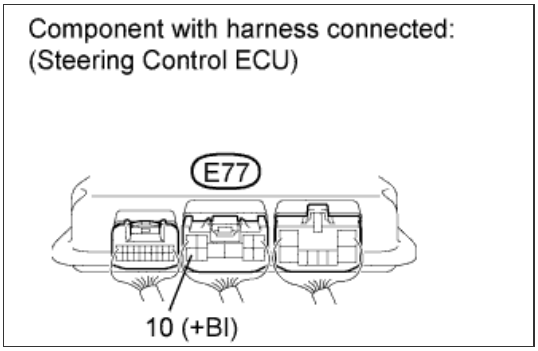
A

2.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU +BI TERMINAL VOLTAGE)

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E77-10 (+BI) - Body ground	Always	11 to 14 V



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.CHECK STEERING CONTROL ECU (+BO TERMINAL VOLTAGE)

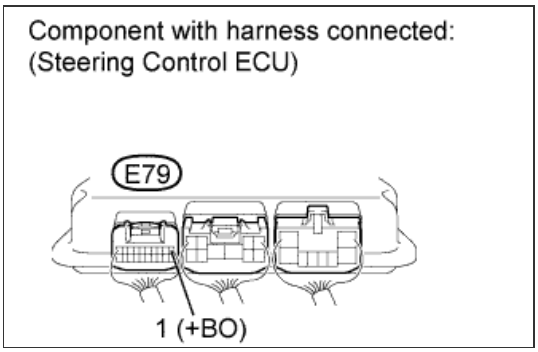
a. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Condition	Specified Condition
E79-1 (+BO) - Body ground	Always	11 to 14 V

Result

Result Result	Proceed to
OK	A
NG (for LHD)	B
NG (for RHD)	C



B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

4.CHECK HARNESS AND CONNECTOR (STEERING ANGLE SENSOR)

a. Disconnect the E11 steering angle sensor connector.

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

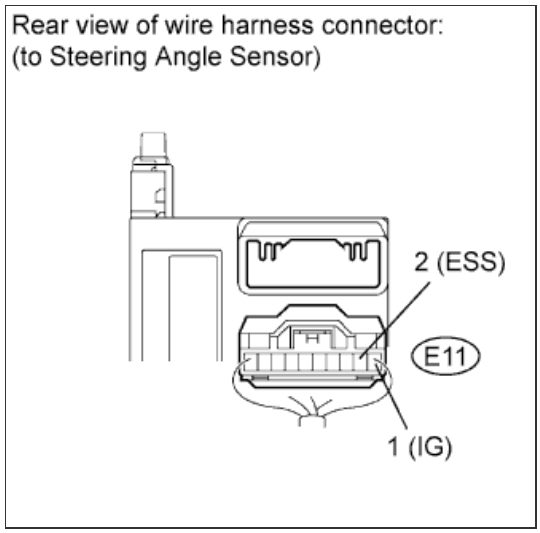
Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E11-1 (IG) - Body ground	Engine switch on (IG)	11 to 14 V

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E11-2 (ESS) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

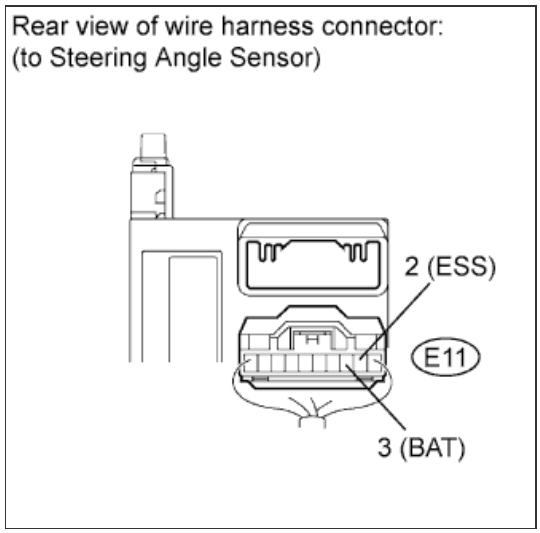
5.CHECK STEERING ANGLE SENSOR

a. Disconnect the E11 steering angle sensor connector.

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E11-3 (BAT) - E11-2 (ESS)	Engine switch on (IG)	11 to 14 V



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE STEERING ANGLE SENSOR (Click here)

DTC C15A2/62 Actuator Malfunction

DTC C15A6/62 Actuator Malfunction

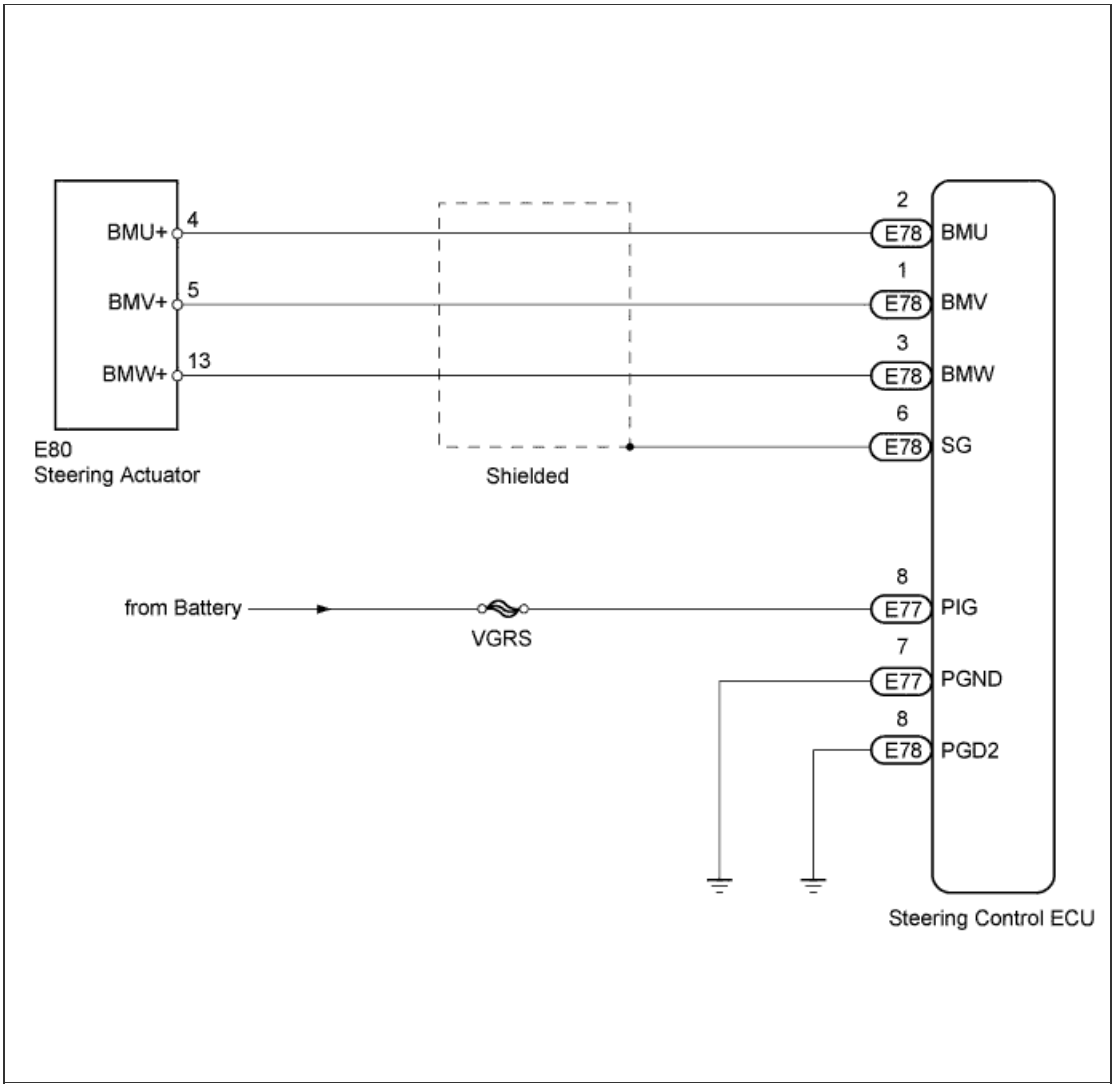
for Preparation Click here

DESCRIPTION

The steering control ECU drives the actuator based on steering angle sensor signals and vehicle speed signals.
If the steering control ECU detects excessive current flowing into the steering actuator, or an internal malfunction, it will turn on the master warning light, store DTC C15A2/62, and stop VGRS operation.
If the steering control ECU detects a malfunction in the motor drive circuit, it will turn the master warning light on, store DTC C15A6/62, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15A2/62	The VGRS system detects a malfunction in the motor drive circuit.	• Harness or connector • Power source circuit • Steering actuator • Steering control ECU
C15A6/62	The actual motor current value greatly differs from the estimated value.	• Power source circuit • Harness or connector • Steering actuator • Steering control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Only the actuator only can be checked in this procedure. If it is normal, the steering control ECU is faulty.

1.CHECK HARNESS AND CONNECTOR (POWER SOURCE CIRCUIT)

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

Standard Resistance:

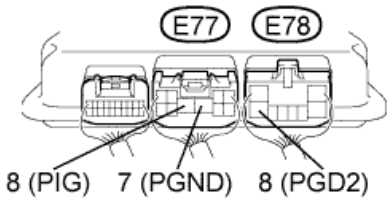
Tester Connection	Condition	Specified Condition
E77-7 (PGND) - Body ground	Always	Below 1 Ω
E78-8 (PGD2) - Body ground		

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E77-8 (PIG) - Body ground	Always	11 to 14 V

Component with harness connected:
(Steering Control ECU)

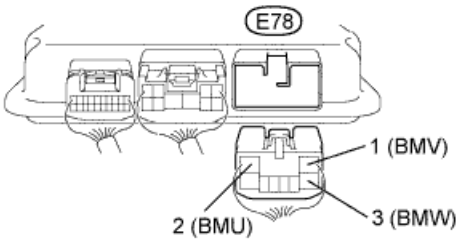


NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

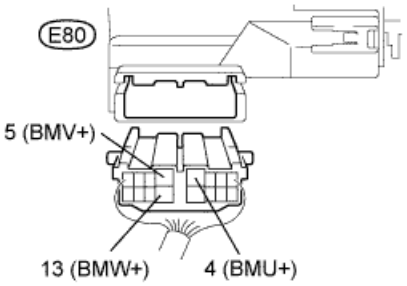
OK

2.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU - STEERING ACTUATOR)

Rear view of wire harness connector:
(to Steering Control ECU)



Rear view of wire harness connector:
(to Steering Actuator)



a. Disconnect the E78 steering control ECU connector.

b. Disconnect the E80 steering actuator connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E78-1 (BMV) - E78-2 (BMU)	Always	10 kΩ or higher
E78-1 (BMV) - E78-3 (BMW)		
E78-2 (BMU) - E78-3 (BMW)		
E78-1 (BMV) - E80-5 (BMV+)	Always	Below 1 Ω
E78-2 (BMU) - E80-4 (BMU+)		
E78-3 (BMW) - E80-13 (BMW+)		
E78-1 (BMV) - Body ground		

E78-2 (BMU) - Body ground	Always	10 kΩ or higher
E78-3 (BMW) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.CHECK STEERING ACTUATOR

a. Disconnect the E78 steering control ECU connector.

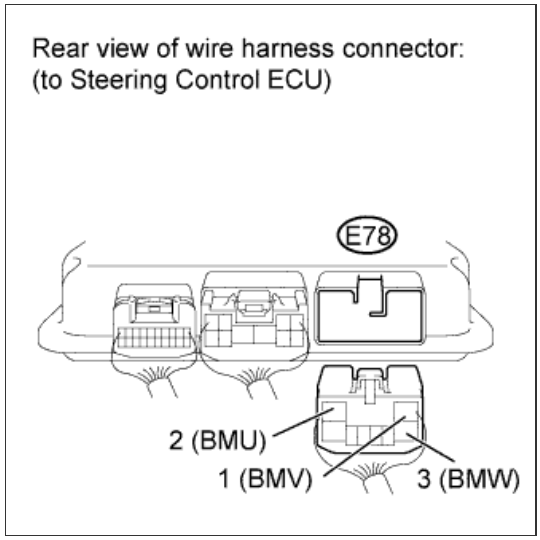
b. Measure the resistance according to the value(s) in the table below.

HINT:

The resistance must be measured with the steering actuator connector connected.

Standard Resistance:

Tester Connection	Condition	Specified Condition
E78-1 (BMV) - E78-2 (BMU)	Always	Below 1 Ω
E78-1 (BMV) - E78-3 (BMW)		
E78-2 (BMU) - E78-3 (BMW)		
E78-1 (BMV) - Body ground	Always	10 kΩ or higher
E78-2 (BMU) - Body ground		
E78-3 (BMW) - Body ground		



NG → REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

OK

4.CHECK DTC

a. Check for DTCs (Click here).

Result

Result	Proceed to
C15A1/61 is output	A
C15A1/61 is not output (for LHD)	B
C15A1/61 is not output (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

DTC C15C3/75 Brake System Control Module Malfunction

for Preparation Click here

DESCRIPTION

The steering control ECU detects a vehicle speed error by receiving an error signal from the skid control ECU via CAN communication.
If the steering control ECU detects this error signal, it will turn the master warning light on, store this DTC, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15C3/75	The steering control ECU receives a vehicle speed error signal via CAN communication.	• Vehicle stability control system • CAN communication system • Steering control ECU

INSPECTION PROCEDURE

1.CHECK DTC (VEHICLE STABILITY CONTROL SYSTEM)

a. Check for DTCs in the vehicle stability control system (Click here).

Result

Result	Proceed to
DTC is not output	OK
DTC is output	NG

NG → GO TO VEHICLE STABILITY CONTROL SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)

OK

2.CHECK DTC (CAN COMMUNICATION SYSTEM)

a. Using the intelligent tester, check if the CAN communication system is functioning normally (Click here for LHD, Click here for RHD).

Result

Result	Proceed to
DTC is not output (for LHD)	A
DTC is not output (for RHD)	B
DTC is output (for LHD)	C
DTC is output (for RHD)	D

B → REPLACE STEERING CONTROL ECU (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)

D → GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)

A

REPLACE STEERING CONTROL ECU (Click here)

DTC C15A3/63 Actuator Malfunction

DTC C15C5/69 Motor Revolution Angle Signal (Test Mode DTC)

for Preparation Click here

DESCRIPTION

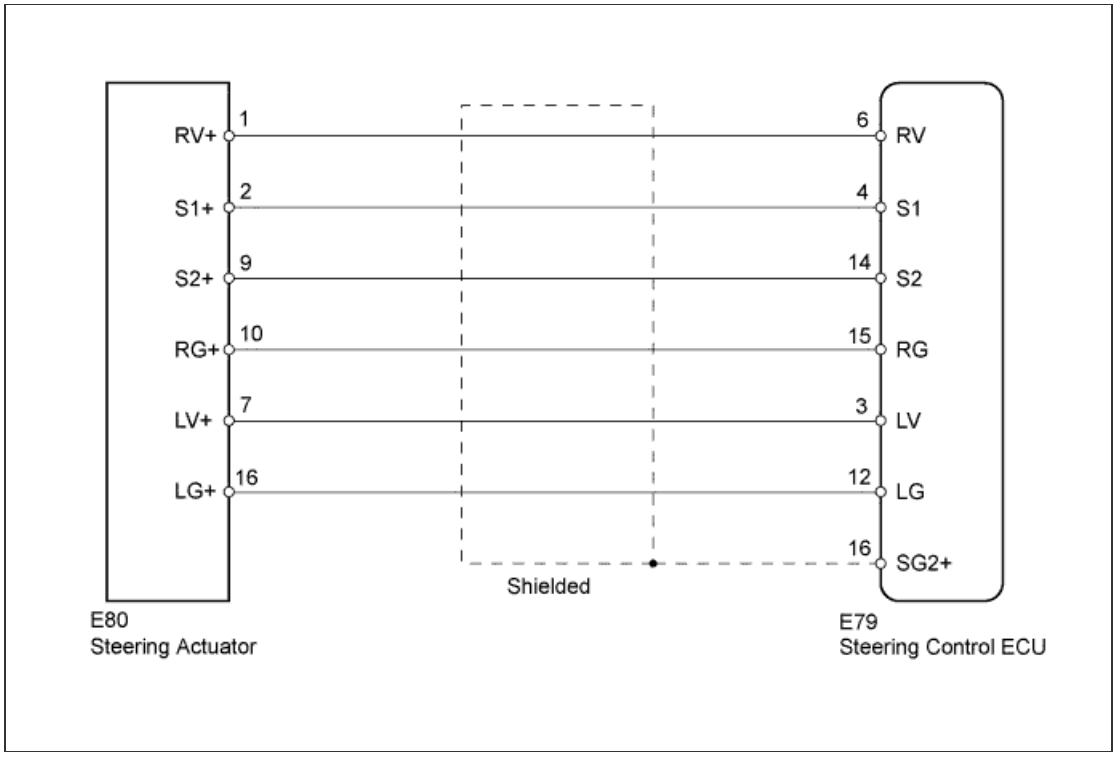
The steering actuator drives the internal motor using the current output from the steering control ECU to change the relative angle between the tire angle and steering wheel angle.
The rotation angle sensor in the steering actuator detects the motor rotation angle and outputs this information to the steering control ECU.
If the steering control ECU detects a malfunction in the rotation angle sensor circuit, it will store DTC C15A3/63.

DTC Code	DTC Detection Condition	Trouble Area
C15A3/63	The steering control ECU detects a malfunction in the rotation angle sensor circuit.	• Harness or connector • Steering actuator • Steering control ECU
C15C5/69	A steering signal indicating a motor rotation angle of 36° or more (to the left or right) is input after entering test mode.*	• Harness or connector • Steering actuator • Steering control ECU

HINT:

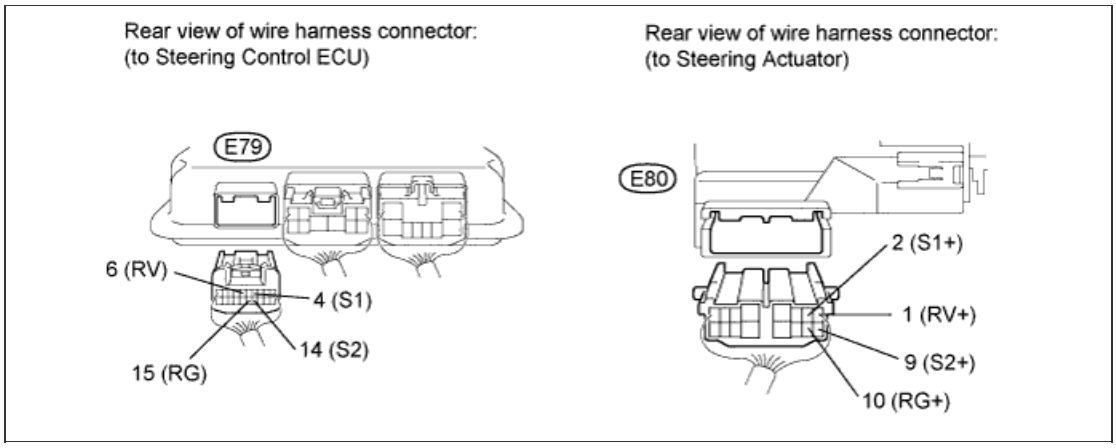
*: A tire angle of 36° and a motor rotation angle of 36° correspond to the steering wheel angle. The amount of change in tire angle and motor rotation angle is from when the mode is changed to test mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU - STEERING ACTUATOR)



a. Disconnect the E79 steering control ECU connector.

b. Disconnect the E80 steering actuator connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E79-4 (S1) - E80-2 (S1+)	Always	Below 1 Ω
E79-6 (RV) - E80-1 (RV+)		
E79-14 (S2) - E80-9 (S2+)		
E79-15 (RG) - E80-10 (RG+)		
E79-4 (S1) - E79-6 (RV)	Always	10 kΩ or higher
E79-4 (S1) - E79-14 (S2)		
E79-4 (S1) - E79-15 (RG)		
E79-6 (RV) - E79-14 (S2)		
E79-6 (RV) - E79-15 (RG)		
E79-14 (S2) - E79-15 (RG)		
E79-4 (S1) - Body ground		
E79-6 (RV) - Body ground		
E79-14 (S2) - Body ground		
E79-15 (RG) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

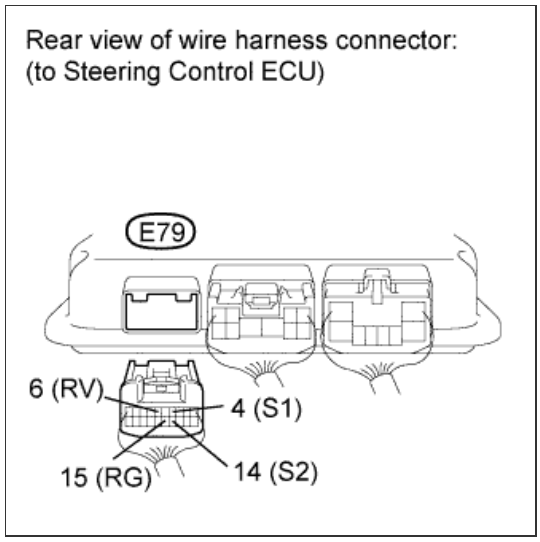
2.CHECK STEERING ACTUATOR

a. Disconnect the E79 steering control ECU connector.

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

HINT:

The resistance must be measured with the steering actuator connector connected.



Standard Resistance:

Tester Connection	Condition	Specified Condition
E79-4 (S1) - E79-6 (RV)	Always	Below 200 Ω
E79-4 (S1) - E79-14 (S2)		
E79-4 (S1) - E79-15 (RG)		
E79-6 (RV) - E79-14 (S2)		
E79-6 (RV) - E79-15 (RG)		
E79-14 (S2) - E79-15 (RG)		
E79-4 (S1) - Body ground	Always	10 kΩ or higher
E79-6 (RV) - Body ground		
E79-14 (S2) - Body ground		
E79-15 (RG) - Body ground		

Result

Result Result	Proceed to
NG	A
OK (for LHD)	B
OK (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A → REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

DTC C15C6/77 IG Power Supply Voltage Malfunction

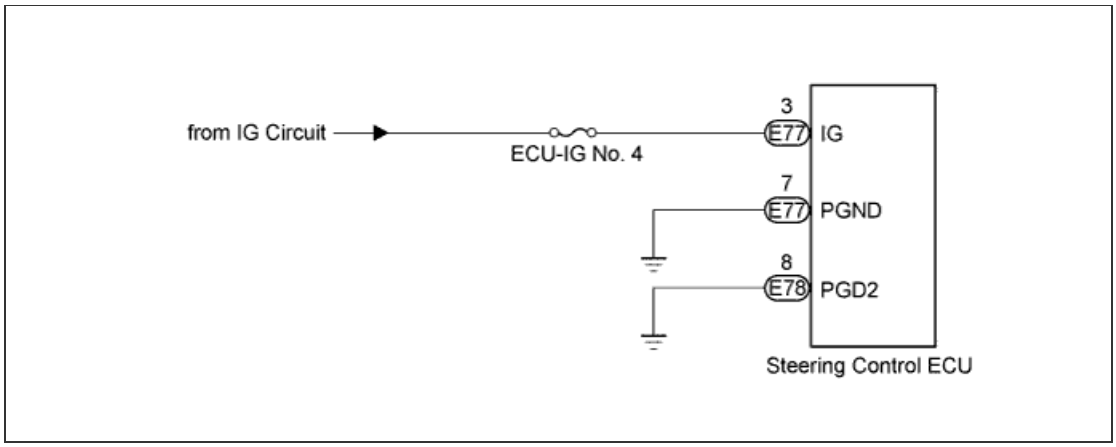
for Preparation Click here

DESCRIPTION

The steering control ECU monitors the IG power supply voltage.
If the steering control ECU detects a malfunction, it will turn on the master warning light, store DTC C15C6/77, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15C6/77	The steering control ECU detects that the battery voltage is normal and the IG terminal voltage is below 4 V for 6 seconds.	• Harness or connector • Steering control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The fault may be intermittent. Check the harnesses and connectors thoroughly and retest.

1.CHECK STEERING CONTROL ECU (POWER SOURCE CIRCUIT)

a. Record and clear the DTCs (Click here).

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

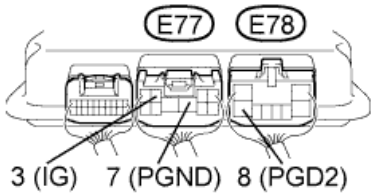
Standard Resistance:

Tester Connection	Condition	Specified Condition
E77-7 (PGND) - Body ground	Always	Below 1 Ω
E78-8 (PGD2) - Body ground		

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E77-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V

Component with harness connected:
(Steering Control ECU)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2.RECONFIRM DTC OUTPUT

a. Check for DTCs (Click here).

Result

Result	Proceed to
C15C6/77 is not output	A
C15C6/77 is output (for LHD)	B
C15C6/77 is output (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

DTC C15A3/63 Actuator Malfunction

DTC C15C5/69 Motor Revolution Angle Signal (Test Mode DTC)

for Preparation Click here

DESCRIPTION

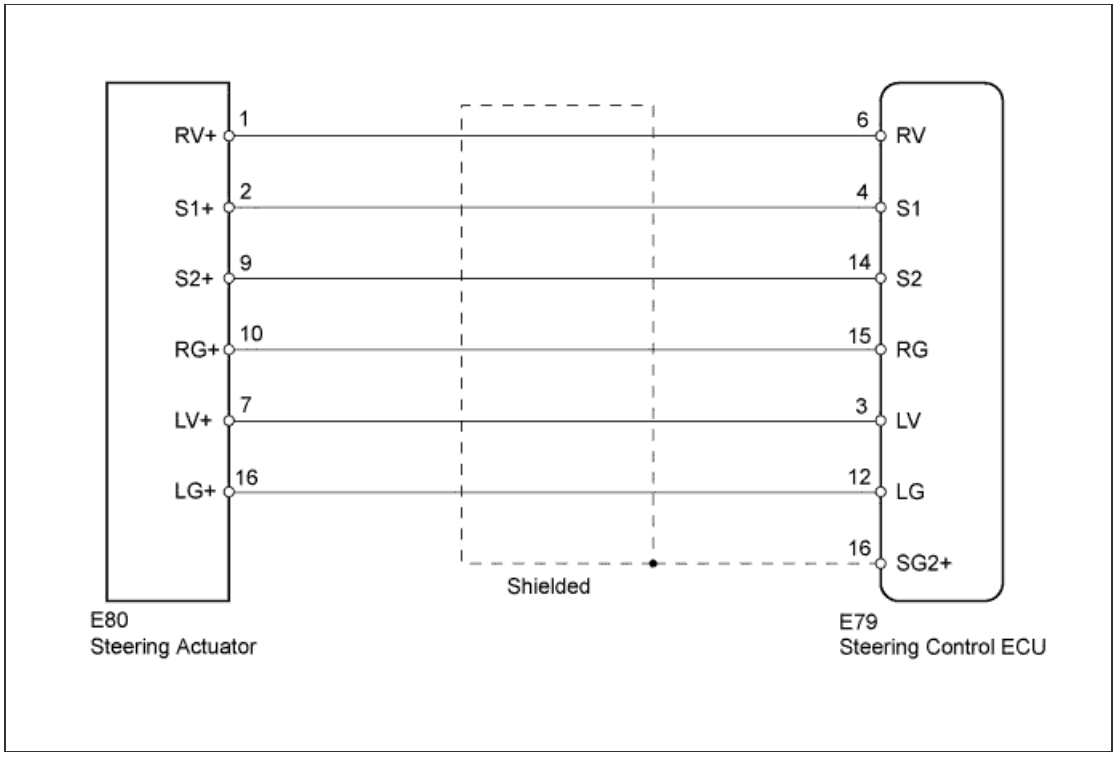
The steering actuator drives the internal motor using the current output from the steering control ECU to change the relative angle between the tire angle and steering wheel angle.
The rotation angle sensor in the steering actuator detects the motor rotation angle and outputs this information to the steering control ECU.
If the steering control ECU detects a malfunction in the rotation angle sensor circuit, it will store DTC C15A3/63.

DTC Code	DTC Detection Condition	Trouble Area
C15A3/63	The steering control ECU detects a malfunction in the rotation angle sensor circuit.	• Harness or connector • Steering actuator • Steering control ECU
C15C5/69	A steering signal indicating a motor rotation angle of 36° or more (to the left or right) is input after entering test mode.*	• Harness or connector • Steering actuator • Steering control ECU

HINT:

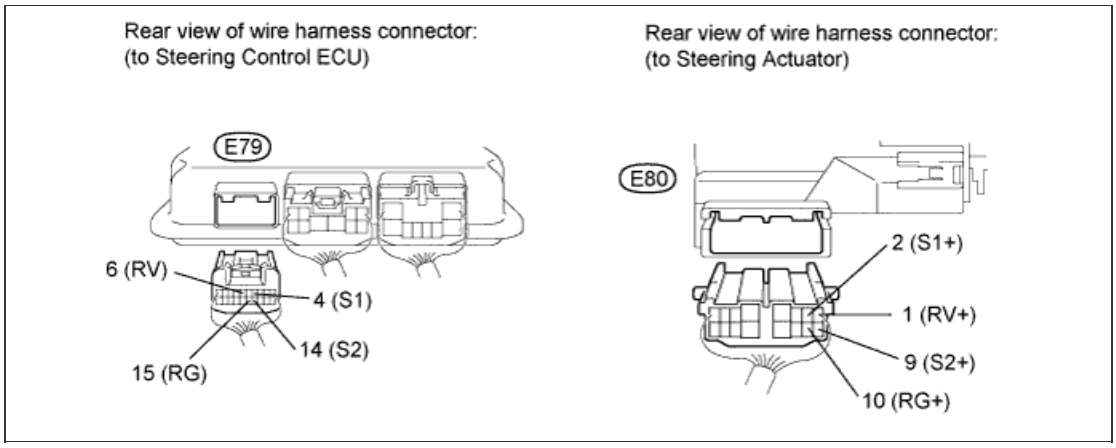
*: A tire angle of 36° and a motor rotation angle of 36° correspond to the steering wheel angle. The amount of change in tire angle and motor rotation angle is from when the mode is changed to test mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK HARNESS AND CONNECTOR (STEERING CONTROL ECU - STEERING ACTUATOR)



a. Disconnect the E79 steering control ECU connector.

b. Disconnect the E80 steering actuator connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E79-4 (S1) - E80-2 (S1+)	Always	Below 1 Ω
E79-6 (RV) - E80-1 (RV+)		
E79-14 (S2) - E80-9 (S2+)		
E79-15 (RG) - E80-10 (RG+)		
E79-4 (S1) - E79-6 (RV)	Always	10 kΩ or higher
E79-4 (S1) - E79-14 (S2)		
E79-4 (S1) - E79-15 (RG)		
E79-6 (RV) - E79-14 (S2)		
E79-6 (RV) - E79-15 (RG)		
E79-14 (S2) - E79-15 (RG)		
E79-4 (S1) - Body ground		
E79-6 (RV) - Body ground		
E79-14 (S2) - Body ground		
E79-15 (RG) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

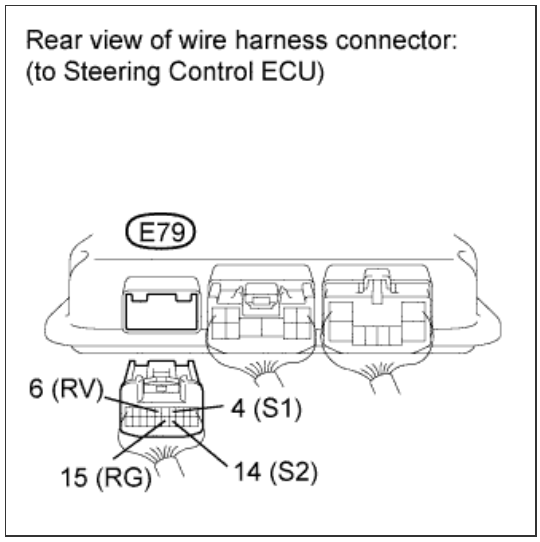
2.CHECK STEERING ACTUATOR

a. Disconnect the E79 steering control ECU connector.

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

HINT:

The resistance must be measured with the steering actuator connector connected.



Standard Resistance:

Tester Connection	Condition	Specified Condition
E79-4 (S1) - E79-6 (RV)	Always	Below 200 Ω
E79-4 (S1) - E79-14 (S2)		
E79-4 (S1) - E79-15 (RG)		
E79-6 (RV) - E79-14 (S2)		
E79-6 (RV) - E79-15 (RG)		
E79-14 (S2) - E79-15 (RG)		
E79-4 (S1) - Body ground	Always	10 kΩ or higher
E79-6 (RV) - Body ground		
E79-14 (S2) - Body ground		
E79-15 (RG) - Body ground		

Result

Result Result	Proceed to
NG	A
OK (for LHD)	B
OK (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A → REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

DTC C15C7/78 DC Motor Power Source Voltage Malfunction

DTC C15C8/79 Power Supply Relay Failure

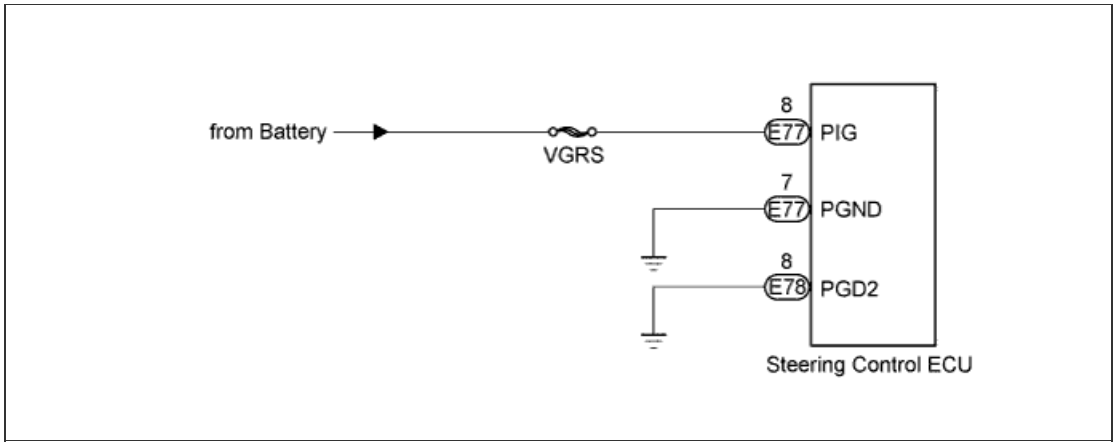
for Preparation Click here

DESCRIPTION

The steering control ECU monitors PIG (motor power source voltage) and detects a malfunction in the power supply relay (located inside the steering control ECU).
If the steering control ECU detects a malfunction, it will turn on the master warning light, store these DTCs, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15C7/78	The steering control ECU detects that the IG terminal voltage is between 9 and 16 V, and the PIG terminal voltage is below 7 V or higher than 18.5 V for 2.4 seconds.	• Harness or connector • Steering control ECU
C15C8/79	The steering control ECU detects a malfunction in the power source relay or an open circuit.	• Harness or connector • Steering control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

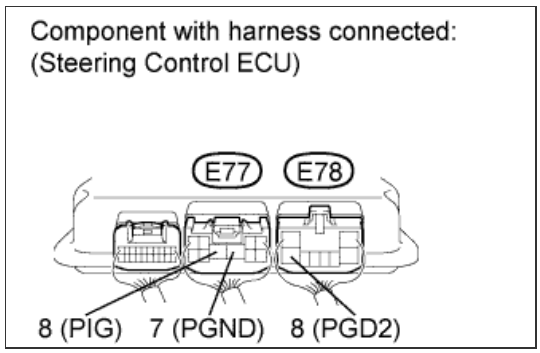
HINT:

The fault may be intermittent. Check the harnesses and connectors thoroughly and retest.

1.CHECK HARNESS AND CONNECTOR (POWER SOURCE CIRCUIT)

a. Record and clear the DTCs (Click here).

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



Standard Resistance:

Tester Connection	Condition	Specified Condition
E77-7 (PGND) - Body ground	Always	Below 1 Ω
E78-8 (PGD2) - Body ground		

Standard Voltage:

Tester Connection	Condition	Specified Condition
E77-8 (PIG) - Body ground	Always	11 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2.RECONFIRM DTC OUTPUT

a. Check for DTCs (Click here).

Result

Result	Proceed to
C15C7/78 or C15C8/79 is not output	A
C15C7/78 or C15C8/79 is output (for LHD)	B
C15C7/78 or C15C8/79 is output (for RHD)	C

B → REPLACE STEERING CONTROL ECU (**Click here**)

C → REPLACE STEERING CONTROL ECU (**Click here**)

A

USE SIMULATION METHOD TO CHECK (**Click here**)

DTC C15A4/64 Actuator Malfunction

DTC C15A9/66 Lock Holder Deviation Detection

DTC C15AA/66 Lock Mechanism Release Incomplete

DTC C15AB/66 Lock Mechanism Insertion Malfunction

for Preparation Click here

DESCRIPTION

When the VGRS system is normal, the steering actuator conducts current from the steering control ECU to the steering actuator solenoid to release the lock mechanism, enabling motor operation.
The steering actuator does not operate under any of the following conditions:

- The engine switch is off.
- The motor in the actuator is locked by the lock mechanism to prevent rotation (fail-safe function).
- The system is being protected from overheating (fail-safe function).

If the steering control ECU detects a malfunction in the steering actuator lock mechanism or a motor rotation angle error, it will store these DTCs.

DTC Code	DTC Detection Condition	Trouble Area
C15A4/64	The steering control ECU detects that the difference between the actuator target angle and the actuator position is approximately 30° or more for 1 second.	Steering actuator
C15A9/66	The steering control ECU detects that the lock pin is not aligned with the lock holder correctly.	Steering actuator
C15AA/66	The steering control ECU cannot operate because the actuator lock cannot be released.	Steering actuator
C15AB/66	The steering control ECU detects that the lock pin cannot be inserted into the lock holder.	Steering actuator

INSPECTION PROCEDURE

1.REPLACE STEERING ACTUATOR ASSEMBLY

a. Replace steering actuator assembly (Click here).

NOTICE:

Before replacing the steering actuator assembly, make sure to use the intelligent tester Data List to confirm and record the "Elec Angle Position" value (Click here).

NEXT

END

DTC C15C7/78 DC Motor Power Source Voltage Malfunction

DTC C15C8/79 Power Supply Relay Failure

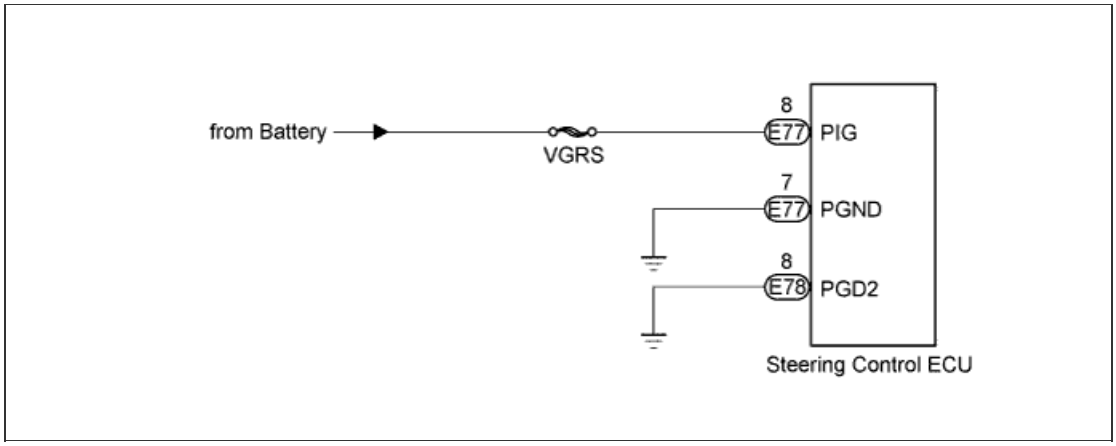
for Preparation Click here

DESCRIPTION

The steering control ECU monitors PIG (motor power source voltage) and detects a malfunction in the power supply relay (located inside the steering control ECU).
If the steering control ECU detects a malfunction, it will turn on the master warning light, store these DTCs, and stop VGRS operation.

DTC Code	DTC Detection Condition	Trouble Area
C15C7/78	The steering control ECU detects that the IG terminal voltage is between 9 and 16 V, and the PIG terminal voltage is below 7 V or higher than 18.5 V for 2.4 seconds.	• Harness or connector • Steering control ECU
C15C8/79	The steering control ECU detects a malfunction in the power source relay or an open circuit.	• Harness or connector • Steering control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

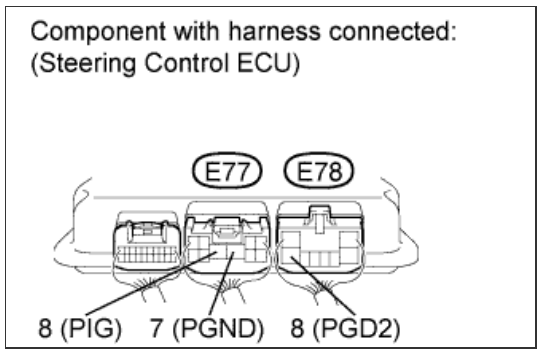
HINT:

The fault may be intermittent. Check the harnesses and connectors thoroughly and retest.

1.CHECK HARNESS AND CONNECTOR (POWER SOURCE CIRCUIT)

a. Record and clear the DTCs (Click here).

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



Standard Resistance:

Tester Connection	Condition	Specified Condition
E77-7 (PGND) - Body ground	Always	Below 1 Ω
E78-8 (PGD2) - Body ground		

Standard Voltage:

Tester Connection	Condition	Specified Condition
E77-8 (PIG) - Body ground	Always	11 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2.RECONFIRM DTC OUTPUT

a. Check for DTCs (Click here).

Result

Result	Proceed to
C15C7/78 or C15C8/79 is not output	A
C15C7/78 or C15C8/79 is output (for LHD)	B
C15C7/78 or C15C8/79 is output (for RHD)	C

B → REPLACE STEERING CONTROL ECU (**Click here**)

C → REPLACE STEERING CONTROL ECU (**Click here**)

A

USE SIMULATION METHOD TO CHECK (**Click here**)

DTC C15A4/64 Actuator Malfunction

DTC C15A9/66 Lock Holder Deviation Detection

DTC C15AA/66 Lock Mechanism Release Incomplete

DTC C15AB/66 Lock Mechanism Insertion Malfunction

for Preparation Click here

DESCRIPTION

When the VGRS system is normal, the steering actuator conducts current from the steering control ECU to the steering actuator solenoid to release the lock mechanism, enabling motor operation.
The steering actuator does not operate under any of the following conditions:

- The engine switch is off.
- The motor in the actuator is locked by the lock mechanism to prevent rotation (fail-safe function).
- The system is being protected from overheating (fail-safe function).

If the steering control ECU detects a malfunction in the steering actuator lock mechanism or a motor rotation angle error, it will store these DTCs.

DTC Code	DTC Detection Condition	Trouble Area
C15A4/64	The steering control ECU detects that the difference between the actuator target angle and the actuator position is approximately 30° or more for 1 second.	Steering actuator
C15A9/66	The steering control ECU detects that the lock pin is not aligned with the lock holder correctly.	Steering actuator
C15AA/66	The steering control ECU cannot operate because the actuator lock cannot be released.	Steering actuator
C15AB/66	The steering control ECU detects that the lock pin cannot be inserted into the lock holder.	Steering actuator

INSPECTION PROCEDURE

1.REPLACE STEERING ACTUATOR ASSEMBLY

a. Replace steering actuator assembly (Click here).

NOTICE:

Before replacing the steering actuator assembly, make sure to use the intelligent tester Data List to confirm and record the "Elec Angle Position" value (Click here).

NEXT

END

DTC U0100/56 Lost Communication with ECM / PCM "A"

DTC U0122/56 Lost Communication with Vehicle Dynamics Control Module

DTC U0126/56 Lost Communication with Steering Angle Sensor Module

for Preparation Click here

DESCRIPTION

The steering control ECU receives signals from the skid control ECU, ECM and steering angle sensor via CAN communication. When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system first.

DTC Code	DTC Detection Condition	Trouble Area
U0100/56	The steering control ECU detects an error in reception (from ECM) via CAN communication.	• CAN communication system • ECM
U0122/56	The steering control ECU detects an error in reception (from skid control ECU) via CAN communication.	• CAN communication system • Skid control ECU
U0126/56	The steering control ECU detects an error in reception (from steering angle sensor) via CAN communication.	• CAN communication system • Steering angle sensor

INSPECTION PROCEDURE

1.CHECK DTC

a. Using the intelligent tester, check if the CAN communication system is functioning normally (Click here for LHD, Click here for RHD).

Result

Result	Proceed to
DTC is not output	A
DTC is output (for LHD)	B
DTC is output (for RHD)	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

DTC C15A4/64 Actuator Malfunction

DTC C15A9/66 Lock Holder Deviation Detection

DTC C15AA/66 Lock Mechanism Release Incomplete

DTC C15AB/66 Lock Mechanism Insertion Malfunction

for Preparation Click here

DESCRIPTION

When the VGRS system is normal, the steering actuator conducts current from the steering control ECU to the steering actuator solenoid to release the lock mechanism, enabling motor operation.
The steering actuator does not operate under any of the following conditions:

- The engine switch is off.
- The motor in the actuator is locked by the lock mechanism to prevent rotation (fail-safe function).
- The system is being protected from overheating (fail-safe function).

If the steering control ECU detects a malfunction in the steering actuator lock mechanism or a motor rotation angle error, it will store these DTCs.

DTC Code	DTC Detection Condition	Trouble Area
C15A4/64	The steering control ECU detects that the difference between the actuator target angle and the actuator position is approximately 30° or more for 1 second.	Steering actuator
C15A9/66	The steering control ECU detects that the lock pin is not aligned with the lock holder correctly.	Steering actuator
C15AA/66	The steering control ECU cannot operate because the actuator lock cannot be released.	Steering actuator
C15AB/66	The steering control ECU detects that the lock pin cannot be inserted into the lock holder.	Steering actuator

INSPECTION PROCEDURE

1.REPLACE STEERING ACTUATOR ASSEMBLY

a. Replace steering actuator assembly (Click here).

NOTICE:

Before replacing the steering actuator assembly, make sure to use the intelligent tester Data List to confirm and record the "Elec Angle Position" value (Click here).

NEXT

END

DTC U0100/56 Lost Communication with ECM / PCM "A"

DTC U0122/56 Lost Communication with Vehicle Dynamics Control Module

DTC U0126/56 Lost Communication with Steering Angle Sensor Module

for Preparation Click here

DESCRIPTION

The steering control ECU receives signals from the skid control ECU, ECM and steering angle sensor via CAN communication. When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system first.

DTC Code	DTC Detection Condition	Trouble Area
U0100/56	The steering control ECU detects an error in reception (from ECM) via CAN communication.	• CAN communication system • ECM
U0122/56	The steering control ECU detects an error in reception (from skid control ECU) via CAN communication.	• CAN communication system • Skid control ECU
U0126/56	The steering control ECU detects an error in reception (from steering angle sensor) via CAN communication.	• CAN communication system • Steering angle sensor

INSPECTION PROCEDURE

1.CHECK DTC

a. Using the intelligent tester, check if the CAN communication system is functioning normally (Click here for LHD, Click here for RHD).

Result

Result	Proceed to
DTC is not output	A
DTC is output (for LHD)	B
DTC is output (for RHD)	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

DTC C15A4/64 Actuator Malfunction

DTC C15A9/66 Lock Holder Deviation Detection

DTC C15AA/66 Lock Mechanism Release Incomplete

DTC C15AB/66 Lock Mechanism Insertion Malfunction

for Preparation Click here

DESCRIPTION

When the VGRS system is normal, the steering actuator conducts current from the steering control ECU to the steering actuator solenoid to release the lock mechanism, enabling motor operation.
The steering actuator does not operate under any of the following conditions:

- The engine switch is off.
- The motor in the actuator is locked by the lock mechanism to prevent rotation (fail-safe function).
- The system is being protected from overheating (fail-safe function).

If the steering control ECU detects a malfunction in the steering actuator lock mechanism or a motor rotation angle error, it will store these DTCs.

DTC Code	DTC Detection Condition	Trouble Area
C15A4/64	The steering control ECU detects that the difference between the actuator target angle and the actuator position is approximately 30° or more for 1 second.	Steering actuator
C15A9/66	The steering control ECU detects that the lock pin is not aligned with the lock holder correctly.	Steering actuator
C15AA/66	The steering control ECU cannot operate because the actuator lock cannot be released.	Steering actuator
C15AB/66	The steering control ECU detects that the lock pin cannot be inserted into the lock holder.	Steering actuator

INSPECTION PROCEDURE

1.REPLACE STEERING ACTUATOR ASSEMBLY

a. Replace steering actuator assembly (Click here).

NOTICE:

Before replacing the steering actuator assembly, make sure to use the intelligent tester Data List to confirm and record the "Elec Angle Position" value (Click here).

NEXT

END

DTC U0100/56 Lost Communication with ECM / PCM "A"

DTC U0122/56 Lost Communication with Vehicle Dynamics Control Module

DTC U0126/56 Lost Communication with Steering Angle Sensor Module

for Preparation Click here

DESCRIPTION

The steering control ECU receives signals from the skid control ECU, ECM and steering angle sensor via CAN communication. When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system first.

DTC Code	DTC Detection Condition	Trouble Area
U0100/56	The steering control ECU detects an error in reception (from ECM) via CAN communication.	• CAN communication system • ECM
U0122/56	The steering control ECU detects an error in reception (from skid control ECU) via CAN communication.	• CAN communication system • Skid control ECU
U0126/56	The steering control ECU detects an error in reception (from steering angle sensor) via CAN communication.	• CAN communication system • Steering angle sensor

INSPECTION PROCEDURE

1.CHECK DTC

a. Using the intelligent tester, check if the CAN communication system is functioning normally (Click here for LHD, Click here for RHD).

Result

Result	Proceed to
DTC is not output	A
DTC is output (for LHD)	B
DTC is output (for RHD)	C

B → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

C → GO TO CAN COMMUNICATION SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

USE SIMULATION METHOD TO CHECK (Click here)

for Preparation Click here

INSPECTION PROCEDURE

This problem may be caused by a malfunction in the vehicle stability control system or steering system.
Make sure that no DTC is output for the skid control ECU or steering control ECU before proceeding with the following procedures.
If a DTC is output for either of these ECUs, first troubleshoot it and then proceed to the troubleshooting below.

1.CHECK DRIVE VEHICLE

a. Drive the vehicle straight at 35 km/h (22 mph) or more for 5 seconds or more.

b. Turn the steering wheel slowly from left to right several times, and then check if the steering wheel is centered.

Result

Result	Proceed to
The steering wheel is off-center	A
The steering wheel is centered	B

HINT:

If turning the steering wheel quickly while driving at low speeds, the steering angle may differ between the left and right, or the steering wheel may become off-center. However, this is not a malfunction.

B → VGRS SYSTEM IS NORMAL

A

2.CHECK TIRE SIZE

a. Check all the tires.

Result

Result	Proceed to
All tire sizes are correct and tire pressures are normal	A
The size of any of the tires is incorrect	B
All tire sizes are correct, but tire pressures are incorrect	C

B → REPLACE WITH SPECIFIED SIZE TIRE (Click here)

C → ADJUST TIRE AIR PRESSURE TO SPECIFIED VALUE (Click here)

A

3.CHECK WHEEL ALIGNMENT

a. Check wheel alignment for the front (Click here).

OK:
The wheel alignment is normal.

HINT:

Adjust the tie-rod ends within the specified values so that the tire angles are the same between the left and right when the steering wheel is turned from lock to lock.

NG → PERFORM WHEEL ALIGNMENT ADJUSTMENT (Click here)

OK

PERFORM STEERING ANGLE ADJUSTMENT AND VGRS SYSTEM CALIBRATION

for Preparation Click here

INSPECTION PROCEDURE

HINT:

This problem may be caused by a malfunction in the vehicle stability control system or steering system.

Make sure that no DTC is output for the skid control ECU or steering control ECU before proceeding with the following procedures.

If a DTC is output for either of these ECUs, first troubleshoot it and then proceed to the troubleshooting below.

1.READ VALUE USING INTELLIGENT TESTER (RECORD OF OVERHEAT)

a. Use the Data List to check if the record of overheat is functioning properly.

VGRS

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Motor Overheat Record	Record of continuous overheat preventive control/Rec or Unrec	Rec or Unrec	-

Result

Result	Proceed to
"Rec" (Record of motor overheating)	A
"Unrec" (No record of motor overheating)	B

HINT:

If "Rec" is displayed, reset the setting to "Unrec". Enter the VGRS menu on the tester, select record clearance, and follow the prompts to set to "Unrec".

B → Go to step 3

A

2.CHECK HEAT PROTECTION FUNCTION FOR STEERING ACTUATOR

a. Turn the engine switch on (IG) and wait for 30 minutes until the steering actuator cools down.

b. Start the engine and slowly turn the steering wheel from lock to lock (approximately 90°/sec.) 3 times.

HINT:

If turning the steering wheel quickly while driving at low speeds, the steering angle may differ between the left and right, or the steering wheel may become off-center.

However, this is not a malfunction.

c. Check the number of turns from lock to lock.

Result

Result	Proceed to
3.2 turns	A
2.7 turns	B

B → VGRS SYSTEM IS NORMAL

A

3.CHECK STEERING EFFORT

a. Start the engine.

b. Turn the steering wheel.

c. Measure the steering effort.

Standard steering effort:
Below 6.9 N*m (70 kgf*cm, 61 in.*lbf)

HINT:

After completing the inspection or repair, attempt to simulate the problem and then perform "Read Value Using Intelligent Tester" above again to reconfirm that the problem does not occur.

Result

Result Result	Proceed to
OK	A
NG (for 1VD-FTV with DPF)	B
NG (except 1VD-FTV with DPF)	C

B → GO TO POWER STEERING SYSTEM (PROBLEM SYMPTOMS TABLE) (Click here)

C → GO TO POWER STEERING SYSTEM (PROBLEM SYMPTOMS TABLE) (Click here)

A

4.CHECK STEERING ACTUATOR

a. Check for abnormal noise or vibration in the steering actuator.

OK:
Neither abnormal noise nor vibration occurs.

NG → GO TO STEERING WHEEL VIBRATES OR ABNORMAL NOISE IS HEARD FROM STEERING WHEEL (Click here)

OK

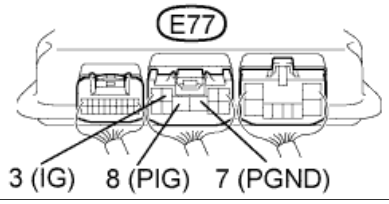
5.CHECK STEERING CONTROL ECU (POWER SOURCE CIRCUIT)

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E77-3 (IG) - Body ground	Engine switch on (IG)	11 to 14 V
E77-8 (PIG) - Body ground		

Component with harness connected:
(Steering Control ECU)



b. Turn the engine switch off.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E77-7 (PGND) - Body ground	Always	Below 1 Ω

Result

Result Result	Proceed to
NG	A
OK (for LHD)	B
OK (for RHD)	C

B → REPLACE STEERING CONTROL ECU (Click here)

C → REPLACE STEERING CONTROL ECU (Click here)

A → REPAIR OR REPLACE HARNESS OR CONNECTOR

for Preparation Click here

INSPECTION PROCEDURE

HINT:

- **Check that the steering wheel is centered.**
- **After checking that no DTC is output for the VGRS system, perform the following procedure.**

1.CHECK STEERING WHEEL POSITION

a. Turn the steering wheel from lock to lock at a speed of approximately 90°/sec. Check the steering wheel angles between the left and right.

Result

Result	Proceed to
The steering wheel is off-center	A
The steering wheel is centered	B

HINT:

If turning the steering wheel quickly while driving at low speeds, the steering angle may differ between the left and right, or the steering wheel may become off-center. However, this is not a malfunction.

B → VGRS SYSTEM IS NORMAL

A

2.CHECK STEERING EFFORT

a. Start the engine.

b. Turn the steering wheel.

c. Measure the steering effort.

Standard steering effort:
Below 6.9 N*m (70 kgf*cm, 61 in.*lbf)

HINT:

After completing the inspection or repair, attempt to simulate the problem and then read the Data List again to confirm that the problem does not occur.

Result

Result Result	Proceed to
OK	A
NG (for 1VD-FTV with DPF)	B
NG (except 1VD-FTV with DPF)	C

B → GO TO POWER STEERING SYSTEM (PROBLEM SYMPTOMS TABLE) (Click here)

C → GO TO POWER STEERING SYSTEM (PROBLEM SYMPTOMS TABLE) (Click here)

A

3.CHECK WHEEL ALIGNMENT

a. Check wheel alignment for the front (Click here).

OK:
The wheel alignment is normal.

HINT:

Adjust the tie-rod ends within the specified values so that the tire angles are the same between the left and right when the steering wheel is turned from lock to lock.

NG → PERFORM WHEEL ALIGNMENT ADJUSTMENT (Click here)

OK → PERFORM STEERING GEAR NEUTRAL POSITION CALIBRATION AND STEERING COLUMN NEUTRAL POSITION CALIBRATION

for Preparation Click here

INSPECTION PROCEDURE

HINT:

Check that no DTC is output for the VGRS system and vehicle stability control system.

1.CHECK STEERING WHEEL CONDITION

a. Center the steering wheel.

b. Turn the engine switch off.

c. Disconnect the steering actuator connector.

d. Start the engine.

e. Check for abnormal noise or vibration while turning the steering wheel.

OK:
No abnormal noise or vibration.

NOTICE:

DTC C15A5/65 is stored when the engine is running with the connector disconnected from the steering actuator. Clear the DTC after this check.

NG → REPAIR OR REPLACE STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR) (Click here)

OK → REPLACE STEERING ACTUATOR ASSEMBLY (Click here)

for Preparation Click here

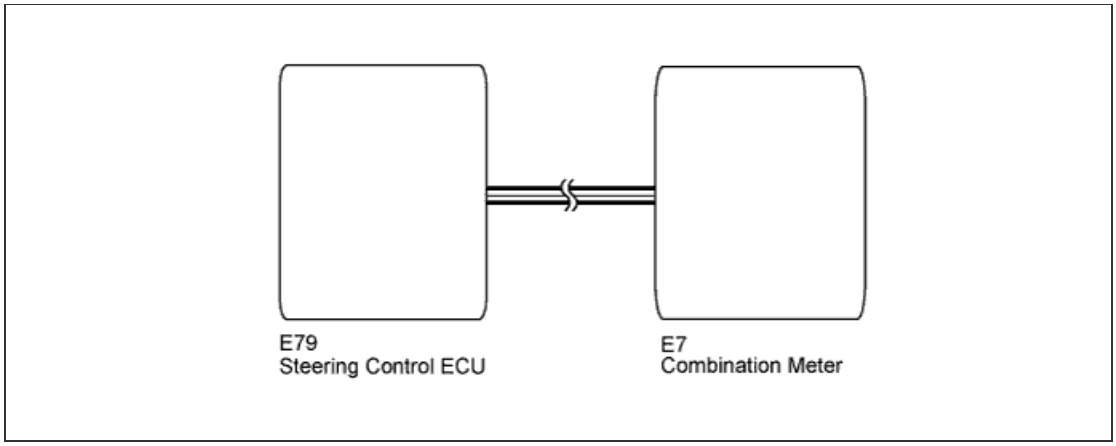
DESCRIPTION

If the steering control ECU detects that the VGRS system has a malfunction, warning information is transmitted to the combination meter via CAN communication.
The combination meter will turn the master warning light on based on this information.
Warning information is transmitted via the following route:

- Steering control ECU → (CAN) → Network gateway ECU → (CAN) → Combination meter

Connecting terminals TC and CG of the DLC3 makes the master warning light blink and outputs DTCs.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Check that there is no problem in CAN communication before performing the following procedure.

If there are any problems in CAN communication, first troubleshoot them and then proceed to the troubleshooting below.

1.CHECK BATTERY

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
Positive (+) battery terminal - negative (-) battery terminal	Always	11 to 14 V

NG → RECHARGE OR REPLACE BATTERY

OK

2.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (COMBINATION METER)

a. Select the Active Test, use the intelligent tester to generate a control command, and then check that the master warning light turns on/off.

Combination Meter:

Tester Display	Test Part	Control Range	Diagnostic Note
Master Warning	Master warning light	OFF/ON	Confirm that the vehicle is stopped and the engine is running

OK:
Indicator light turns on/off.

Result

Result	Proceed to
NG	A
OK (for LHD)	B
OK (for RHD)	C

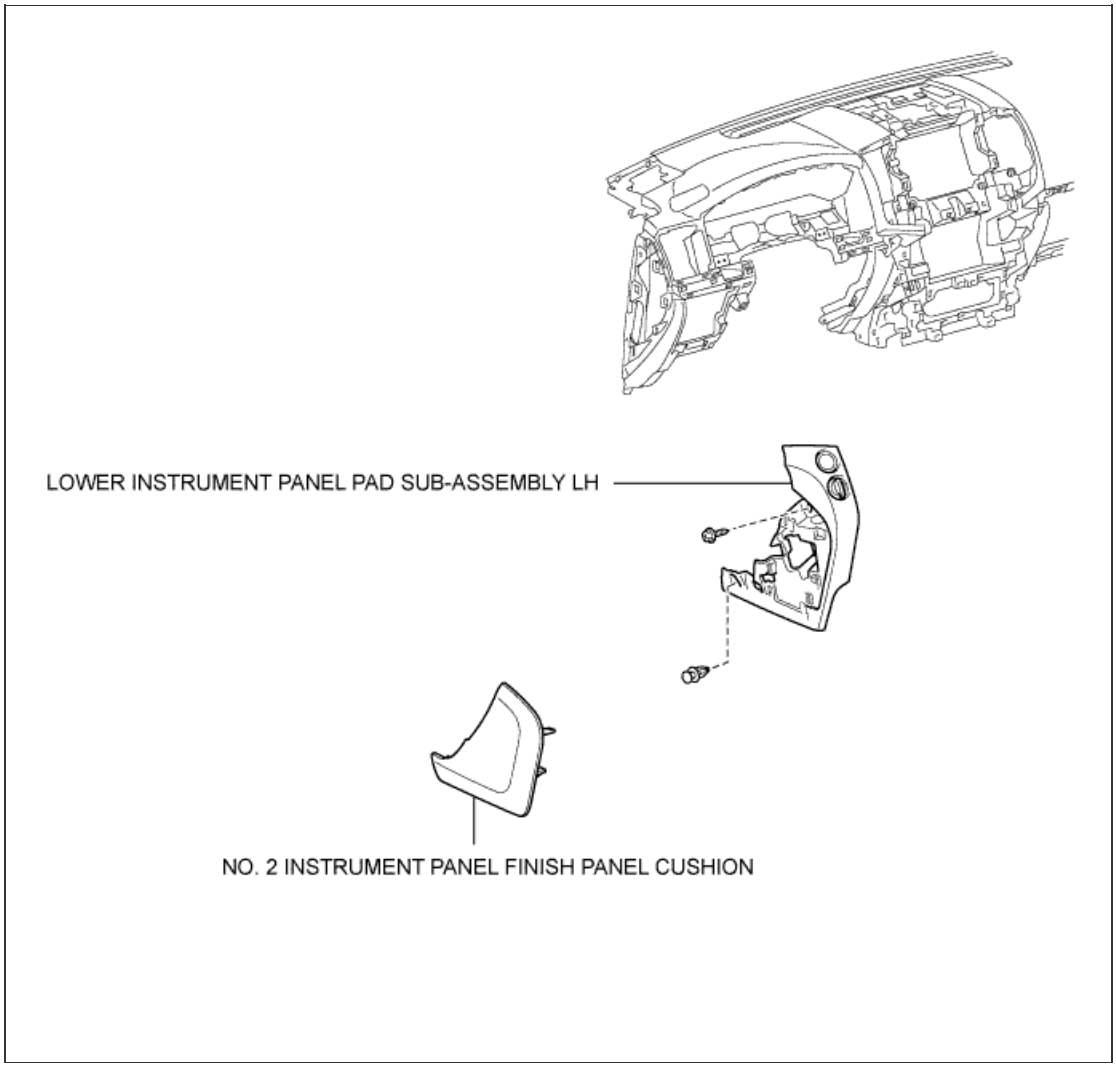
B → REPLACE STEERING CONTROL ECU (Click here)

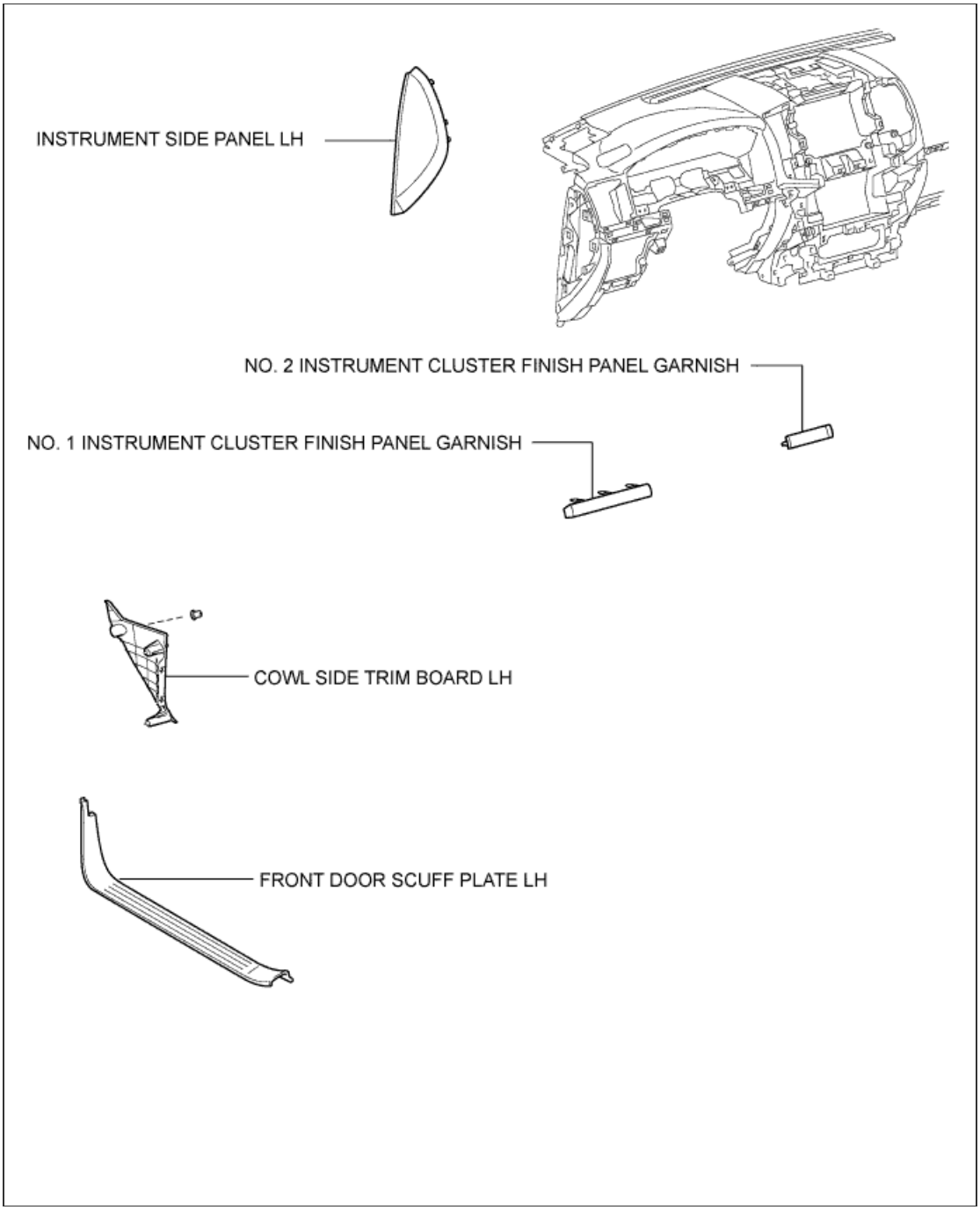
C → REPLACE STEERING CONTROL ECU (Click here)

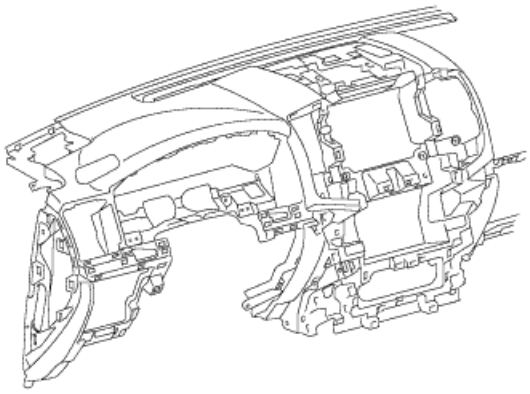
A

GO TO METER / GAUGE SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

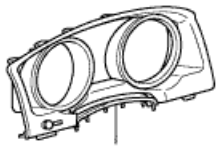
for Preparation [Click here]




INSTRUMENT SIDE PANEL LH
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
COWL SIDE TRIM BOARD LH
FRONT DOOR SCUFF PLATE LH

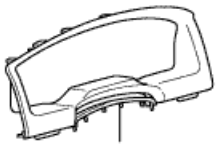


w/ Multi-information Display:

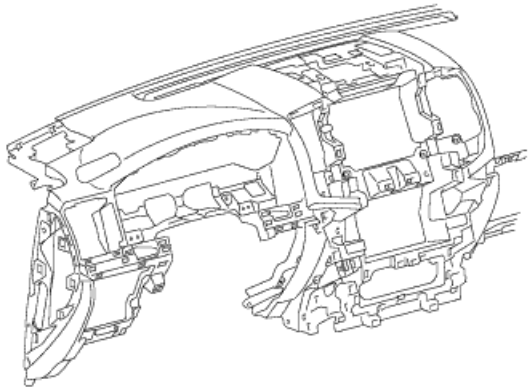


INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

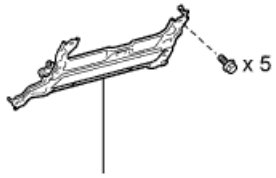
w/o Multi-information Display:



INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

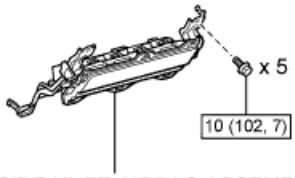


w/o Driver Side Knee Airbag:



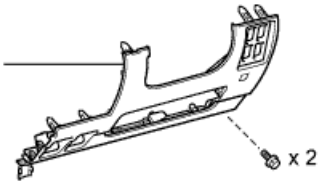
LOWER INSTRUMENT PANEL SUB-ASSEMBLY

w/ Driver Side Knee Airbag:



DRIVER SIDE KNEE AIRBAG ASSEMBLY

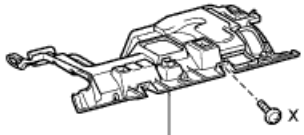
LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL





NO. 1 SWITCH HOLE BASE

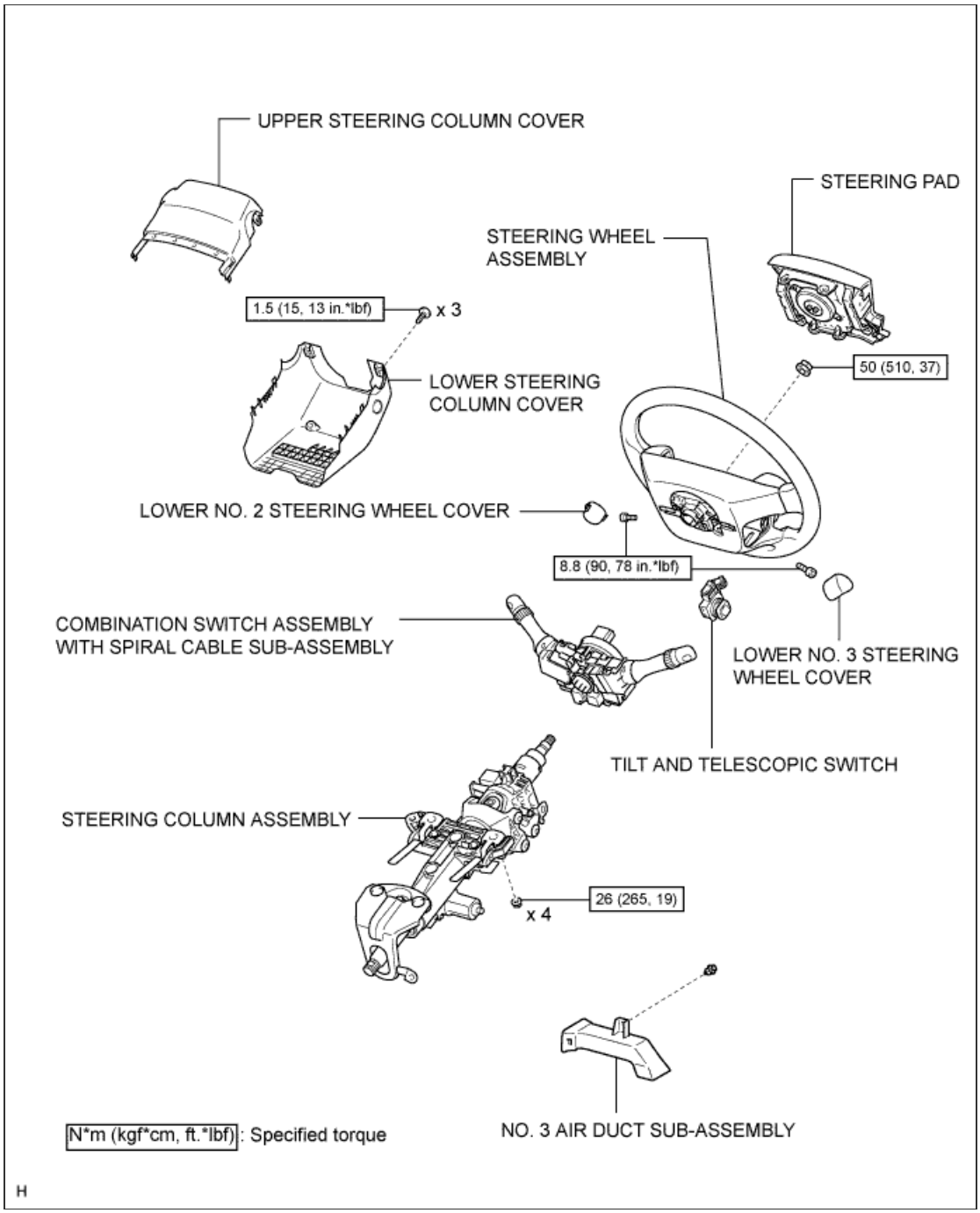
w/ Floor Under Cover:

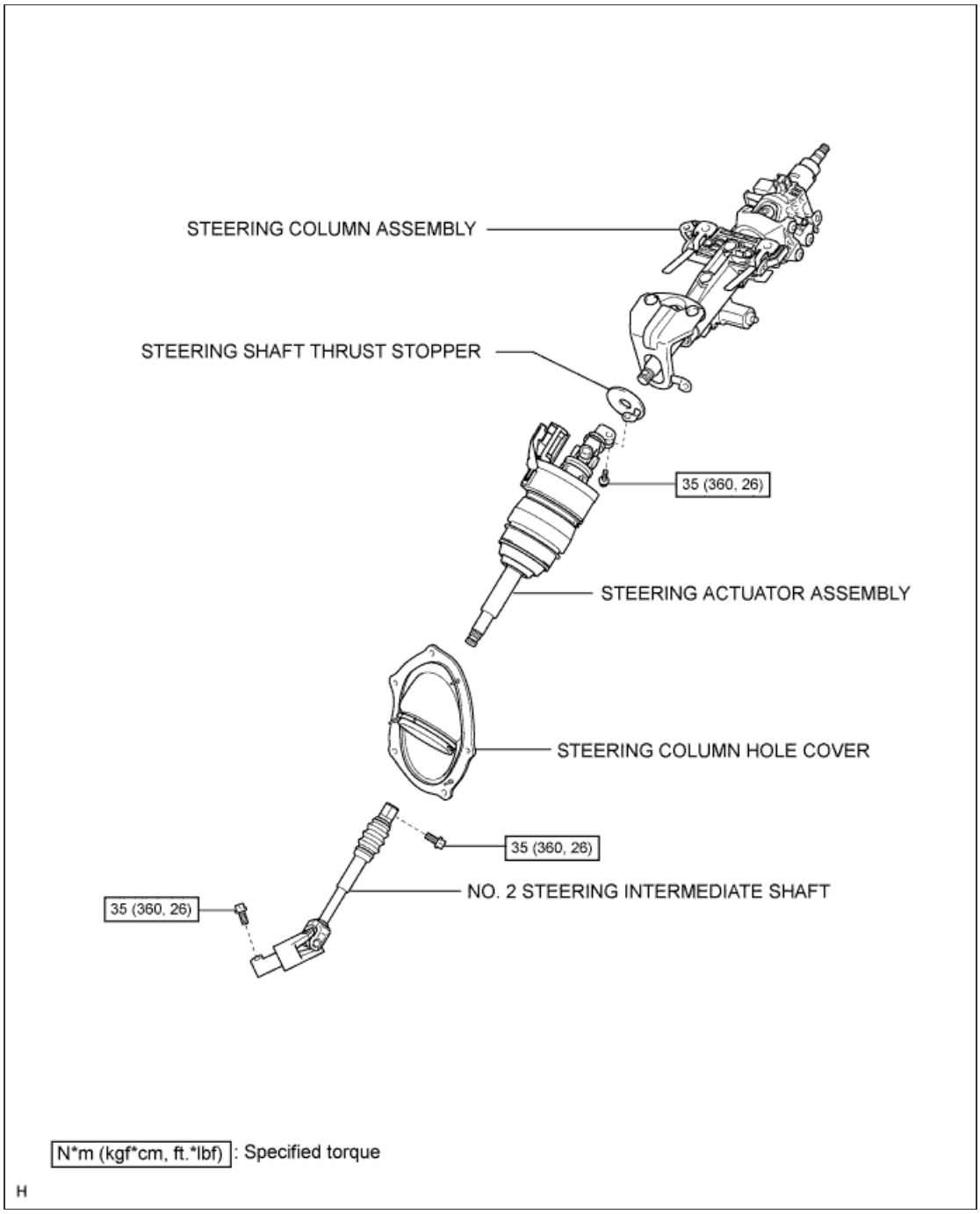


NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

N*m (kgf*cm, ft.*lbf) : Specified torque

T


UPPER STEERING COLUMN COVER
STEERING PAD
STEERING WHEEL ASSEMBLY
1.5 (15, 13 in.*lbf)
x 3
LOWER STEERING COLUMN COVER
50 (510, 37)
LOWER NO. 2 STEERING WHEEL COVER
8.8 (90, 78 in.*lbf)
COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY
LOWER NO. 3 STEERING WHEEL COVER
TILT AND TELESCOPIC SWITCH
STEERING COLUMN ASSEMBLY
26 (265, 19)
x 4
NO. 3 AIR DUCT SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
H


STEERING COLUMN ASSEMBLY
STEERING SHAFT THRUST STOPPER
35 (360, 26)
STEERING ACTUATOR ASSEMBLY
STEERING COLUMN HOLE COVER
35 (360, 26)
NO. 2 STEERING INTERMEDIATE SHAFT
35 (360, 26)
N*m (kgf*cm, ft.*lbf) : Specified torque

H

for Preparation Click here

CAUTION:

Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing the steering column (Click here).

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

a. Disable the AUTO TILT AWAY function by changing the customize parameter (Click here).

NOTICE:

Record the current customize parameter setting (whether the AUTO TILT AWAY function is enabled or disabled) in order to restore the current setting after finishing the operation.

HINT:

Performing the above operation causes the AUTO TILT AWAY function to be disabled when the engine switch is turned off.

b. Turn the engine switch on (IG). Operate the tilt and telescopic switch to fully extend and lower the steering column assembly.

c. Turn the engine switch off and disconnect the cable from the negative (-) battery terminal.

CAUTION:

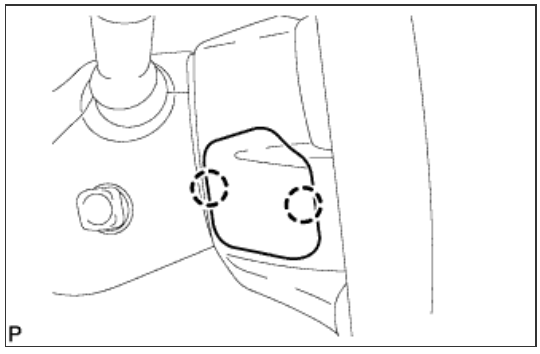
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

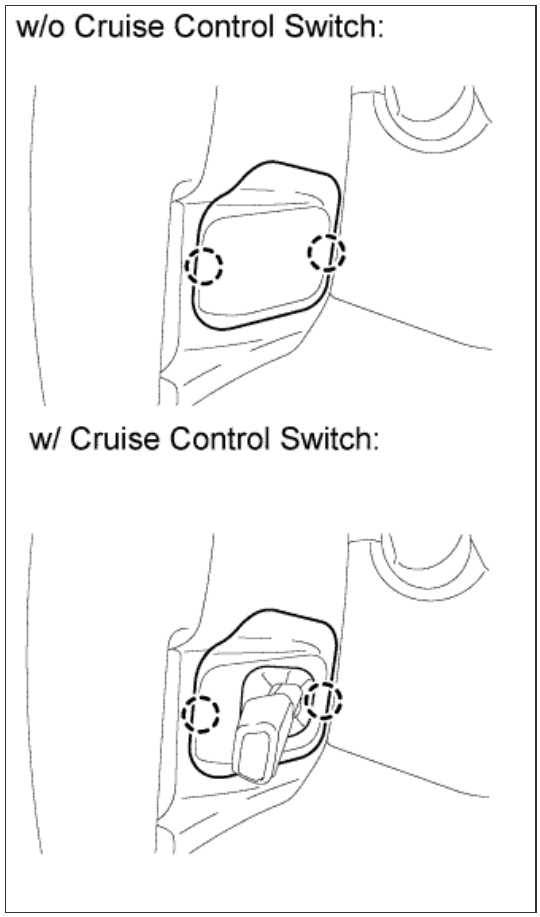
3. REMOVE LOWER NO. 3 STEERING WHEEL COVER

a. Detach the 2 claws and remove the steering wheel cover.



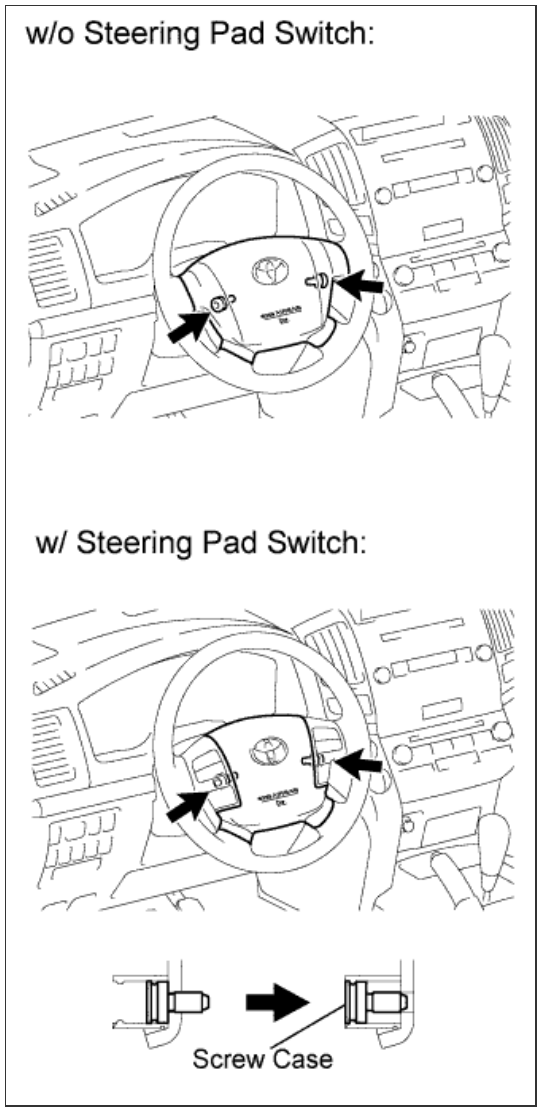
4. REMOVE LOWER NO. 2 STEERING WHEEL COVER

a. Detach the 2 claws and remove the steering wheel cover.



5. REMOVE STEERING PAD

a. Using a T30 "TORX" socket wrench, loosen the 2 screws until the groove along the screw circumference catches on the screw case.



b. Pull out the steering pad from the steering wheel, as shown in the illustration. Then support the steering pad with one hand.

NOTICE:

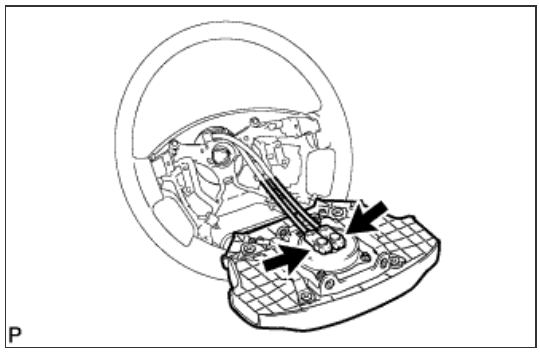
When removing the steering pad, do not pull the airbag wire harness.

c. Disconnect the horn connector.

d. Disconnect the 2 connectors and remove the steering pad.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



6. REMOVE STEERING WHEEL ASSEMBLY

a. Remove the steering wheel set nut.

b. Put matchmarks on the steering wheel and main shaft.

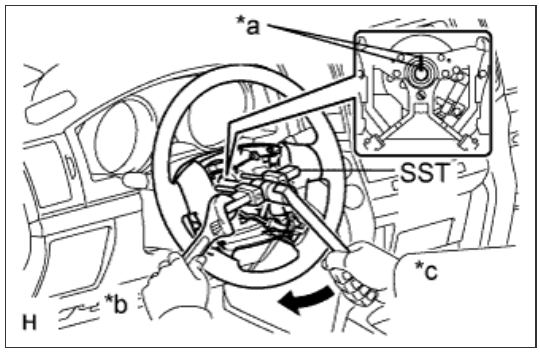
Text in Illustration

*a	Matchmark
*b	Hold
*c	Turn

c. Using SST, remove the steering wheel assembly.

SST

09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05011)



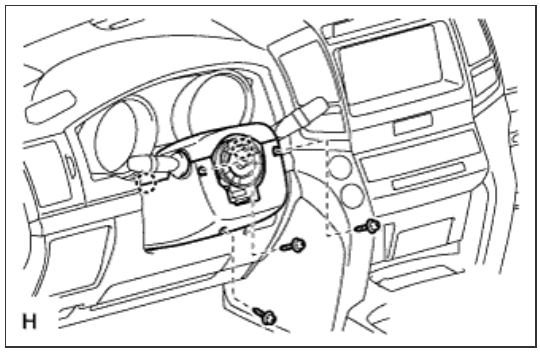
7. REMOVE LOWER STEERING COLUMN COVER

a. Remove the 3 screws.

b. Detach the 2 claws to remove the lower steering column cover.

NOTICE:

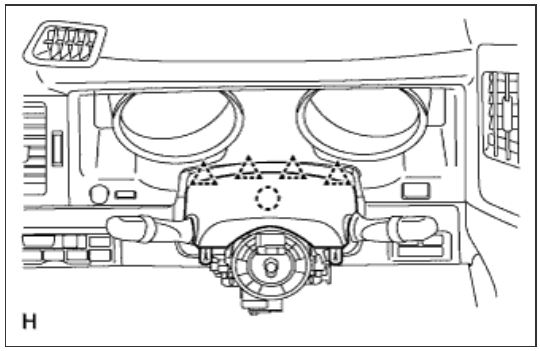
Do not damage the tilt and telescopic switch.



8. REMOVE UPPER STEERING COLUMN COVER

a. Detach the 4 clips.

b. Detach the claw to remove the upper steering column cover.



9. REMOVE TILT AND TELESCOPIC SWITCH

a. Disconnect the switch connector.

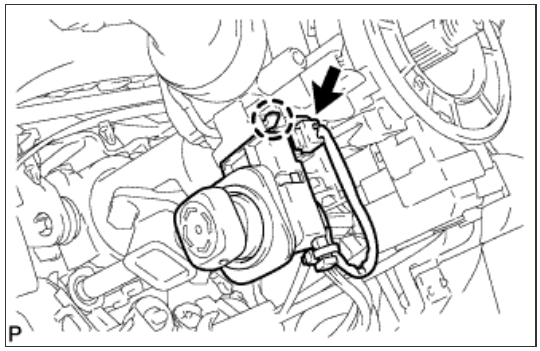
b. Using a screwdriver, detach the claw and pull out the switch.

HINT:

Tape the screwdriver tip before use.

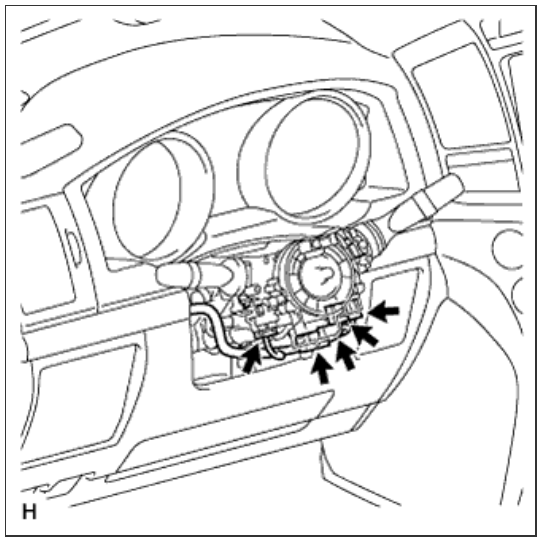
NOTICE:

Pushing on the claw too hard will break the claw.

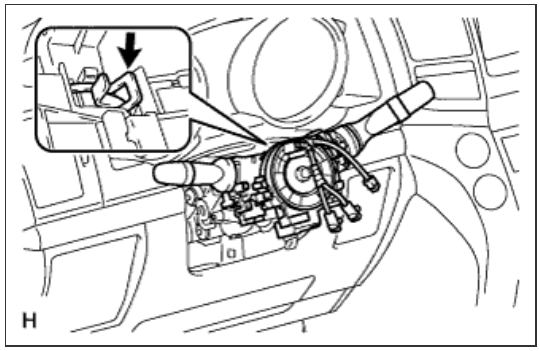


10. REMOVE COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

a. Disconnect the 5 connectors from the combination switch with spiral cable.



b. Using pliers, grip the claws of the clamp and remove the combination switch with spiral cable from the steering column.



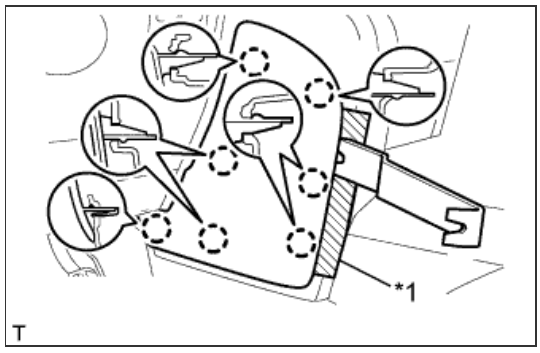
11. REMOVE NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Put protective tape around the No. 2 instrument panel finish panel cushion.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 7 claws and remove the No. 2 instrument panel finish panel cushion.

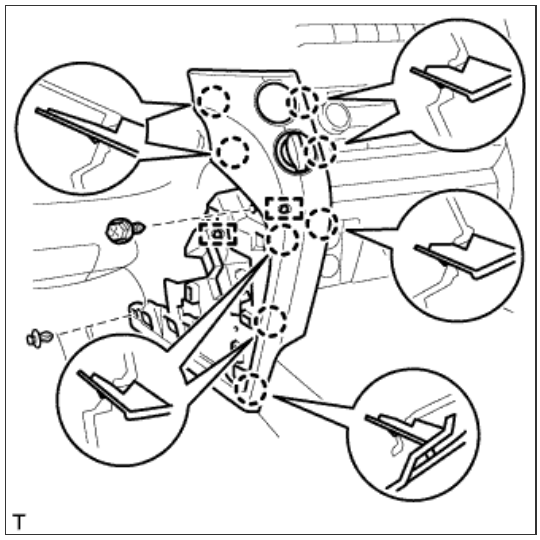


12. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Remove the clip and screw.

b. Detach the 8 claws.

c. Disconnect the connectors, detach the 2 clamps and remove the lower instrument panel pad sub-assembly.



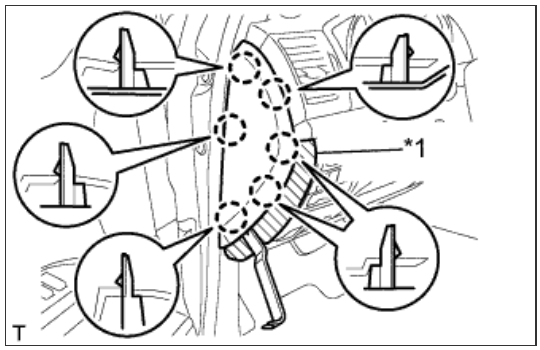
13. REMOVE INSTRUMENT SIDE PANEL LH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 6 claws and remove the instrument side panel.



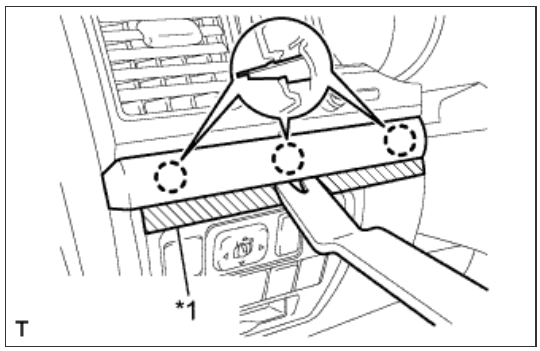
14. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

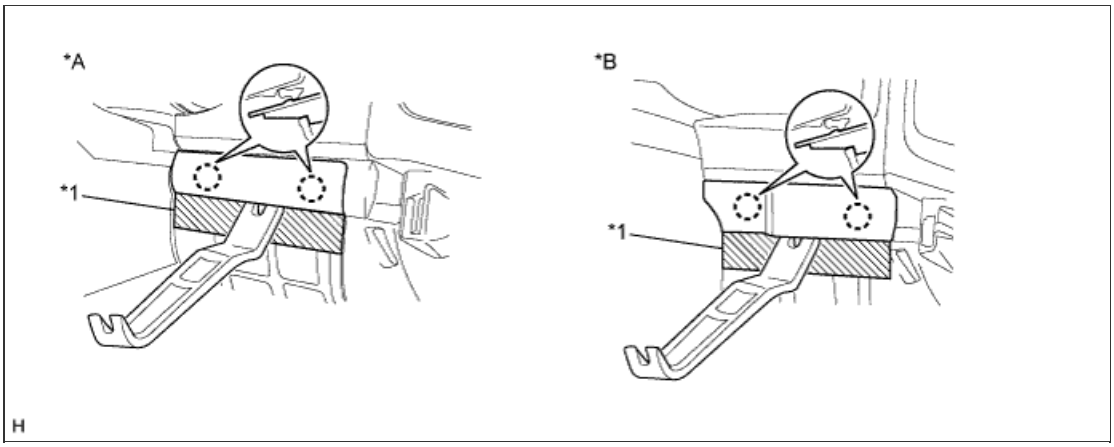
b. Using a moulding remover, detach the 3 claws and remove the No. 1 instrument cluster finish panel garnish.



15. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

b. Using a moulding remover, detach the 2 claws and remove the No. 2 instrument cluster finish panel garnish.



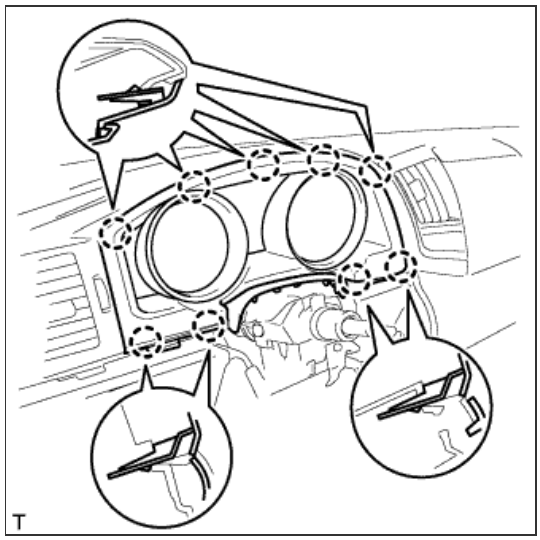
Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System
*1	Protective Tape	-	-

16. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/ Multi-information Display)

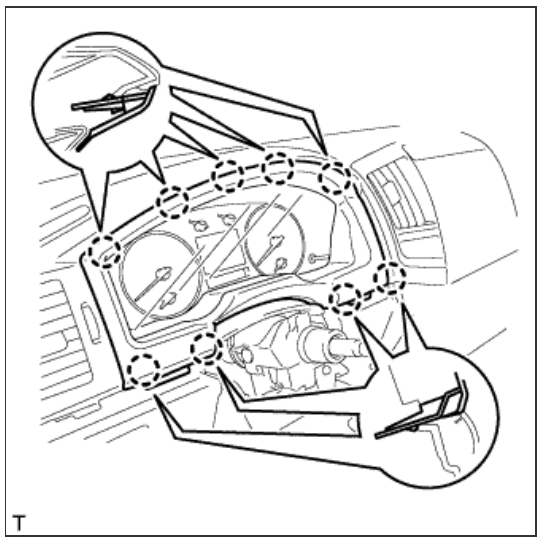
a. Detach the 9 claws.

b. Disconnect the connector and remove the instrument cluster finish panel.



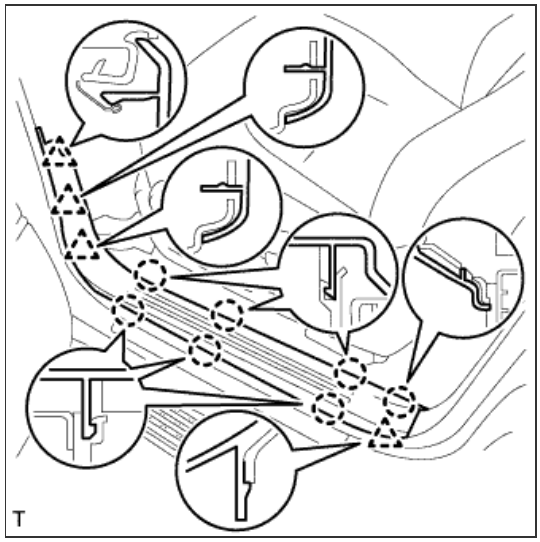
17. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/o Multi-information Display)

a. Detach the 9 claws and remove the instrument cluster finish panel.



18. REMOVE FRONT DOOR SCUFF PLATE LH

a. Detach the 7 claws and 4 clips, and remove the scuff plate.

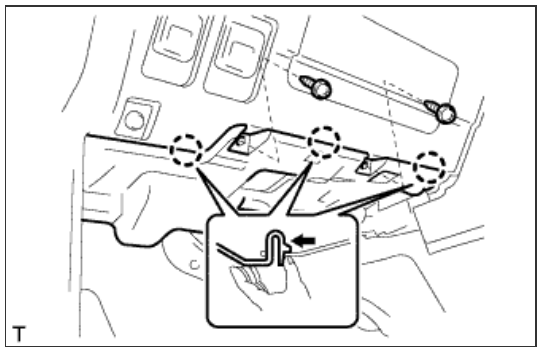


19. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Remove the 2 screws.

b. Detach the 3 claws.

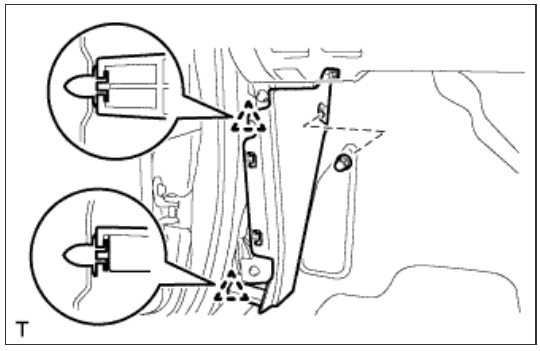
c. Disconnect the connectors and remove the No. 1 instrument panel under cover.



20. REMOVE COWL SIDE TRIM BOARD LH

a. Remove the cap nut.

b. Detach the 2 clips and remove the cowl side trim board.



21. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

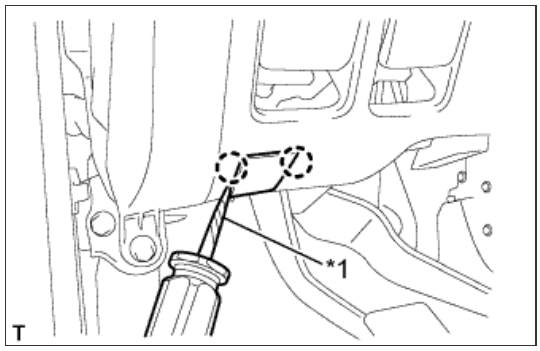
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

Tape the screwdriver tip before use.

Text in Illustration

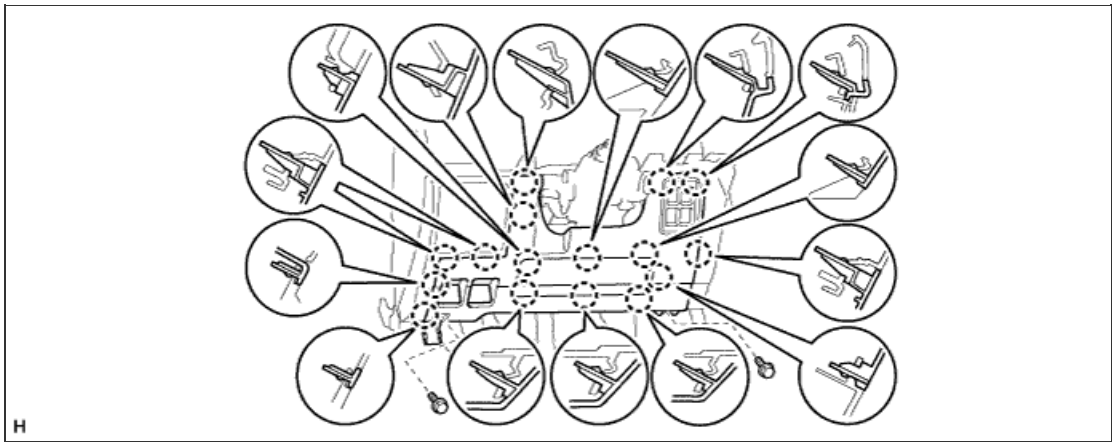
*1	Protective Tape



b. w/ Driver Side Knee Airbag:

i. Remove the 2 bolts.

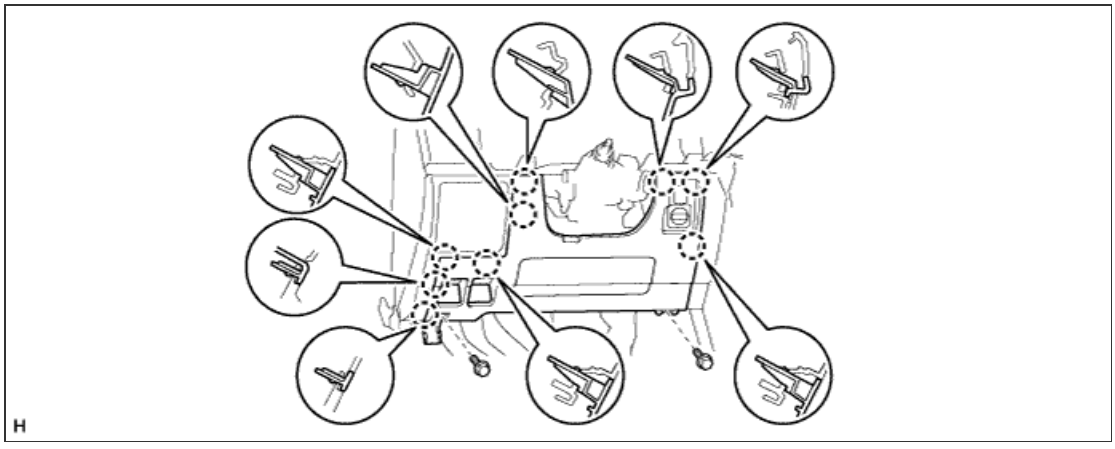
ii. Detach the 16 claws.



c. w/o Driver Side Knee Airbag:

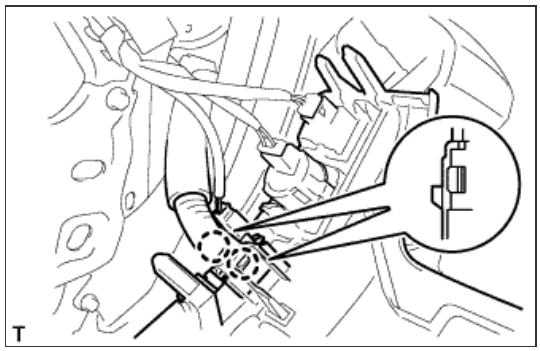
i. Remove the 2 bolts.

ii. Detach the 9 claws.



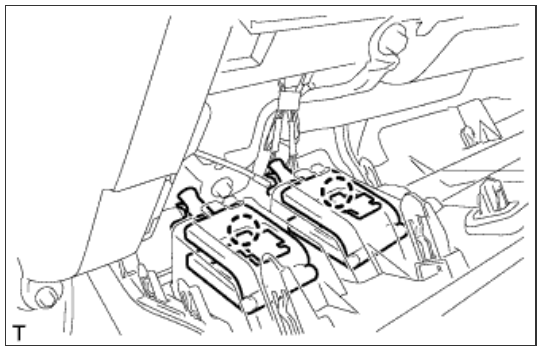
d. for Automatic Air Conditioning System:

i. Detach the 2 claws and remove the room temperature sensor.



e. Detach the 2 claws and disconnect the 2 control cables.

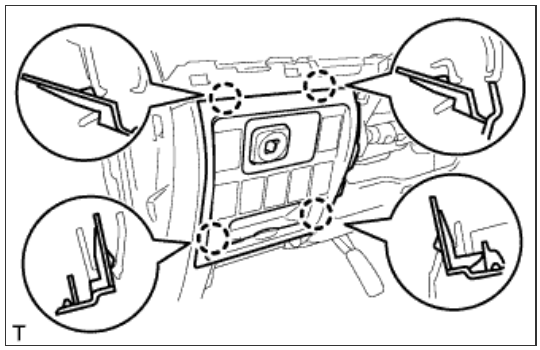
f. Disconnect the connectors and remove the lower No. 1 instrument panel finish panel.



22. REMOVE NO. 1 SWITCH HOLE BASE

a. Detach the 4 claws.

b. Disconnect the connectors and remove the No. 1 switch hole cover.



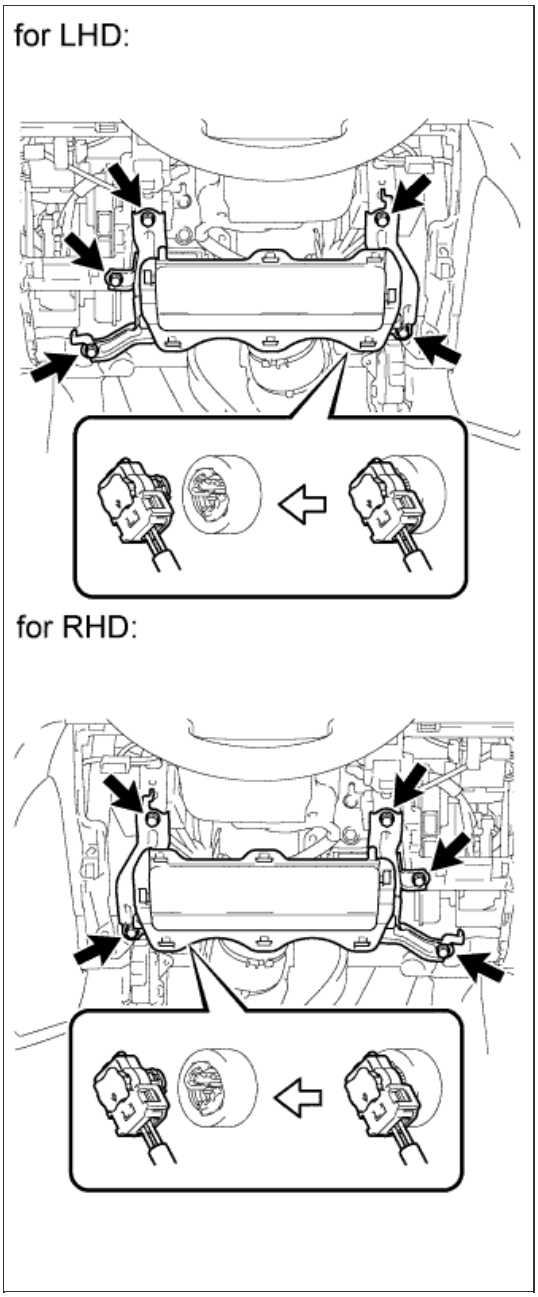
23. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

a. Remove the 5 bolts and driver side knee airbag.

b. Disconnect the connector.

NOTICE:

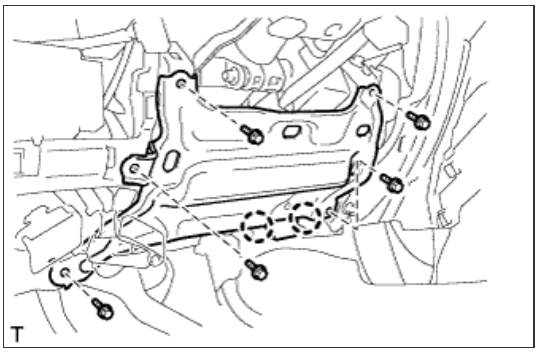
When handling the airbag connector, take care not to damage the airbag wire harness.



24. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (w/o Driver Side Knee Airbag)

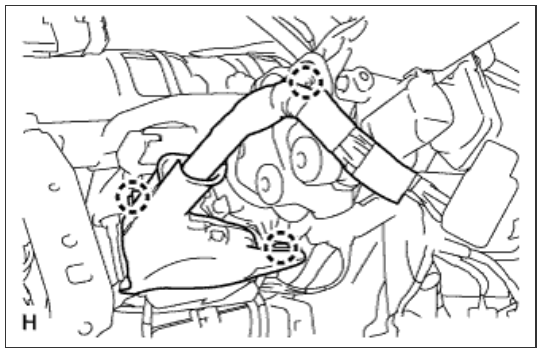
a. Detach the 2 claws and disconnect the DLC3.

b. Remove the 5 bolts and lower instrument panel.



25. DISCONNECT WIRE HARNESS PROTECTOR AND WIRE HARNESS

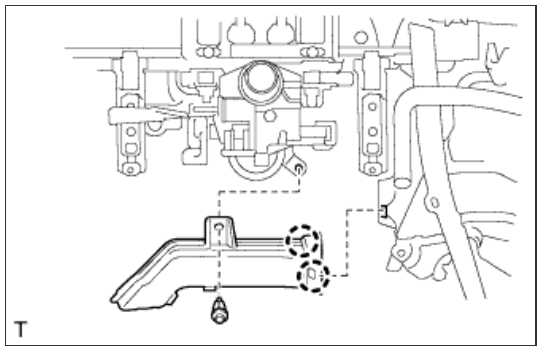
a. Detach the 3 claws to disconnect the wire harness protector and wire harness.



26. REMOVE NO. 3 AIR DUCT SUB-ASSEMBLY

a. Remove the clip.

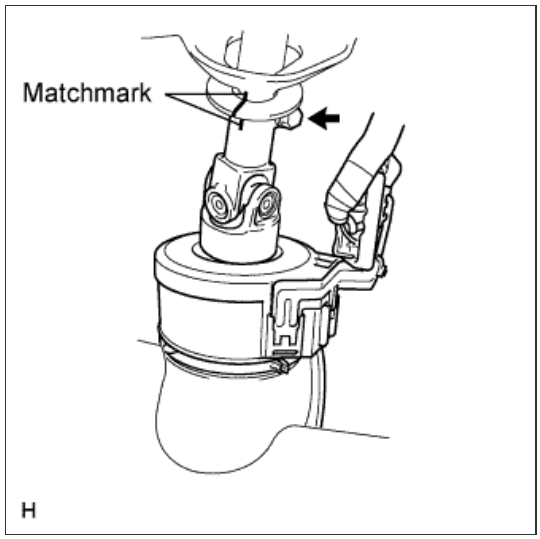
b. Detach the 2 claws and remove the duct.



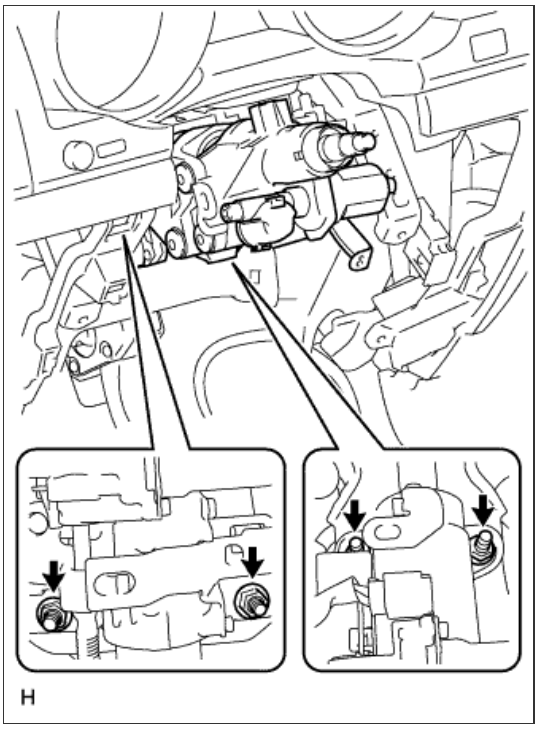
27. REMOVE STEERING COLUMN ASSEMBLY

a. Put matchmarks on the steering actuator and steering column.

b. Remove the bolt.



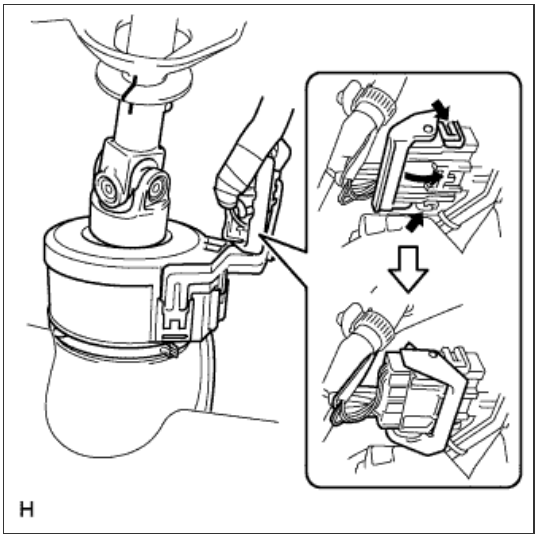
c. Remove the 4 nuts and steering column.



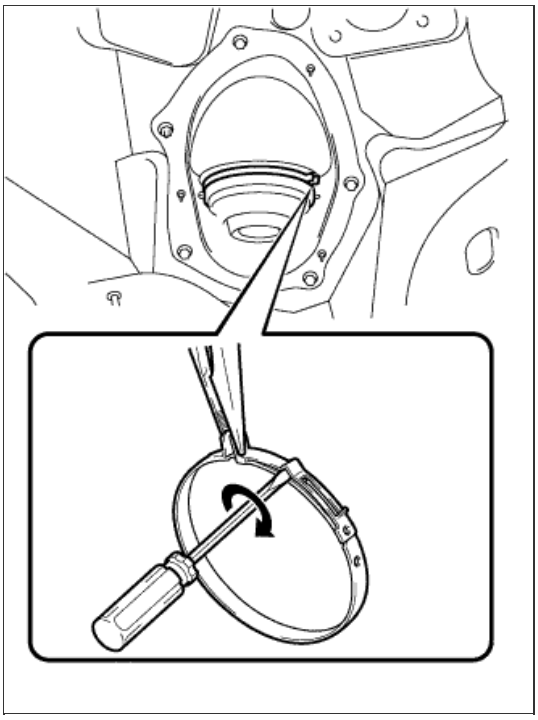
28. REMOVE STEERING ACTUATOR ASSEMBLY

a. While pushing the claws on both sides of the connector, move the lock in the direction of the arrow.

b. Disconnect the connector.

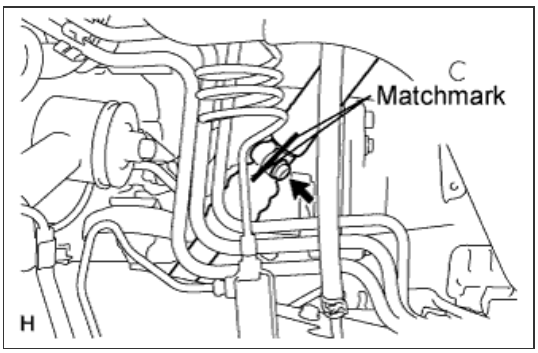


c. Hold the clamp with needle nose pliers, then insert a screwdriver and turn it in the direction shown in the illustration to remove the clamp of the steering column hole cover.



d. Put matchmarks on the steering actuator and No. 2 steering intermediate shaft.

e. Remove the bolt, and then pull out the actuator assembly toward the inside of the vehicle.

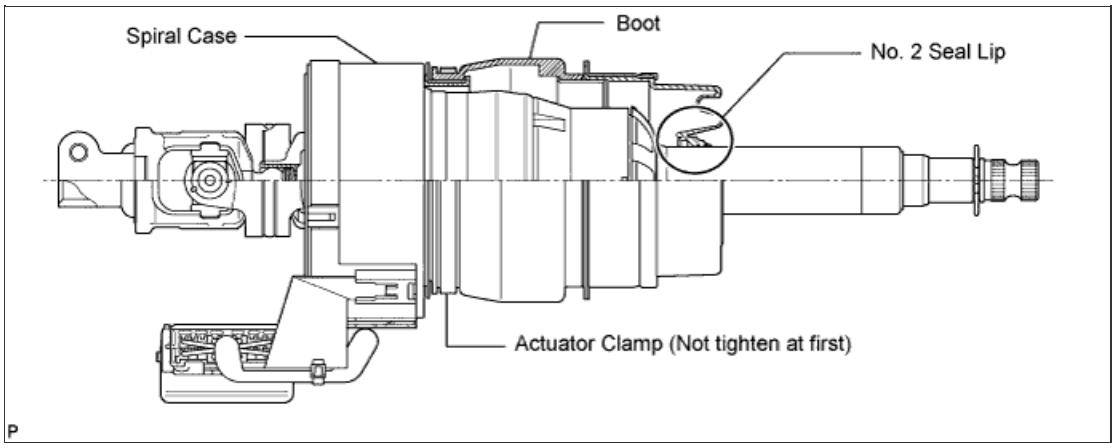


for Preparation Click here

1. HANDLING PRECAUTIONS FOR STEERING ACTUATOR ASSEMBLY

NOTICE:

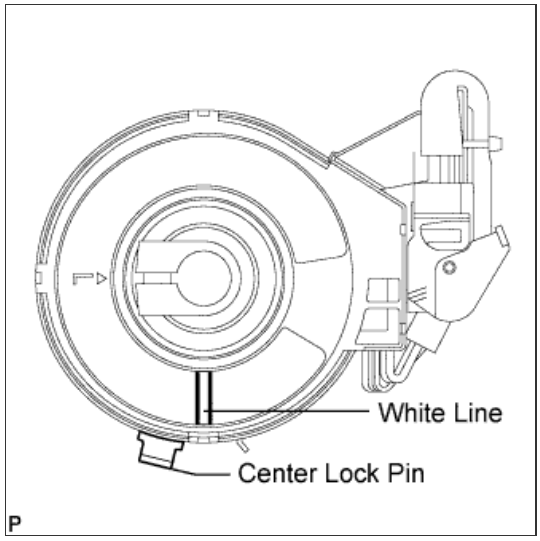
- **Be careful that the No. 2 seal lip or boot does not turn outward while carrying or installing the steering actuator assembly. If installing a new steering actuator assembly, make sure that the spiral center lock pin is securely inserted.**
- **Do not use the steering actuator assembly if it has been dropped.**



2. INSTALL STEERING ACTUATOR ASSEMBLY

a. Make sure that the power steering link assembly is centered.

b. Install the steering actuator assembly.



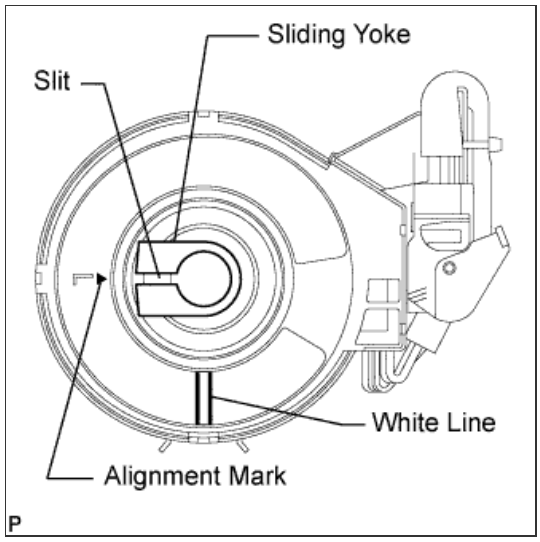
i. If installing a new steering actuator assembly:
Install the steering actuator assembly with the white paint on the upper surface of the spiral case facing down.

NOTICE:

Do not pull out the center lock pin.

ii. If reinstalling the removed steering actuator assembly:

1. Slowly turn the spiral case clockwise until it locks.
2. Turn the spiral case two turns counterclockwise from the lock position.
3. Align the slit of the sliding yoke with the alignment mark (▲).
4. Install the steering actuator assembly with the white paint on the upper surface of the spiral case facing down.



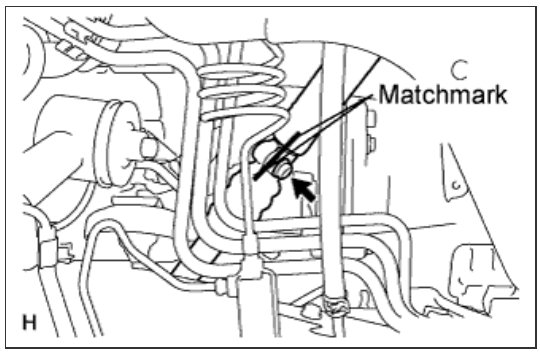
c. Align the matchmarks on the No. 2 steering intermediate shaft and steering actuator.

NOTICE:

- **Do not fold back the boot part of the steering hole cover or turn it excessively. If it is turned excessively, return it to its original position.**
- **Do not turn the actuator body and the spiral case.**

HINT:

Install the steering actuator from the inside of the vehicle.



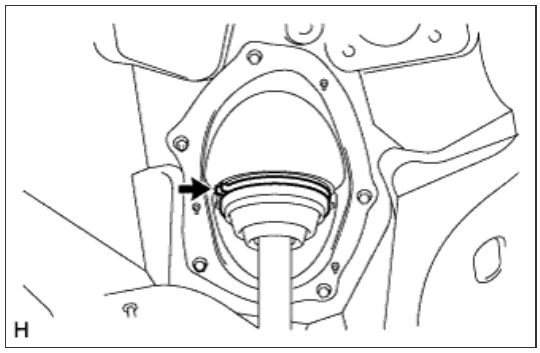
d. Install the bolt.

Torque:
35 N*m{ 360 kgf*cm , 26 ft.*lbf }

e. Using needle nose pliers, lock the clamp to the steering column hole cover to install it.

NOTICE:

Be careful when performing the operation as the clamp may not lock if the claws of the clamp are deformed.

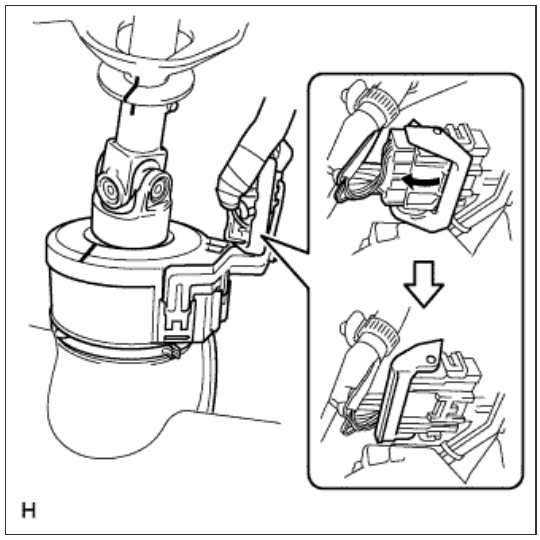


f. Move the lock in the direction of the arrow and connect the steering actuator connector.

HINT:

When a new actuator is installed, remove the center lock pin.

g. Connect the connector.

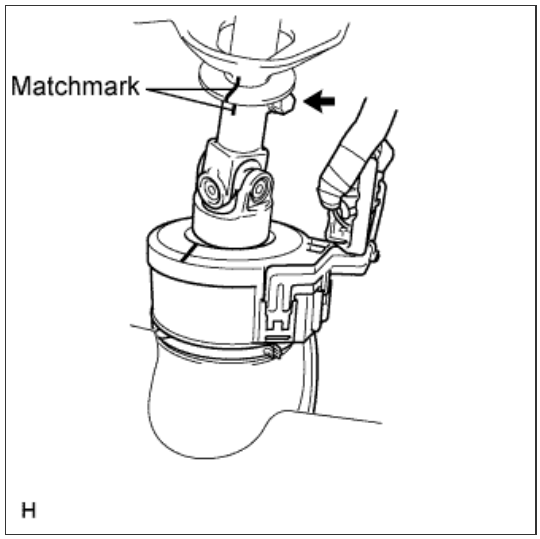


3. INSTALL STEERING COLUMN ASSEMBLY

a. Align the matchmarks on the steering actuator and steering column.

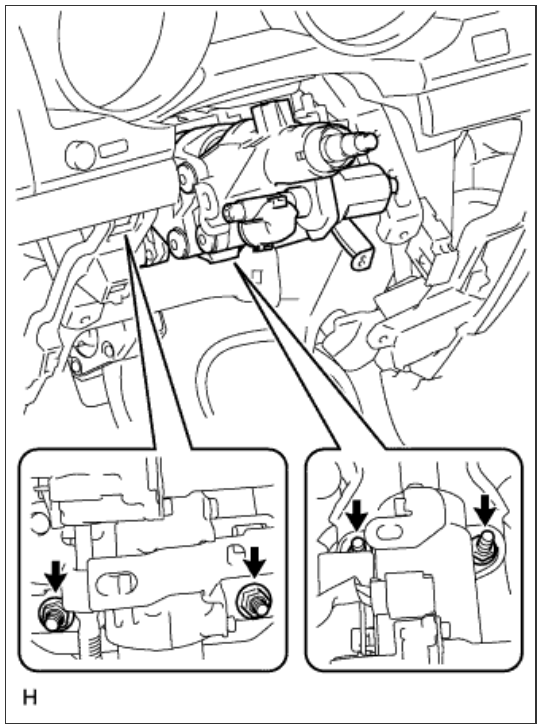
b. Install the bolt.

Torque:
35 N*m{ 360 kgf*cm , 26 ft.*lbf }



c. Install the steering column with the 4 nuts.

Torque:
26 N*m{ 265 kgf*cm , 19 ft.*lbf }



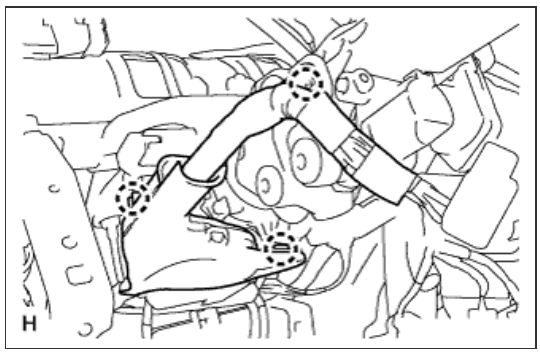
4. INSTALL NO. 3 AIR DUCT SUB-ASSEMBLY

a. Attach the 2 claws to install the duct.

b. Install the clip.

5. CONNECT WIRE HARNESS PROTECTOR AND WIRE HARNESS

a. Attach the 3 claws to connect the wire harness protector and wire harness.



6. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

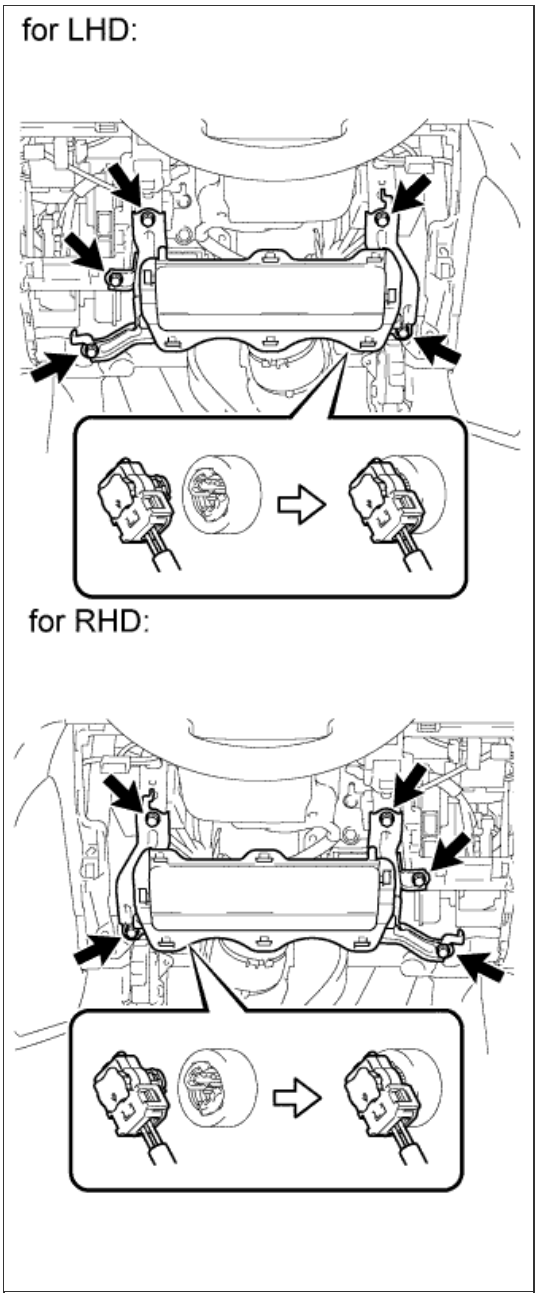
a. Connect the connector.

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.

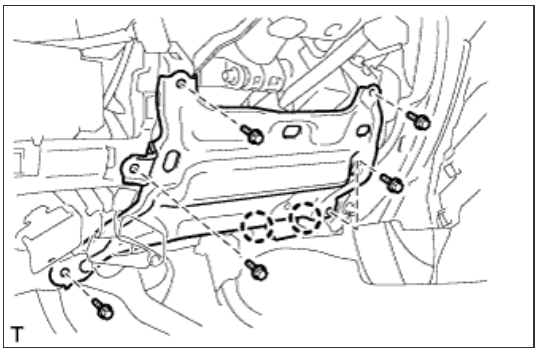
Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



7. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (w/o Driver Side Knee Airbag)

a. Attach the 2 claws and connect the DLC3.

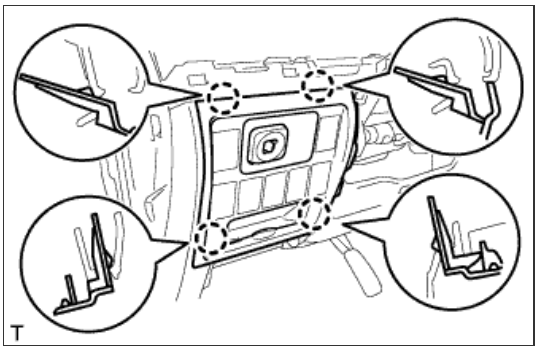
b. Install the lower instrument panel with the 5 bolts.



8. INSTALL NO. 1 SWITCH HOLE BASE

a. Connect the connectors.

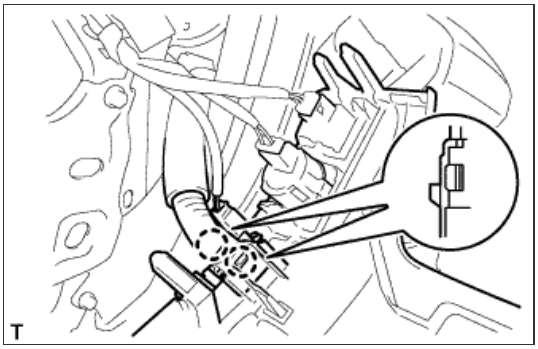
b. Attach the 4 claws to install the No. 1 switch hole base.



9. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

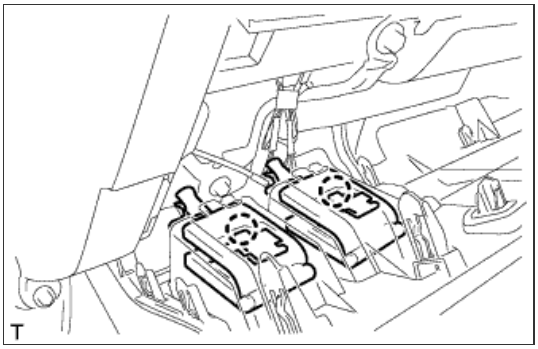
a. Connect the connectors.

b. for Automatic Air Conditioning System:



i. Attach the 2 claws to install the room temperature sensor.

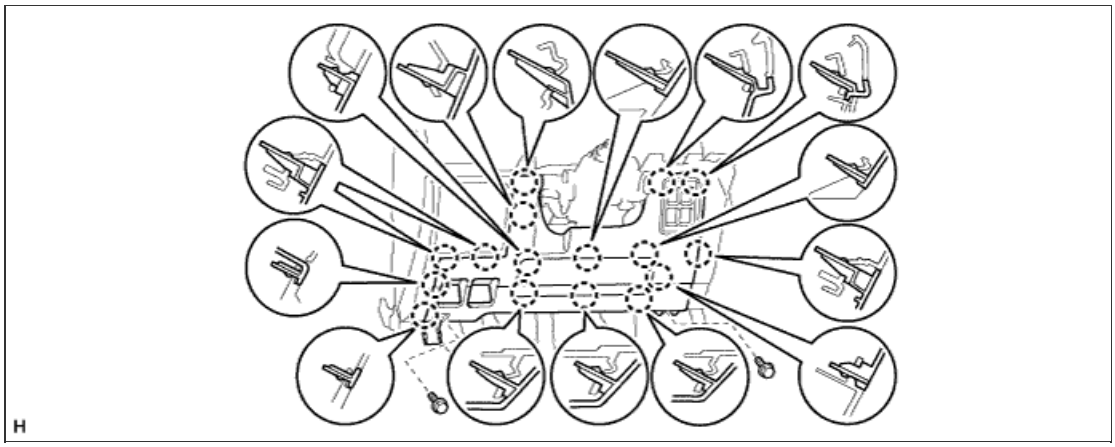
c. Attach the 2 claws to connect the 2 control cables.



d. w/ Driver Side Knee Airbag:

i. Attach the 16 claws to install the lower No. 1 instrument panel finish panel.

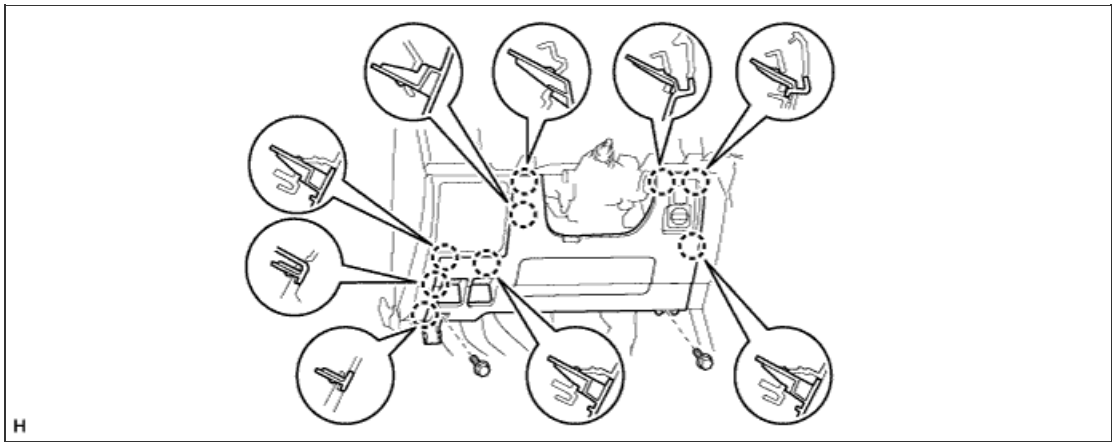
ii. Install the 2 bolts.



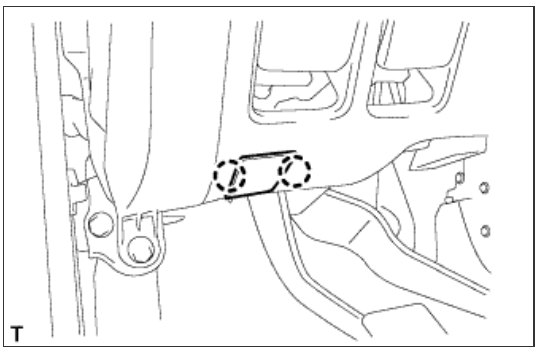
e. w/o Driver Side Knee Airbag:

i. Attach the 9 claws to install the lower No. 1 instrument panel finish panel.

ii. Install the 2 bolts.



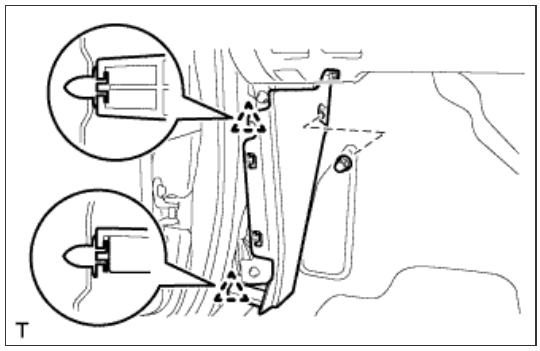
f. Attach the 2 claws to close the hole cover.



10. INSTALL COWL SIDE TRIM BOARD LH

a. Attach the 2 clips to install the cowl side trim board.

b. Install the cap nut.

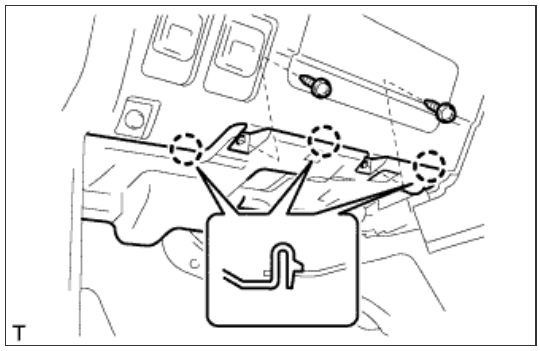


11. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Connect the connectors.

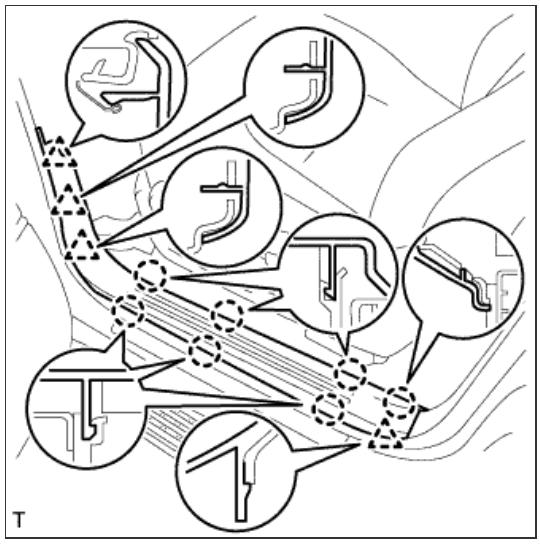
b. Attach the 3 claws to install the No. 1 instrument panel under cover.

c. Install the 2 screws.



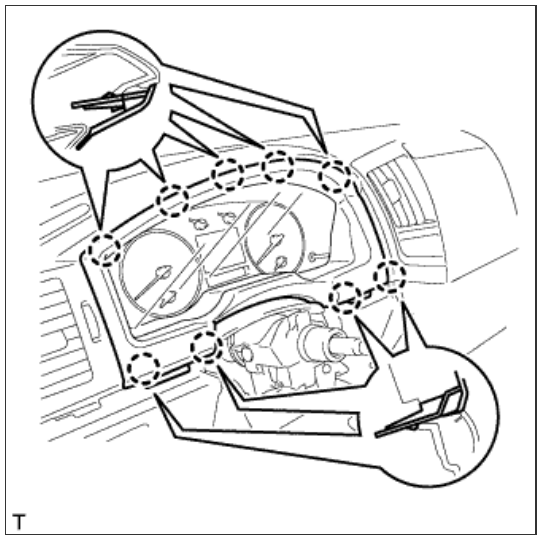
12. INSTALL FRONT DOOR SCUFF PLATE LH

a. Attach the 7 claws and 4 clips to install the scuff plate.



13. INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/o Multi-information Display)

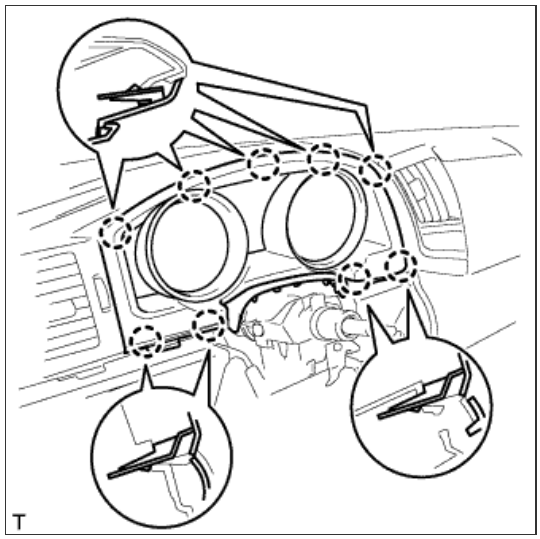
a. Attach the 9 claws to install the instrument cluster finish panel.



14. INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/ Multi-information Display)

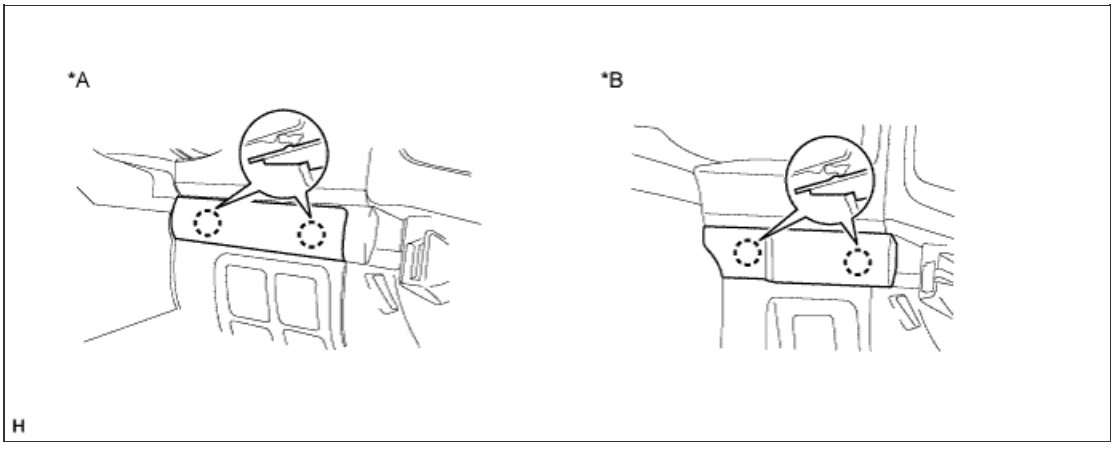
a. Connect the connector.

b. Attach the 9 claws to install the instrument cluster finish panel.



15. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 2 claws to install the No. 2 instrument cluster finish panel garnish.

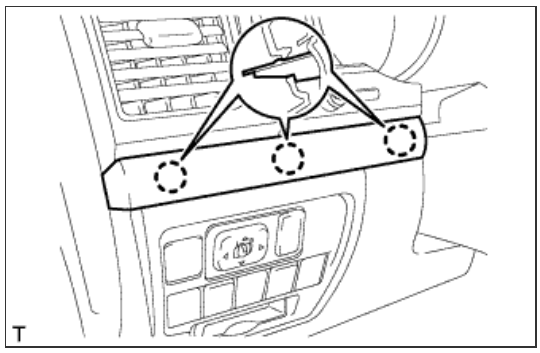


Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System

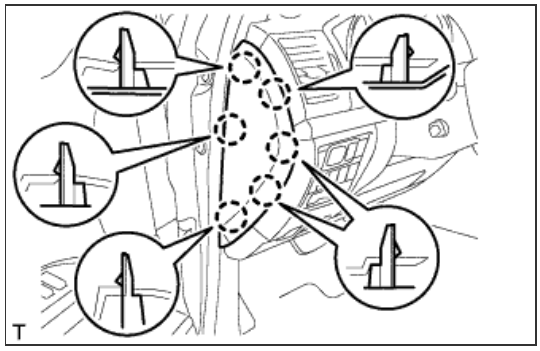
16. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 3 claws to install the No. 1 instrument cluster finish panel garnish.



17. INSTALL INSTRUMENT SIDE PANEL LH

a. Attach the 6 claws to install the instrument side panel.

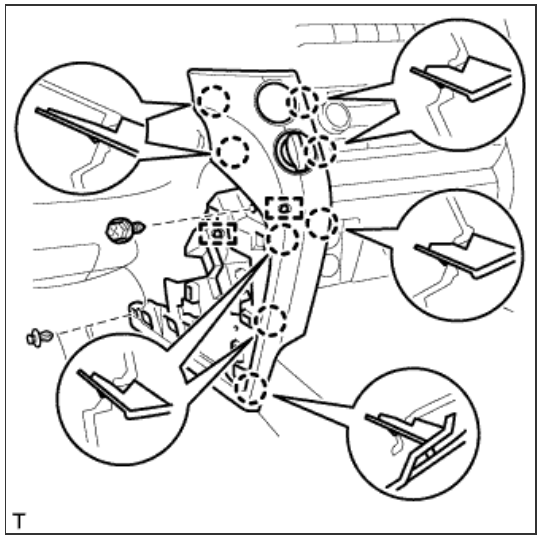


18. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Connect the connectors and attach the 2 clamps.

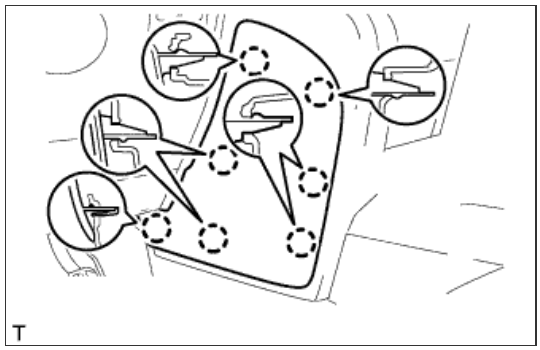
b. Attach the 8 claws to install the lower instrument panel pad sub-assembly.

c. Install the clip and screw.



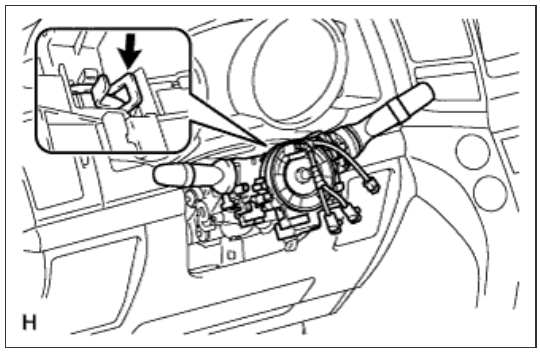
19. INSTALL NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Attach the 7 claws to install the No. 2 instrument panel finish panel cushion.

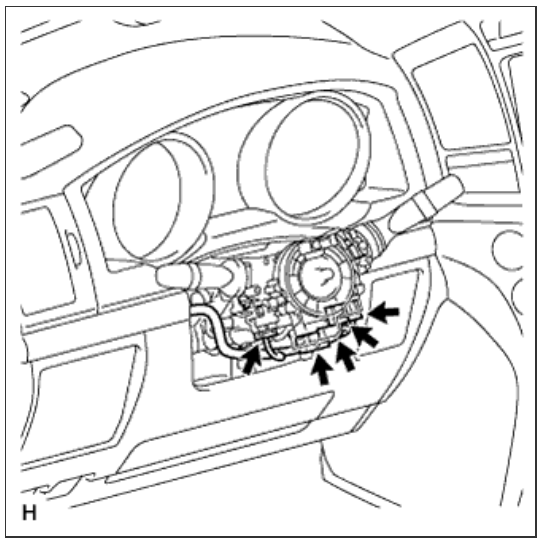


20. INSTALL COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

a. Using pliers, grip the claws of the clamp and install the combination signal switch assembly with spiral cable sub-assembly to the steering column assembly with the clamp.



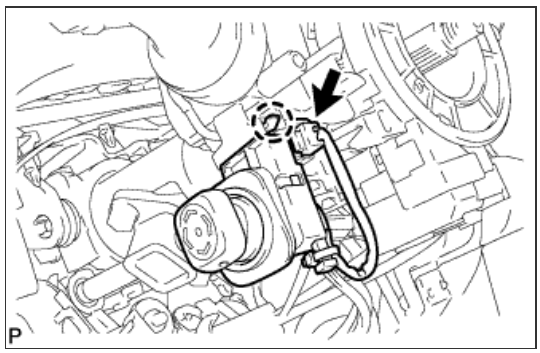
b. Connect the 5 connectors to the combination switch with spiral cable.



21. INSTALL TILT AND TELESCOPIC SWITCH

a. Attach the claw to install the switch.

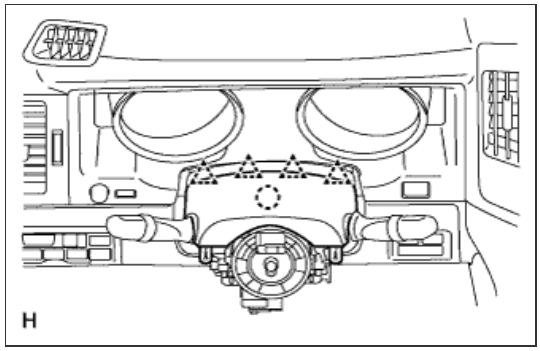
b. Connect the switch connector.



22. INSTALL UPPER STEERING COLUMN COVER

a. Attach the claw to install the upper steering column cover.

b. Attach the 4 clips to the instrument cluster finish panel.



23. INSTALL LOWER STEERING COLUMN COVER

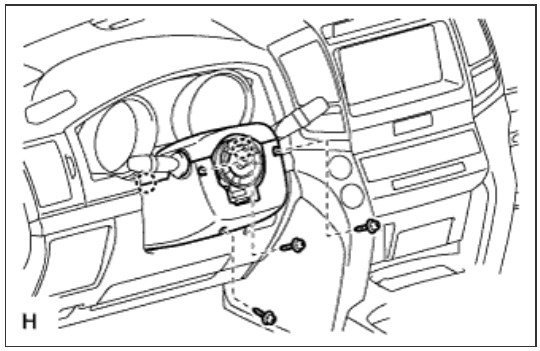
a. Attach the 2 claws to install the lower steering column cover.

NOTICE:

Do not damage the tilt and telescopic switch.

b. Install the 3 screws.

Torque:
1.5 N*m{ 15 kgf*cm , 13 in.*lbf }



24. INSTALL STEERING WHEEL ASSEMBLY

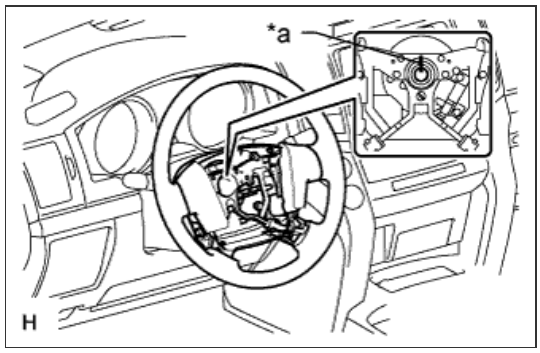
a. Align the matchmarks on the steering wheel assembly and steering main shaft assembly.

Text in Illustration

*a	Matchmark

b. Install the steering wheel assembly set nut.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }



25. INSTALL STEERING PAD

a. Support the steering pad with one hand.

b. Connect the 2 connectors to the steering pad.

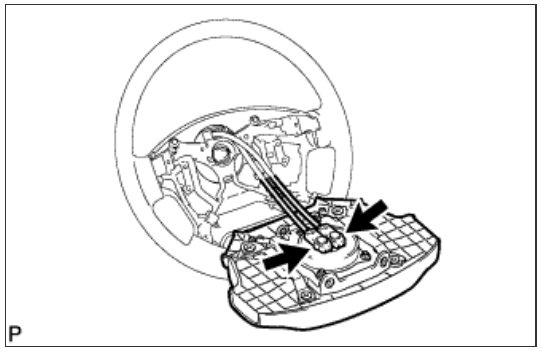
NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

c. Connect the horn connector.

d. Confirm that the circumference groove of the "TORX" screw fits in the screw case, and place the steering pad onto the steering wheel.

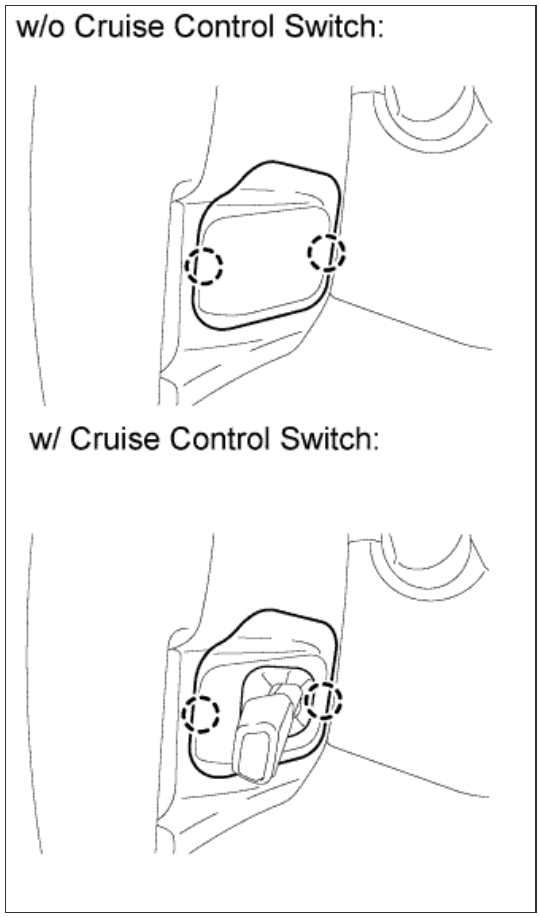
e. Using a T30 "TORX" socket wrench, tighten the 2 screws.



Torque:
8.8 N*m{ 90 kgf*cm , 78 in.*lbf }

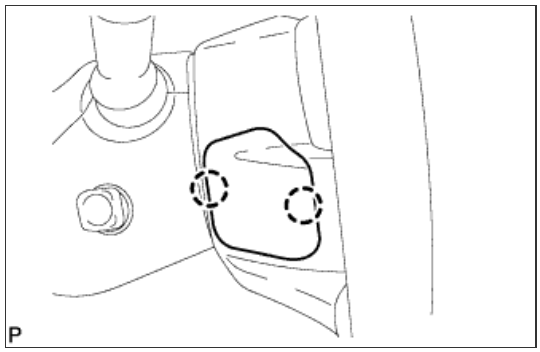
26. INSTALL LOWER NO. 2 STEERING WHEEL COVER

a. Attach the 2 claws to install the cover.



27. INSTALL LOWER NO. 3 STEERING WHEEL COVER

a. Attach the 2 claws to install the cover.



28. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

- **Reset the AUTO TILT AWAY function setting to the previous condition by changing the customize parameter (Click here).**
- **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).**

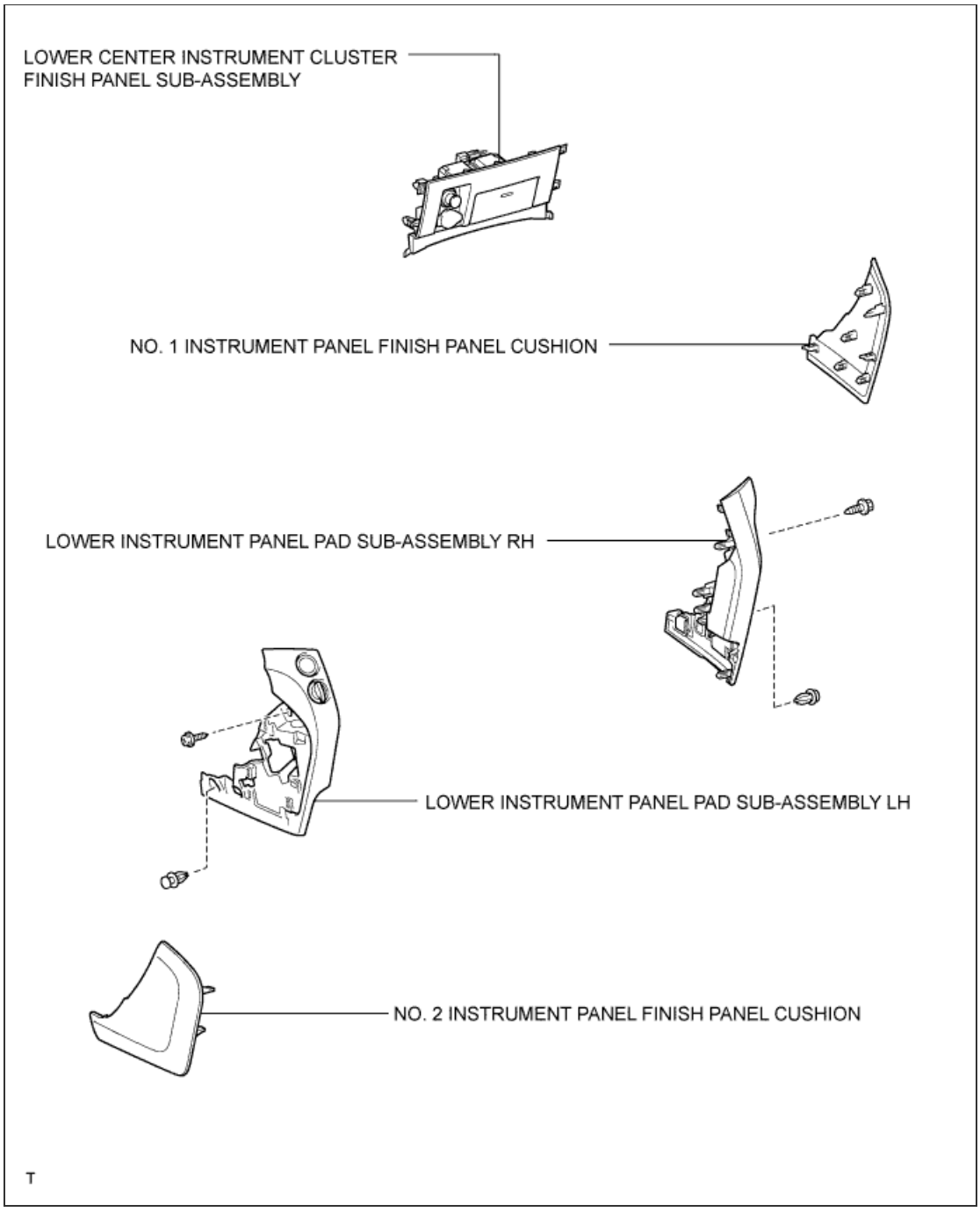
29. INSPECT SRS WARNING LIGHT

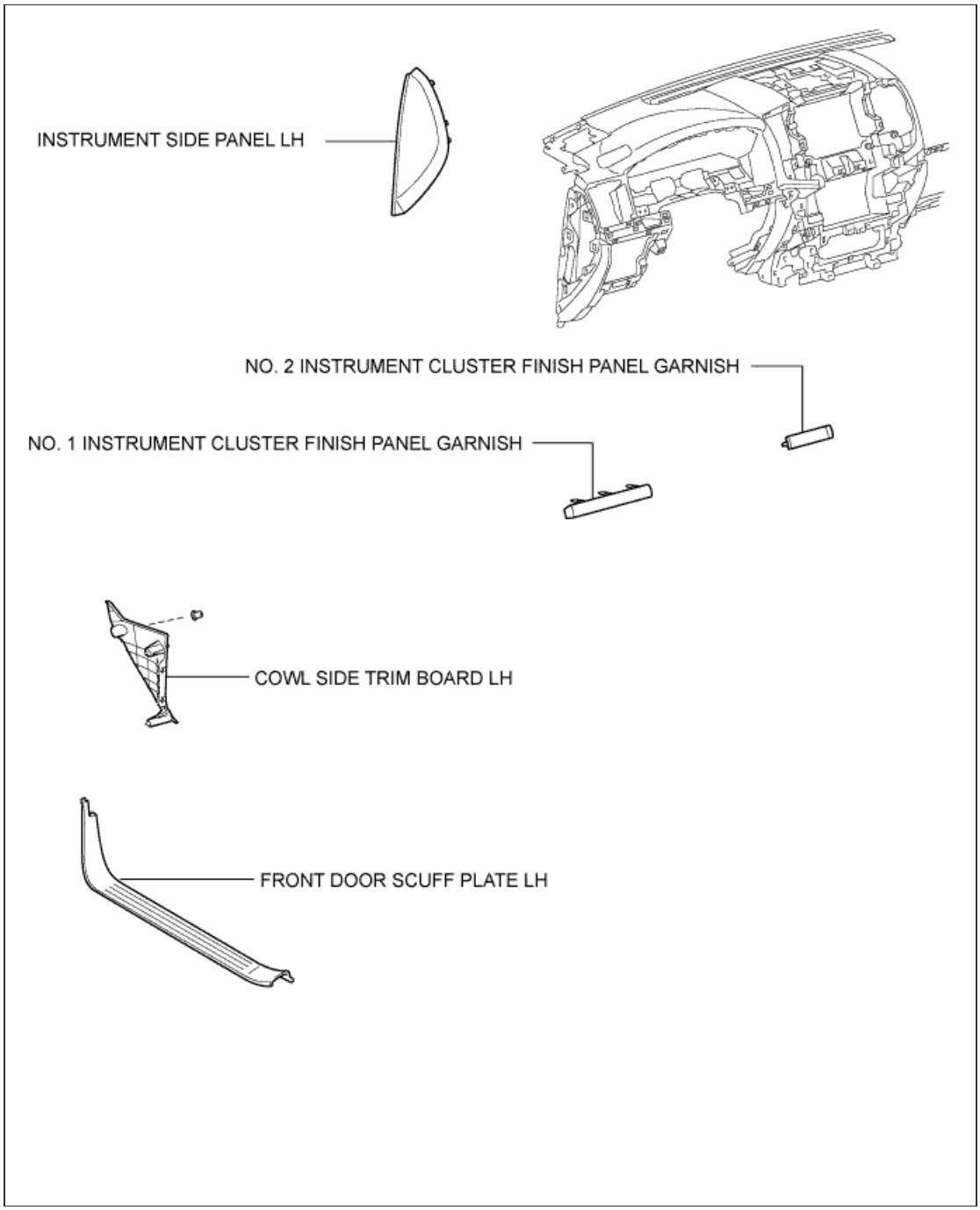
a. Inspect the SRS warning light (Click here).

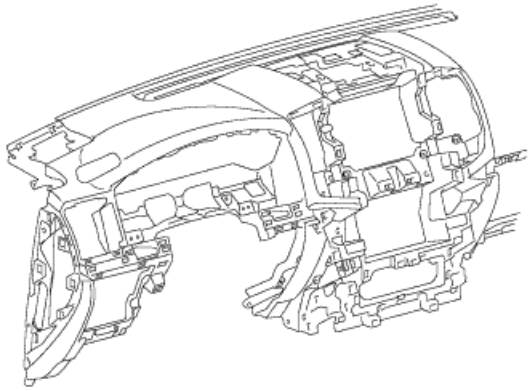
30. PERFORM VARIABLE GEAR RATIO STEERING SYSTEM CALIBRATION

a. Perform variable gear ratio steering system calibration (Click here).

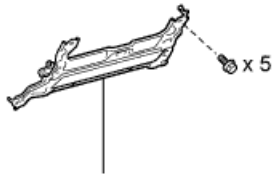
for Preparation Click here




INSTRUMENT SIDE PANEL LH
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
COWL SIDE TRIM BOARD LH
FRONT DOOR SCUFF PLATE LH

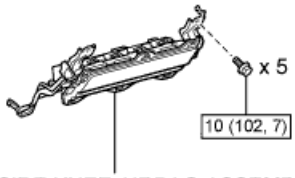


w/o Driver Side Knee Airbag:



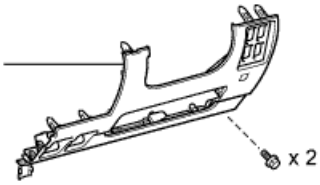
LOWER INSTRUMENT PANEL SUB-ASSEMBLY

w/ Driver Side Knee Airbag:



DRIVER SIDE KNEE AIRBAG ASSEMBLY

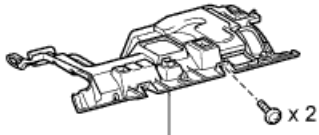
LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL





NO. 1 SWITCH HOLE BASE

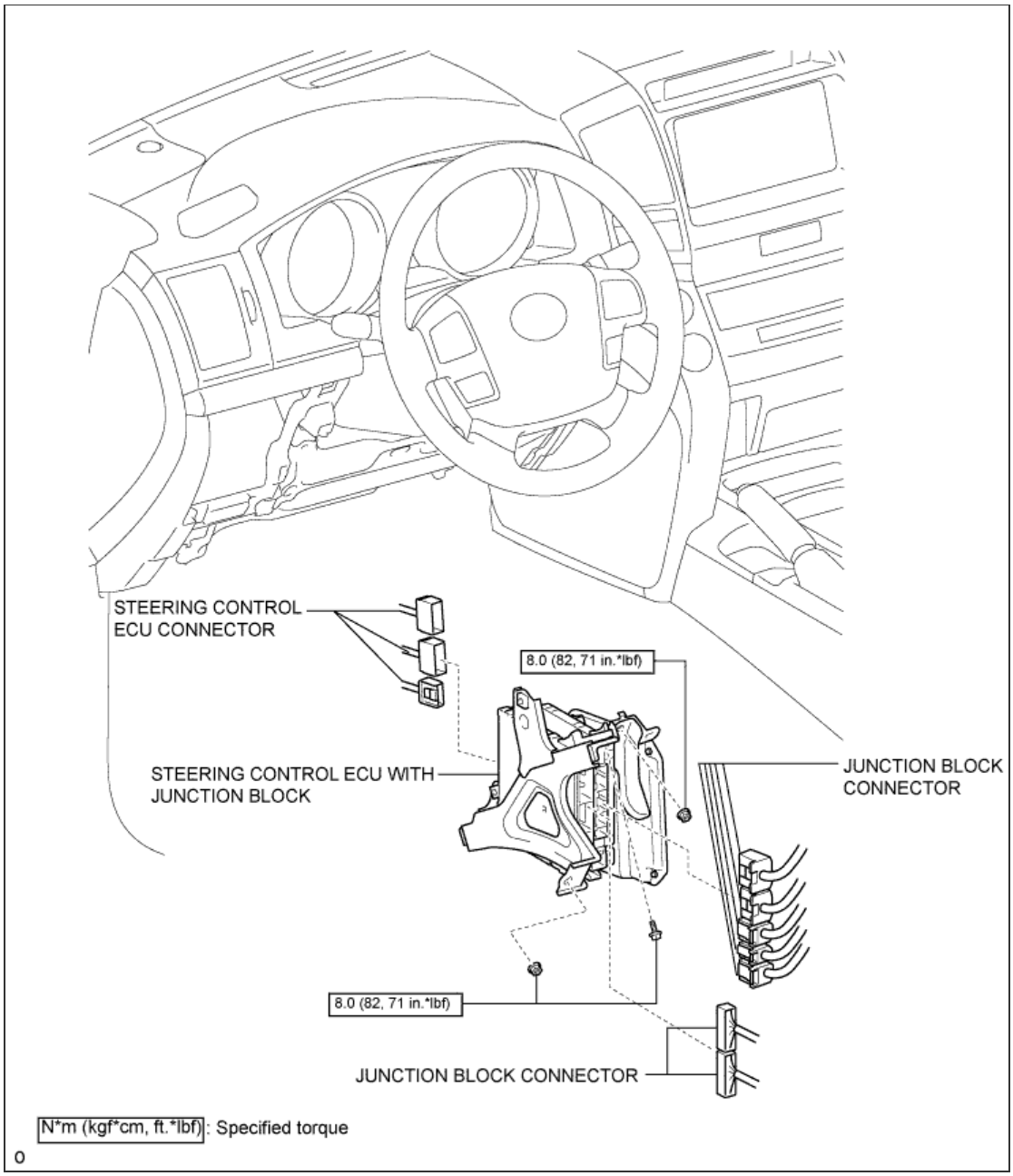
w/ Floor Under Cover:



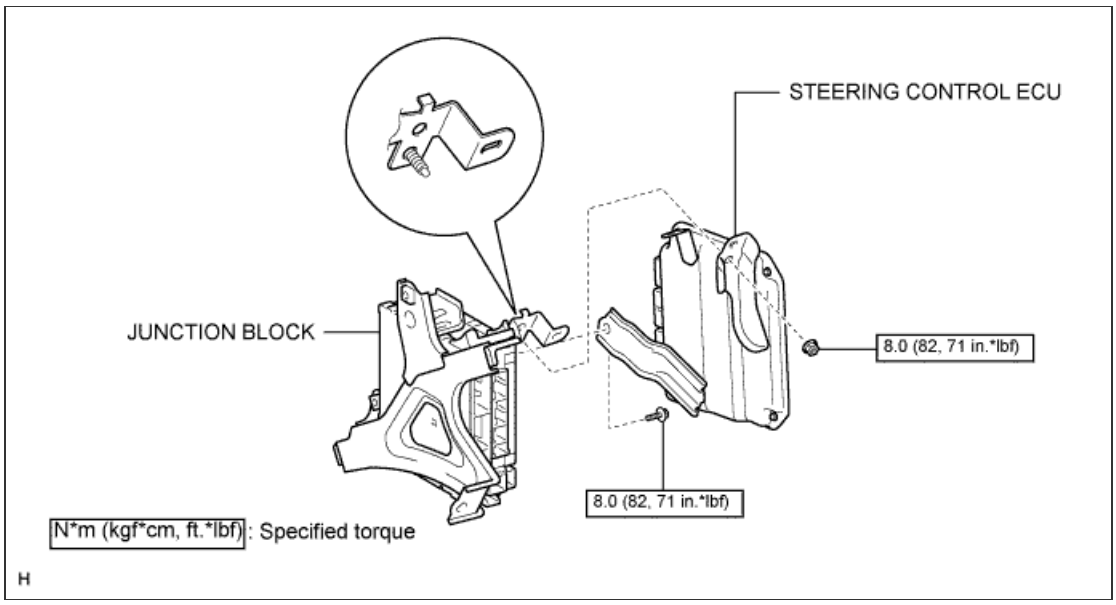
NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

N*m (kgf*cm, ft.*lbf) : Specified torque

T


STEERING CONTROL
ECU CONNECTOR
8.0 (82, 71 in.*lbf)
STEERING CONTROL ECU WITH
JUNCTION BLOCK
JUNCTION BLOCK
CONNECTOR
8.0 (82, 71 in.*lbf)
JUNCTION BLOCK CONNECTOR
N*m (kgf*cm, ft.*lbf): Specified torque

O


STEERING CONTROL ECU
JUNCTION BLOCK
8.0 (82, 71 in.*lbf)
8.0 (82, 71 in.*lbf)
N*m (kgf*cm, ft.*lbf): Specified torque

H

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:

- **After the engine switch is turned off, the navigation system requires approximately 90 seconds to record various types of memory and settings. As a result, after turning the engine switch off, wait 90 seconds or more before disconnecting the cable from the negative (-) battery terminal.**
- **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).**

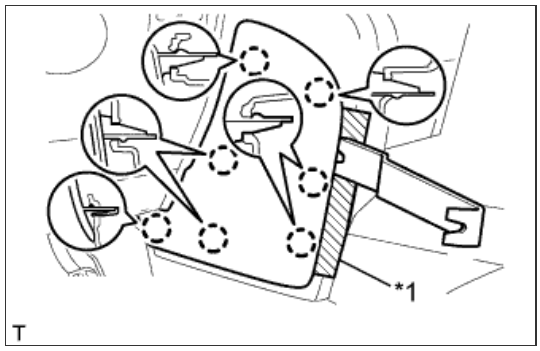
2. REMOVE NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Put protective tape around the No. 2 instrument panel finish panel cushion.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 7 claws and remove the No. 2 instrument panel finish panel cushion.

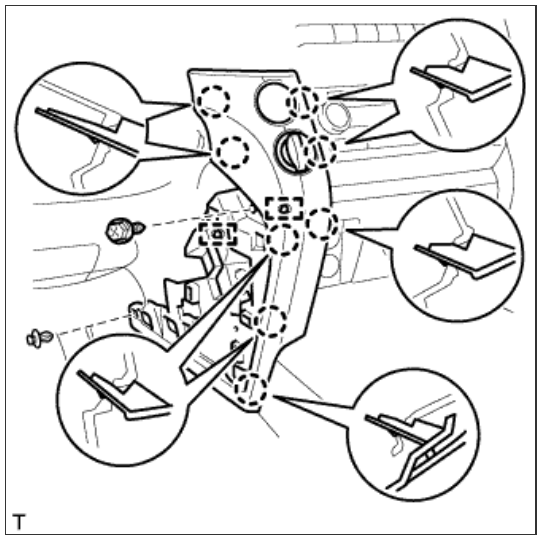


3. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Remove the clip and screw.

b. Detach the 8 claws.

c. Disconnect the connectors, detach the 2 clamps and remove the lower instrument panel pad sub-assembly.



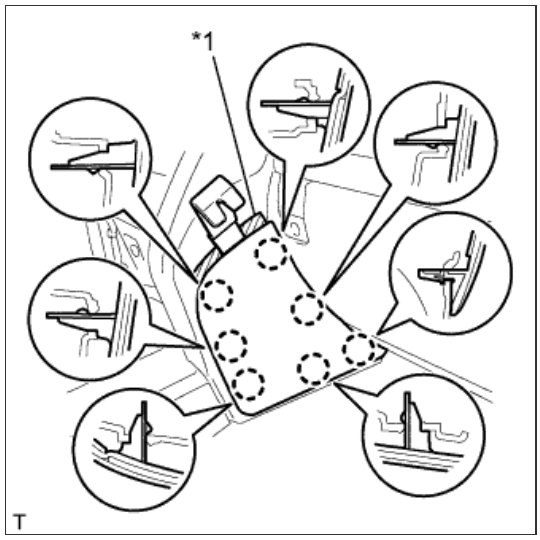
4. REMOVE NO. 1 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Put protective tape around the No. 1 instrument panel finish panel cushion.

Text in Illustration

*1	Protective Tape

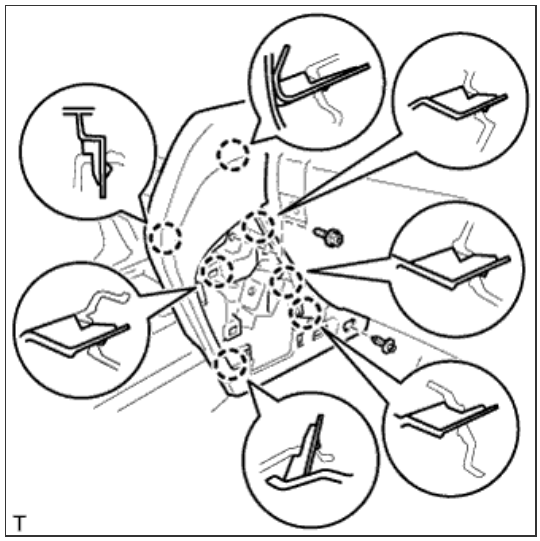
b. Using a moulding remover, detach the 7 claws and remove the No. 1 instrument panel finish panel cushion.



5. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH

a. Remove the clip and screw.

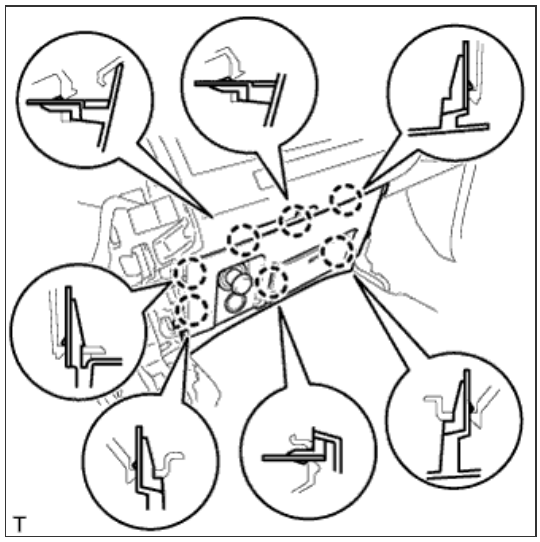
b. Detach the 7 claws and remove the lower instrument panel pad sub-assembly.



6. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

a. Detach the 7 claws.

b. Disconnect the connectors and remove the lower center instrument cluster finish panel sub-assembly.



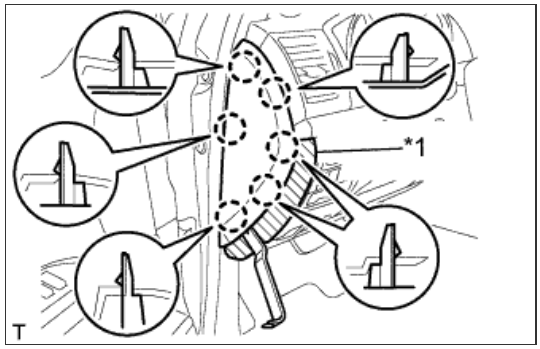
7. REMOVE INSTRUMENT SIDE PANEL LH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 6 claws and remove the instrument side panel.



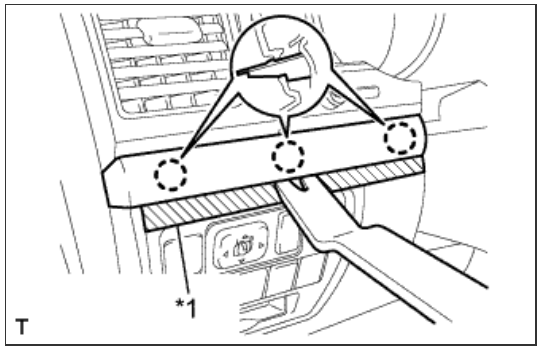
8. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

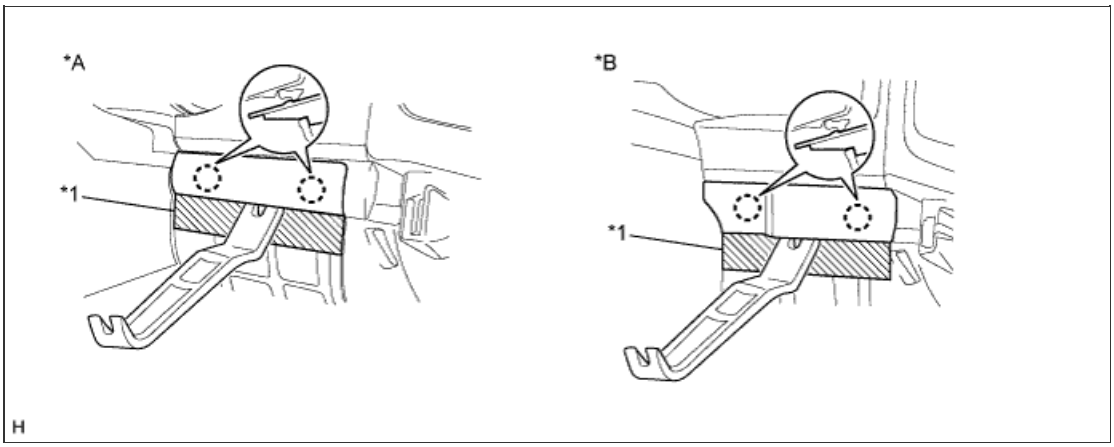
b. Using a moulding remover, detach the 3 claws and remove the No. 1 instrument cluster finish panel garnish.



9. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

b. Using a moulding remover, detach the 2 claws and remove the No. 2 instrument cluster finish panel garnish.



Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System
*1	Protective Tape	-	-

10. REMOVE FRONT DOOR SCUFF PLATE LH

HINT:

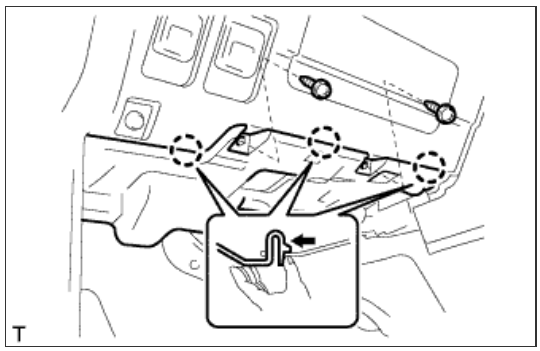
Use the same procedures described for the LH side.

11. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Remove the 2 screws.

b. Detach the 3 claws.

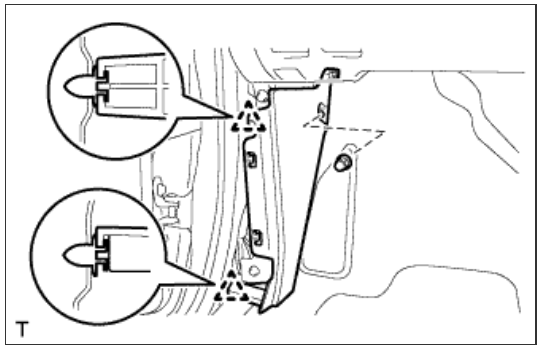
c. Disconnect the connectors and remove the No. 1 instrument panel under cover.



12. REMOVE COWL SIDE TRIM BOARD LH

a. Remove the cap nut.

b. Detach the 2 clips and remove the cowl side trim board.



13. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

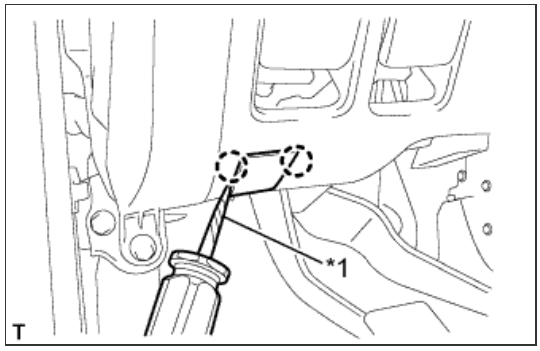
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

Tape the screwdriver tip before use.

Text in Illustration

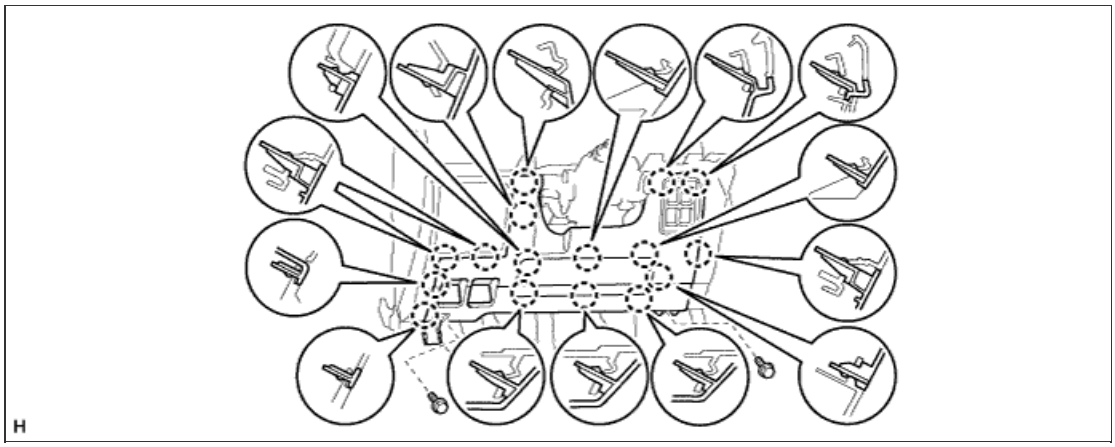
*1	Protective Tape



b. w/ Driver Side Knee Airbag:

i. Remove the 2 bolts.

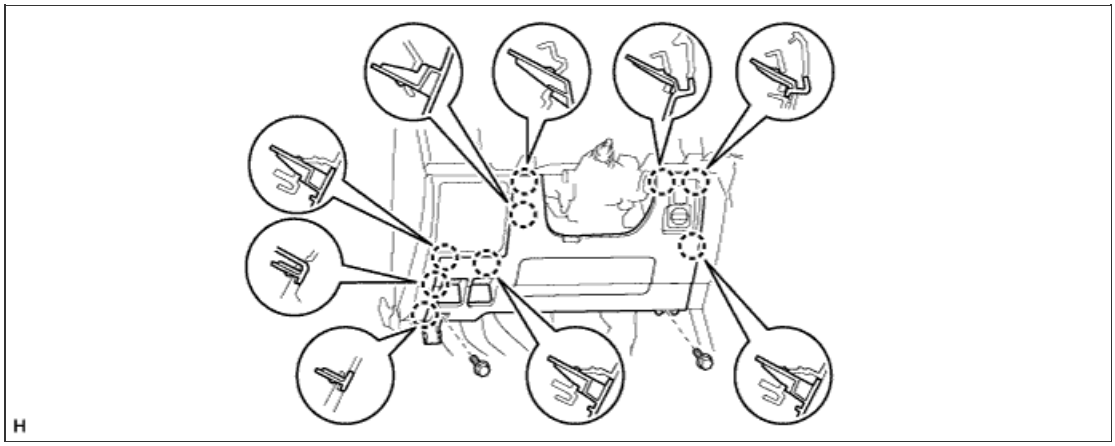
ii. Detach the 16 claws.



c. w/o Driver Side Knee Airbag:

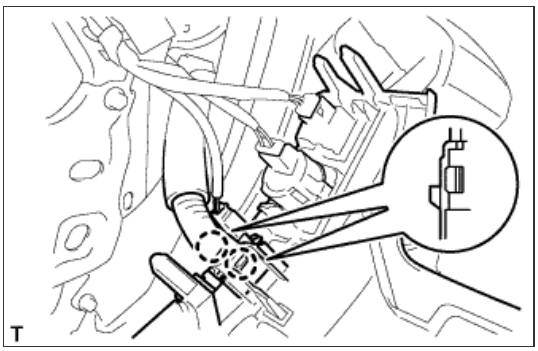
i. Remove the 2 bolts.

ii. Detach the 9 claws.



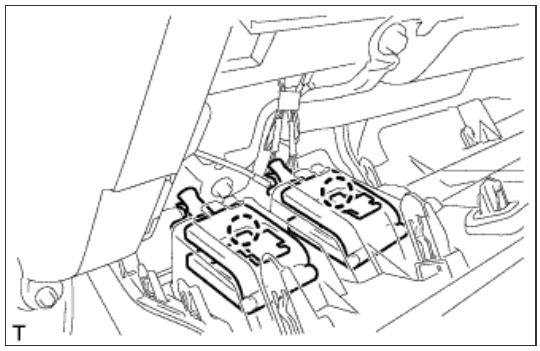
d. for Automatic Air Conditioning System:

i. Detach the 2 claws and remove the room temperature sensor.



e. Detach the 2 claws and disconnect the 2 control cables.

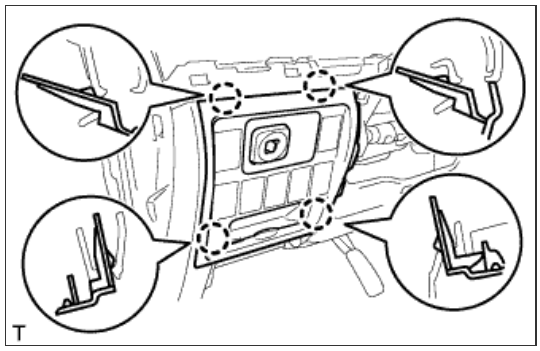
f. Disconnect the connectors and remove the lower No. 1 instrument panel finish panel.



14. REMOVE NO. 1 SWITCH HOLE BASE

a. Detach the 4 claws.

b. Disconnect the connectors and remove the No. 1 switch hole cover.



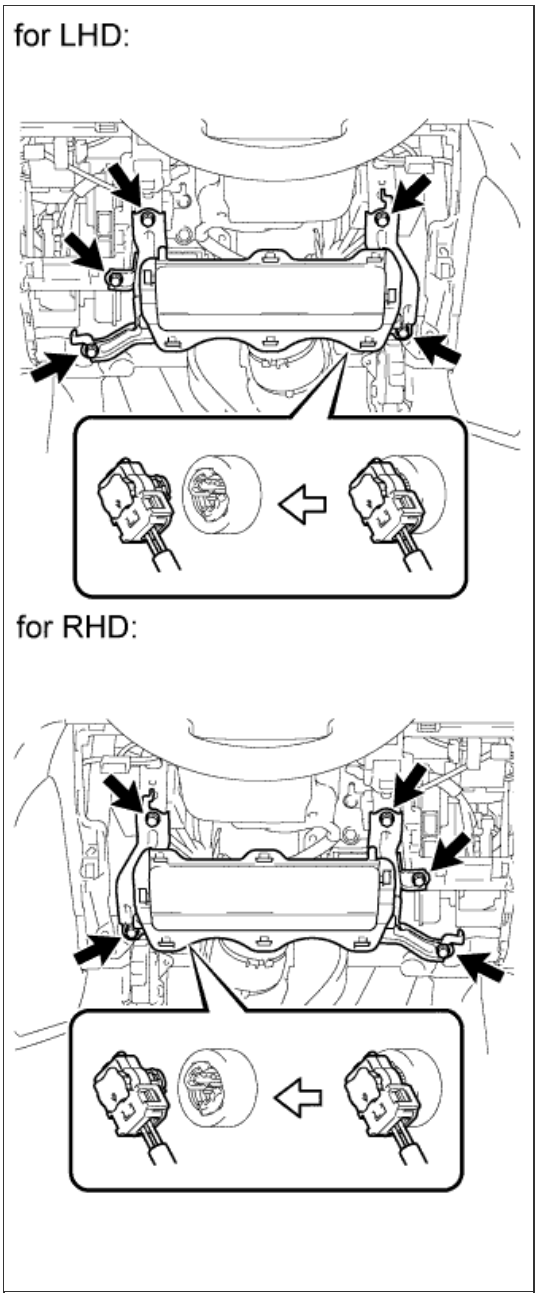
15. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

a. Remove the 5 bolts and driver side knee airbag.

b. Disconnect the connector.

NOTICE:

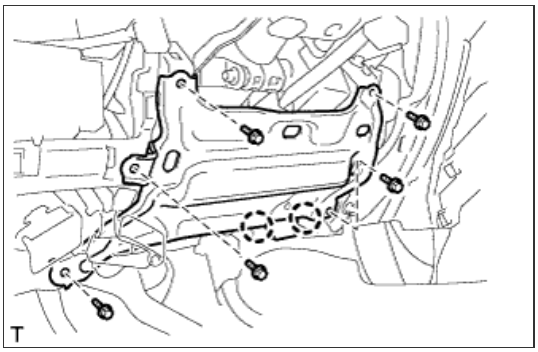
When handling the airbag connector, take care not to damage the airbag wire harness.



16. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (w/o Driver Side Knee Airbag)

a. Detach the 2 claws and disconnect the DLC3.

b. Remove the 5 bolts and lower instrument panel.



17. REMOVE STEERING CONTROL ECU WITH JUNCTION BLOCK

a. Rear Side:

i. Disconnect the 7 connectors.

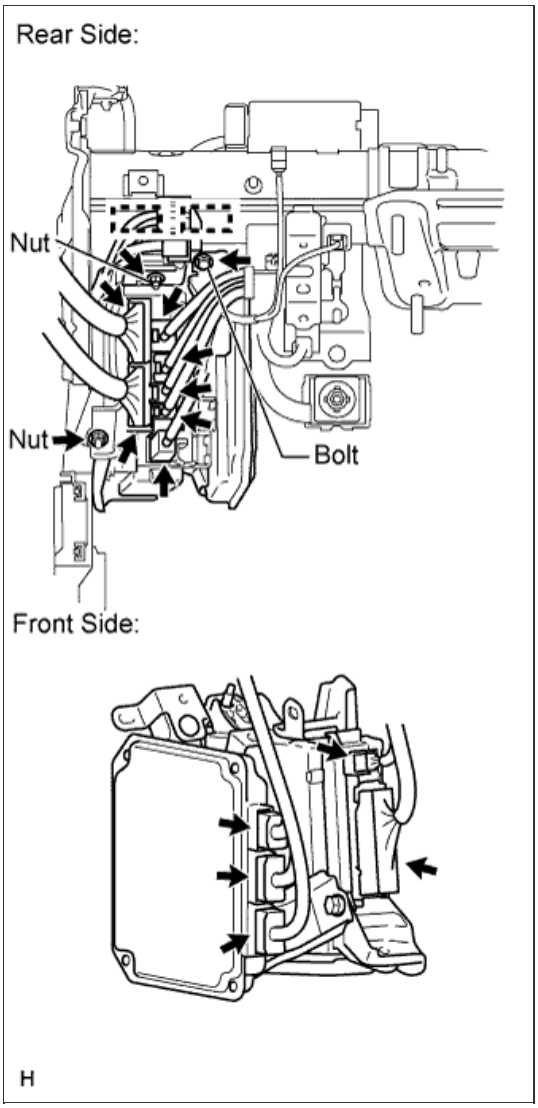
ii. Detach the 2 clamps.

iii. Remove the bolt and 2 nuts.

b. Front Side:

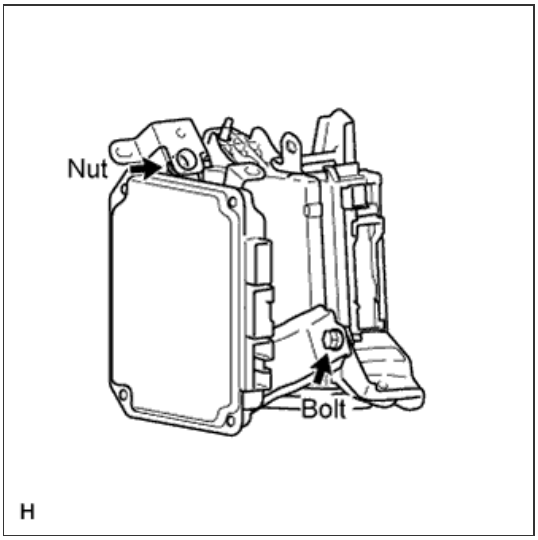
i. Disconnect the 5 connectors.

c. Remove the steering control ECU with junction block.



18. REMOVE STEERING CONTROL ECU

a. Remove the bolt, nut and steering control ECU from the junction block.

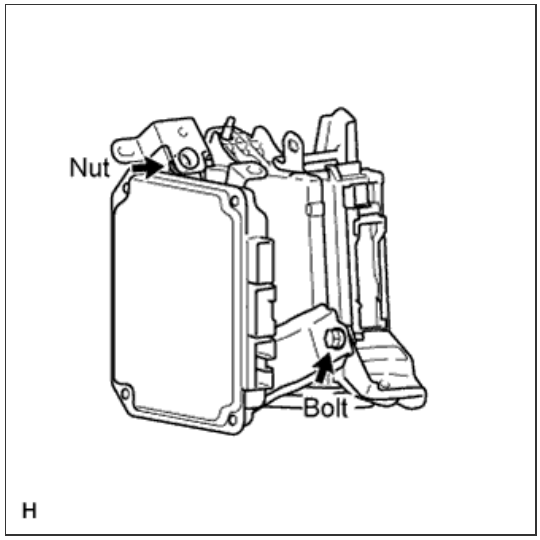


for Preparation Click here

1. INSTALL STEERING CONTROL ECU

a. Install the steering control ECU to the junction block with the bolt and nut.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }



2. INSTALL STEERING CONTROL ECU WITH JUNCTION BLOCK

a. Front side:

i. Connect the 5 connectors.

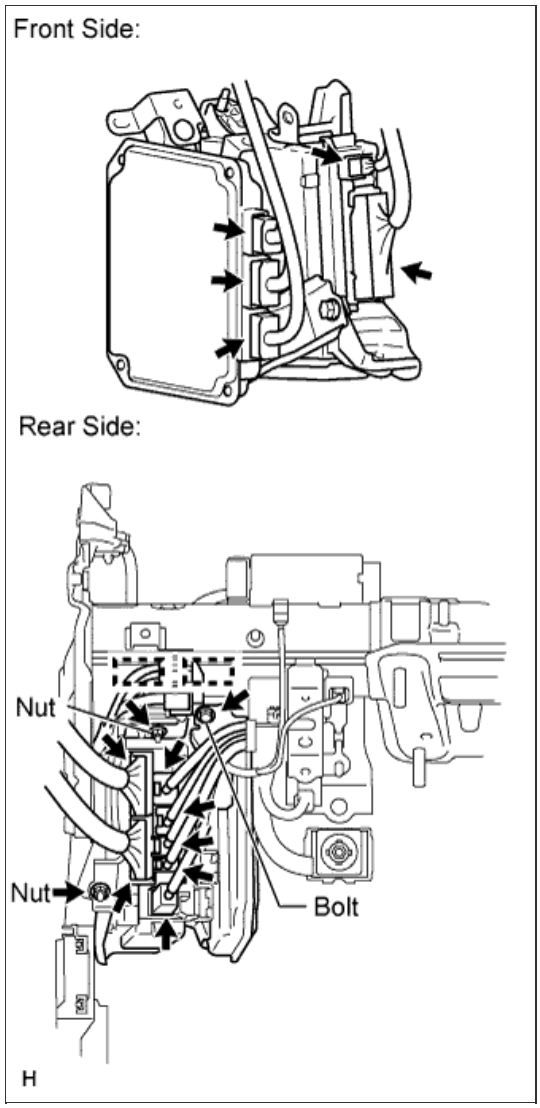
b. Rear side:

i. Install the steering control ECU with junction block with the bolt and 2 nuts.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

ii. Attach the 2 clamps.

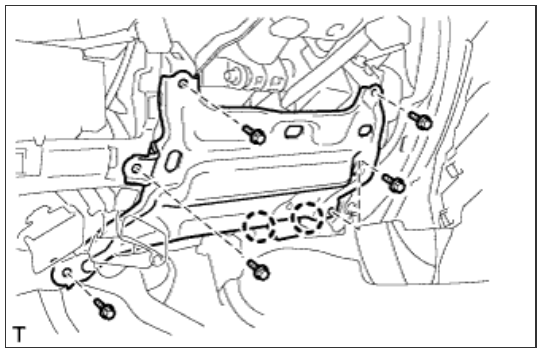
iii. Connect the 7 connectors.



3. INSTALL LOWER INSTRUMENT PANEL (w/o Driver Side Knee Airbag)

a. Attach the 2 claws and connect the DLC3.

b. Install the lower instrument panel with the 5 bolts.



4. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

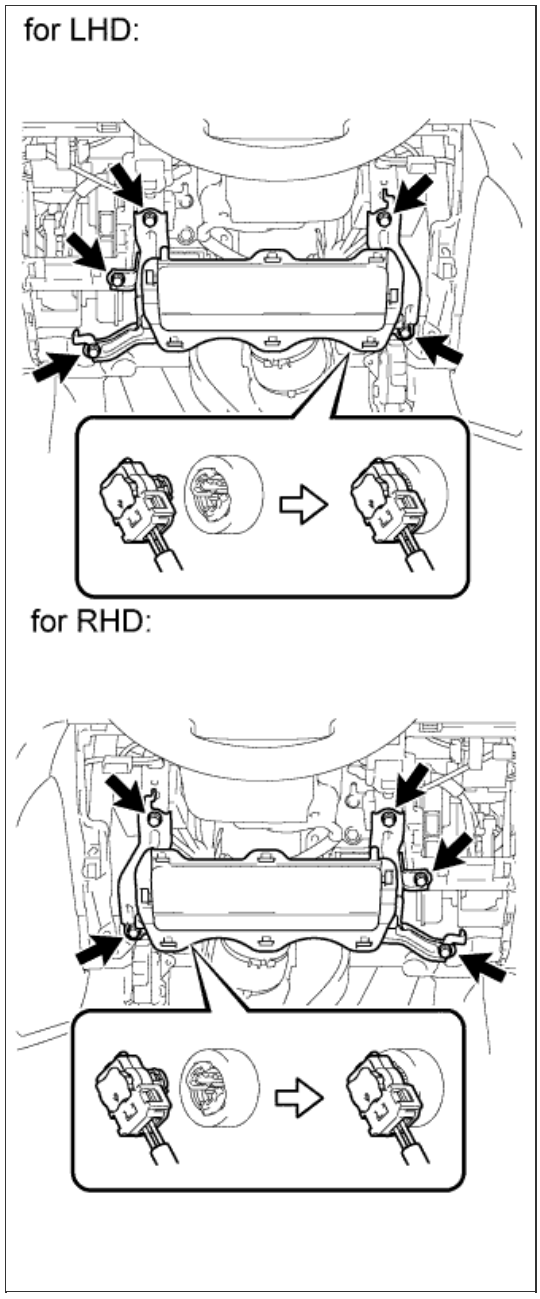
a. Connect the connector.

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.

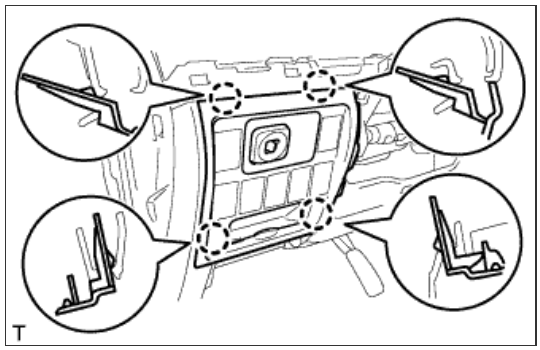
Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



5. INSTALL NO. 1 SWITCH HOLE BASE

a. Connect the connectors.

b. Attach the 4 claws to install the No. 1 switch hole base.

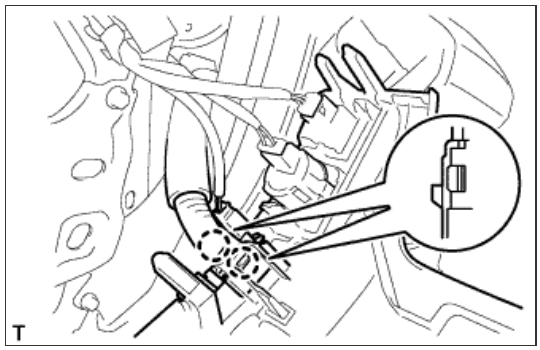


6. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

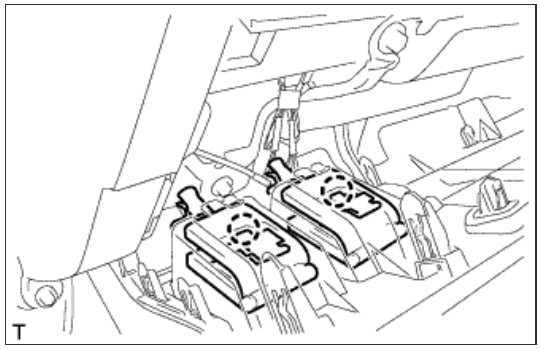
a. Connect the connectors.

b. for Automatic Air Conditioning System:

i. Attach the 2 claws to install the room temperature sensor.



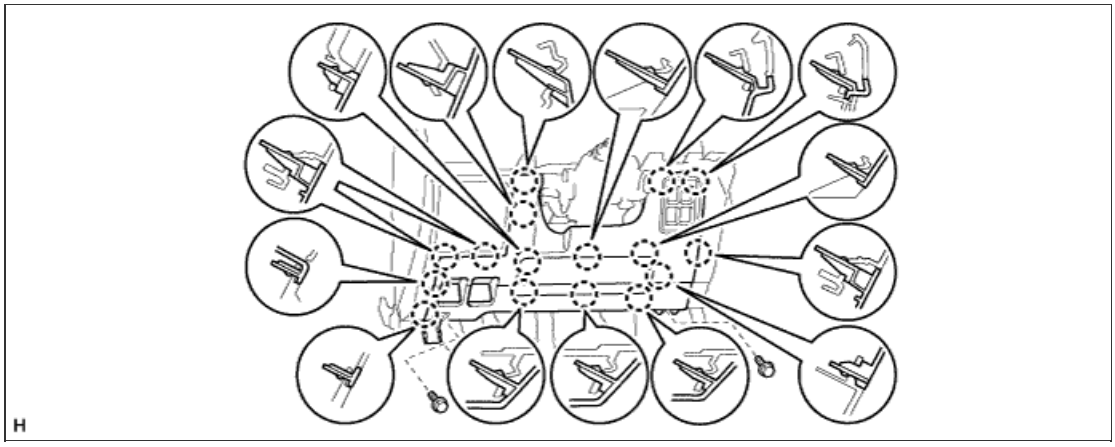
c. Attach the 2 claws to connect the 2 control cables.



d. w/ Driver Side Knee Airbag:

i. Attach the 16 claws to install the lower No. 1 instrument panel finish panel.

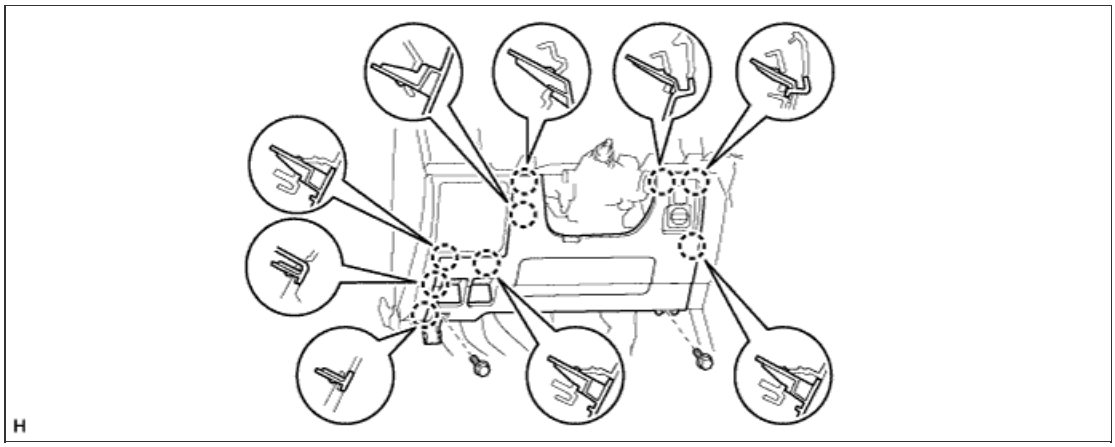
ii. Install the 2 bolts.



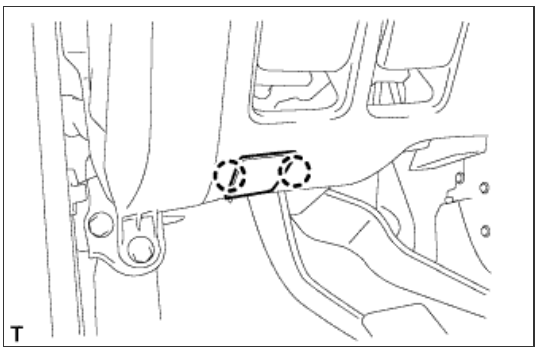
e. w/o Driver Side Knee Airbag:

i. Attach the 9 claws to install the lower No. 1 instrument panel finish panel.

ii. Install the 2 bolts.



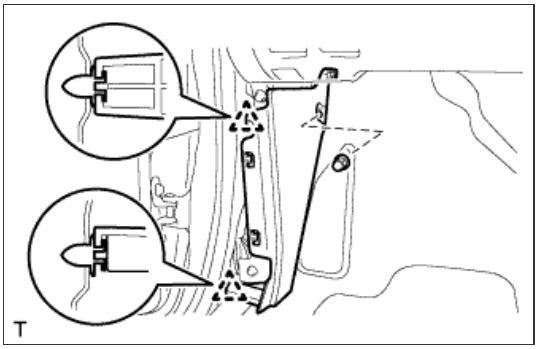
f. Attach the 2 claws to close the hole cover.



7. INSTALL COWL SIDE TRIM BOARD LH

a. Attach the 2 clips to install the cowl side trim board.

b. Install the cap nut.

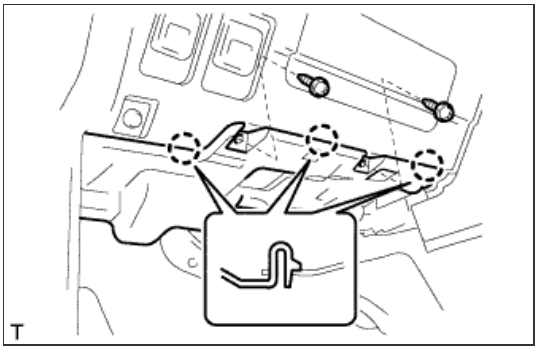


8. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Connect the connectors.

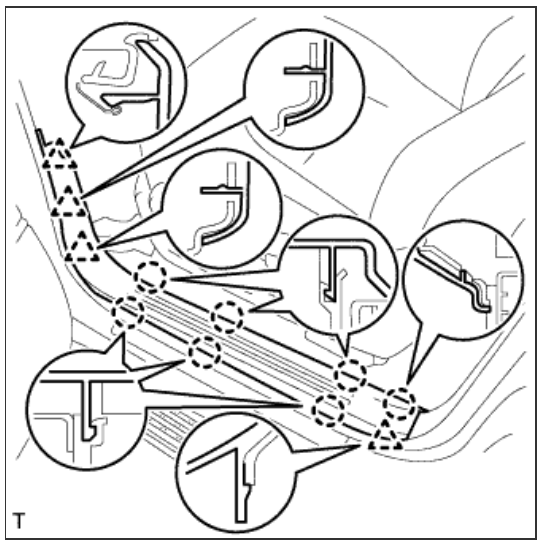
b. Attach the 3 claws to install the No. 1 instrument panel under cover.

c. Install the 2 screws.



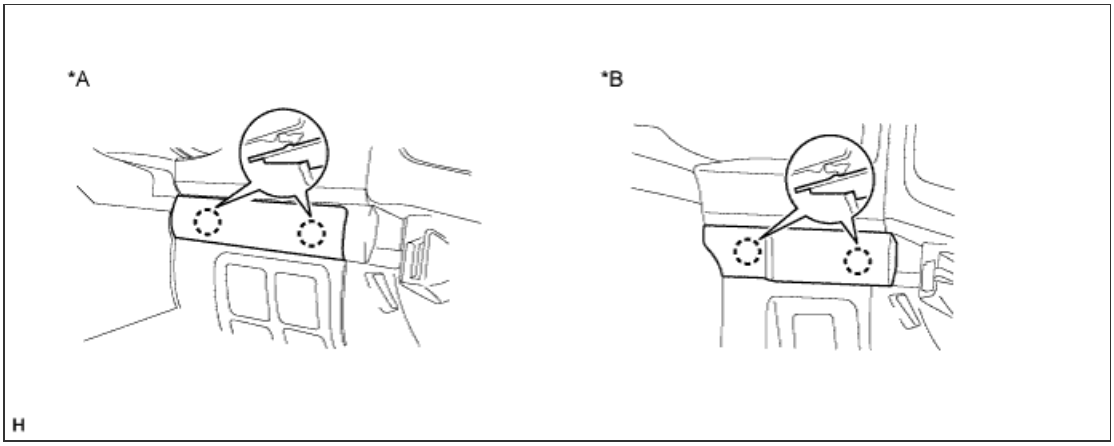
9. INSTALL FRONT DOOR SCUFF PLATE LH

a. Attach the 7 claws and 4 clips to install the scuff plate.



10. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 2 claws to install the No. 2 instrument cluster finish panel garnish.

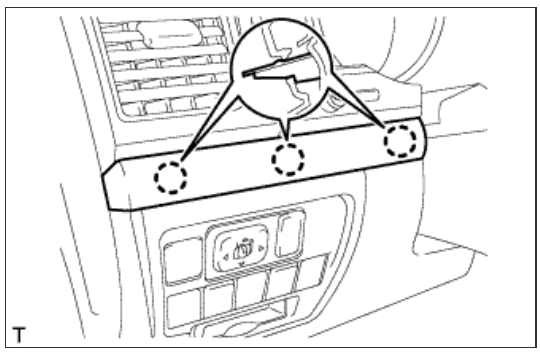


Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System

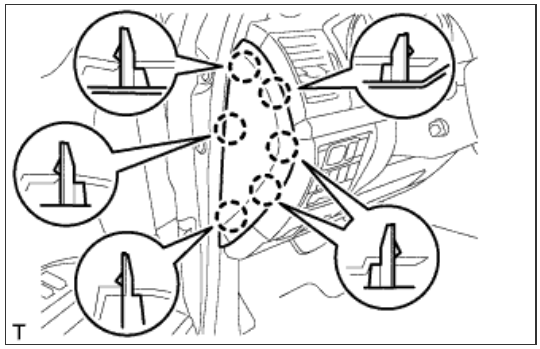
11. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 3 claws to install the No. 1 instrument cluster finish panel garnish.



12. INSTALL INSTRUMENT SIDE PANEL LH

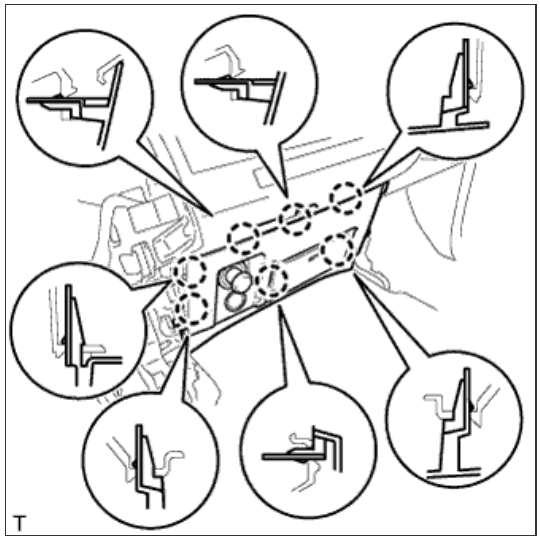
a. Attach the 6 claws to install the instrument side panel.



13. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

a. Connect the connectors.

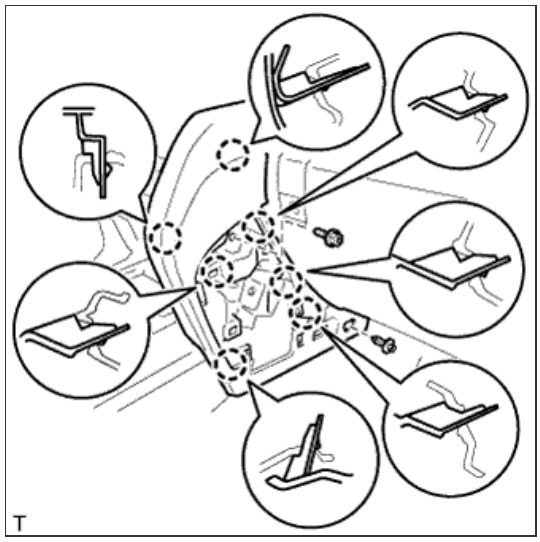
b. Attach the 7 claws to install the lower center instrument cluster finish panel sub-assembly.



14. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY RH

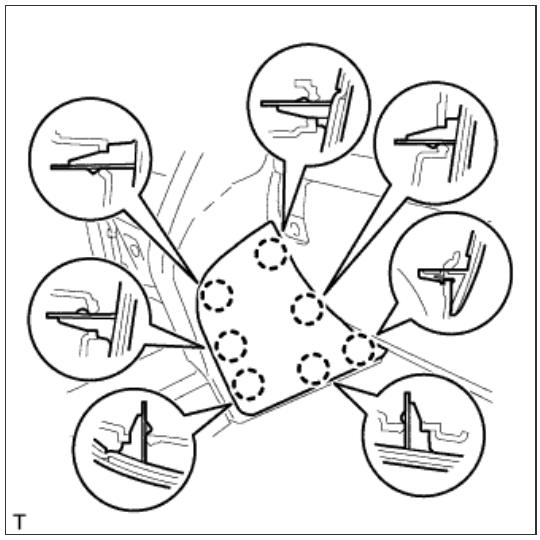
a. Attach the 7 claws to install the lower instrument panel pad sub-assembly.

b. Install the clip and screw.



15. INSTALL NO. 1 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Attach the 7 claws to install the No. 1 instrument panel finish panel cushion.

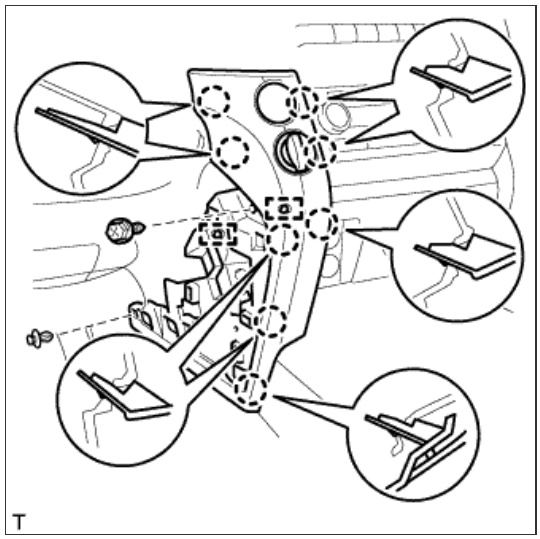


16. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Connect the connectors and attach the 2 clamps.

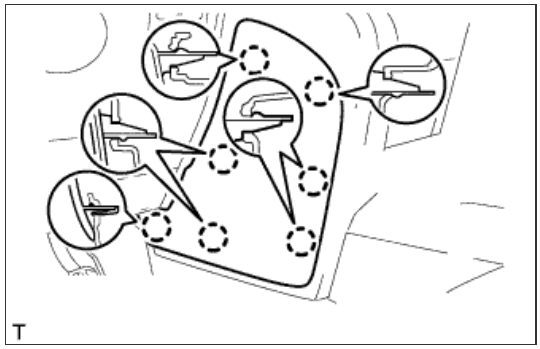
b. Attach the 8 claws to install the lower instrument panel pad sub-assembly.

c. Install the clip and screw.



17. INSTALL NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Attach the 7 claws to install the No. 2 instrument panel finish panel cushion.

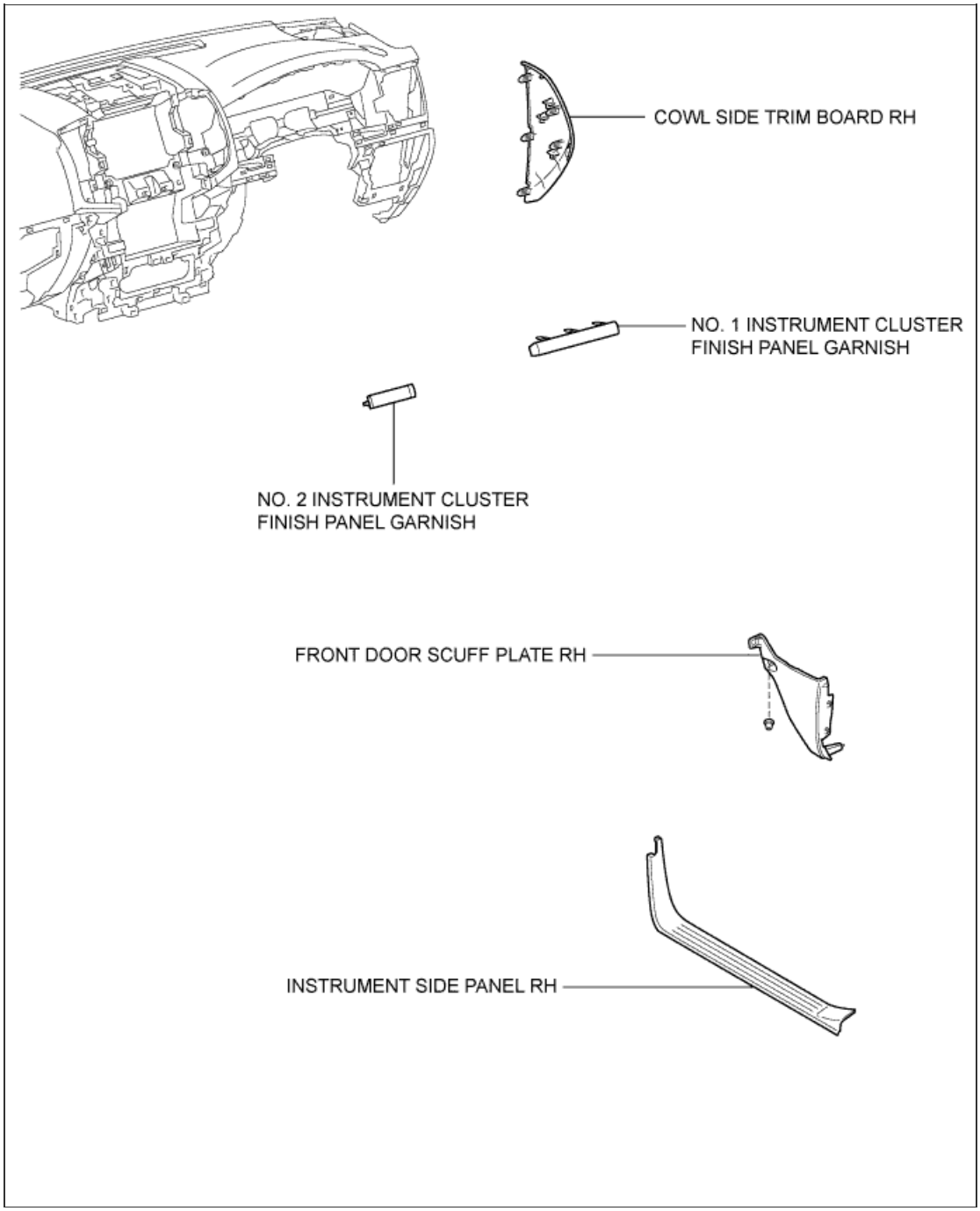


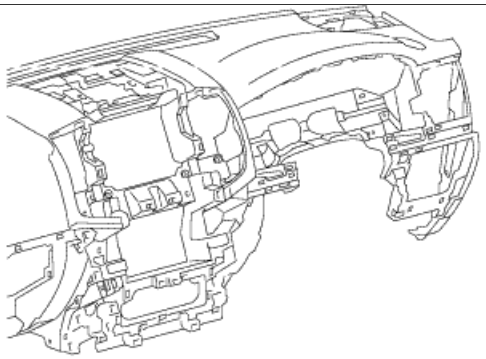
18. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

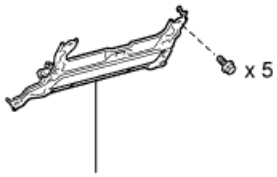
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here



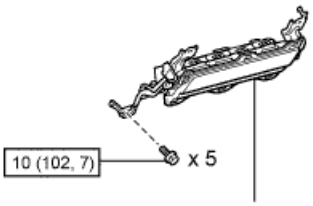


w/o Driver SIde Knee Airbag:



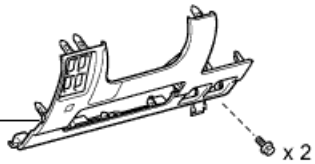
LOWER INSTRUMENT PANEL SUB-ASSEMBLY

w/ Driver SIde Knee Airbag:



DRIVER SIDE KNEE AIRBAG ASSEMBLY

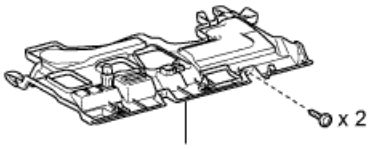
LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL





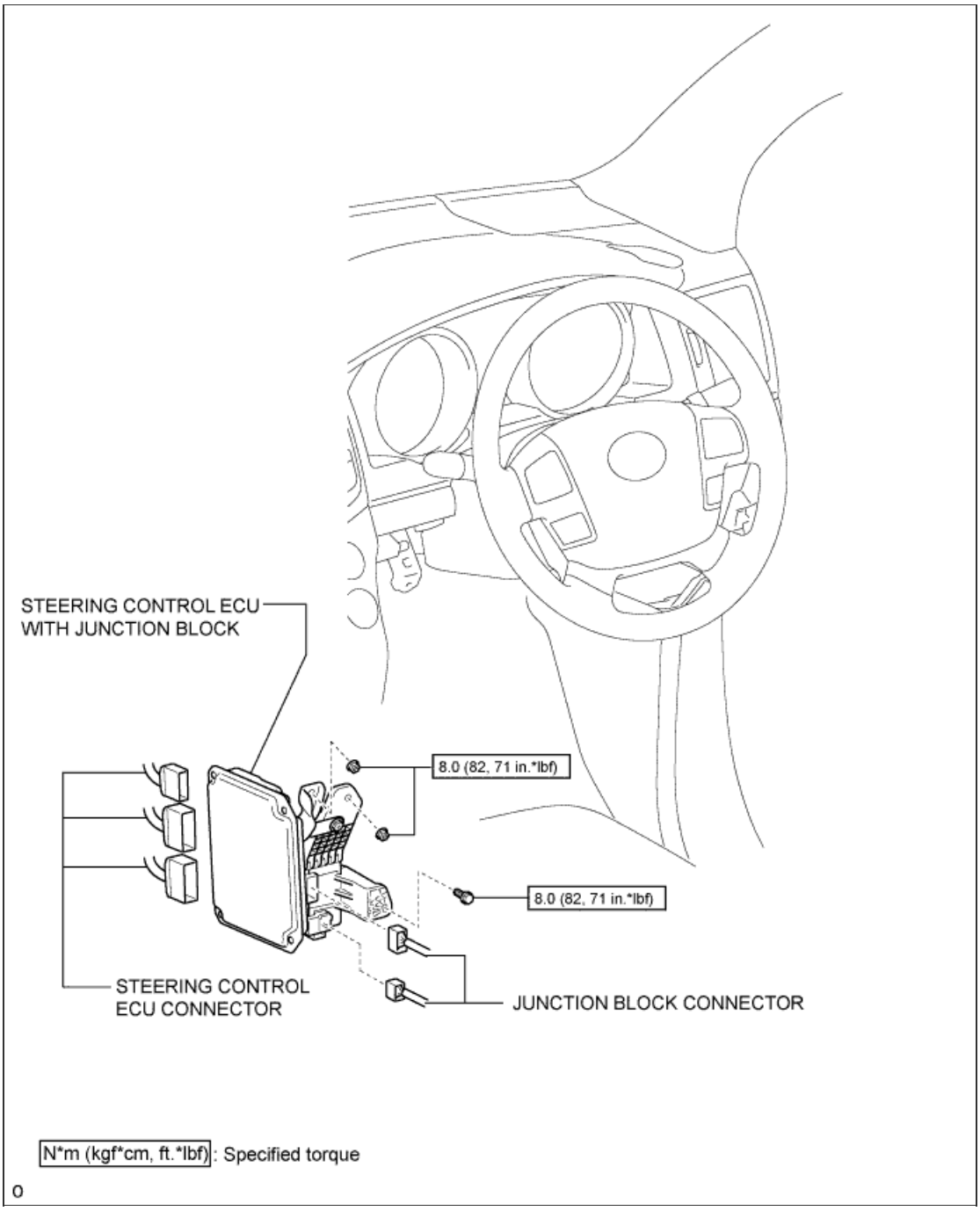
NO. 1 SWITCH HOLE BASE

w/ Floor Under Cover:

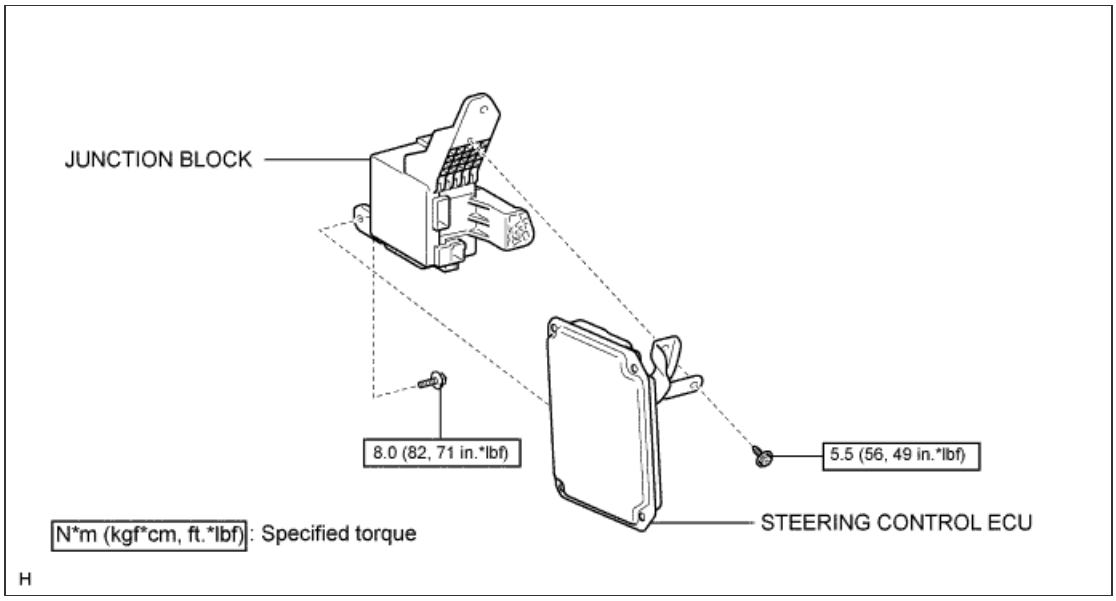


NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

N*m (kgf*cm, ft.*lbf) : Specified torque


STEERING CONTROL ECU
WITH JUNCTION BLOCK
8.0 (82, 71 in.*lbf)
8.0 (82, 71 in.*lbf)
STEERING CONTROL
ECU CONNECTOR
JUNCTION BLOCK CONNECTOR
N*m (kgf*cm, ft.*lbf): Specified torque

o


JUNCTION BLOCK
8.0 (82, 71 in.*lbf)
5.5 (56, 49 in.*lbf)
STEERING CONTROL ECU
N*m (kgf*cm, ft.*lbf): Specified torque
H

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:

- **After the engine switch is turned off, the navigation system requires approximately 90 seconds to record various types of memory and settings. As a result, after turning the engine switch off, wait 90 seconds or more before disconnecting the cable from the negative (-) battery terminal.**
- **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).**

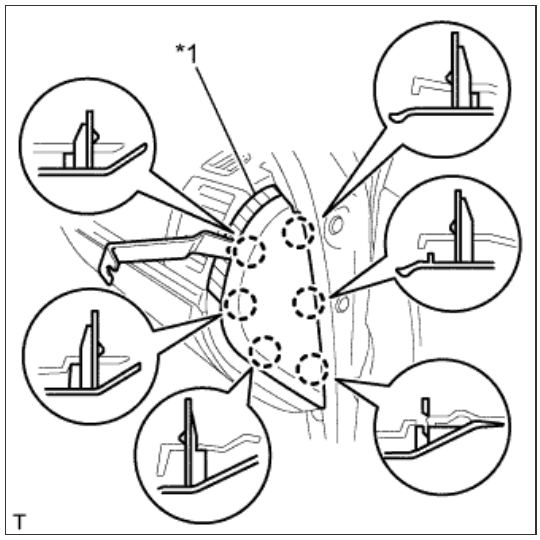
2. REMOVE INSTRUMENT SIDE PANEL RH (w/o Airbag Cut Off Switch)

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 6 claws and remove the instrument side panel.



3. REMOVE INSTRUMENT SIDE PANEL RH (w/ Airbag Cut Off Switch)

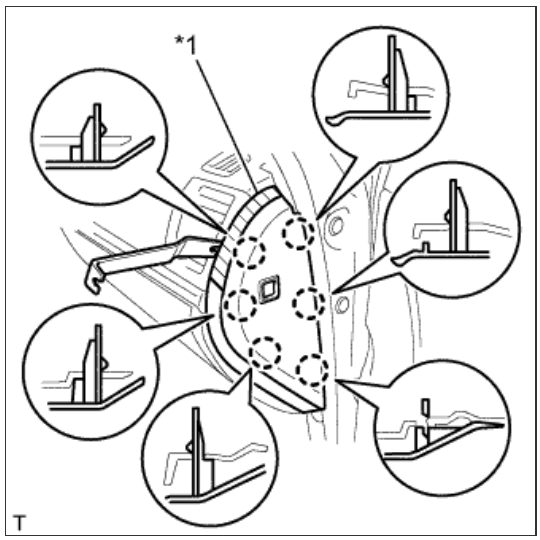
a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 6 claws.

c. Disconnect the connector and remove the instrument side panel.



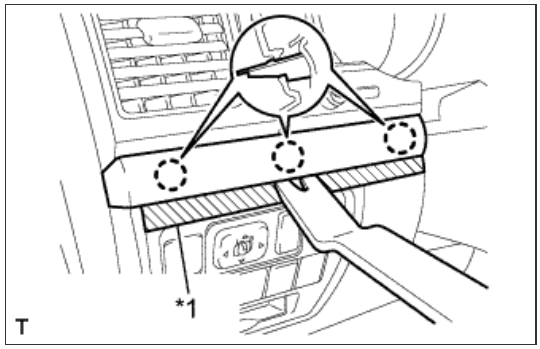
4. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

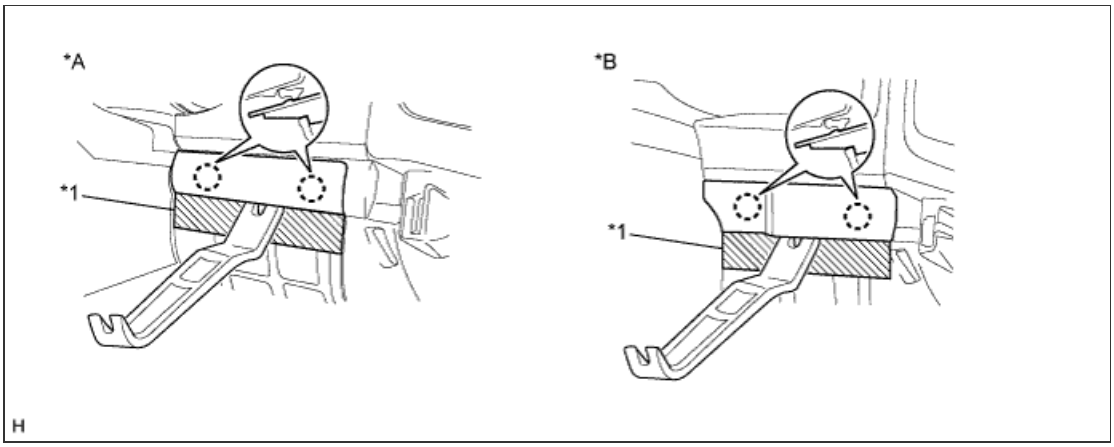
b. Using a moulding remover, detach the 3 claws and remove the No. 1 instrument cluster finish panel garnish.



5. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

b. Using a moulding remover, detach the 2 claws and remove the No. 2 instrument cluster finish panel garnish.

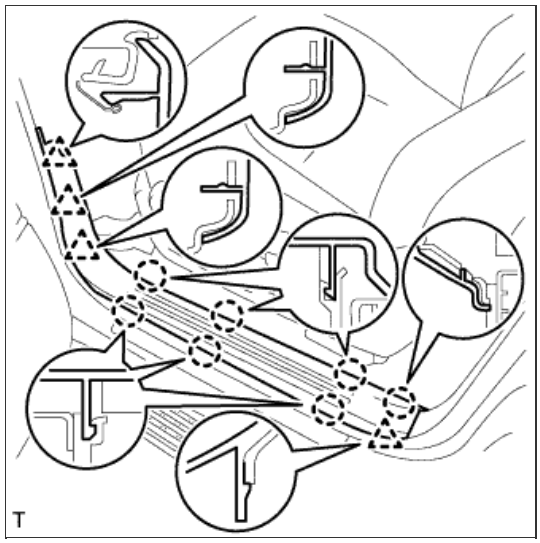


Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System
*1	Protective Tape	-	-

6. REMOVE FRONT DOOR SCUFF PLATE RH (w/o Sliding Roof)

a. Detach the 7 claws and 4 clips, and remove the scuff plate.



7. REMOVE FRONT DOOR SCUFF PLATE RH (w/ Sliding Roof)

HINT:

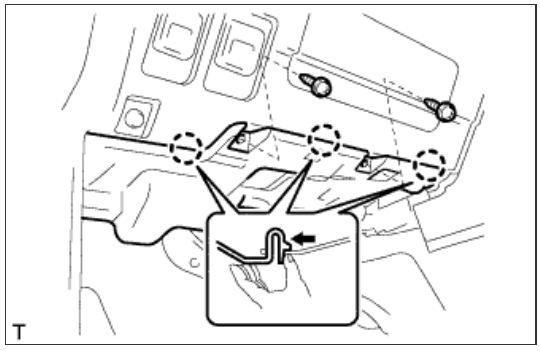
Use the same procedures described for the LH side.

8. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Remove the 2 screws.

b. Detach the 3 claws.

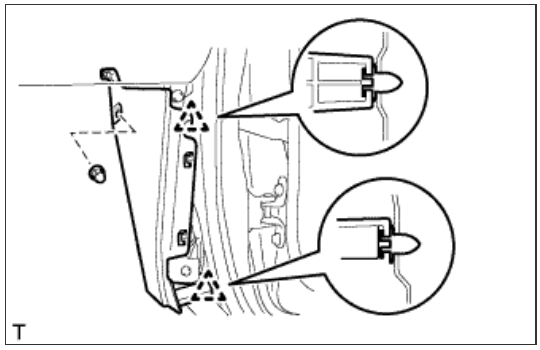
c. Disconnect the connectors and remove the No. 1 instrument panel under cover.



9. REMOVE COWL SIDE TRIM BOARD RH

a. Remove the cap nut.

b. Detach the 2 clips and remove the cowl side trim board.



10. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

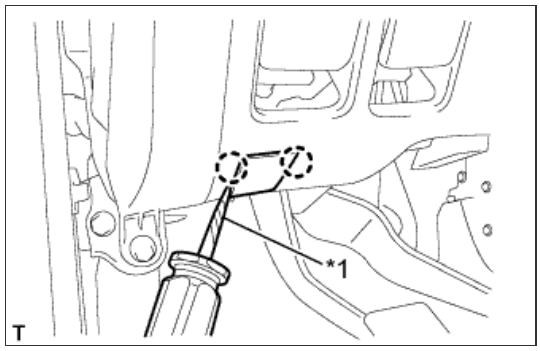
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

Tape the screwdriver tip before use.

Text in Illustration

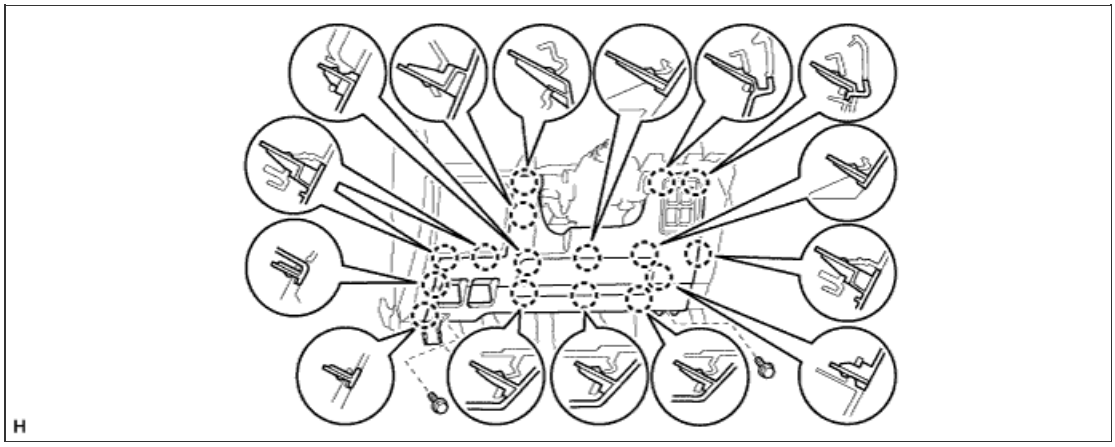
*1	Protective Tape



b. w/ Driver Side Knee Airbag:

i. Remove the 2 bolts.

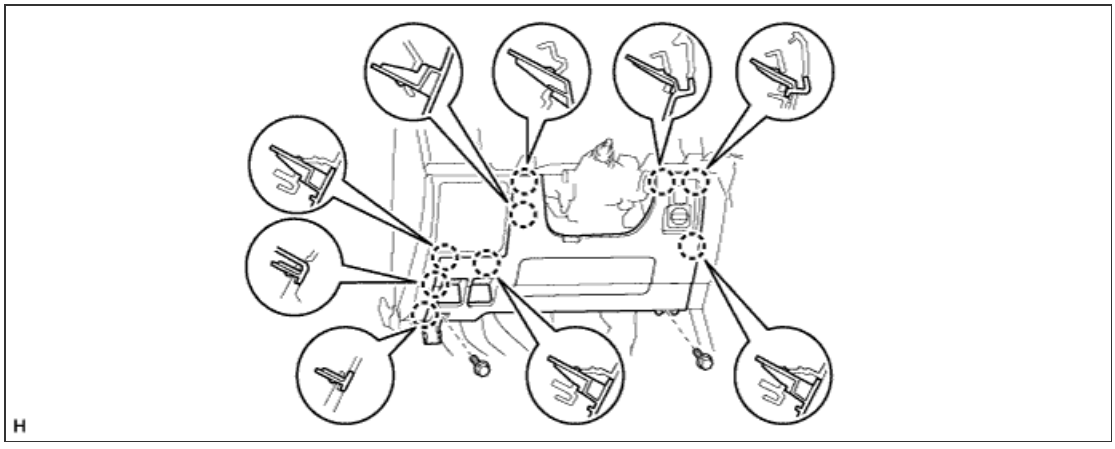
ii. Detach the 16 claws.



c. w/o Driver Side Knee Airbag:

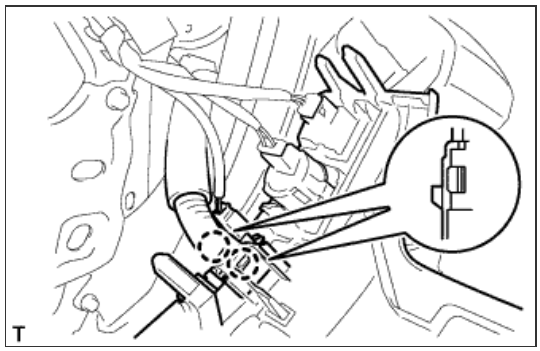
i. Remove the 2 bolts.

ii. Detach the 9 claws.



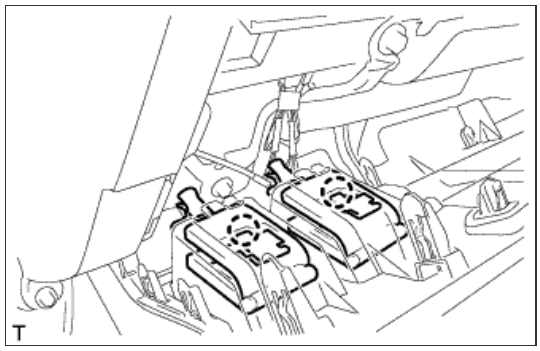
d. for Automatic Air Conditioning System:

i. Detach the 2 claws and remove the room temperature sensor.



e. Detach the 2 claws and disconnect the 2 control cables.

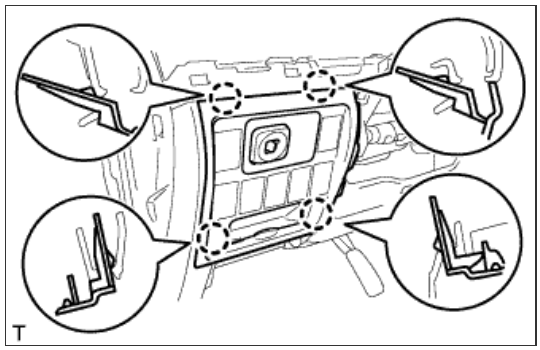
f. Disconnect the connectors and remove the lower No. 1 instrument panel finish panel.



11. REMOVE NO. 1 SWITCH HOLE BASE

a. Detach the 4 claws.

b. Disconnect the connectors and remove the No. 1 switch hole cover.



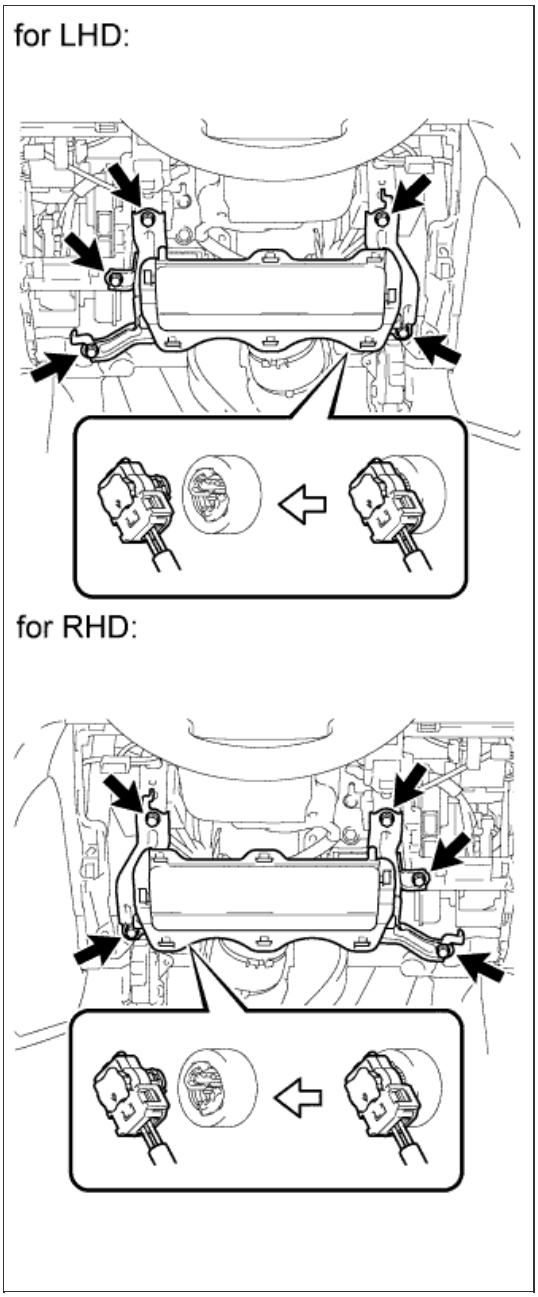
12. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

a. Remove the 5 bolts and driver side knee airbag.

b. Disconnect the connector.

NOTICE:

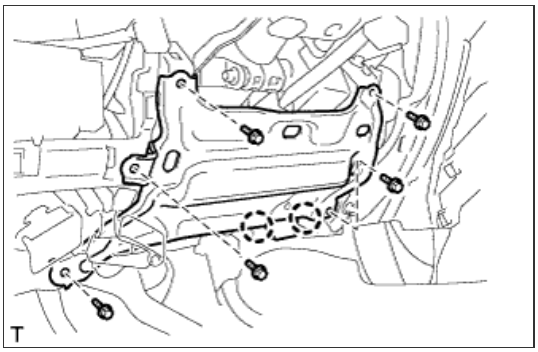
When handling the airbag connector, take care not to damage the airbag wire harness.



13. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (w/o Driver Side Knee Airbag)

a. Detach the 2 claws and disconnect the DLC3.

b. Remove the 5 bolts and lower instrument panel.



14. REMOVE STEERING CONTROL ECU WITH JUNCTION BLOCK

a. Rear side:

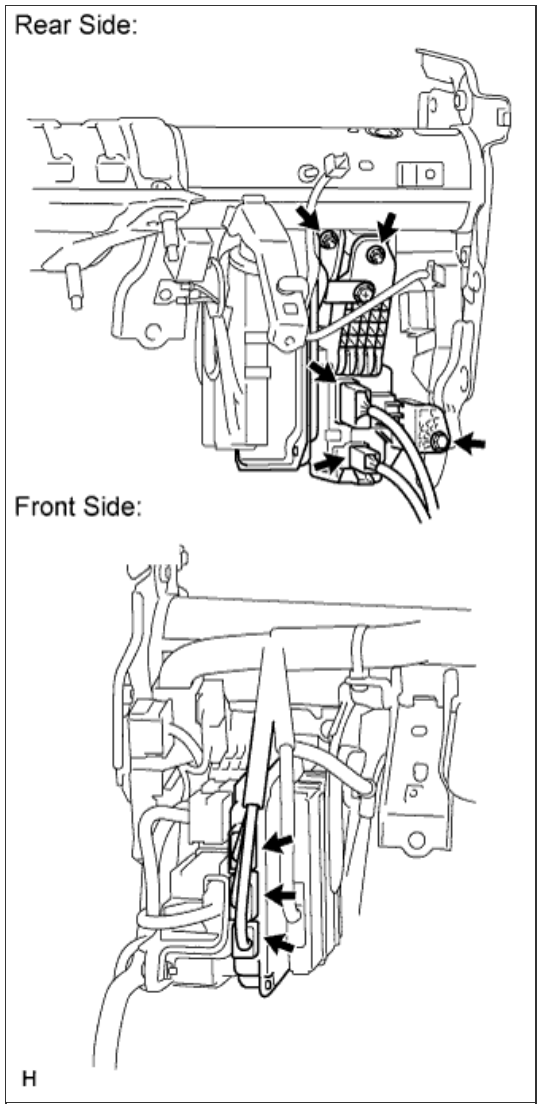
i. Disconnect the 2 connectors.

ii. Remove the bolt and 2 nuts.

b. Front side:

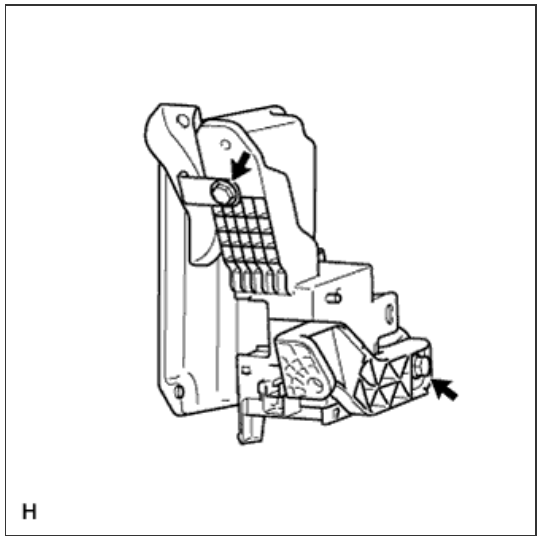
i. Disconnect the 3 connectors.

c. Remove the steering control ECU with the junction block.



15. REMOVE STEERING CONTROL ECU

a. Remove the 2 bolts and separate the steering control ECU from the junction block.

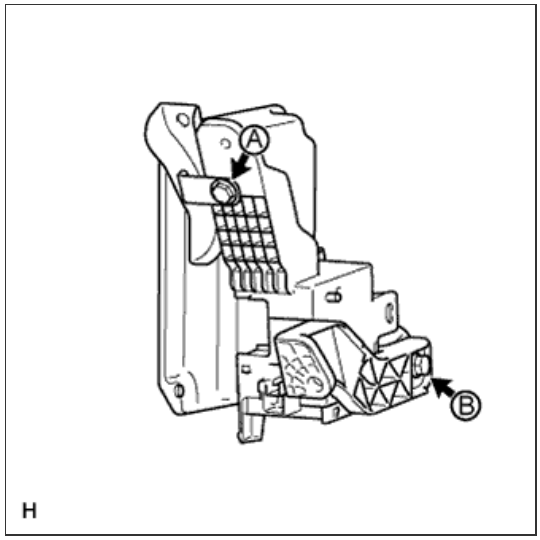


for Preparation Click here

1. INSTALL STEERING CONTROL ECU

a. Install the steering control ECU to the junction block with the 2 bolts.

Torque:
for bolt A:
5.5 N*m{ 56 kgf*cm , 49 in.*lbf }
for bolt B:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }



2. INSTALL STEERING CONTROL ECU WITH JUNCTION BLOCK

a.

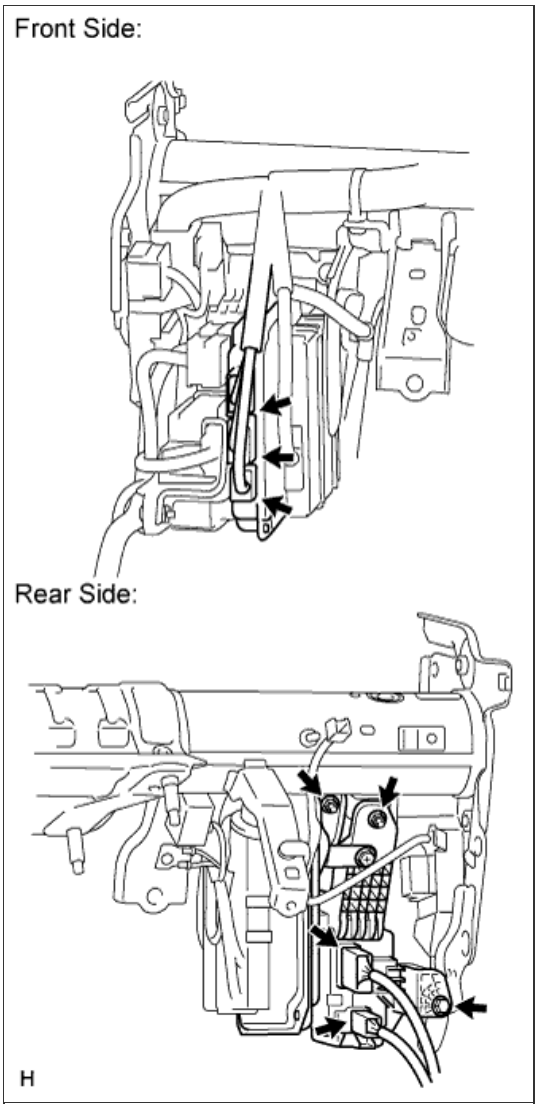
i. Front side:
Connect the 3 connectors.

b. Rear side:

i. Install the steering control ECU with junction block with the bolt and 2 nuts.

Torque:
8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

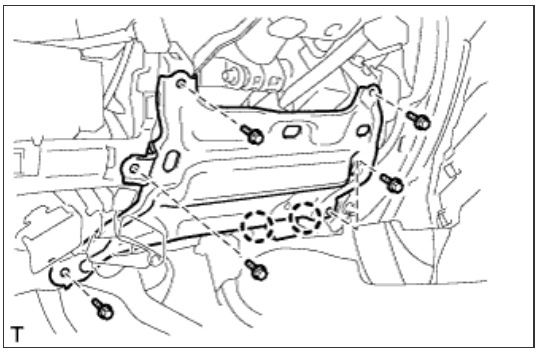
ii. Connect the 2 connectors.



3. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (w/o Driver Side Knee Airbag)

a. Attach the 2 claws and connect the DLC3.

b. Install the lower instrument panel with the 5 bolts.



4. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

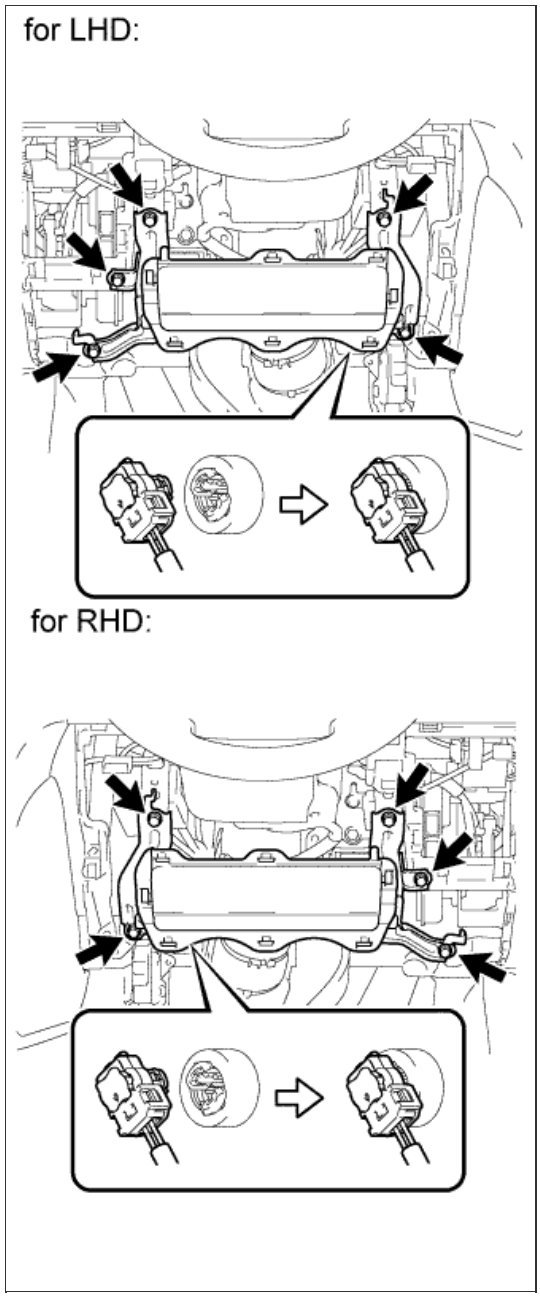
a. Connect the connector.

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.

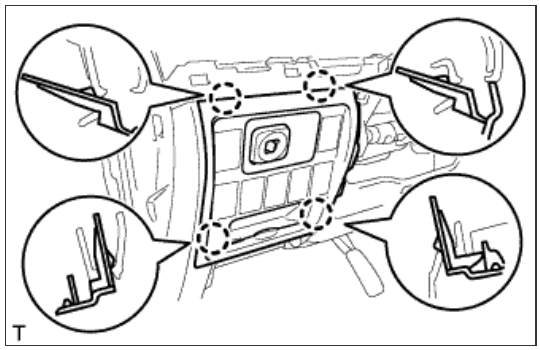
Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



5. INSTALL NO. 1 SWITCH HOLE BASE

a. Connect the connectors.

b. Attach the 4 claws to install the No. 1 switch hole base.

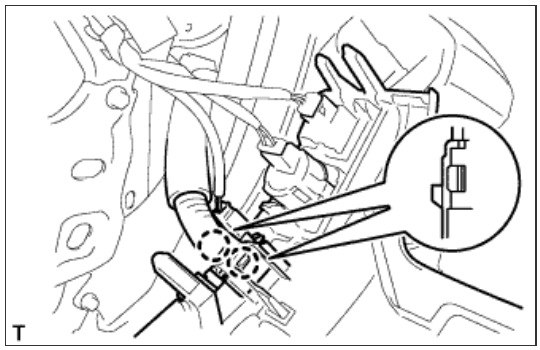


6. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

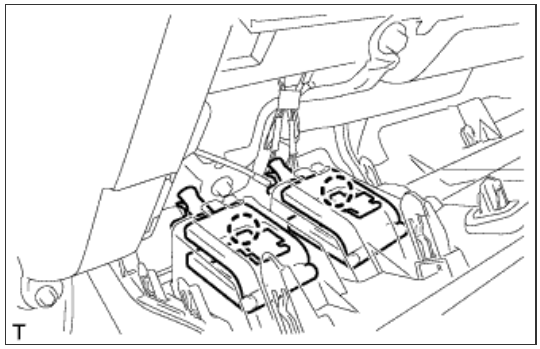
a. Connect the connectors.

b. for Automatic Air Conditioning System:

i. Attach the 2 claws to install the room temperature sensor.



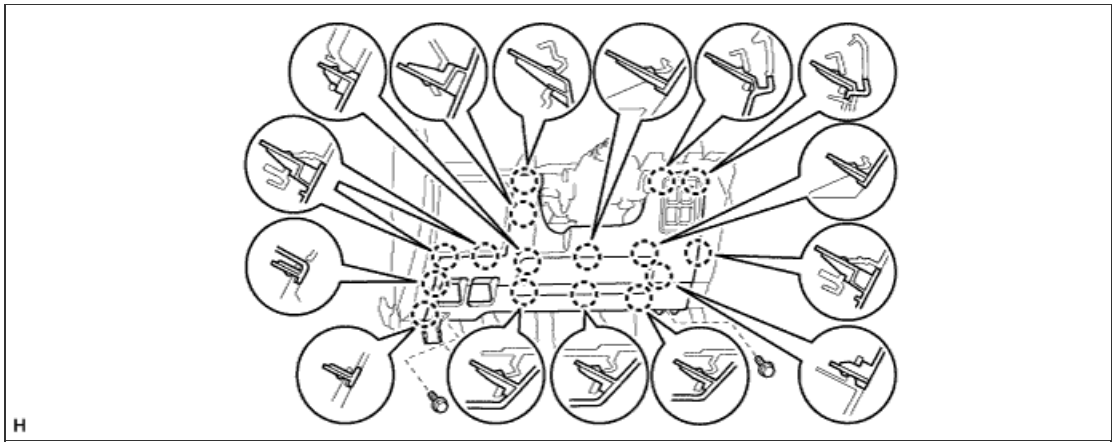
c. Attach the 2 claws to connect the 2 control cables.



d. w/ Driver Side Knee Airbag:

i. Attach the 16 claws to install the lower No. 1 instrument panel finish panel.

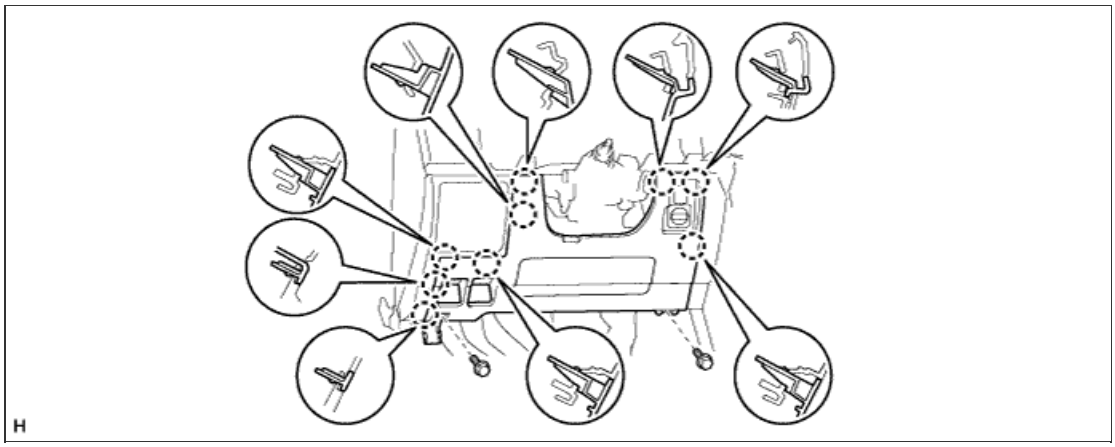
ii. Install the 2 bolts.



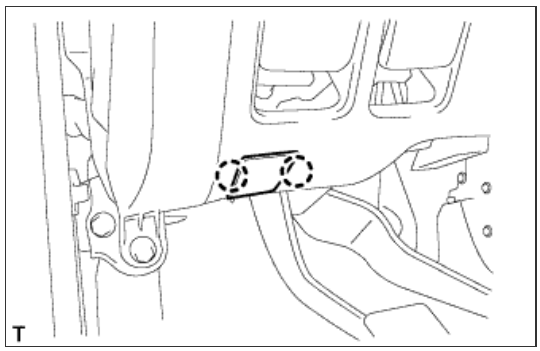
e. w/o Driver Side Knee Airbag:

i. Attach the 9 claws to install the lower No. 1 instrument panel finish panel.

ii. Install the 2 bolts.



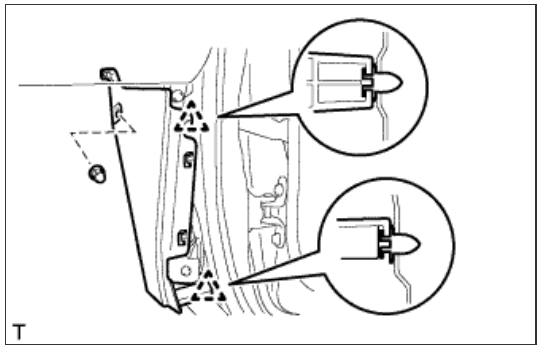
f. Attach the 2 claws to close the hole cover.



7. INSTALL COWL SIDE TRIM BOARD RH

a. Attach the 2 clips to install the cowl side trim board.

b. Install the cap nut.

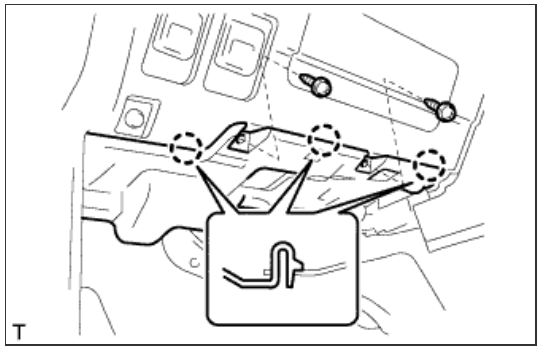


8. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Connect the connectors.

b. Attach the 3 claws to install the No. 1 instrument panel under cover.

c. Install the 2 screws.



9. INSTALL FRONT DOOR SCUFF PLATE RH (w/ Sliding Roof)

HINT:

Use the same procedures described for the LH side.

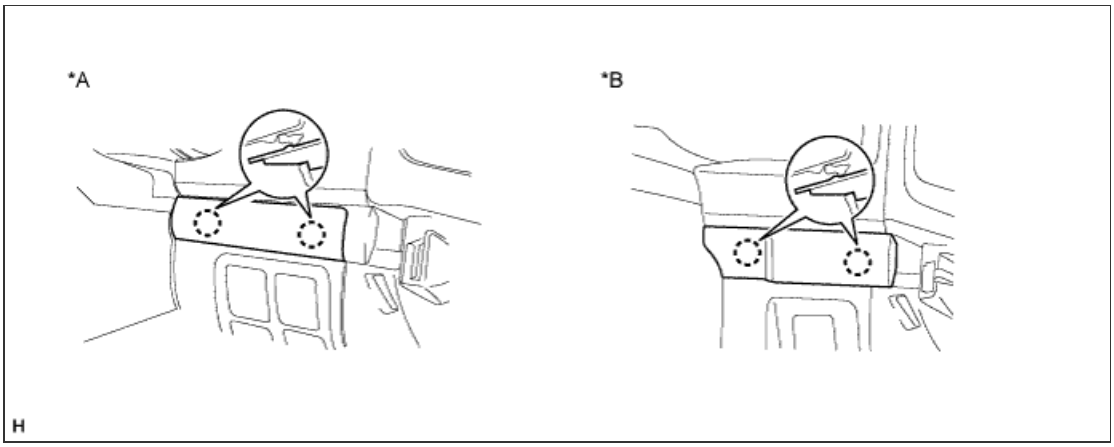
10. INSTALL FRONT DOOR SCUFF PLATE RH (w/o Sliding Roof)

HINT:

Use the same procedures described for the LH side.

11. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 2 claws to install the No. 2 instrument cluster finish panel garnish.

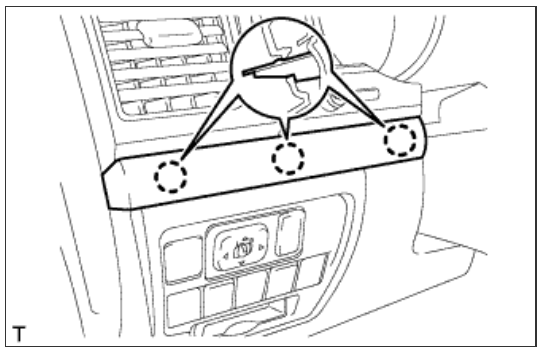


Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System

12. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

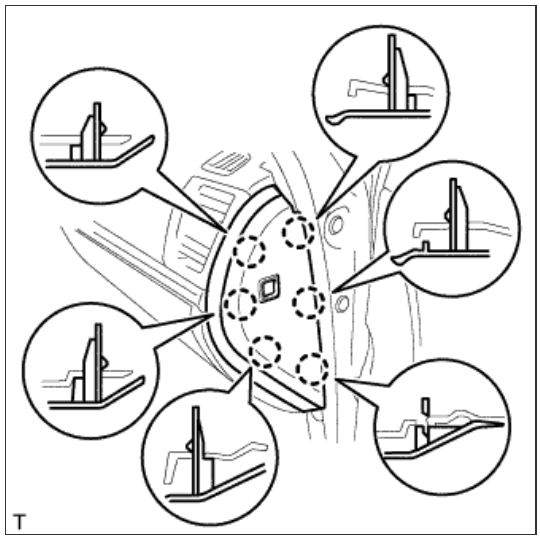
a. Attach the 3 claws to install the No. 1 instrument cluster finish panel garnish.



13. INSTALL INSTRUMENT SIDE PANEL RH (w/ Airbag Cut Off Switch)

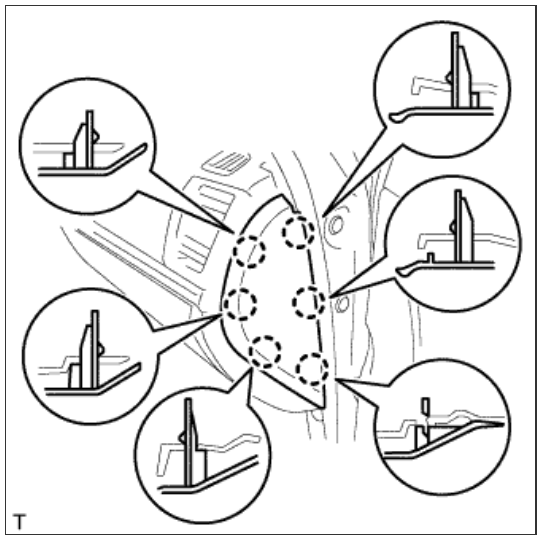
a. Connect the connector.

b. Attach the 6 claws to install the instrument side panel.



14. INSTALL INSTRUMENT SIDE PANEL RH (w/o Airbag Cut Off Switch)

a. Attach the 6 claws to install the instrument side panel.

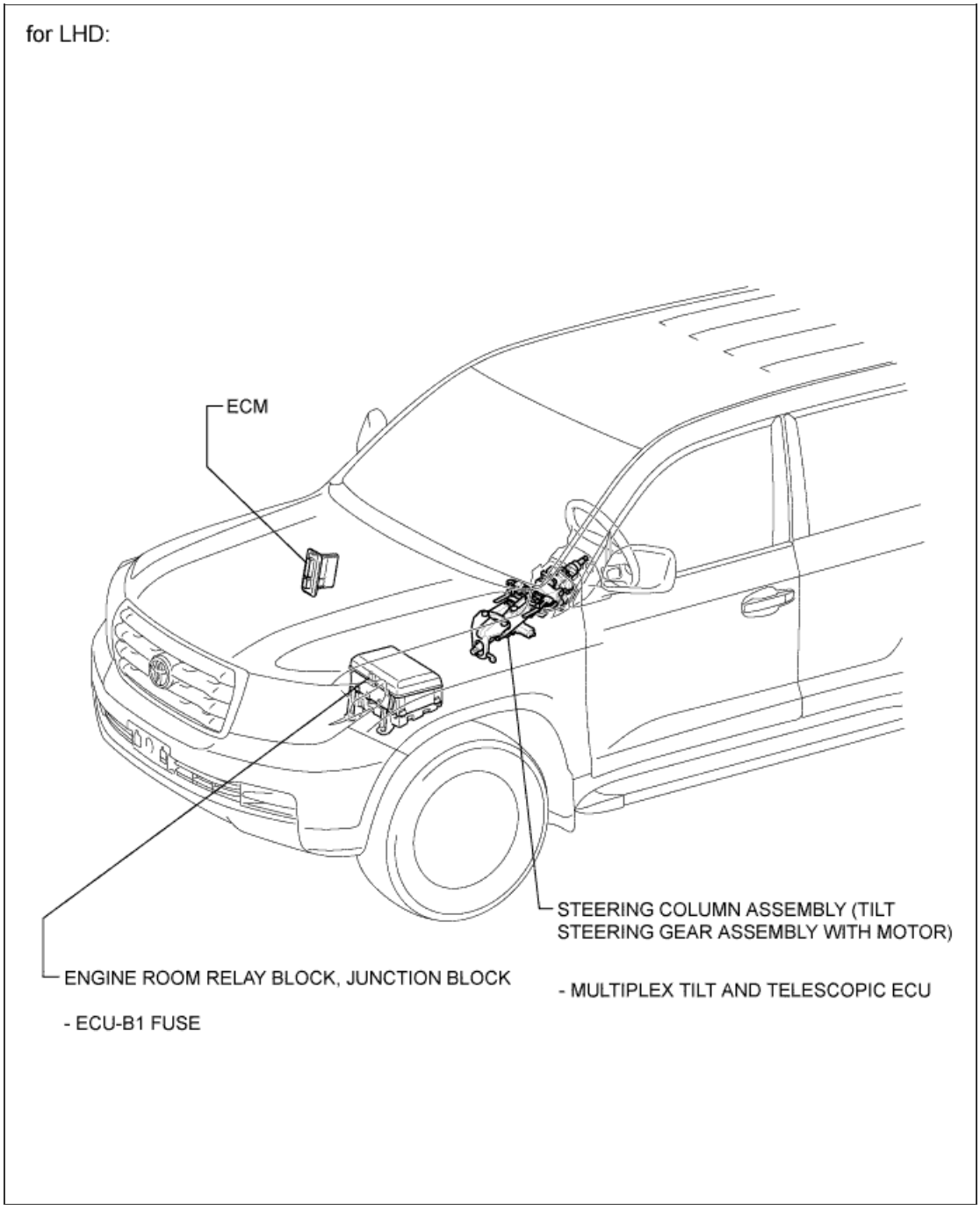


15. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

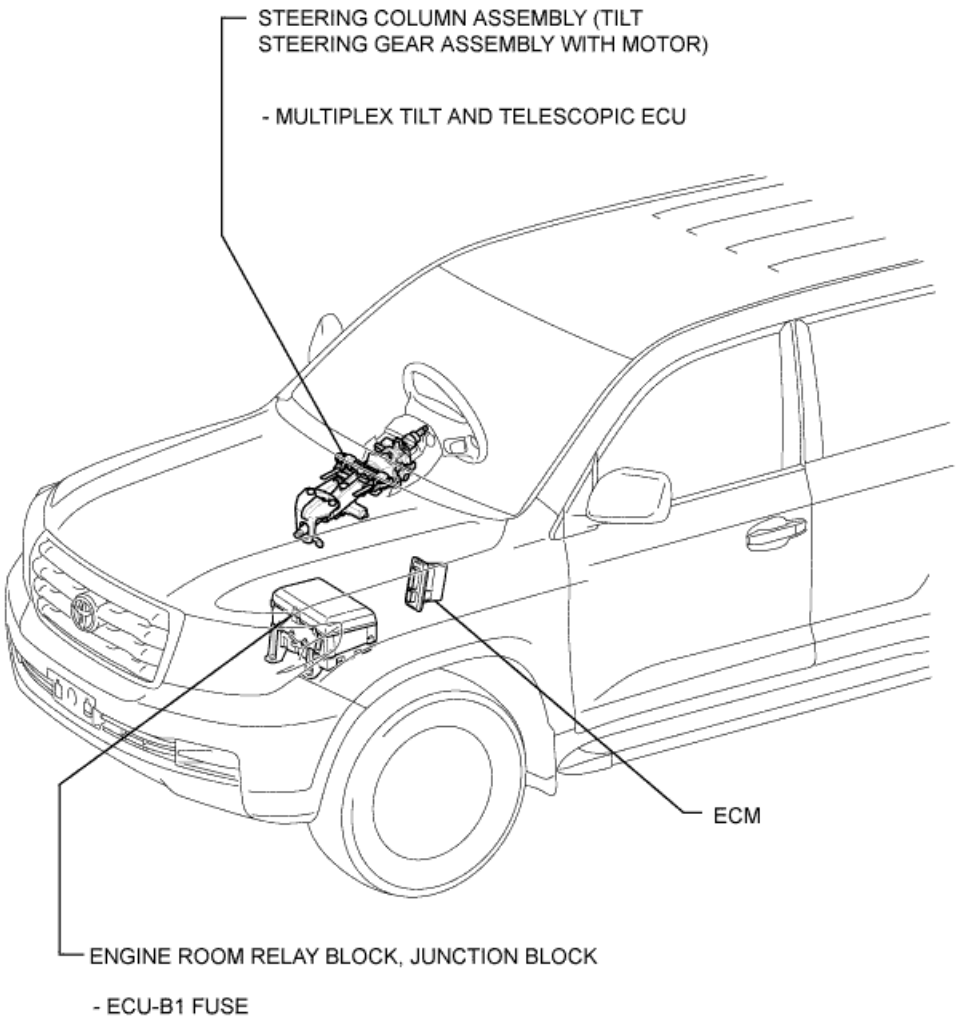
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

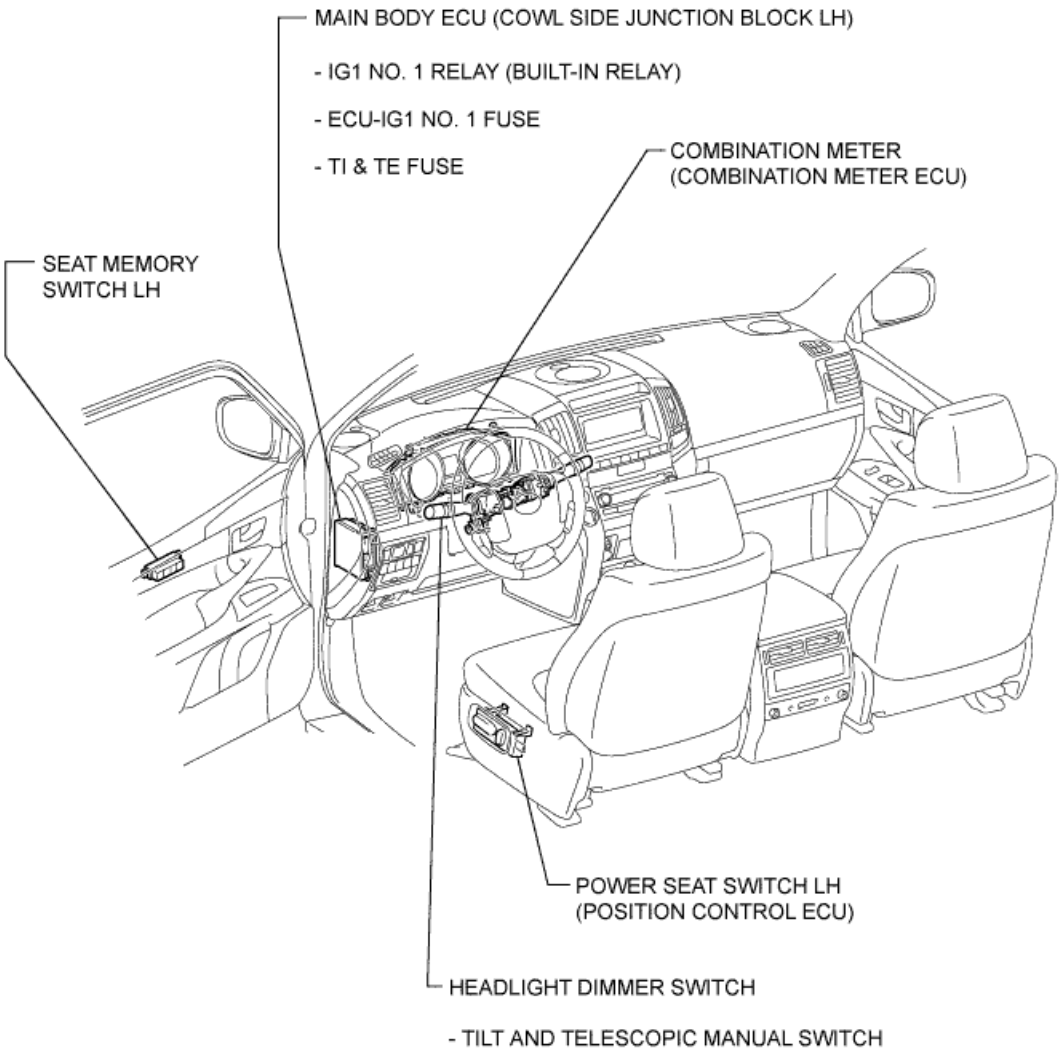
for Preparation Click here



for RHD:

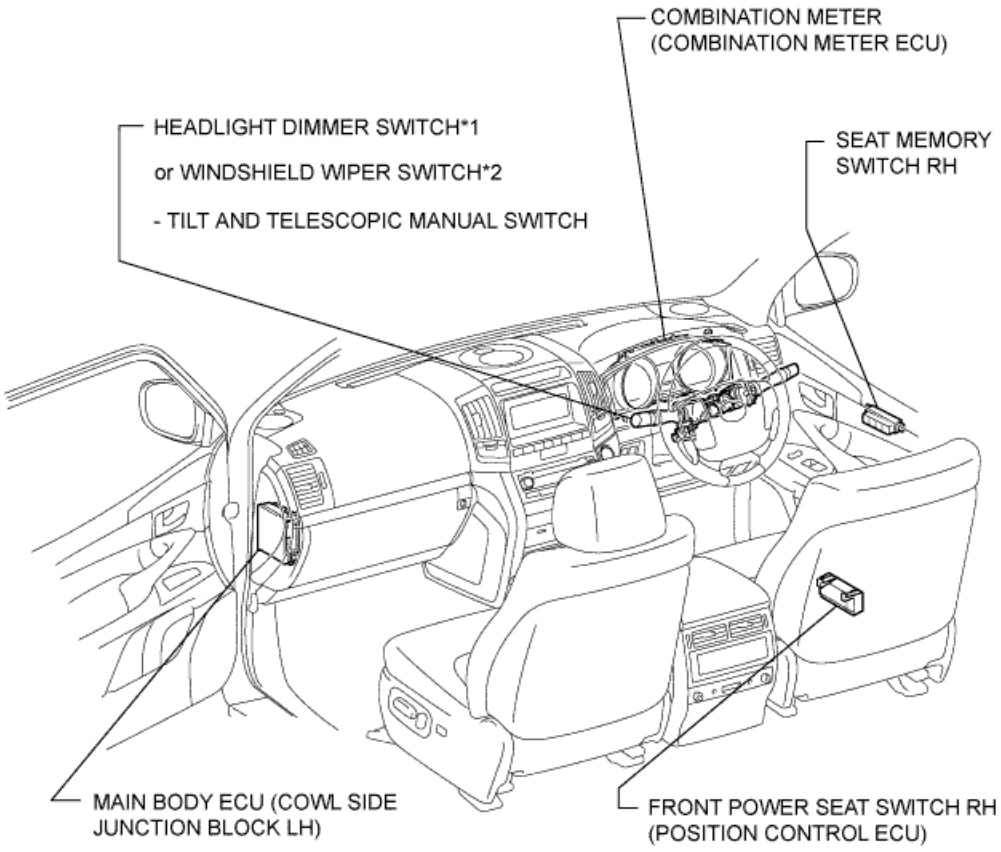

STEERING COLUMN ASSEMBLY (TILT
STEERING GEAR ASSEMBLY WITH MOTOR)
- MULTIPLEX TILT AND TELESCOPIC ECU
ECM
ENGINE ROOM RELAY BLOCK, JUNCTION BLOCK
- ECU-B1 FUSE

for LHD:


MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)
- IG1 NO. 1 RELAY (BUILT-IN RELAY)
- ECU-IG1 NO. 1 FUSE
- TI & TE FUSE
COMBINATION METER
(COMBINATION METER ECU)
SEAT MEMORY
SWITCH LH
POWER SEAT SWITCH LH
(POSITION CONTROL ECU)
HEADLIGHT DIMMER SWITCH
- TILT AND TELESCOPIC MANUAL SWITCH

T

for RHD:

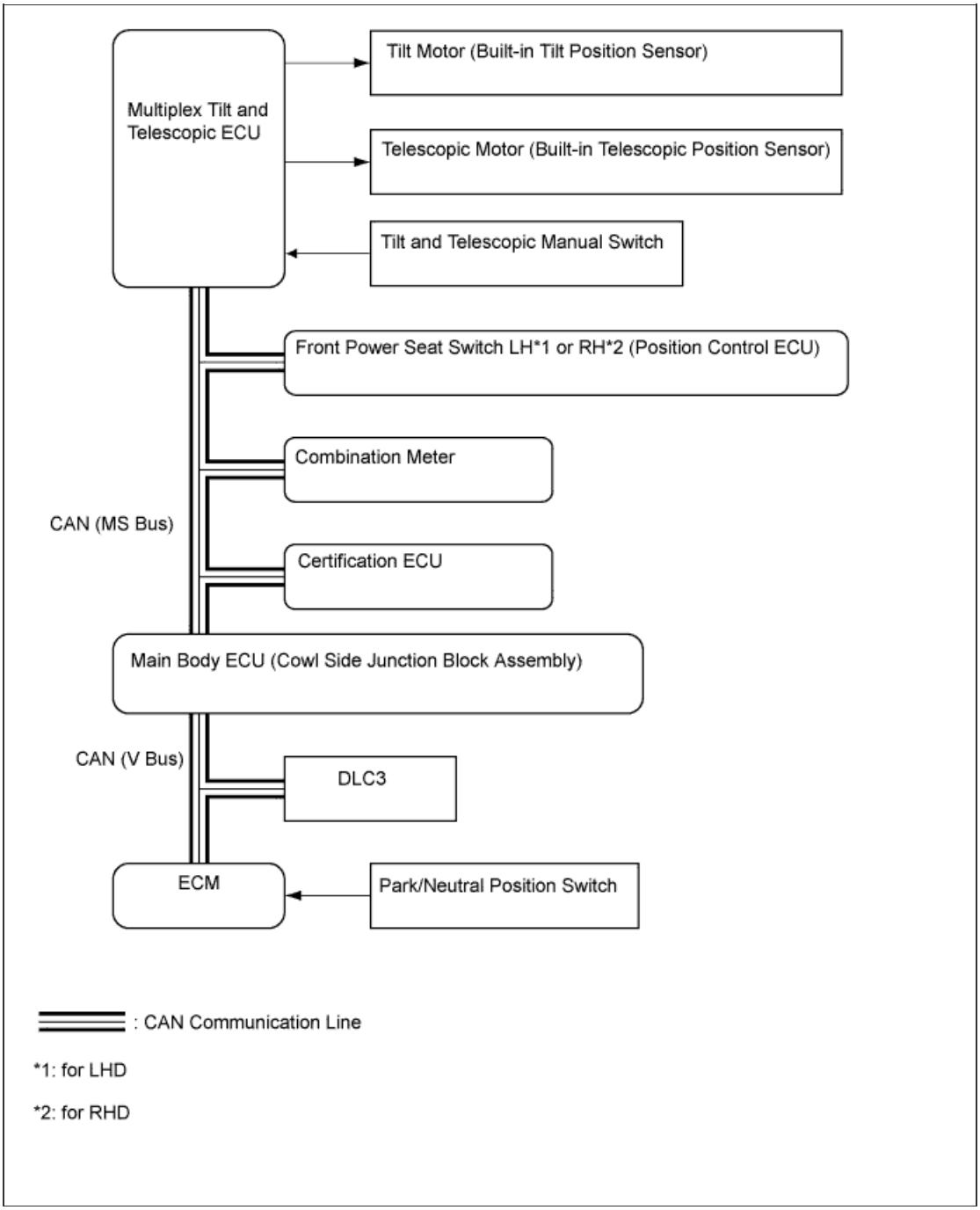


*1: for Headlight Dimmer Switch LH Side Type

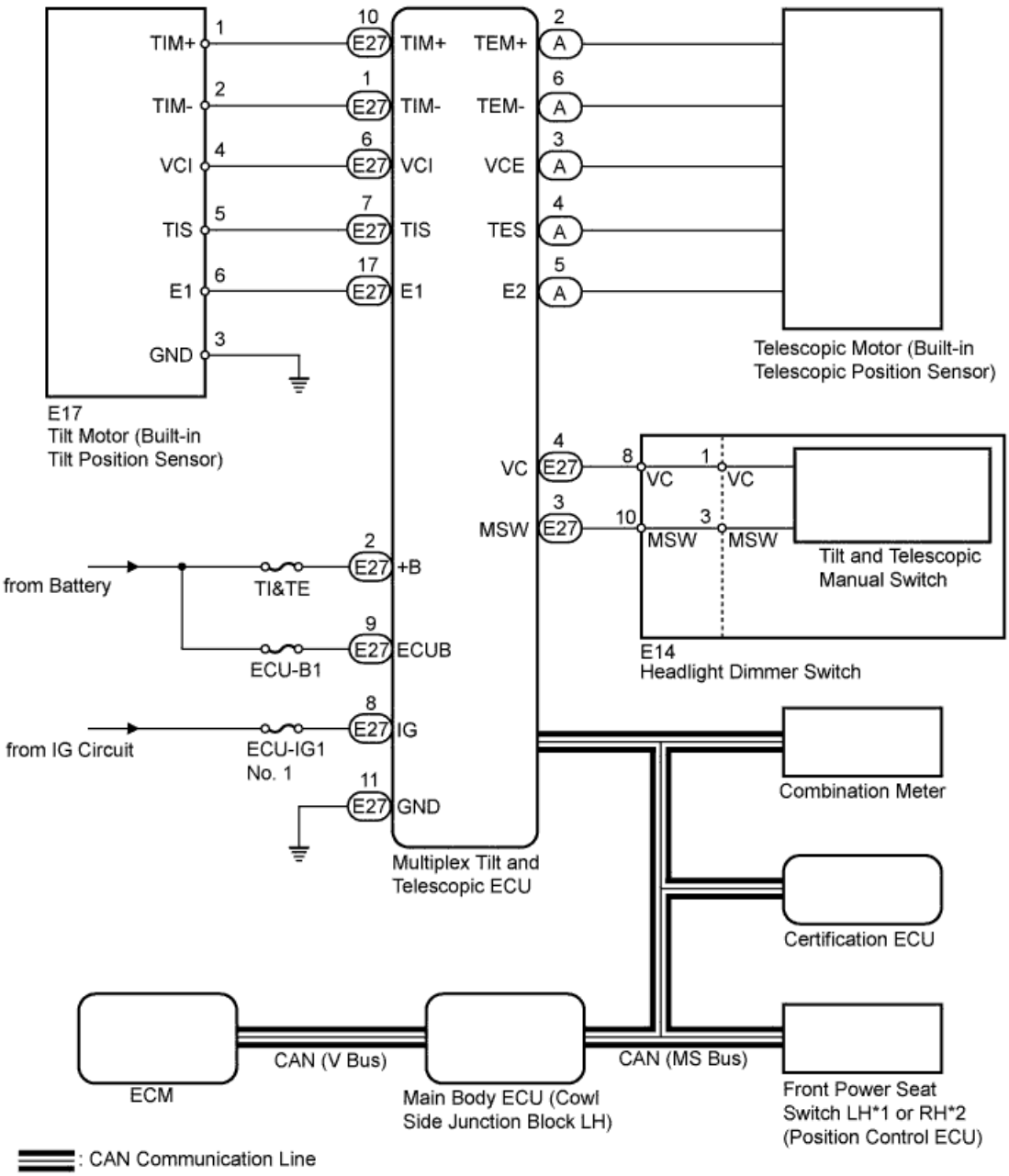
*2: for Headlight Dimmer Switch RH Side Type

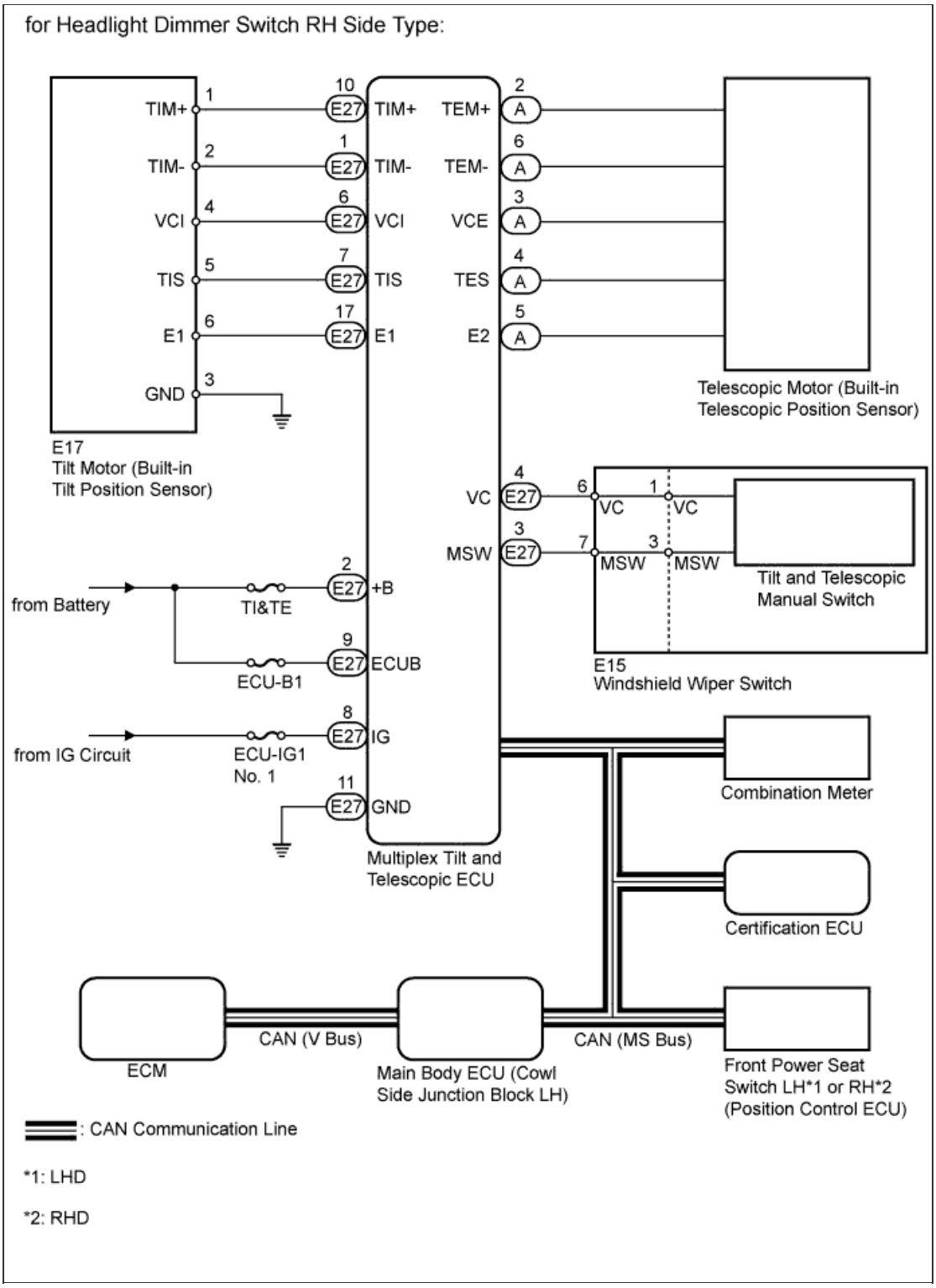
T

for Preparation Click here



for Headlight Dimmer Switch LH Side Type:





Communication Table:

Sender	Receiver	Signal	Line
Main Body ECU	Multiplex Tilt and Telescopic ECU	• Engine switch signal • Key switch signal • Key signal for push start system	CAN
Multiplex Tilt and Telescopic ECU	Front Power Seat Switch LH*1 or RH*2 (Position Control ECU)	• Tilt and telescopic execution signal • Tilt and telescopic completion signal	CAN
		• Memory command of memory 1 for driver seat • Memory command of memory 2 for driver seat • Memory command of memory 3 for driver seat	

Front Power Seat Switch LH*1 or RH*2 (Position Control ECU)	Multiplex Tilt and Telescopic ECU	• Play command of memory 1 for driver seat • Play command of memory 2 for driver seat • Play command of memory 3 for driver seat • Start signal to play tilt and Telescopic steering • Stop signal to play tilt and Telescopic steering	CAN
Combination Meter ECU	Multiplex Tilt and Telescopic ECU	Vehicle speed signal	CAN
Tilt and Telescopic Manual Switch	Multiplex Tilt and Telescopic ECU	Tilt and telescopic manual switch signal	Serial

HINT:

*1: for LHD

*2: for RHD

for Preparation Click here

FUNCTION OF MAIN COMPONENTS

Component	Function
Multiplex tilt and telescopic ECU	This ECU sends a control signal to the power tilt motor and power telescopic motor, based on signals from each switch, to adjust the steering position.
Power tilt motor (Built-in tilt position sensor)	This motor is activated by a signal from the multiplex tilt and telescopic ECU and adjusts the tilt position. The tilt position sensor in the motor detects the tilt position by counting the number of pulses as the motor rotates.
Power telescopic motor (Built-in telescopic position sensor)	This motor is activated by a signal from the multiplex tilt and telescopic ECU and adjusts the telescopic position. The telescopic position sensor in the motor detects the telescopic position by counting the number of pulses as the motor rotates.

MANUAL OPERATION

a. The tilt and telescopic positions can be adjusted as desired by operating the tilt and telescopic switch.

AUTO AWAY/RETURN FUNCTION

a. When the engine switch is turned off, the steering column moves forward, away from the driver, and also tilts up for easy ingress and egress.

b. When the engine switch is turned on (IG), the steering column returns to the previously set position.

c. The auto away/return function can be prohibited by using the intelligent tester.

DRIVING POSITION MEMORY FUNCTION (with Seat Position Memory System)

a. The steering column moves to the previously set position by pressing the seat memory switches.

for Preparation Click here

HINT:

- **Use the following procedures to troubleshoot the power tilt and telescopic steering column system.**
- ***: Use the intelligent tester.**

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

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

NEXT

3.CHECK CAN COMMUNICATION SYSTEM*

a. Use the intelligent tester to check if the CAN communication system is functioning normally.

Result

Result	Proceed to
CAN DTC is not output	A
for LHD: CAN DTC is output	B
for RHD: CAN DTC is output	C

B. → Go to CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (**Click here**)

C. → Go to CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (**Click here**)

A

4.CHECK FOR DTC*

a. Check for DTCs (Click here).

b. Clear the DTCs (Click here).

c. Recheck for DTCs (Click here).

Result

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

B. → Go to POWER TILT AND POWER TELESCOPIC STEERING COLUMN SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (**Click here**)

A

5.PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B. Go to step 7

A

6.OVERALL ANALYSIS AND TROUBLESHOOTING*

a. Terminals of ECU (Click here)

b. Data List/Active Test (Click here)

NEXT

7.REPAIR

NEXT

8.CONFIRMATION TEST

NEXT

END

for Preparation Click here

CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER (REFERENCE)

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the tester on.

d. Enter the following menus: Body / Tilt & Telescopic / Utility / Customize.

e. Select the setting by referring to the table below.

Tilt & Telescopic

Display	Default	Contents	Setting
Autoaway/Return function	ON	Turn the auto away/return function ON/OFF	ON/OFF

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 power tilt and power telescopic steering column system uses the CAN communication system, so check its diagnostic system before proceeding to troubleshooting.**
- **If the problem still occurs when there is no abnormality in the related circuits, check the multiplex tilt and telescopic ECU and replace it if necessary.**

Power Tilt and Power Telescopic Steering Column System

Symptom	Suspected Area	See page
Only manual switch does not operate	Tilt and telescopic manual switch circuit	Click here
	Headlight dimmer switch assembly*1 (tilt and telescopic manual switch)	Click here
	Windshield wiper switch assembly*2 (tilt and telescopic manual switch)	Click here
Only auto away/return function does not operate	Check customization status of auto away function using intelligent tester	Click here
	Actuator power source circuit	Click here
	IG power source circuit	Click here
Only auto away function does not operate	Entry and start system (for start function)	Click here
	Multiplex tilt and telescopic ECU	Click here
Only auto return function does not operate	Entry and start system (for start function)	Click here
	Multiplex tilt and telescopic ECU	Click here
Only memory function does not operate	Front power seat switch LH*3 or RH*4 (Position control ECU)	Click here
	Multiplex tilt and telescopic ECU	Click here

HINT:

*1: for Headlight Dimmer Switch LH Side Type

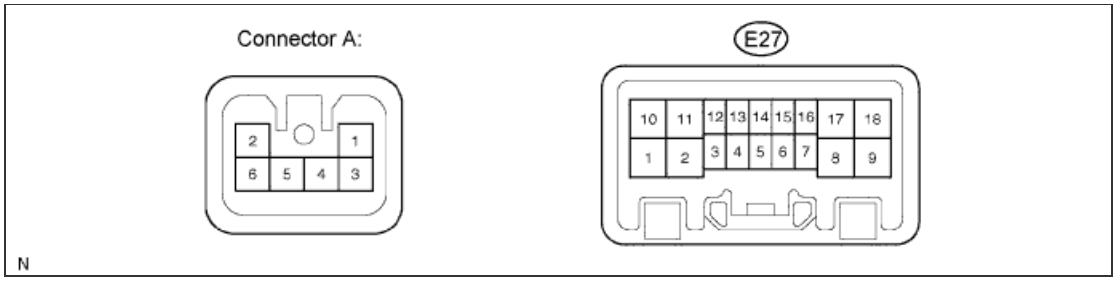
*2: for Headlight Dimmer Switch RH Side Type

*3: for LHD

*4: for RHD

for Preparation Click here

CHECK MULTIPLEX TILT AND TELESCOPIC ECU



Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
A-2 (TEM+) - E27-11 (GND)	- (Not available) - W-B	Telescopic motor output	• Engine switch on (IG) • Telescopic steering contracts	11 to 14 V
			Telescopic motor not operating	Below 1 V
A-3 (VCE) - A-5 (E2)	- (Not available)	Telescopic sensor power source	Engine switch on (IG)	8 to 16 V
A-4 (TES) - A-5 (E2)	- (Not available)	Telescopic sensor signal	Telescopic motor operating	Pulse generation High: 8 to 16 V Low: Below 1 V
A-5 (E2) - Body ground	- (Not available) - Body ground	Telescopic sensor ground	Always	Below 1 V
A-6 (TEM-) - E27-11 (GND)	- (Not available) - W-B	Telescopic motor output	• Engine switch on (IG) • Telescopic steering extends	11 to 14 V
			Telescopic motor not operating	Below 1 V
E27-1 (TIM-) - E27-11 (GND)	LG - W-B	Tilt motor output	• Engine switch on (IG) • Steering tilts down	11 to 14 V
			Tilt motor not operating	Below 1 V
E27-2 (+B) - E27-11 (GND)	L - W-B	Motor power source	Always	11 to 14 V
E27-3 (MSW) - E27-4 (VC)	R - Y	Tilt and telescopic manual switch signal	Engine switch on (IG)	4.9 to 5.1 V
E27-5 (CANP) - E27-11 (GND)	P - W-B	CAN communication	Engine switch on (IG)	Below 1 V
E27-6 (VCI) - E27-17 (E1)	Y - G	Tilt sensor power source	Engine switch on (IG)	8 to 16 V
E27-7 (TIS) - E27-17 (E1)	W - G	Tilt sensor signal	Tilt motor operating	Pulse generation High: 8 to 16 V Low: Below 1 V
E27-8 (IG) - E27-11 (GND)	G - W-B	IG signal/IG power source	Engine switch on (IG)	11 to 14 V
			Engine switch off	Below 1 V
E27-9 (ECUB) - E27-11 (GND)	R - W-B	ECU power source	Always	11 to 14 V
E27-10 (TIM+) - E27-11 (GND)	GR - W-B	Tilt motor output	• Engine switch on (IG) • Steering tilts up	11 to 14 V
			Tilt motor not operating	Below 1 V
E27-11 (GND) - Body	W-B - Body ground	ECU ground	Always	Below 1 V

ground				
E27-14 (CANN) - E27-11 (GND)	R - W-B	CAN communication	Engine switch on (IG)	Below 1 V
E27-17 (E1) - Body ground	G - Body ground	Tilt sensor ground	Always	Below 1 V

for Preparation Click here

CHECK DTC

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: Body / Tilt & Telescopic / DTC.

e. Read the DTCs.

CLEAR DTC

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: Body / Tilt & Telescopic / DTC.

e. Clear the DTCs.

for Preparation Click here

FREEZE FRAME DATA

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG) and check the freeze frame data by following the prompts on the intelligent tester screen.

Tilt & Telescopic

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Tilt Position	Current tilt position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Position	Current telescopic position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Return Position	Memorized tilt return position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Return Position	Memorized telescopic return position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Up Limit	Uppermost tilt position/Not Mem or Mem	Not Mem: Position is not memorized Mem: Position is memorized	-
Tilt Up Limit Position	Uppermost tilt position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Down Limit	Lowermost tilt position/Not Mem or Mem	Not Mem: Position is not memorized Mem: Position is memorized	-
Tilt Down Limit Position	Lowermost tilt position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Short Limit	Shortest telescopic position/Not Mem or Mem	Not Mem: Position is not memorized Mem: Position is memorized	-
Telesco Short Limit Pos	Shortest telescopic position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Long Limit	Longest telescopic position/Not Mem or Mem	Not Mem: Position is not memorized Mem: Position is memorized	-
Telesco Long Limit Pos	Longest telescopic position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Up SW (CAN)	Input state of tilt up by manual switch/ON or OFF	ON: Tilt up is activated by manual switch OFF: Tilt up is not activated by manual switch	-
Tilt Down SW (CAN)	Input state of tilt down by manual switch/ON or OFF	ON: Tilt down is activated by manual switch OFF: Tilt down is not activated by manual switch	-
Telesco Short SW (CAN)	Input state of telescopic short by manual switch/ON or OFF	ON: Telescopic short is activated by manual switch OFF: Telescopic short is not activated by manual switch	-
Telesco Long SW (CAN)	Input state of telescopic long by manual switch/ON or OFF	ON: Telescopic long is activated by manual switch OFF: Telescopic long is not activated by manual switch	-
S/B Mem 1	Tilt and telescopic memory position 1/Not Mem or Mem	Not Mem: Position is not memorized Mem: Position is memorized	-
S/B Mem 2	Tilt and telescopic memory position 2/Not Mem or Mem	Not Mem: Position is not memorized Mem: Position is memorized	-
S/B Mem 3	Tilt and telescopic memory position 3/Not Mem or Mem	Not Mem: Position is not memorized Mem: Position is memorized	-
T&T Autoaway Function	Auto away/return function/ON or OFF	ON: Auto away and return function is allowed OFF: Auto away and return function is prohibited	-
Power Source Voltage	Voltage data of power supply/min.: 0 V, max.: 20 V	Actual power supply voltage 11 to 14 V	-

Freeze Speed Info	Vehicle speed data/min: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-
IG Switch (CAN)	Communication state of engine switch/ON or OFF	ON: Communication is normal OFF: Communication is interrupted	-
Key Code Confirm (CAN)	Communication state of key code confirmation signal/ON or OFF	ON: Communication is normal OFF: Communication is interrupted	-
Driver Seat Buckle SW	Driver side buckle switch signal / Set, Unset or Unknown	-	-
The Number of DTCs	Number of diagnostic trouble codes/min.: 0, max.: 255	Actual number of diagnostic trouble codes	-

for Preparation Click here

HINT:

If the power source voltage to the tilt and telescopic ECU returns to normal within 10 seconds during tilt or telescopic operation, the operation will be resumed. If it returns to normal after 10 seconds have elapsed, the operation restarts when a tilt or telescopic operation signal is again input to the tilt and telescopic ECU.

Fail-safe Operation

DTC Code	Detection Item	Fail-safe
B2602	Key Unlock Warning Switch Circuit Malfunction	The auto away function stops. The auto return function: • Continues (when the engine switch is on (IG)). • Stops (when the engine switch is off).
B2603	Tilt and Telescopic Manual Switch Circuit Malfunction	The tilt and telescopic operation by the manual switch is suspended.
B2606	Key Code Confirm Signal Malfunction	The auto away or auto return function stops.
B2610	Tilt Position Sensor or Tilt Motor Circuit Malfunction	The tilt operation is suspended.
B2611	Telescopic Position Sensor or Telescopic Motor Circuit Malfunction	The telescopic operation is suspended.
B2620	ECU Power Source Circuit Malfunction	The tilt and telescopic operation is suspended.
B2624	Speed Signal Malfunction	The auto away and/or auto return function stops.

FAIL-SAFE FUNCTION

a. If a malfunction in the tilt position sensor signal or telescopic position sensor signal occurs while operating the power tilt or power telescopic function, the tilt and telescopic ECU stops the operation of the power tilt and power telescopic steering column system.

b. If the power source voltage to the ECU drops below approximately 8 V while operating the power tilt or power telescopic function, the ECU stops the operation of the power tilt and power telescopic steering column system.

c. If the tilt and telescopic ECU detects that the motor has locked during the operation of the power tilt or power telescopic function, the ECU stops the operation of the power tilt and power telescopic steering column system.

d. If the communication of an ECU that is related to the power tilt and power telescopic steering column system is interrupted, the tilt and telescopic ECU cannot control the functions listed below.

Tilt and Telescopic Operation	Main Body ECU Communication Interruption	Front Power Seat Switch LH*1 or RH*2 (Position Control ECU) Communication Interruption	All ECUs*3 Communication Interruption
Manual	○*4	○	X*4
Auto away/return	X	○	X
Position memory (Memorization)	X	X	X
Position memory (Reproduction)	○*4	X	X

HINT:

- **○: Operates**
  X: Does not operate
- ***1: for LHD**
  ***2: for RHD**
- ***3: All ECUs that are related to the power tilt and power telescopic steering column system.**
- ***4: The operation is permitted if the engine switch is on (IG) while the signal from the main body ECU is interrupted. The operation is prohibited if the engine switch is off while the signal from the main body ECU is interrupted.**

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. 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: Body Electrical / Tilt & Telescopic / Data List.

e. Check the values by referring to the table below.

Tilt & Telescopic

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Tilt Position	Current tilt position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Position	Current telescopic position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Return Position	Memorized tilt return position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Return Position	Memorized telescopic return position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Memory Pos 1	Tilt data of memory position 1/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Memory Pos 1	Telescopic data of memory position 1/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Memory Pos 2	Tilt data of memory position 2/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Memory Pos 2	Telescopic data of memory position 2/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Memory Pos 3	Tilt data of memory position 3/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Memory Pos 3	Telescopic data of memory position 3/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Up Limit	Uppermost tilt position/Not Mem or Mem	Not Mem: Position not memorized Mem: Position memorized	-
Tilt Up Limit Position	Uppermost tilt position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Tilt Down Limit	Lowermost tilt position/Not Mem or Mem	Not Mem: Position not memorized Mem: Position memorized	-
Tilt Down Limit Position	Lowermost tilt position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Short Limit	Shortest telescopic position/Not Mem or Mem	Not Mem: Position not memorized Mem: Position memorized	-
Telesco Short Limit Pos	Shortest telescopic position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
Telesco Long Limit	Longest telescopic position/Not Mem or Mem	Not Mem: Position not memorized Mem: Position memorized	-
Telesco Long Limit Pos	Longest telescopic position data/min.: 0000 H (0 edges), max.: FFFF H (65535 edges)	7000 to 9000 H (28672 to 36864 edges)	-
		ON: Tilt up activated by manual	

Tilt Up Switch	Input state of tilt up by manual switch/ON or OFF	switch OFF: Tilt up not activated by manual switch	-
Tilt Up SW (CAN)	Input state of tilt up by manual switch/ON or OFF	ON: Tilt up activated by manual switch OFF: Tilt up not activated by manual switch	-
Tilt Down Switch	Input state of tilt down by manual switch/ON or OFF	ON: Tilt down activated by manual switch OFF: Tilt down not activated by manual switch	-
Tilt Down SW (CAN)	Input state of tilt down by manual switch/ON or OFF	ON: Tilt down activated by manual switch OFF: Tilt down not activated by manual switch	-
Telesco Short Switch	Input state of telescopic short by manual switch/ON or OFF	ON: Telescopic short activated by manual switch OFF: Telescopic short not activated by manual switch	-
Telesco Short SW (CAN)	Input state of telescopic short by manual switch/ON or OFF	ON: Telescopic short activated by manual switch OFF: Telescopic short not activated by manual switch	-
Telesco Long Switch	Input state of telescopic long by manual switch/ON or OFF	ON: Telescopic long activated by manual switch OFF: Telescopic long not activated by manual switch	-
Telesco Long SW (CAN)	Input state of telescopic long by manual switch/ON or OFF	ON: Telescopic long activated by manual switch OFF: Telescopic long not activated by manual switch	-
T&T Manual SW Data	Voltage data of manual switch/min.: 0 V, max.: 5 V	Neutral position: Below 0.2 V Tilt up: 1.67 to 2.13 V Tilt down: 0.54 to 0.74 V Telescopic contract: 1.08 to 1.40 V Telescopic extend: 2.22 to 2.77 V	-
S/B Mem 1	Tilt and telescopic memory position 1/Not Mem or Mem	Not Mem: Position not memorized Mem: Position memorized	-
S/B Mem 2	Tilt and telescopic memory position 2/Not Mem or Mem	Not Mem: Position not memorized Mem: Position memorized	-
S/B Mem 3	Tilt and telescopic memory position 3/Not Mem or Mem	Not Mem: Position not memorized Mem: Position memorized	-
T&T Autoaway Function	Auto away/return function/ON or OFF	ON: Auto away/return function allowed OFF: Auto away/return function prohibited	-
Power Source Voltage	Voltage data of power supply/min.: 0 V, max.: 20 V	Actual power supply voltage 11 to 14 V	-
Freeze Speed Info	Vehicle speed data/min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-
IG Switch (CAN)	Communication state of engine switch/ON or OFF	ON: Communication normal OFF: Communication interrupted	-
IG Switch	Input state of engine switch/ON or OFF	ON: Input signal normal OFF: Input signal interrupted	-
Key Code Confirm (CAN)	Communication state of key code confirmation signal/ON or OFF	ON: Communication normal OFF: Communication interrupted	-
Receive from Meter	Communication state of combination meter signal/OK or Interruption	OK: Communication normal Interruption: Communication interrupted	-
Receive from Seat ECU	Communication state of position control ECU signal/OK or Interruption	OK: Communication normal Interruption: Communication interrupted	-
Receive from Combi	Communication state of combination switch ECU signal/OK or Interruption	OK: Communication normal Interruption: Communication interrupted	-
J/B	Communication state of main body ECU signal/OK or Interruption	OK: Communication normal Interruption: Communication interrupted	-
		OK: Communication normal	

B/B	Communication state of optional after parts ECU signal/OK or Interruption	Interruption: Communication interrupted	-
Driver Seat Buckle SW	Driver side buckle switch signal / Set, Unset or Unknown	-	-
The Number of DTCs	Number of diagnostic trouble codes/min.: 0, max.: 255	Actual number of diagnostic trouble codes	-

PERFORM ACTIVE TEST

HINT:

Using the intelligent tester to perform Active Test 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 intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the intelligent tester on.

d. Enter the following menus: Body Electrical / Tilt & Telescopic / Active Test.

e. Check the values by referring to the table below.

Tilt & Telescopic

Tester Display	Test Part	Control Range	Diagnostic Note
Tilt Operation	Tilt operation	Up/Down	-
Telesco Operation	Telescopic operation	Long/Short	-

for Preparation Click here

HINT:

If a trouble code is output during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

Power Tilt and Power Telescopic Steering Column System

DTC Code	Detection Item	See page
B2602	Key Unlock Warning Switch Circuit Malfunction	Click here
B2603	Tilt and Telescopic Manual Switch Circuit Malfunction	Click here
B2606	Key Code Confirm Signal Malfunction	Click here
B2610	Tilt Position Sensor or Tilt Motor Circuit Malfunction	Click here
B2611	Telescopic Position Sensor or Telescopic Motor Circuit Malfunction	Click here
B2620	ECU Power Source Circuit Malfunction	Click here
B2621	Communication Interruption	Click here
B2624	Vehicles Speed Malfunction	Click here

DTC B2602 Key Unlock Warning Switch Circuit Malfunction

DTC B2606 Key Code Confirm Signal Malfunction

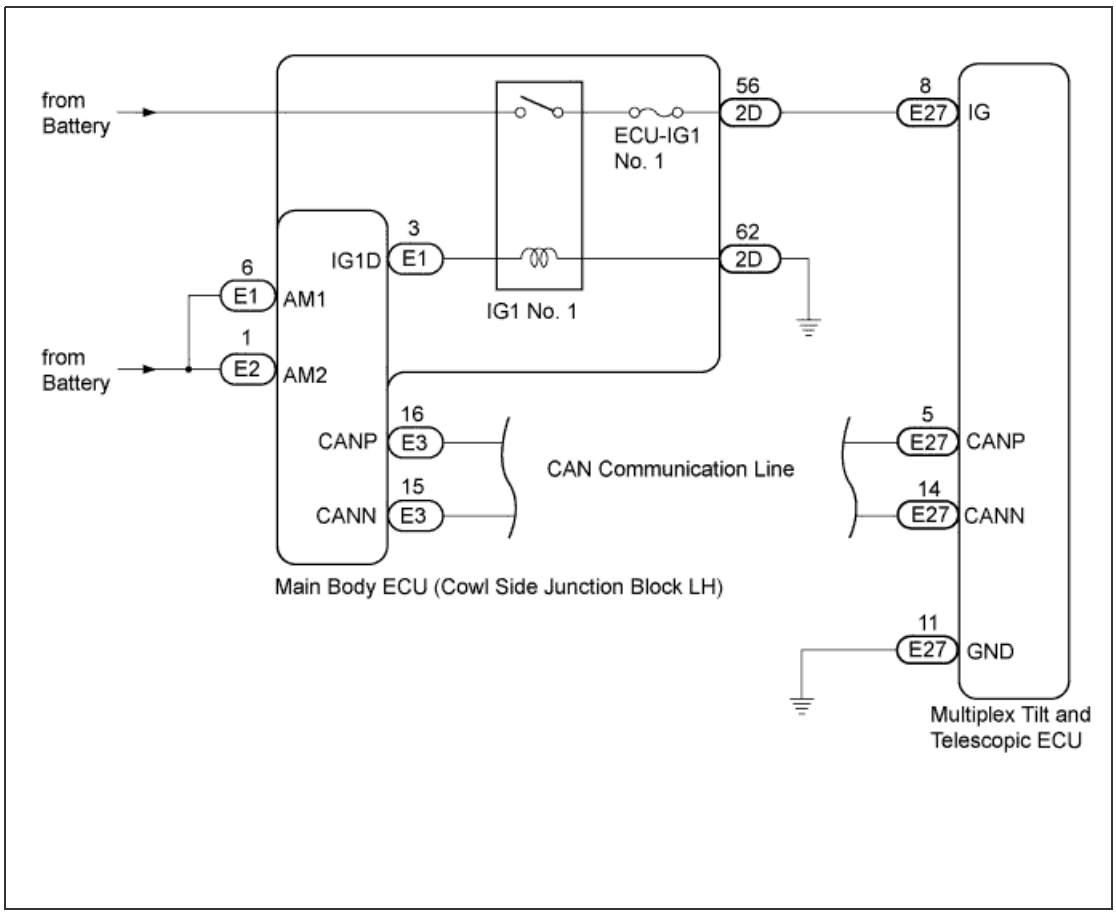
for Preparation Click here

DESCRIPTION

A key code confirmation signal (ON or OFF) is sent from the main body ECU to the multiplex tilt and telescopic ECU via the communication bus. The multiplex tilt and telescopic ECU uses this signal to operate the auto away/return function.

DTC Code	Detection Condition	Trouble Area
B2602	Both of the following conditions continue: • The key code confirmation signal is off. • The engine switch is on (IG).	• CAN communication system • Entry and start system (for start function) • Multiplex tilt and telescopic ECU
B2606	IG signals and/or key code confirmation signals are not received correctly.	• CAN communication system • Entry and start system (for start function) • Multiplex tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK OTHER DTC OUTPUT

HINT:

The power tilt and power telescopic steering column system uses the CAN communication system, so check its diagnostic system before proceeding to troubleshooting.

a. Check if DTC B2621 is output.

Result

DTC Condition	Proceed to
B2621 is not output	A

B2621 is output	B

HINT:

- **If DTC B2621 is output, perform troubleshooting for B2621 first.**
- **DTC B2621 indicates a communication interruption for the power tilt and power telescopic steering column system.**

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE (Click here)**

A

2.READ VALUE USING INTELLIGENT TESTER (COMMUNICATION STATE OF ENGINE SWITCH AND KEY CODE)

a. Use the Data List to check if the communication of the key code and the engine switch are functioning properly.

Tilt & Telescopic

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
IG Switch (CAN)	Communication state of engine switch/ON or OFF	ON: Communication normal OFF: Communication interrupted	-
Key Code Confirm (CAN)	Communication state of key code confirmation signal/ON or OFF	ON: Communication normal OFF: Communication interrupted	-

OK:
"ON" is displayed.

NG → **GO TO ENTRY AND START SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)**

OK

3.RECONFIRM DTC

a. Clear the DTCs (Click here).

b. Check for DTCs (Click here).

OK:
DTC B2602 and/or B2606 is not output.

NG → **REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)**

OK

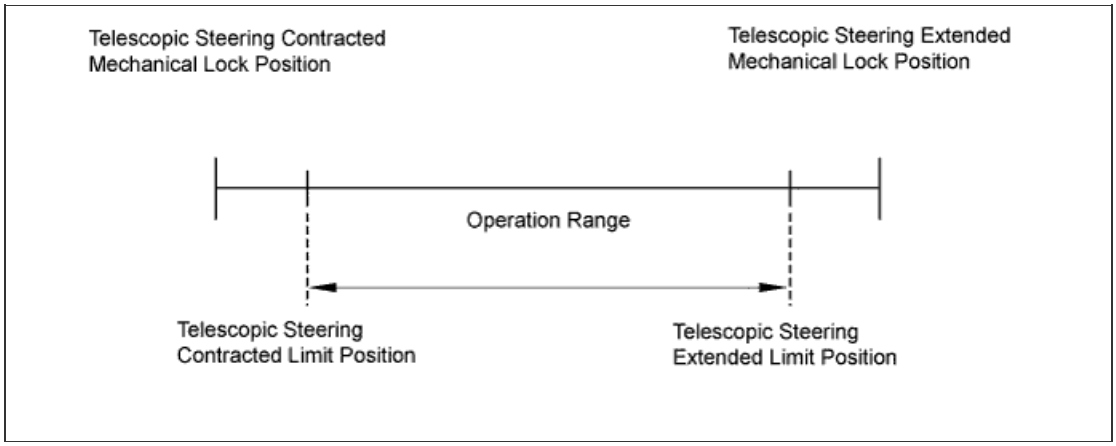
USE SIMULATION METHOD TO CHECK (Click here)

DTC B2611 Telescopic Position Sensor or Telescopic Motor Circuit Malfunction

for Preparation Click here

DESCRIPTION

The telescopic motor is operated by the power source voltage supplied from the multiplex tilt and telescopic ECU and slides the steering column forward and backward. The telescopic position sensor (Hall IC) in the telescopic motor detects the sliding position in the forward and backward directions of the steering column and outputs a signal to the multiplex tilt and telescopic ECU based on that sliding amount.

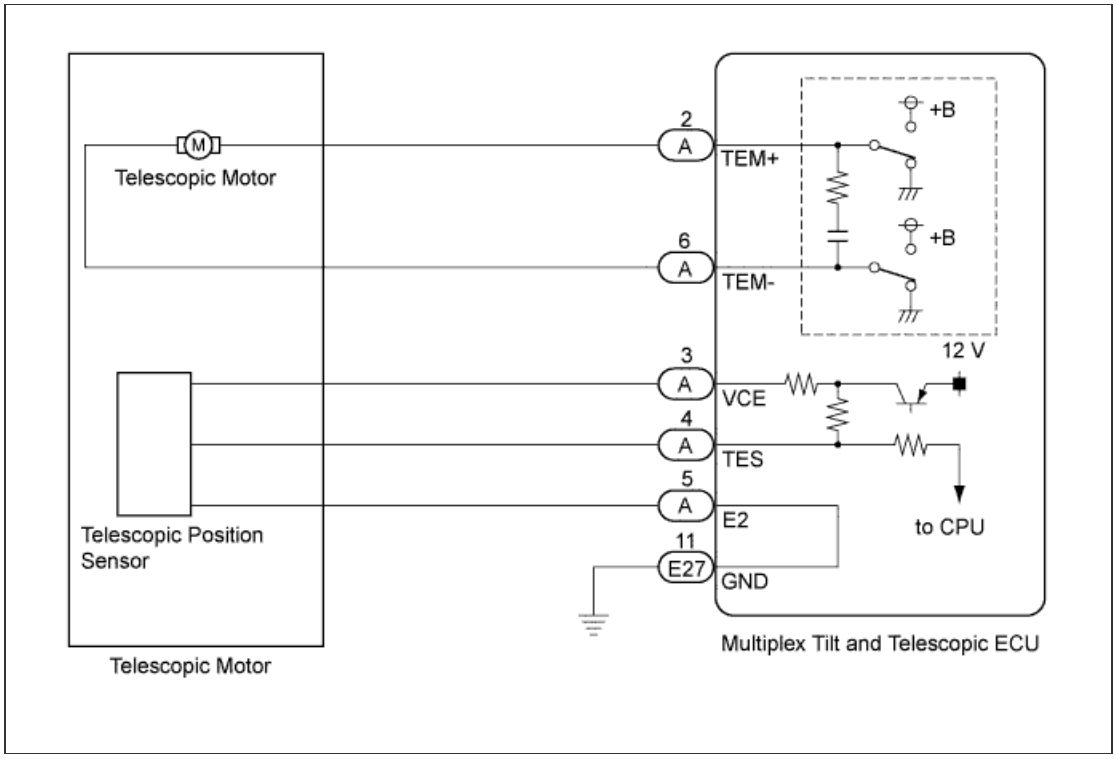


HINT:

Limit positions can be confirmed on the screen of the intelligent tester.

DTC Code	Detection Condition	Trouble Area
B2611	The telescopic operation stops within the operation range while operating.	• **Harness or connector** • **Telescopic position sensor or telescopic motor** • **Multiplex tilt and telescopic ECU**

WIRING DIAGRAM



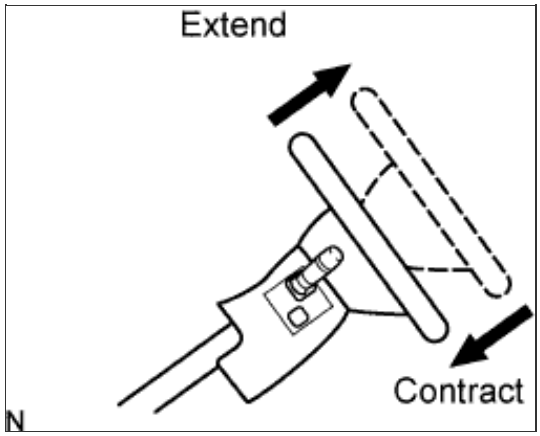
INSPECTION PROCEDURE

HINT:

The wire harness between the multiplex tilt and telescopic ECU and telescopic motor is provided with the steering column assembly.

1.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (TELESCOPIC SHORT/LONG)

a. Select the Active Test, use the intelligent tester to generate a control command, and then check that the steering column contracts and extends.



Tilt & Telescopic

Tester Display	Test Part	Control Range	Diagnostic Note
Telesco Operation	Telescopic operation	Long/Short	-

Result

Result	Proceed to
The steering column does not contract/extend.	A
The steering column contracts/extends.	B

B → Go to step 3

A

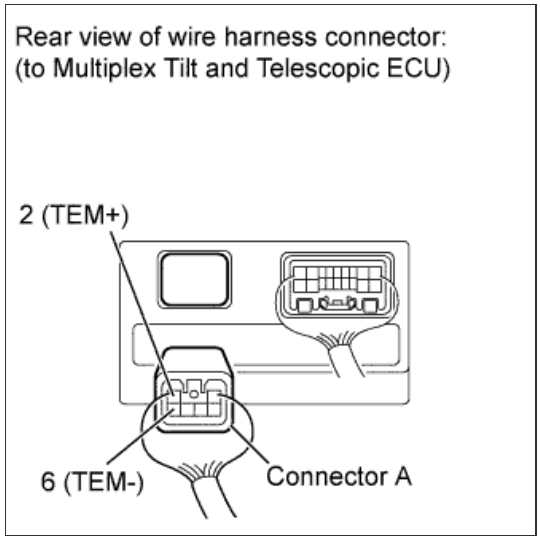
2.CHECK TELESCOPIC MOTOR

a. Disconnect connector A from the multiplex tilt and telescopic ECU.

b. Apply 12 V battery voltage to the multiplex tilt and telescopic ECU connector. Then check the steering wheel telescopic operation.

OK:

Measurement Condition	Specified Condition
12 V battery positive (+) lead → Terminal A-2 (TEM+) 12 V battery negative (-) lead → Terminal A-6 (TEM-)	The steering column contracts.
12 V battery positive (+) lead → Terminal A-6 (TEM-) 12 V battery negative (-) lead → Terminal A-2 (TEM+)	The steering column extends.



NG → REPLACE STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR) (Click here)

OK

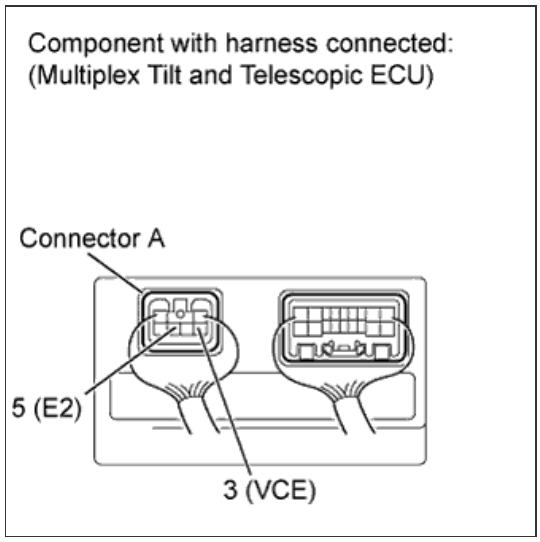
REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

3.CHECK MULTIPLEX TILT AND TELESCOPIC ECU (VCE TERMINAL VOLTAGE)

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
A-3 (VCE) - A-5 (E2)	Engine switch on (IG)	8 to 16 V



NG → Go to step 5

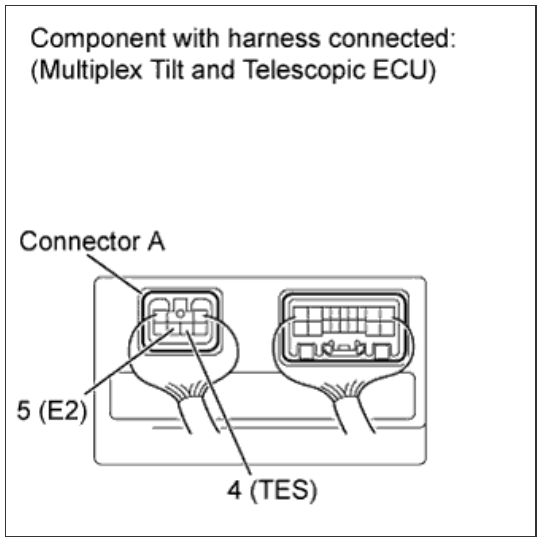
OK

4.CHECK TELESCOPIC POSITION SENSOR

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
A-4 (TES) - A-5 (E2)	Telescopic steering contracting or extending	Pulse generation High: 8 to 16 V Low: Below 1 V



NG → REPLACE STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR) (Click here)

OK

REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

5.CHECK HARNESS AND CONNECTOR (ECU - TELESCOPIC POSITION SENSOR)

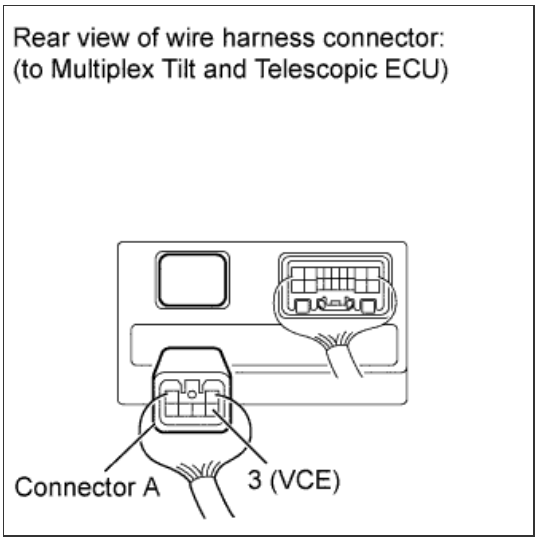
a. Disconnect connector A from the multiplex tilt and telescopic ECU.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
A-3 (VCE) - Body		

ground	Always	10 kΩ or higher



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

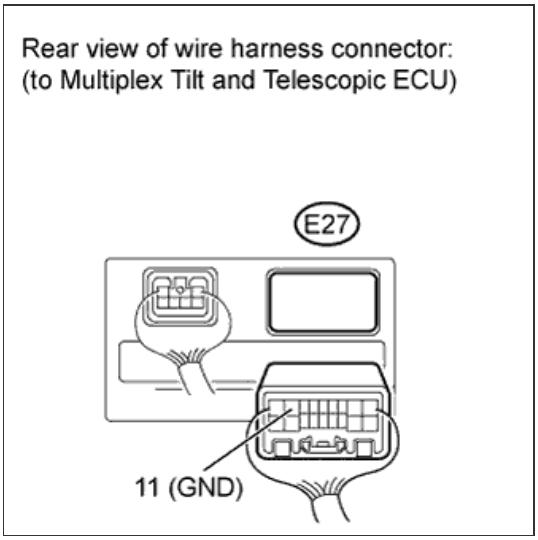
6.CHECK HARNESS AND CONNECTOR (ECU - BODY GROUND)

a. Disconnect the E27 multiplex tilt and telescopic ECU connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E27-11 (GND) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

DTC B2602 Key Unlock Warning Switch Circuit Malfunction

DTC B2606 Key Code Confirm Signal Malfunction

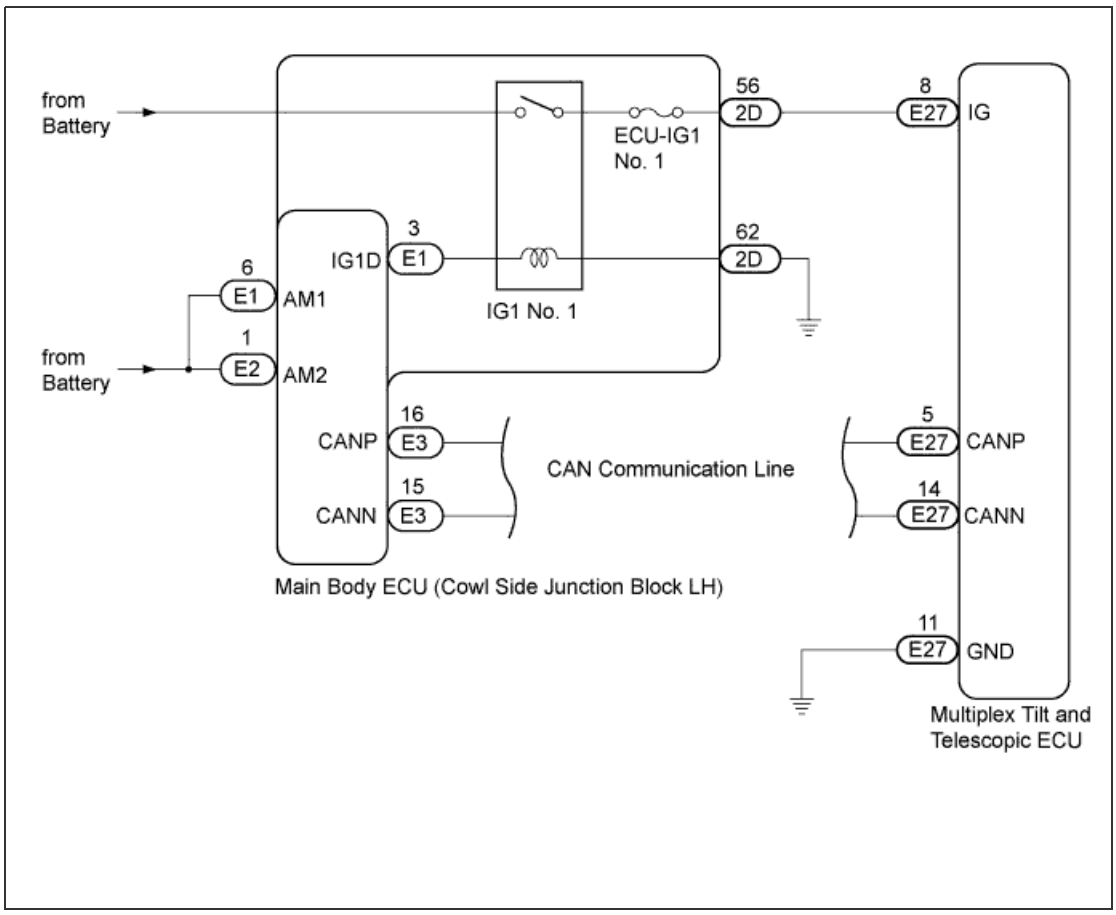
for Preparation Click here

DESCRIPTION

A key code confirmation signal (ON or OFF) is sent from the main body ECU to the multiplex tilt and telescopic ECU via the communication bus. The multiplex tilt and telescopic ECU uses this signal to operate the auto away/return function.

DTC Code	Detection Condition	Trouble Area
B2602	Both of the following conditions continue: • The key code confirmation signal is off. • The engine switch is on (IG).	• CAN communication system • Entry and start system (for start function) • Multiplex tilt and telescopic ECU
B2606	IG signals and/or key code confirmation signals are not received correctly.	• CAN communication system • Entry and start system (for start function) • Multiplex tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1.CHECK OTHER DTC OUTPUT

HINT:

The power tilt and power telescopic steering column system uses the CAN communication system, so check its diagnostic system before proceeding to troubleshooting.

a. Check if DTC B2621 is output.

Result

DTC Condition	Proceed to
B2621 is not output	A

B2621 is output	B

HINT:

- **If DTC B2621 is output, perform troubleshooting for B2621 first.**
- **DTC B2621 indicates a communication interruption for the power tilt and power telescopic steering column system.**

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE (Click here)**

A

2.READ VALUE USING INTELLIGENT TESTER (COMMUNICATION STATE OF ENGINE SWITCH AND KEY CODE)

a. Use the Data List to check if the communication of the key code and the engine switch are functioning properly.

Tilt & Telescopic

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
IG Switch (CAN)	Communication state of engine switch/ON or OFF	ON: Communication normal OFF: Communication interrupted	-
Key Code Confirm (CAN)	Communication state of key code confirmation signal/ON or OFF	ON: Communication normal OFF: Communication interrupted	-

OK:
"ON" is displayed.

NG → **GO TO ENTRY AND START SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)**

OK

3.RECONFIRM DTC

a. Clear the DTCs (Click here).

b. Check for DTCs (Click here).

OK:
DTC B2602 and/or B2606 is not output.

NG → **REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)**

OK

USE SIMULATION METHOD TO CHECK (Click here)

DTC B2620 ECU Power Source Circuit Malfunction

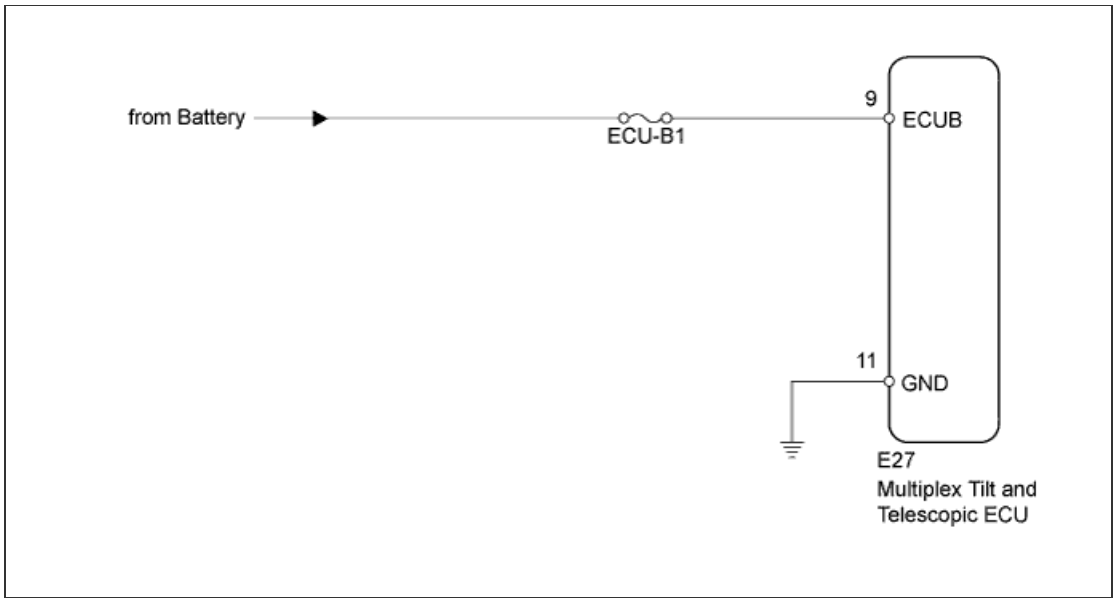
for Preparation Click here

DESCRIPTION

The ECU power source circuit supplies positive voltage to the multiplex tilt and telescopic ECU.

DTC Code	Detection Condition	Trouble Area
B2620	The ECU power source voltage drops to 8 V or less and this condition continues for 10 sec. or more.	• ECU-B1 fuse • Harness or connector • Multiplex tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1.INSPECT FUSE (ECU-B1)

a. Remove the ECU-B1 fuse from the main body ECU.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
ECU-B1 fuse	Always	Below 1 Ω

NG → REPLACE FUSE

OK

2.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - BATTERY)

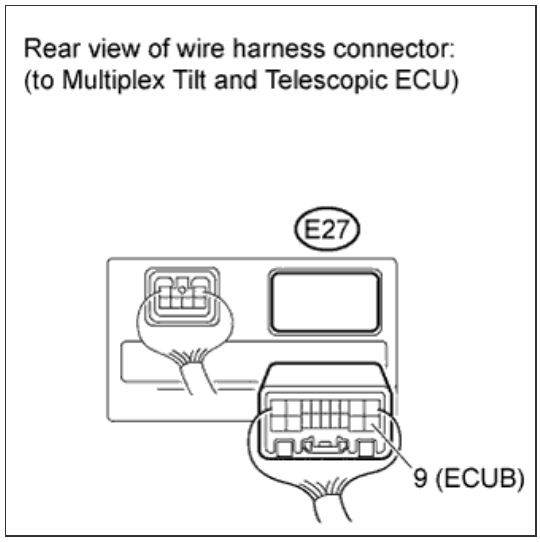
a. Disconnect the E27 multiplex tilt and telescopic ECU connector.

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E27-9 (ECUB) - Body	Always	11 to 14 V

ground		



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

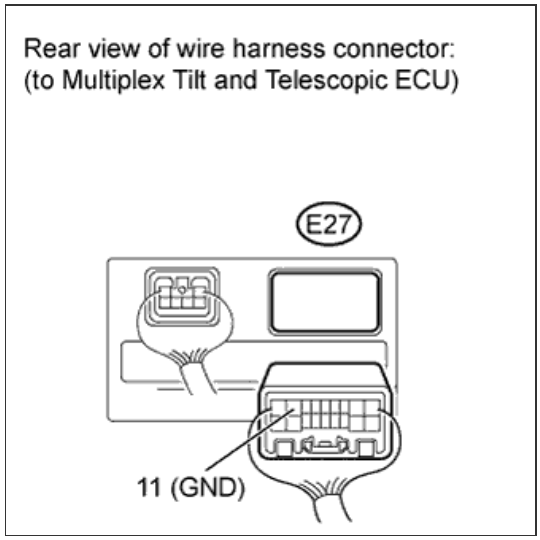
OK

3.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - BODY GROUND)

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E27-11 (GND) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

DTC B2603 Tilt and Telescopic Manual Switch Circuit Malfunction

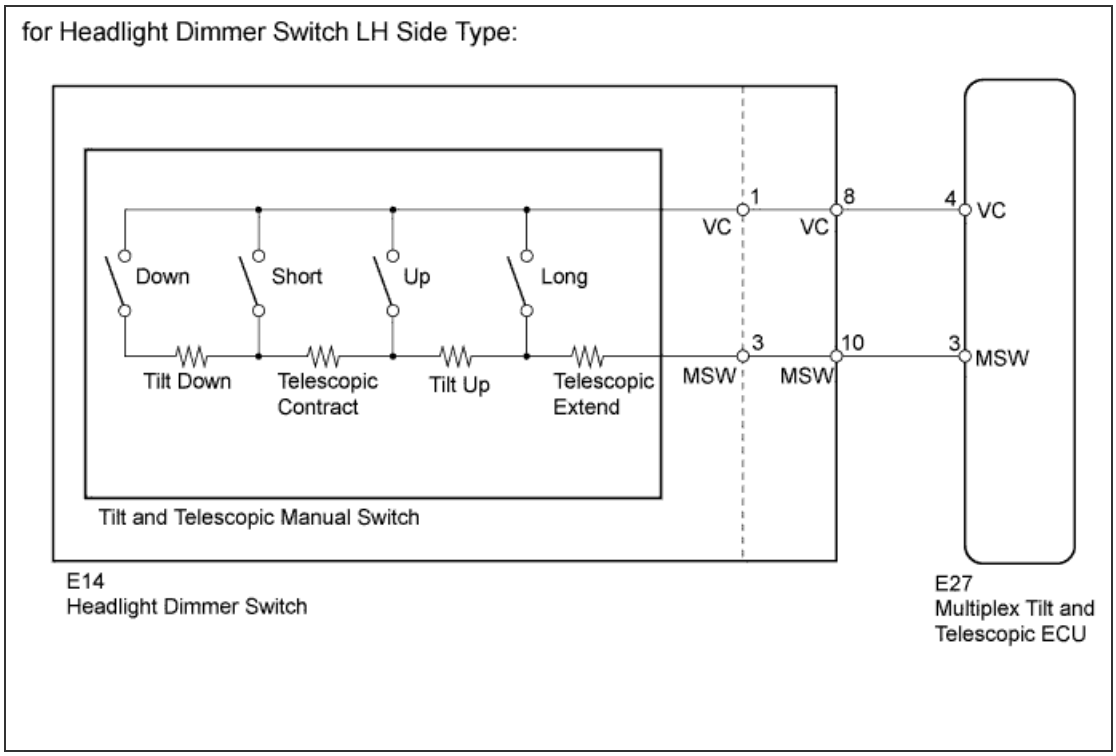
for Preparation Click here

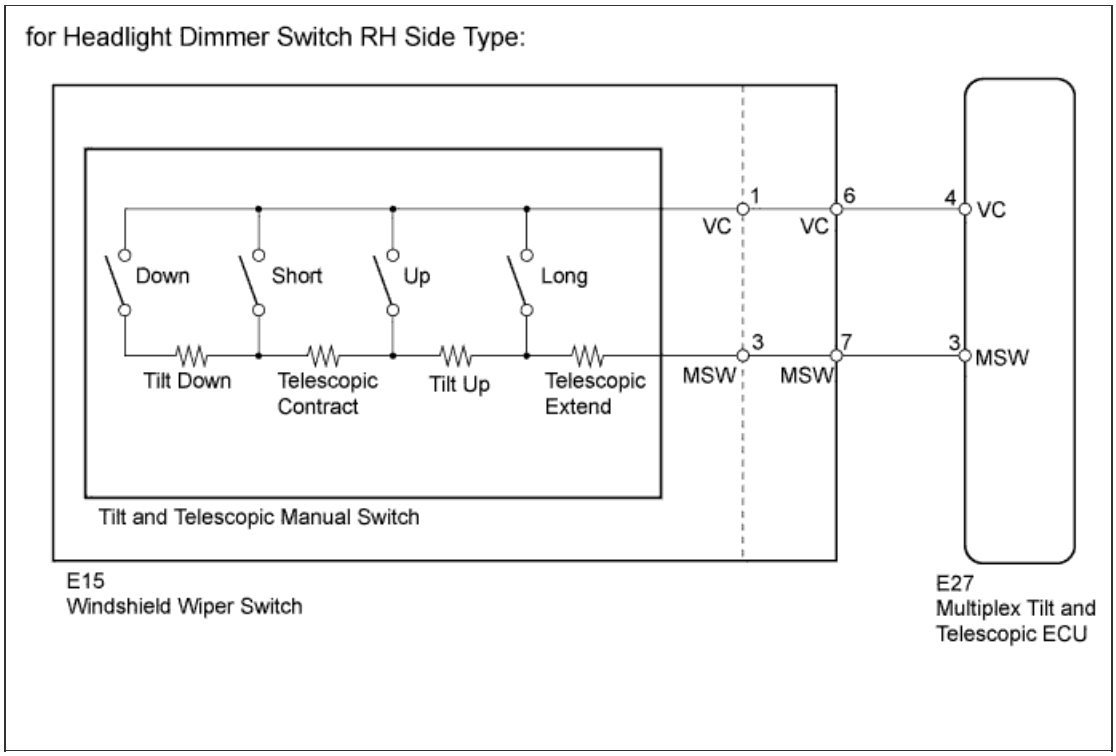
DESCRIPTION

Different voltage values are input to the multiplex tilt and telescopic ECU by operating the tilt and telescopic manual switch. The multiplex tilt and telescopic ECU then judges which motor and in which direction that motor should be moved based on the voltage value.

DTC Code	Detection Condition	Trouble Area
B2603	When operating the tilt and telescopic manual switch, an abnormal voltage value is input to the multiplex tilt and telescopic ECU.	• Tilt and telescopic manual switch • Tilt and telescopic manual switch circuit • Multiplex tilt and telescopic ECU

WIRING DIAGRAM

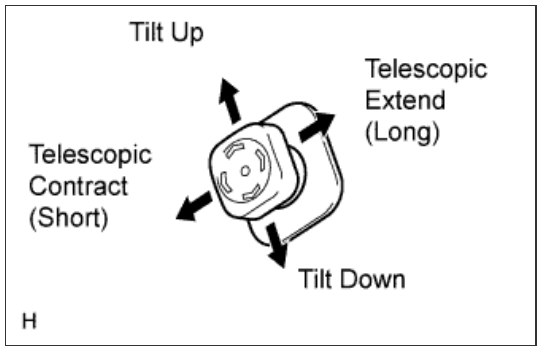




INSPECTION PROCEDURE

1.READ VALUE USING INTELLIGENT TESTER (TILT AND TELESCOPIC MANUAL SWITCH)

a. Use the Data List to check if the tilt and telescopic manual switch is functioning properly.



Tilt & Telescopic

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Tilt Up Switch	Input state of tilt up by manual switch/ON or OFF	ON: Tilt up activated by manual switch OFF: Tilt up not activated by manual switch	-
Tilt Down Switch	Input state of tilt down by manual switch/ON or OFF	ON: Tilt down activated by manual switch OFF: Tilt down not activated by manual switch	-
Telesco Short Switch	Input state of telescopic short by manual switch/ON or OFF	ON: Telescopic short activated by manual switch OFF: Telescopic short not activated by manual switch	-
Telesco Long Switch	Input state of telescopic long by manual switch/ON or OFF	ON: Telescopic long activated by manual switch OFF: Telescopic long not activated by manual switch	-

OK:
"ON" is displayed on the intelligent tester screen when each switch is turned on.
"OFF" is displayed on the intelligent tester screen when each switch is turned off.

NG → **Go to step 3**

OK

2.CONFIRM DTC

a. Clear the DTCs (Click here).

b. Check for DTCs (Click here).

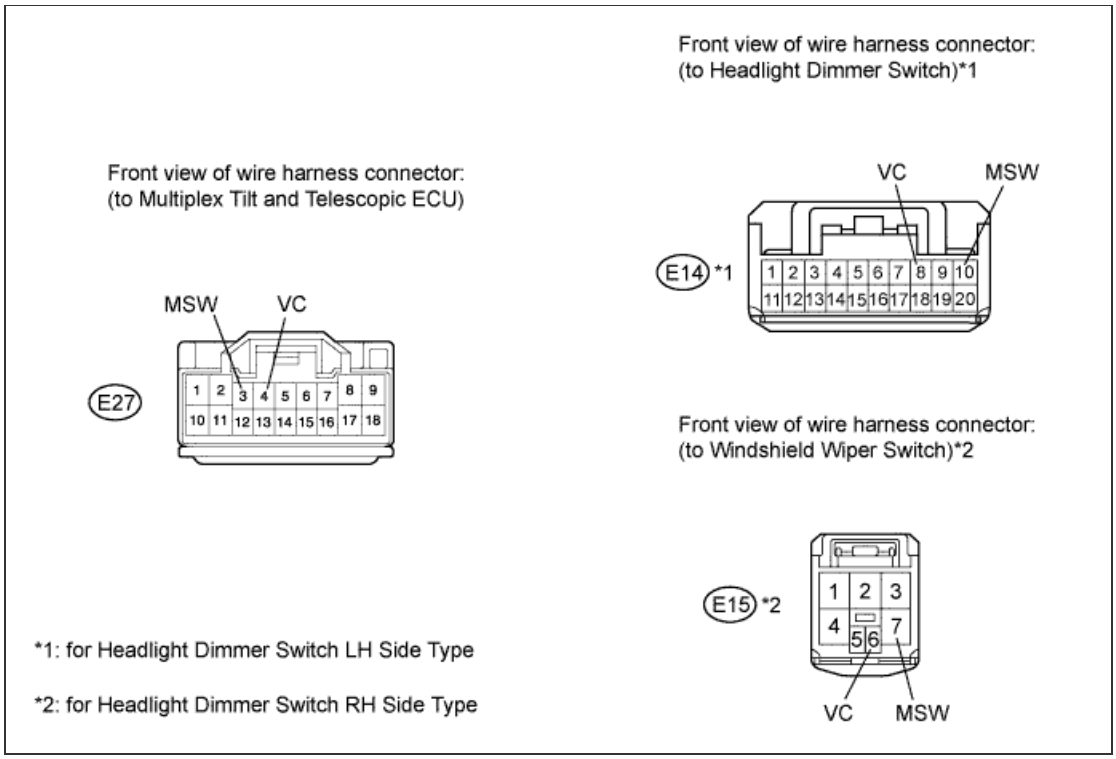
Result

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

B → USE SIMULATION METHOD TO CHECK (**Click here**)

A → REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (**Click here**)

3.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - HEADLIGHT DIMMER SWITCH)



a. Disconnect the E27 multiplex tilt and telescopic ECU connector.

b. Disconnect the E14 headlight dimmer switch or E15 windshield wiper switch connector.

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

Standard Resistance:

for Headlight Dimmer Switch LH Side Type

Tester Connection	Condition	Specified Condition
E27-4 (VC) - E14-8 (VC)	Always	Below 1 Ω
E27-3 (MSW) - E14-10 (MSW)		
E14-8 (VC) - Body ground	Always	10 kΩ or higher
E14-10 (MSW) - Body ground		

for Headlight Dimmer Switch RH Side Type

Tester Connection	Condition	Specified Condition
E27-4 (VC) - E15-6 (VC)	Always	Below 1 Ω
E27-3 (MSW) - E15-7 (MSW)		

E15-6 (VC) - Body ground	Always	10 kΩ or higher
E15-7 (MSW) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4.CHECK MULTIPLEX TILT AND TELESCOPIC ECU (VC TERMINAL VOLTAGE)

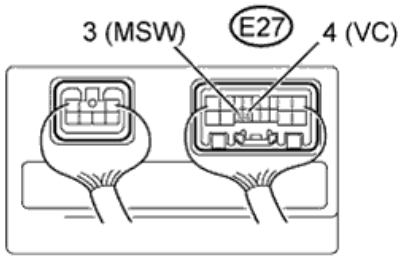
a. Reconnect the E27 multiplex tilt and telescopic ECU connector.

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E27-4 (VC) - E27-3 (MSW)	Engine switch on (IG)	4.9 to 5.1 V

Component with harness connected:
(Multiplex Tilt and Telescopic ECU)



NG → REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

OK

5.INSPECT TILT AND TELESCOPIC MANUAL SWITCH

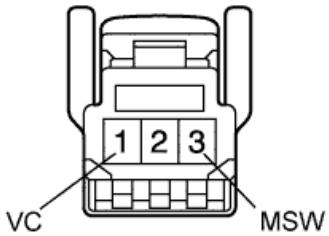
a. Remove the tilt and telescopic manual switch (Click here).

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

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
1 (VC) - 3 (MSW)	Tilt up	342 to 378 Ω
	Tilt down	1890.5 to 2089.5 Ω
	Telescopic contract	750.5 to 829.5 Ω
	Telescopic extend	152 to 168 Ω

Component without harness connected:
(Tilt and Telescopic Manual Switch)



Result

Result	Proceed to
OK (for headlight dimmer switch LH side)	A
OK (for headlight dimmer switch RH side)	B
NG	C

B → REPLACE WINDSHIELD WIPER SWITCH (Click here)

C → REPLACE TILT AND TELESCOPIC MANUAL SWITCH (Click here)

A

REPLACE HEADLIGHT DIMMER SWITCH (Click here)

DTC B2621 Communication Interruption

for Preparation Click here

DESCRIPTION

The multiplex tilt and telescopic ECU forms a network with the ECUs of other systems through the communication bus. Each ECU informs the other ECUs that it is connected to the network by outputting a specified signal (periodic signal) to the communication bus on a regular schedule. The multiplex tilt and telescopic ECU detects the connection of each ECU based on the signal.

DTC Code	Detection Condition	Trouble Area
B2621	The periodic signal from a specified ECU has stopped.	• CAN communication system • Multiplex tilt and telescopic ECU

INSPECTION PROCEDURE

1.CHECK DTC (CAN COMMUNICATION SYSTEM)

a. Check for DTCs of the CAN communication system (for LHD: Click here, for RHD: Click here).

Result

Result	Proceed to
DTC is not output	A
for LHD: DTC is output	B
for RHD: DTC is output	C

B → **GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)**

C → **GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART) (Click here)**

A

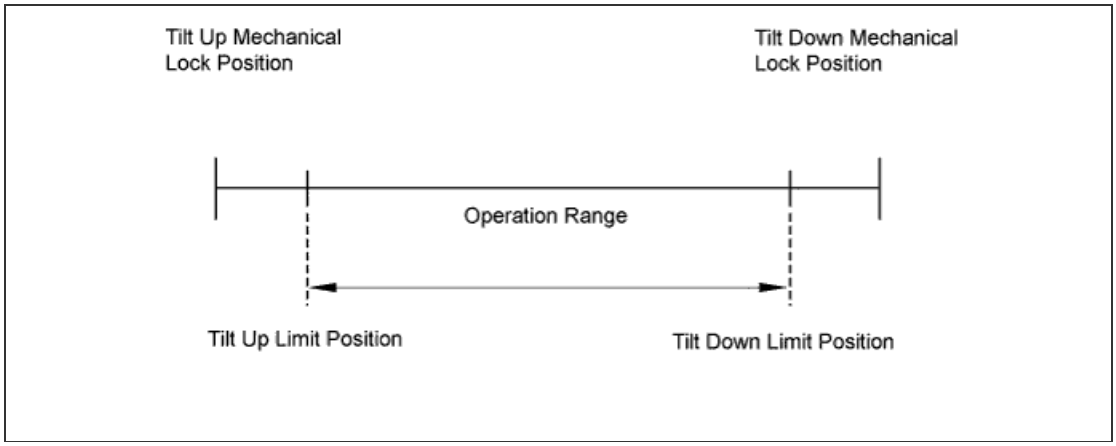
REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

DTC B2610 Tilt Position Sensor or Tilt Motor Circuit Malfunction

for Preparation Click here

DESCRIPTION

The tilt motor is operated by the power source voltage supplied from the multiplex tilt and telescopic ECU and tilts the steering column up and down. The tilt position sensor (Hall IC) in the tilt motor detects the tilt angle of the steering column and outputs a signal to the CPU based on that tilt.

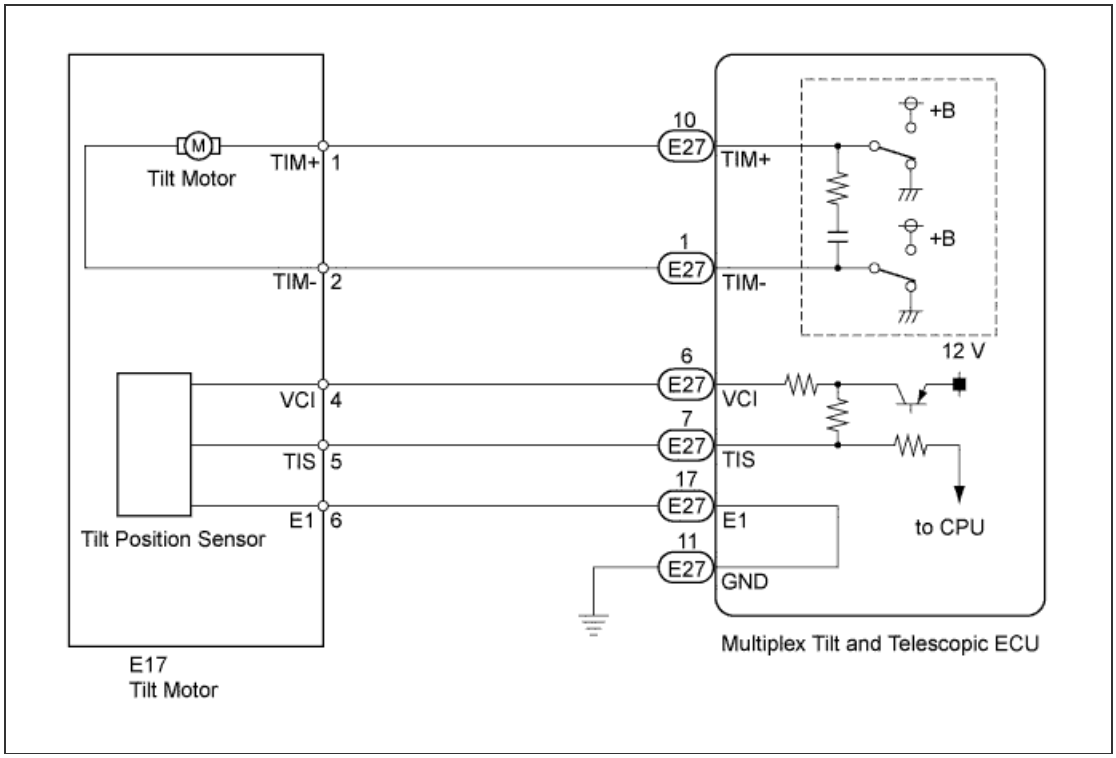


HINT:

Limit positions can be confirmed on the screen of the intelligent tester.

DTC Code	Detection Condition	Trouble Area
B2610	The tilt operation stops within the operation range while operating.	• Harness or connector • Tilt position sensor or tilt motor • Multiplex tilt and telescopic ECU

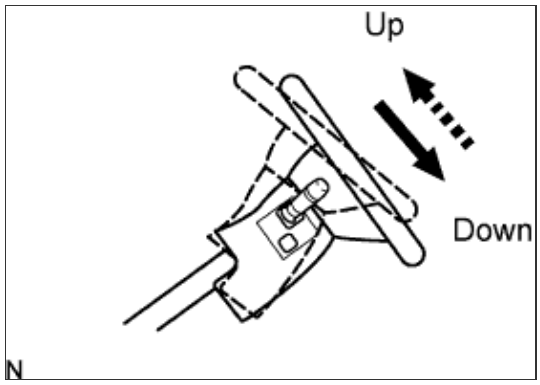
WIRING DIAGRAM



INSPECTION PROCEDURE

1.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (TILT UP/DOWN)

a. Select the Active Test, use the intelligent tester to generate a control command, and then check that the steering wheel tilts up and down.



Tilt & Telescopic

Tester Display	Test Part	Control Range	Diagnostic Note
Tilt Operation	Tilt operation	Up/Down	-

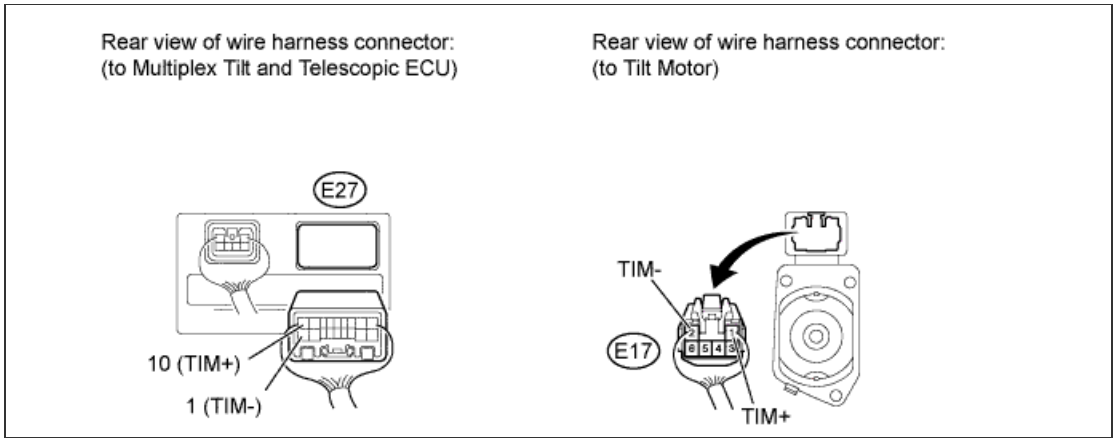
Result

Result	Proceed to
Steering wheel does not tilt up/down.	A
Steering wheel tilts up/down.	B

B → Go to step 4

A

2.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - TILT MOTOR)



a. Disconnect the E27 multiplex tilt and telescopic ECU connector.

b. Disconnect the E17 tilt motor connector.

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

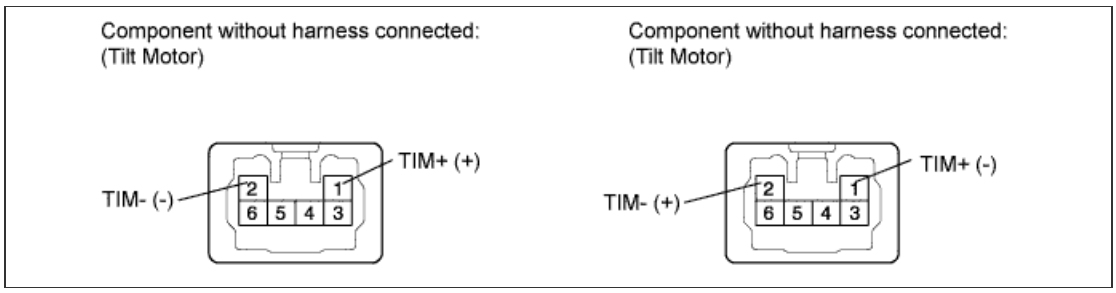
Standard Resistance:

Tester Connection	Condition	Specified Condition
E27-10 (TIM+) - E17-1 (TIM+)	Always	Below 1 Ω
E27-1 (TIM-) - E17-2 (TIM-)		
E27-10 (TIM+) - Body ground	Always	10 kΩ or higher
E27-1 (TIM-) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3.INSPECT TILT MOTOR



a. Apply 12 V battery voltage to the tilt motor connector. Then check the steering wheel tilt operation.

OK:

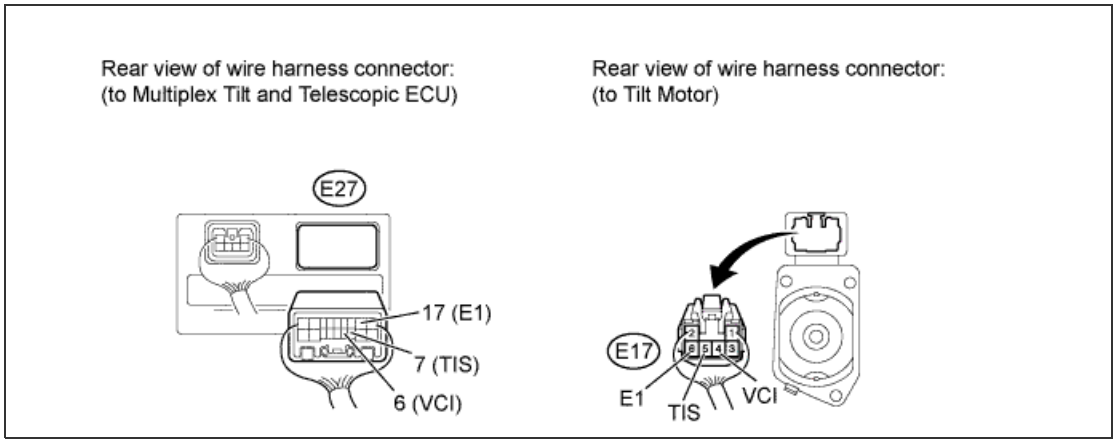
Measurement Condition	Specified Condition
12 V battery positive (+) lead → Terminal E17-1 (TIM+) 12 V battery negative (-) lead → Terminal E17-2 (TIM-)	The steering wheel tilts up.
12 V battery positive (+) lead → Terminal E17-2 (TIM-) 12 V battery negative (-) lead → Terminal E17-1 (TIM+)	The steering wheel tilts down.

NG → REPLACE STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR) (Click here)

OK

REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

4.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - TILT POSITION SENSOR)



a. Disconnect the E27 multiplex tilt and telescopic ECU connector.

b. Disconnect the E17 tilt motor connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E27-6 (VCI) - E17-4 (VCI)	Always	Below 1 Ω
E27-7 (TIS) - E17-5 (TIS)		
E27-17 (E1) - E17-6 (E1)		
E27-6 (VCI) - Body		

ground		
E27-7 (TIS) - Body ground	Always	10 kΩ or higher
E27-17 (E1) - Body ground		

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

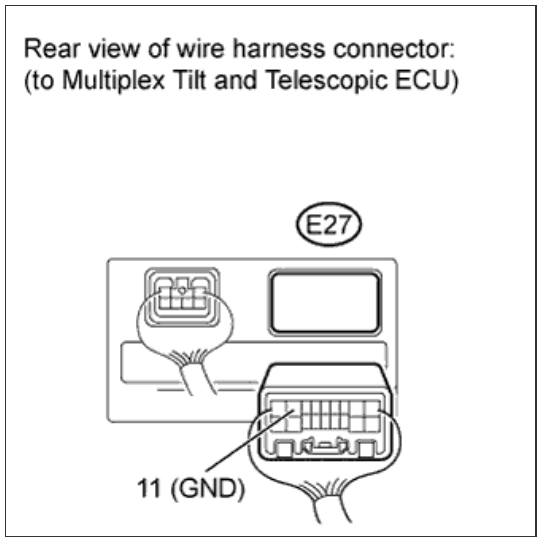
OK

5.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - BODY GROUND)

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E27-11 (GND) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

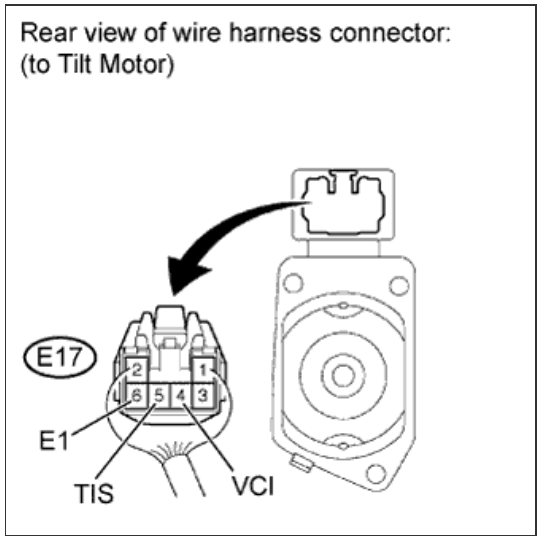
6.CHECK MULTIPLEX TILT AND TELESCOPIC ECU (VCI, TIS TERMINAL VOLTAGE)

a. Reconnect the E27 multiplex tilt and telescopic ECU connector.

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E17-4 (VCI) - E17-6 (E1)	Engine switch on (IG)	8 to 16 V
E17-5 (TIS) - E17-6 (E1)		



NG → REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

OK

7.CHECK TILT POSITION SENSOR

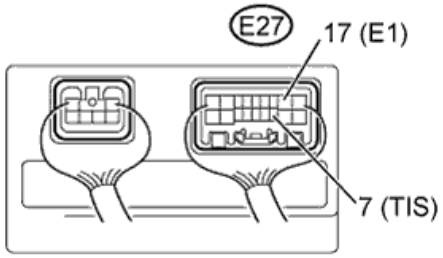
a. Reconnect the E17 tilt motor connector.

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E27-7 (TIS) - E27-17 (E1)	Steering tilting up or tilting down	Pulse generation High: 8 to 16 V Low: Below 1 V

Component with harness connected:
(Multiplex Tilt and Telescopic ECU)



NG → REPLACE STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR) (Click here)

OK → REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

DTC B2624 Vehicles Speed Malfunction

for Preparation Click here

DESCRIPTION

The multiplex tilt and telescopic ECU forms a network with the ECUs of other systems through the communication bus. Each ECU informs the other ECUs that it is connected to the network by outputting a specified signal (periodic signal) to the communication bus on a regular schedule. The multiplex tilt and telescopic ECU receives vehicle speed signals from the combination meter via the communication bus to prevent improper operation of the auto away/return function during driving.

DTC Code	Detection Condition	Trouble Area
B2624	• The auto away function is disabled with the last vehicle speed signal* at 10 km/h (6 mph) or more. • Vehicle speed signal is lost for 5 seconds or more and the auto away/return function is disabled.	• CAN communication system • Meter/gauge system • Multiplex tilt and telescopic ECU

HINT:

*: If the engine switch is turned off immediately after the vehicle comes to a sudden stop, the last vehicle speed signal may not be 0 km/h (0 mph).

INSPECTION PROCEDURE

1.CHECK OTHER DTC OUTPUT

a. Check if DTC B2621 is output (Click here).

Result

Result	Proceed to
B2621 is not output	A
B2621 is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE (Click here)

A

2.READ VALUE USING INTELLIGENT TESTER (SPEED SIGNAL)

a. Use the Data List to check if the speed signal is functioning properly.

Tilt & Telescopic

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Freeze Speed Info	Vehicle speed data/min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-

Result

Result	Proceed to
Tester indication is normal	A
Tester indication is abnormal	B

HINT:

A vehicle speed of 3 km/h (2 mph) or more may be displayed on the intelligent tester screen immediately after the vehicle comes to a sudden stop. This is caused by a delay in vehicle signal input via the communication bus and is not a malfunction.

B → GO TO METER/GAUGE SYSTEM (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

A

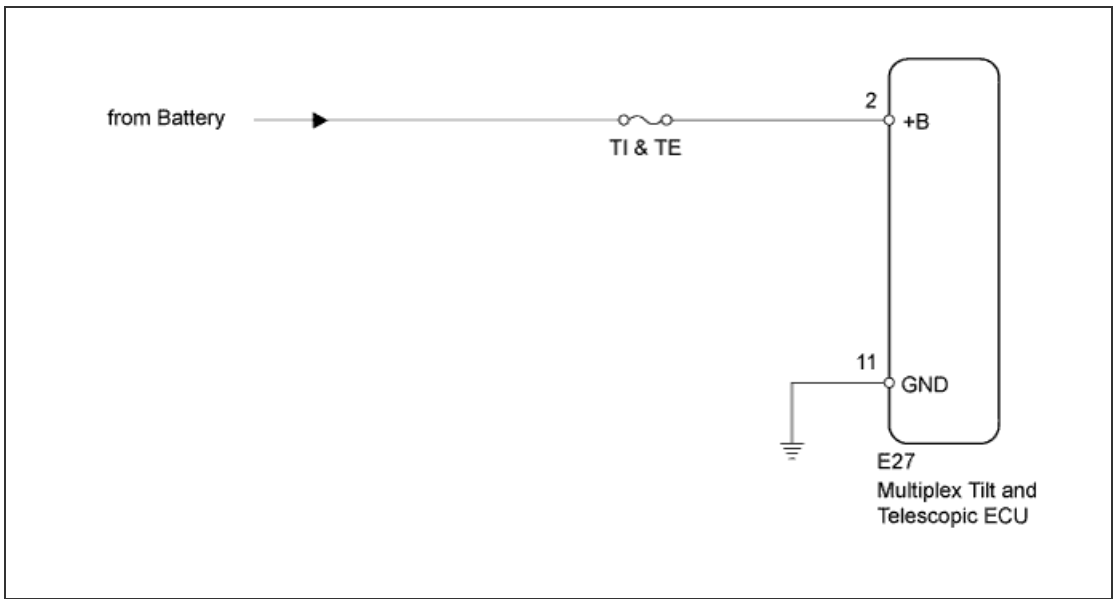
REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

for Preparation Click here

DESCRIPTION

This is the power source for the motors.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.INSPECT FUSE (TI & TE)

a. Remove the TI & TE fuse from the main body ECU.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
TI & TE fuse	Always	Below 1 Ω

NG → REPLACE FUSE

OK

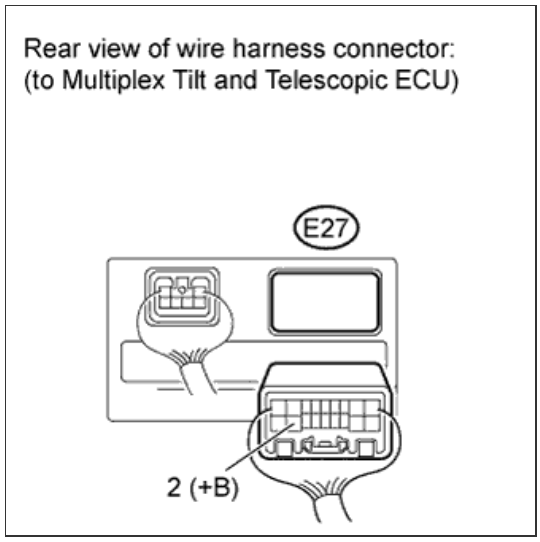
2.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - BATTERY)

a. Disconnect the E27 multiplex tilt and telescopic ECU connector.

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E27-2 (+B) - Body ground	Always	11 to 14 V



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

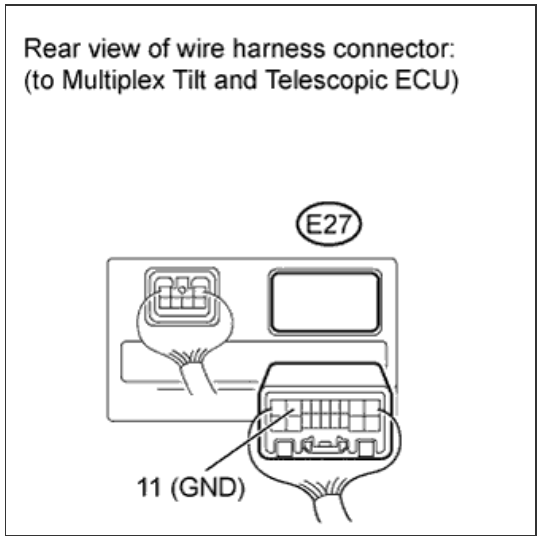
OK

3.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - BODY GROUND)

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E27-11 (GND) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK IG POWER SOURCE CIRCUIT (Click here)

for Preparation Click here

DESCRIPTION

The signals generated by operating the manual switch are sent to the multiplex tilt and telescopic ECU through the serial line.

INSPECTION PROCEDURE

1.READ VALUE USING INTELLIGENT TESTER (TILT AND TELESCOPIC MANUAL SWITCH)

a. Use the Data List to check if the tilt and telescopic manual switch is functioning properly.

Tilt & Telescopic

Tester Display	Measurement Item/Range	Normal Condition	Normal Condition
Tilt Up switch	Input state of tilt up by manual switch/ON or OFF	ON: Tilt up activated by manual switch OFF: Tilt up not activated by manual switch	-
Tilt Down Switch	Input state of tilt down by manual switch/ON or OFF	ON: Tilt down activated by manual switch OFF: Tilt down not activated by manual switch	-
Telesco Short Switch	Input state of telescopic short by manual switch/ON or OFF	ON: Telescopic short activated by manual switch OFF: Telescopic short not activated by manual switch	-
Telesco Long Switch	Input state of telescopic long by manual switch/ON or OFF	ON: Telescopic long activated by manual switch OFF: Telescopic long not activated by manual switch	-

Result

Result	Proceed to
"ON" is displayed on the intelligent tester screen when each switch is turned on. "OFF" is displayed on the intelligent tester screen when each switch is turned off.	A
"ON" is not displayed on the intelligent tester screen when each switch is turned on. "OFF" is not displayed on the intelligent tester screen when each switch is turned off.	B

B → REPLACE TILT AND TELESCOPIC MANUAL SWITCH (Click here)

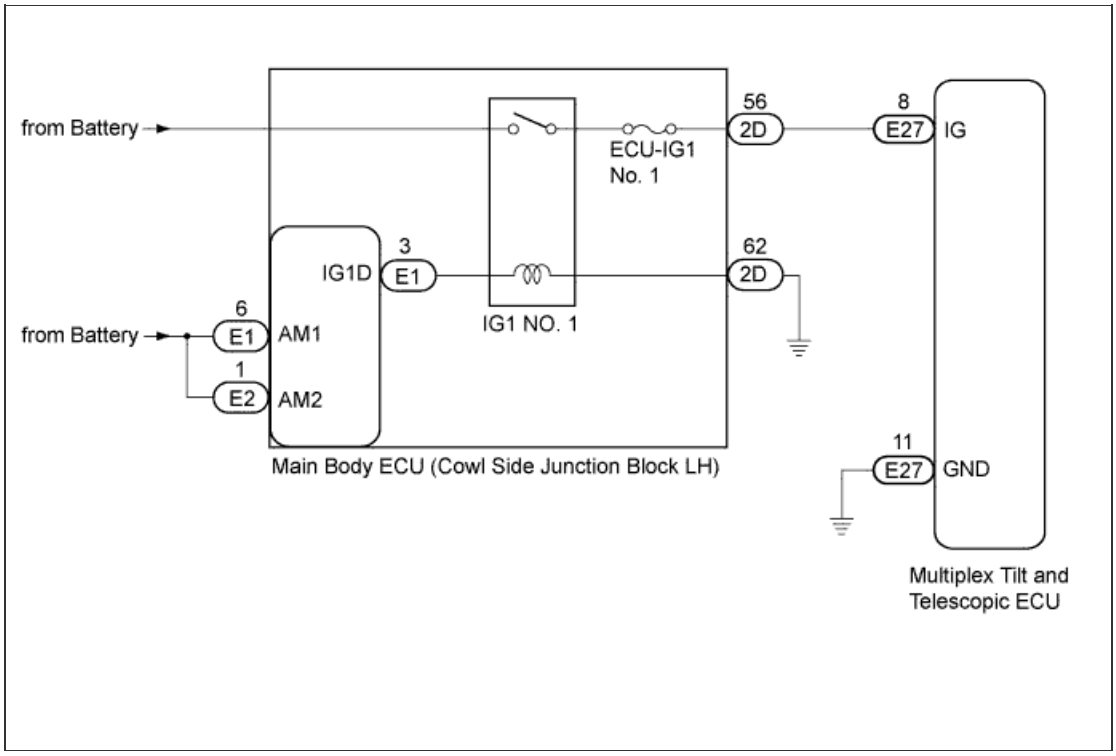
A → REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

for Preparation Click here

DESCRIPTION

When the engine switch is turned on (IG), the IG power source circuit supplies positive (+) voltage to the multiplex tilt and telescopic ECU. The multiplex tilt and telescopic ECU also receives engine switch signals via this circuit.

WIRING DIAGRAM



INSPECTION PROCEDURE

1.INSPECT FUSE (ECU-IG1 No. 1)

a. Remove the ECU-IG1 No. 1 fuse from the main body ECU.

b. Measure the resistance of the fuse.

Standard Resistance:

Tester Connection	Condition	Specified Condition
ECU-IG1 No. 1 fuse	Always	Below 1 Ω

NG → REPLACE FUSE

OK

2.CHECK MULTIPLEX TILT AND TELESCOPIC ECU (IG TERMINAL VOLTAGE)

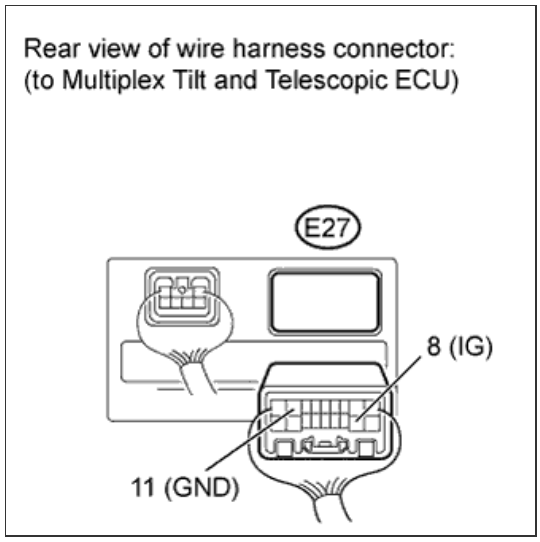
a. Disconnect the E27 connector from the multiplex tilt and telescopic ECU.

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E27-8 (IG) - E27-	Engine switch on	

11 (GND)	(IG)	11 to 14 V



NG → Go to step 3

OK

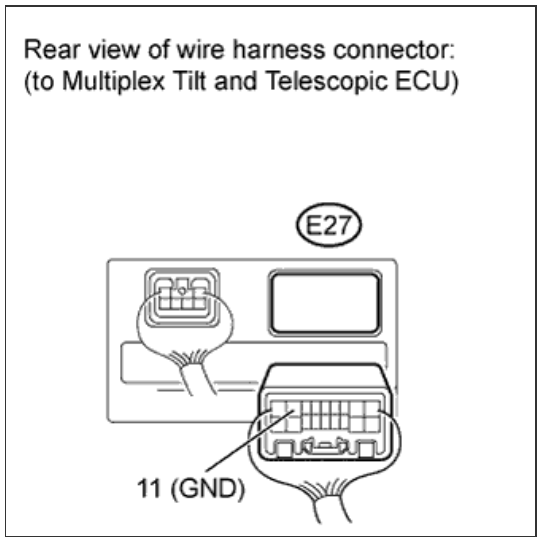
REPLACE MULTIPLEX TILT AND TELESCOPIC ECU (Click here)

3.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - BODY GROUND)

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E27-11 (GND) - Body ground	Always	Below 1 Ω

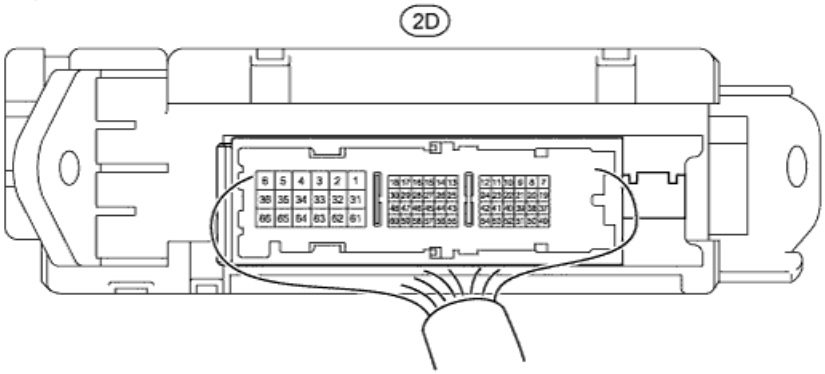


NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4.CHECK HARNESS AND CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - MAIN BODY ECU)

Component with harness connected:
(Main Body ECU)



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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
2D-56 - Body ground	Engine switch on (IG)	11 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU - BATTERY)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (MULTIPLEX TILT AND TELESCOPIC ECU - MAIN BODY ECU)

for Preparation Click here

1.PRECAUTIONS WHEN WORKING ON ELECTRIC STEERING LOCK

a. After replacing the steering lock actuator assembly (steering lock ECU), perform the key ID code registration.

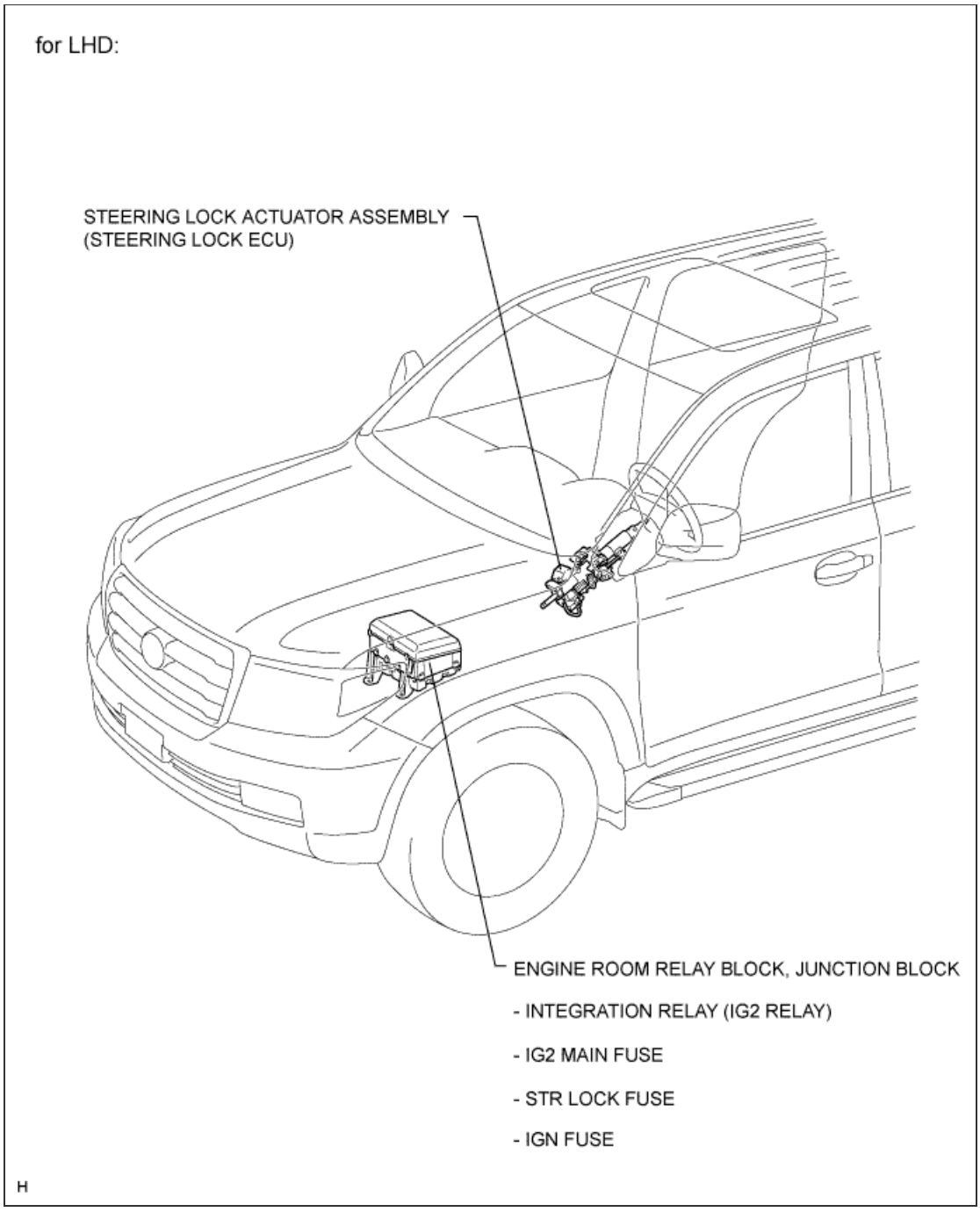
b. If the steering lock actuator assembly (steering lock ECU) is replaced, open and close the driver's door. The engine may not start until the driver's door is opened or closed.

HINT:

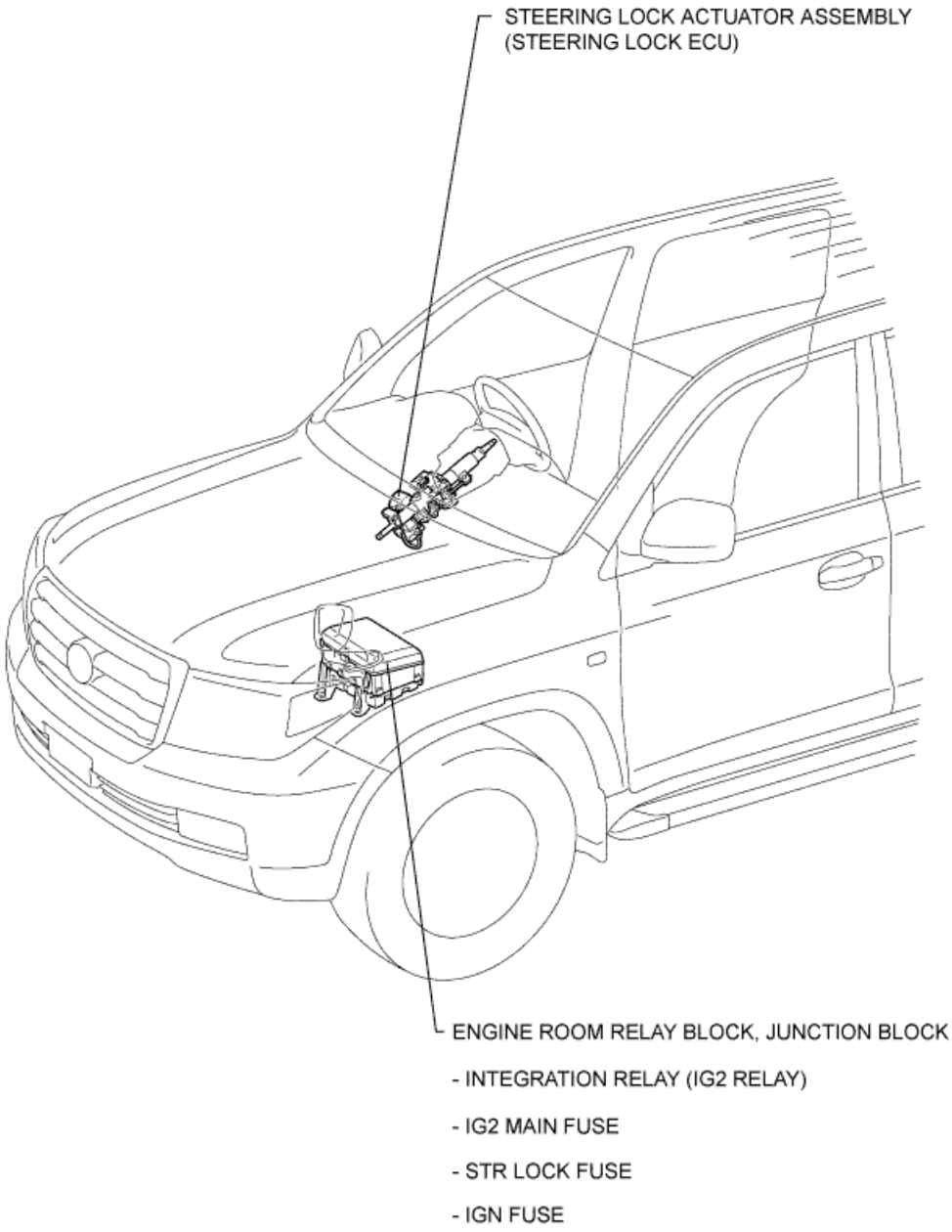
Opening and closing the driver's door causes the steering lock actuator assembly (steering lock ECU) to memorize the correct steering lock bar position.

c. When the main body ECU is in sleep mode, it cannot communicate with the intelligent tester. Therefore, checking for DTCs of the smart key system and checking the Data List with the engine switch off cannot be performed. To exit sleep mode, perform the following steps: 1) open the driver's door with the engine switch off, 2) open and close any door several times at 1.5 second intervals.

for Preparation Click here

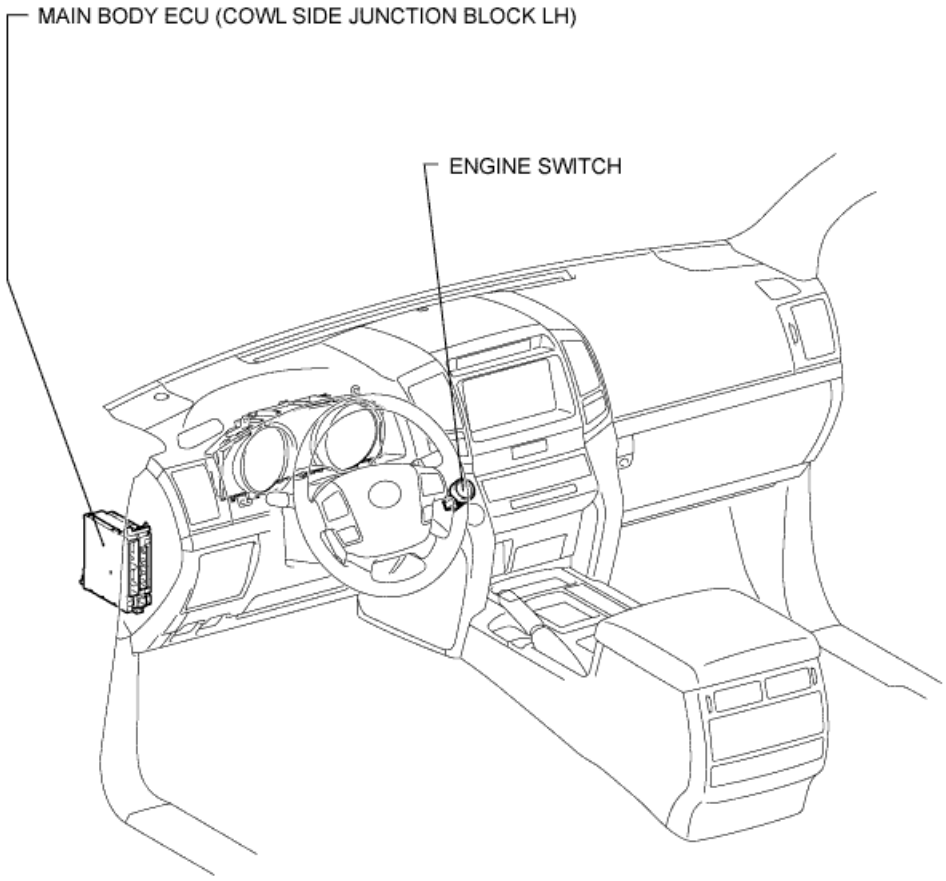


for RHD:


STEERING LOCK ACTUATOR ASSEMBLY
(STEERING LOCK ECU)
ENGINE ROOM RELAY BLOCK, JUNCTION BLOCK
- INTEGRATION RELAY (IG2 RELAY)
- IG2 MAIN FUSE
- STR LOCK FUSE
- IGN FUSE

H

for LHD:



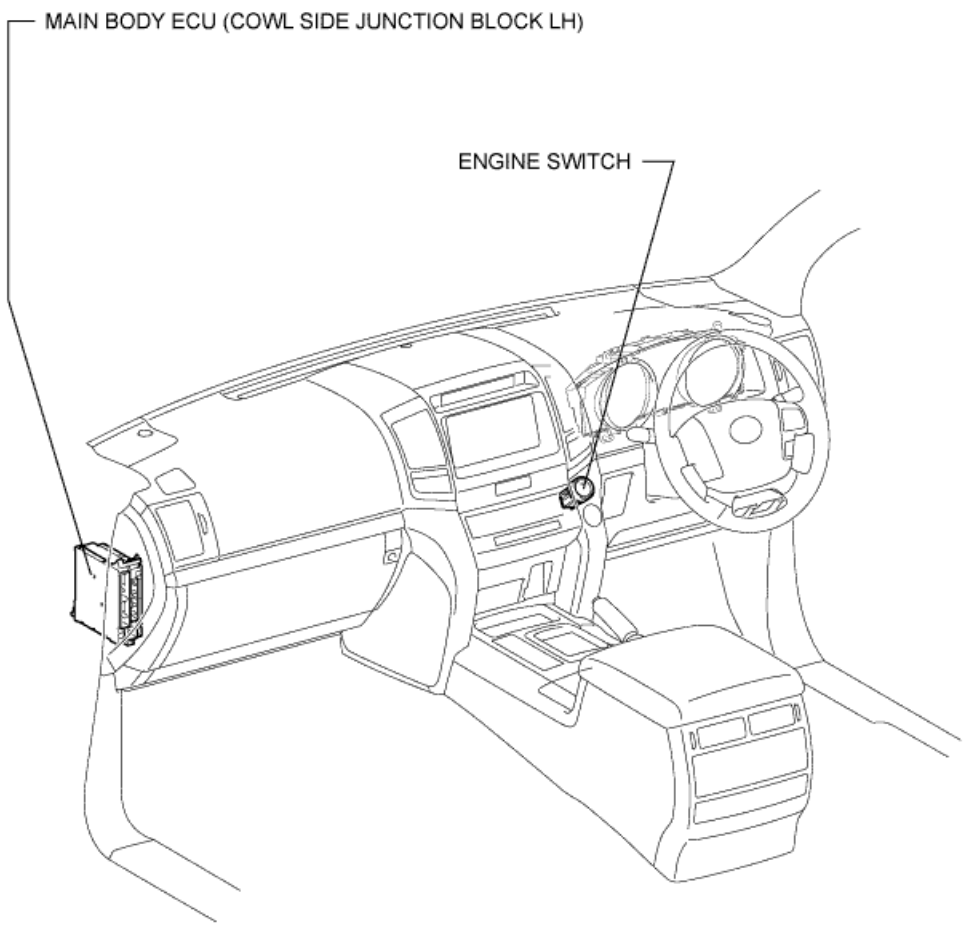
Refer to Service Bulletin for Installation Position

ID CODE BOX
(IMMOBILISER CODE ECU)

CERTIFICATION ECU (SMART
KEY ECU ASSEMBLY)

H

for RHD:



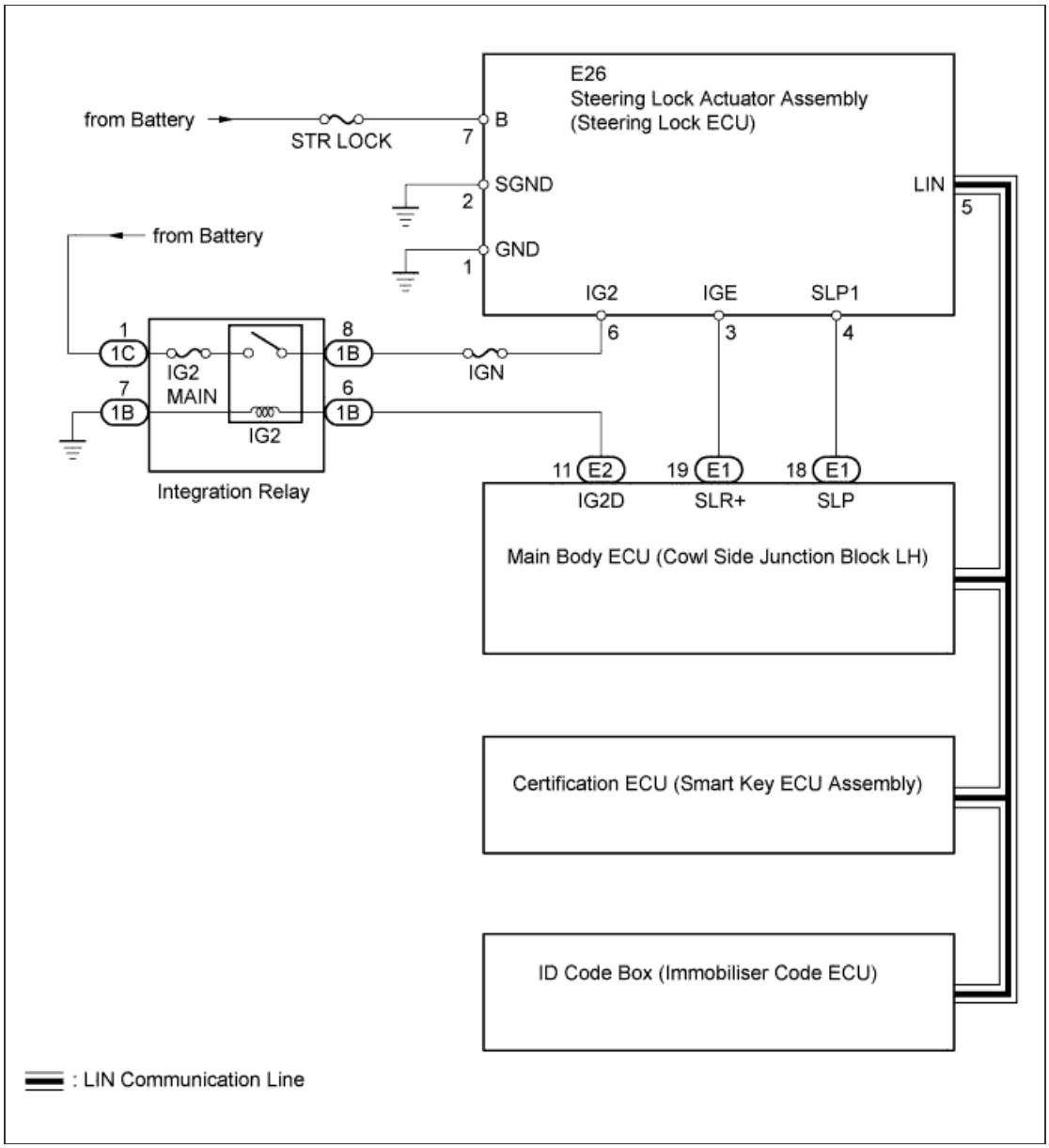
Refer to Service Bulletin for Installation Position

ID CODE BOX
(IMMOBILISER CODE ECU)

CERTIFICATION ECU (SMART
KEY ECU ASSEMBLY)

H

for Preparation Click here



Input and Output Signals of Each ECU

Transmitting ECU	Receiving ECU	Signal	Communication Method
Main Body ECU	Steering Lock ECU	Power supply status (to steering lock motor)	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Sleep available status	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Lock/unlock sensor status	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Steering lock status	LIN
Steering Lock	• Certification ECU (Smart Key ECU Assembly)		

ECU	• Main Body ECU • ID Code Box (Immobiliser Code ECU)	Motor control status	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Diagnostic response status	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Lock/unlock sensor malfunction	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Power supply malfunction (to steering lock motor)	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Motor driver malfunction	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Lock bar stuck status	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Push button start function status	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Lock/unlock relay drive status	LIN
Steering Lock ECU	• Certification ECU (Smart Key ECU Assembly) • Main Body ECU • ID Code Box (Immobiliser Code ECU)	Engine start control status	LIN

for Preparation Click here

DESCRIPTION

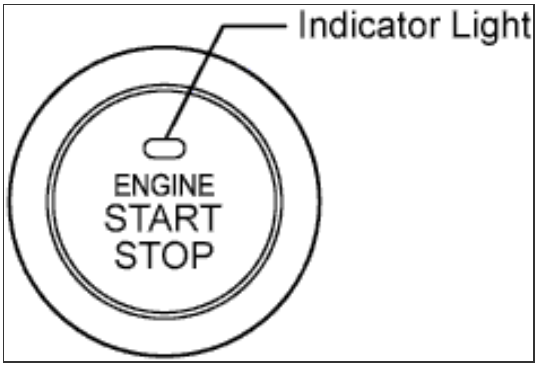
a. The steering lock system locks and unlocks the steering lock by activating the steering lock bar with a motor. The steering lock ECU activates the motor based on permission signals from the certification ECU (smart key ECU assembly) and main body ECU.

FUNCTIONS OF COMPONENTS

Item	Function
Steering lock actuator assembly	Includes motor, lock bar and lock and unlock position sensors. Activated by steering lock ECU.
Steering lock ECU	Included in steering lock actuator assembly. Activates steering lock motor based on permission signals from main body ECU and certification ECU (smart key ECU assembly). Detects steering lock and unlock positions and transmits status to other ECUs.
Main body ECU	Permits steering lock ECU to supply power to activate motor. Main body ECU and certification ECU (smart key ECU assembly) permit engine start after receiving unlock signal from steering lock ECU.
Certification ECU (Smart Key ECU Assembly)	Orders steering lock ECU to lock or unlock steering lock. Main body ECU and certification ECU (smart key ECU assembly) permit engine start after receiving unlock signal from steering lock ECU.
Integration relay (IG2 relay)	Controlled by main body ECU. Sends IG signals to steering lock ECU.
ID code box (Immobiliser Code ECU)	Transmits command to set or cancel immobiliser to ECM based on permission signals from certification ECU (smart key ECU assembly).

WARNING FUNCTION OF ENGINE SWITCH INDICATOR

a. The main body ECU blinks the LED indicator of the engine switch when any of the following problems occur in the system.



Detection Item	Indicator Blink Pattern	Indication Status	Countermeasure
Steering lock release malfunction	• Blinks in green at 1-second intervals • Goes off 30 seconds after blinking starts	Motor operates to release steering lock, but steering lock cannot be released (e.g. lock bar stuck in steering column)	Push engine switch while turning steering wheel to right and left
Malfunction in push button start function	• Blinks in amber at 2-second intervals • Goes off 15 seconds after blinking starts	• Short in devices for activating motor • Problem in steering lock ECU or main body ECU	Troubleshoot by following "How to Proceed with Troubleshooting" (Click here)

for Preparation Click here

HINT:

- **Use the following procedures to troubleshoot the steering lock system.**
- ***: Use the intelligent tester.**

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

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

NEXT

3.CHECK DTC*

a. Check for DTC (Click here).

Result

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

A. → Go to step 6

B

4.PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B. → Go to step 6

A

5.OVERALL ANALYSIS AND TROUBLESHOOTING*

a. Terminals of ECU (Click here).

b. Data List / Active Test (Click here).

NEXT

6.REPAIR OR REPLACE

NEXT

7.CONFIRMATION TEST

NEXT

END

for Preparation Click here

HINT:

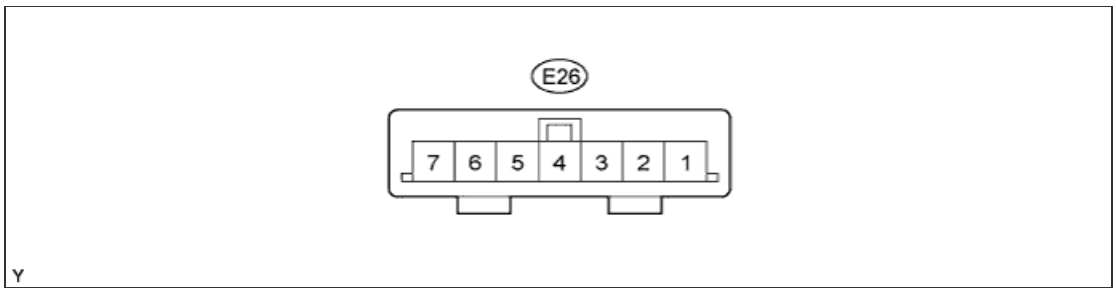
- **Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.**
- **Inspect the fuses and relays related to this system before inspecting the suspected areas below.**

Steering Lock System

Symptom	Suspected Area	See page
Steering wheel cannot unlock (engine cannot start).	Steering lock actuator assembly (Steering lock ECU)	Click here
	Main body ECU	Click here
	Certification ECU (Smart key ECU assembly)	Click here
	Entry and start system (for start function)	Click here
	Steering lock motor drive power circuit	Click here
	Unlock position sensor signal circuit	Click here
Steering wheel cannot unlock (after connecting the intelligent tester to DLC3, starting engine, Data List steering lock system item lock/unlock Receive data is read, and steering lock command reception records display is NO).	Main body ECU	Click here
	Certification ECU (Smart key ECU assembly)	Click here
	ID code box (Immobiliser code ECU)	Click here
	LIN communication line	Click here
	Entry and start system (for start function)	Click here
Steering wheel cannot lock.	Steering lock actuator assembly (Steering lock ECU)	Click here
	Main body ECU	Click here
	Certification ECU (Smart key ECU assembly)	Click here
	Entry and start system (for start function)	Click here
	Steering lock motor drive power circuit	Click here
	Power source circuit	Click here
Steering wheel cannot lock (after connecting the intelligent tester to DLC3, starting engine, Data List steering lock system item lock/unlock Receive data is read, and steering lock command reception records display is NO).	Main body ECU	Click here
	Certification ECU (Smart key ECU assembly)	Click here
	ID code box (Immobiliser code ECU)	Click here
	LIN communication line	Click here
	Entry and start system (for start function)	Click here

for Preparation Click here

CHECK STEERING LOCK ECU



a. Disconnect the E26 steering lock ECU connector.

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

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
E26-1 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E26-2 (SGND) - Body ground	BR - Body ground	Signal ground	Always	Below 1 Ω
E26-6 (IG2) - E26-1 (GND)	B - W-B	IG signal input	Engine switch on (IG)	11 to 14 V
E26-7 (B) - E26-1 (GND)	R - W-B	Power source	Always	11 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.

c. Reconnect the E26 steering lock ECU connector.

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

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
E26-3 (IGE) - E26-1 (GND)	G - W-B	Power source for motor drive	Motor operating	Below 1 V
E26-3 (IGE) - E26-1 (GND)	G - W-B	Power source for motor drive	Motor not operating	11 to 14 V
E26-4 (SLP1) - E26-2 (SGND)	SB - BR	Unlock position sensor output signal	Steering locked	11 to 14 V
E26-4 (SLP1) - E26-2 (SGND)	SB - BR	Unlock position sensor output signal	Steering lock unlocked	Below 1 V
E26-5 (LIN) - E26-2 (SGND)	GR - BR	LIN communication bus	Engine switch on (IG)	Pulse generation

If the result is not as specified, there may be a malfunction on the wire harness side.

for Preparation Click here

DESCRIPTION

a. When troubleshooting a vehicle with a diagnosis system, connect the intelligent tester to the DLC3 of the vehicle and read various data output from the steering lock ECU.
The steering lock ECU stores DTCs when the ECU detects a malfunction in itself or in its circuits.

b. The diagnosis information of the steering lock ECU is transmitted to the intelligent tester via the certification ECU (smart key ECU assembly) as the steering lock ECU is not connected to the CAN communication system.

c. The steering lock ECU does not store DTCs regarding past problems.

HINT:

When the engine switch is off, the main body ECU to which the intelligent tester is to be connected may be malfunctioning or in sleep mode.

Communication with the intelligent tester is not possible if the main body ECU is not working.

d. As the steering lock ECU memory data will be cleared, do not remove the fuses or disconnect the battery terminals until the DTCs are checked and noted.

e. Malfunctions related to systems other than the steering lock ECU system may cause DTCs to be output. Note any DTCs related to other systems.

for Preparation Click here

CHECK DTC

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: Body / Entry&Start / DTC.

e. Check for DTCs.

CLEAR DTC

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: Body / Entry&Start / DTC.

e. Clear the DTCs.

for Preparation Click here

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. Turn the engine switch 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: Body / Entry&Start / Data List.

f. According to the display on the intelligent tester, read the "Data List".

Entry&Start

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
#Codes	Number of diagnostic trouble codes	-	-
Sensor Value	Sensor malfunction/NG (Past) or OK	NG (Past): Sensor malfunction OK: No malfunction	-
Power Supply Short	Short in ECU/NG (Past) or OK	NG (Past): Short in ECU OK: No malfunction	-
Power Supply Open	Open in ECU/NG (Past) or OK	NG (Past): Open in ECU OK: No malfunction	-
Motor Driver Short	Short in driver ECU/NG (Past) or OK	NG (Past): Short in driver ECU OK: No malfunction	-
Motor Driver Open	Open in driver ECU/NG (Past) or OK	NG (Past): Open in driver ECU OK: No malfunction	-
Lock/Unlock Receive	Steering lock command reception record/YES or NO	YES: Steering lock/unlock signal received NO: Steering lock/unlock signal not received	-
Lock Bar Stuck Error	Lock bar stuck malfunction/NG (Past) or OK	NG (Past): Lock bar stuck malfunction OK: No malfunction	-
Push Start Error	Push button start function malfunction/NG (Past) or OK	NG (Past): Malfunction in push button start OK: No malfunction	-
IG2 Status	IG2 voltage/ON or OFF	ON: 11 to 14 V OFF: Below 1 V	-
IG(Lin)	LIN bus start-up status/ON or OFF	ON: LIN bus started-up OFF: LIN bus not started-up	-
S Code Check	S code match record/NG or OK	NG: S code not matched OK: S code matched	-
L Code Check	L code match record/NG or OK	NG: L code not matched OK: L code matched	-
Unlock Request Receive	Steering lock unlock command reception status/NG or OK	NG: Unlock request not received OK: Unlock request received	-
Lock Request	Steering lock lock command reception	NG: Lock request not received	-

Receive	status/NG or OK	OK: Lock request received	
S Code Check(Past)	S code match record/NG (Past) or OK	NG (Past): S code not matched OK: S code matched	-
L Code Check(Past)	L code match record/NG (Past) or OK	NG (Past): L code not matched OK: L code matched	-
Steering Lock	Steering lock condition/Set or Unset	Set: Steering lock set Unset: Steering lock not set	This status changes depending on the state of various sensors.
Steering Unlock	Steering unlock condition/Set or Unset	Set: Steering unlock set Unset: Steering unlock not set	This status changes depending on the state of various sensors.

for Preparation Click here

If a trouble code is output during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

Steering Lock System

DTC Code	Detection Item	See page
B2781	Open / Short in Steering Lock ECU	Click here
B2782	Power Source Control ECU Malfunction	Click here
B2788	IG2 Signal Malfunction	Click here

DTC B2781 Open / Short in Steering Lock ECU

for Preparation Click here

DESCRIPTION

The steering lock ECU and steering lock actuator assembly are supplied as a unit.
The steering lock ECU detects the steering lock position through the signals from the lock and unlock position sensors.
The steering lock ECU activates the steering lock motor based on permission signals from the main body ECU and the certification ECU (smart key ECU assembly).
The diagnosis information of the steering lock ECU is transmitted to the intelligent tester via the certification ECU (smart key ECU assembly) as the steering lock ECU is not connected to the CAN communication system.

DTC Code	Detection Condition	Trouble Area
B2781	When either condition below is met: • Steering lock motor drive power circuit malfunction • Lock and unlock position sensors ON condition is detected	• Steering lock actuator assembly (steering lock ECU) • Certification ECU (smart key ECU assembly) • Harness or connector of LIN bus line

INSPECTION PROCEDURE

HINT:

When the engine switch is off, the main body ECU may occasionally go into a non-active state called sleep mode. Therefore, before proceeding with the inspection, it is necessary to perform the following steps to wake up the ECU:

With the engine switch off, open the driver door. Then (with the engine switch still off) open and close any door several times at 1.5 second intervals.

1.CHECK DTC OUTPUT (B2785)

a. Check for DTCs.

Result

Result	Proceed to
DTC B2781 is output, but DTC B2785 is not output (for Power tilt and telescopic)	A
Condition other than following: DTC B2781 is output, but DTC B2785 is not output	B
DTC B2781 is output, but DTC B2785 is not output (for Manual tilt and telescopic)	C

B → GO TO LIN COMMUNICATION SYSTEM (DTC B2785) (Click here)

C → REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU) (Click here)

A

REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU) (Click here)

DTC B2788 IG2 Signal Malfunction

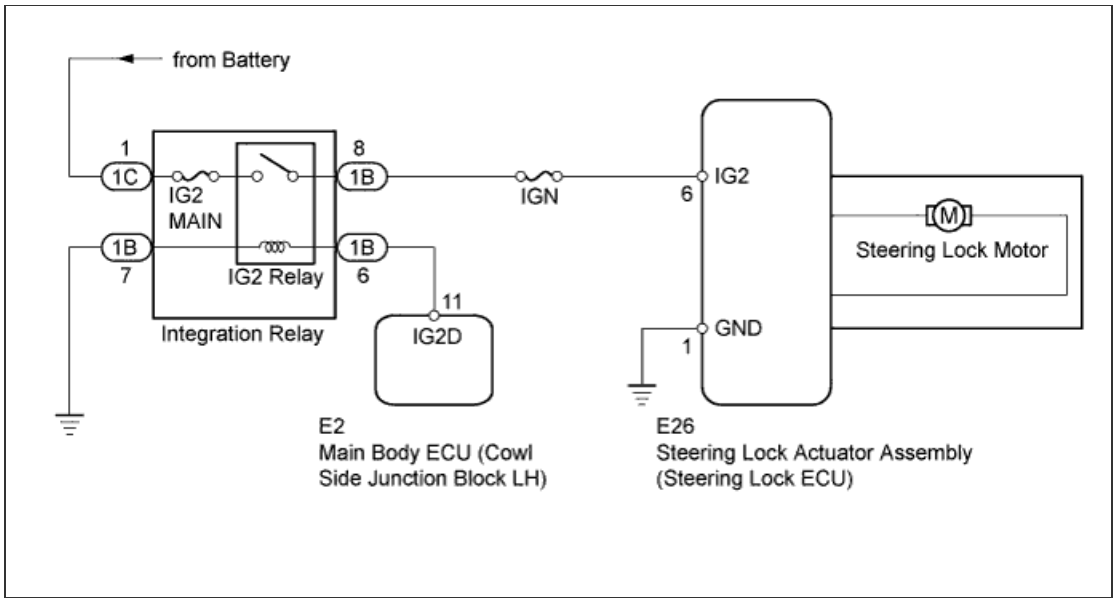
for Preparation Click here

DESCRIPTION

The steering lock ECU determines the on/off status of the engine switch through the IG2 signal circuit.
After receiving an integration relay (IG2 relay) on signal, the steering lock ECU determines that the vehicle is moving.
The steering lock ECU does not lock the steering when it receives the integration relay (IG2 relay) on signal. This prevents the steering from being locked while the vehicle is moving.
The diagnosis information of the steering lock ECU is transmitted to the intelligent tester via the certification ECU (smart key ECU assembly) as the steering lock ECU is not connected to the CAN communication system.

DTC Code	Detection Condition	Trouble Area
B2788	Open or short in IG2 signal circuit	• Steering lock actuator assembly (steering lock ECU) • IGN fuse • IG2 MAIN fuse • Integration relay (IG2 relay) • Main body ECU • Harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

When the engine switch is off, the main body ECU may occasionally go into a non-active state called sleep mode. Therefore, before proceeding with the inspection, it is necessary to perform the following steps to wake up the ECU:

With the engine switch off, open the driver door. Then (with the engine switch still off) open and close any door several times at 1.5 second intervals.

1.INSPECT STEERING LOCK ECU

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

Standard Voltage:

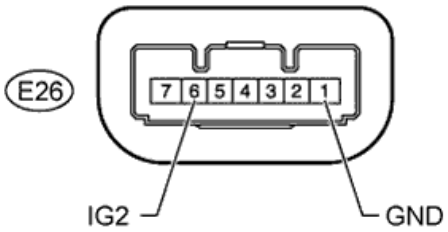
Tester Connection	Switch Condition	Specified Condition
E26-6 (IG2) - E26-1 (GND)	Engine switch off	Below 1 V
E26-6 (IG2) - E26-1 (GND)	Engine switch on (IG)	11 to 14 V

Result

Result	Proceed

	to
Within specified range (for Power tilt and telescopic)	A
Outside specified range	B
Within specified range (for Manual tilt and telescopic)	C

Component with harness connected:
(Steering Lock ECU)



B → Go to step 2

C → REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU) (Click here)

A

REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU) (Click here)

2.INSPECT FUSE (IGN, IG2 MAIN)

a. Remove the IGN fuse and IG2 MAIN fuse from the engine room relay block.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
IGN fuse	Always	Below 1 Ω
IG2 MAIN fuse	Always	Below 1 Ω

NG → REPLACE FUSE

OK

3.INSPECT INTEGRATION RELAY (IG2 RELAY)

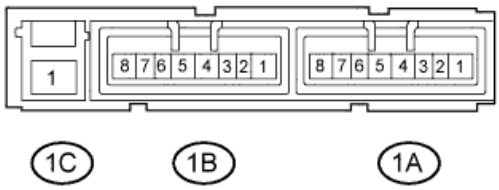
a. Remove the integration relay from the engine room relay block.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
1B-8 - 1C-1	Battery voltage is applied to terminals 1B-6 and 1B-7	Below 1 Ω
1B-8 - 1C-1	Battery voltage is not applied to terminals 1B-6 and 1B-7	10 kΩ or higher

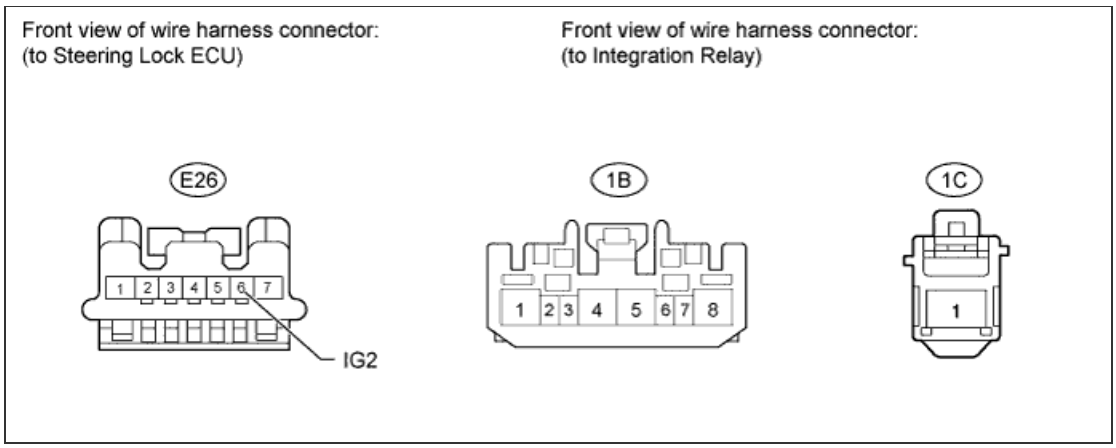
Component without harness connected:
(Integration Relay)



NG → REPLACE INTEGRATION RELAY (IG2 RELAY)

OK

4.CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU - INTEGRATION RELAY (IG2 RELAY) AND BODY GROUND)



a. Disconnect the E26 steering lock ECU connector.

b. Disconnect the 1B and 1C integration relay connectors.

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
1C-1 - Body ground	Always	11 to 14 V

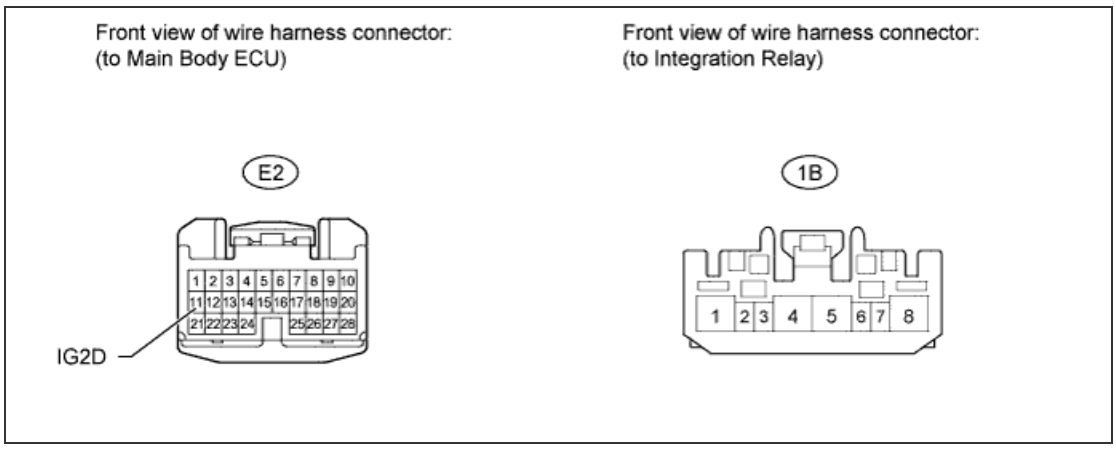
Standard Resistance:

Tester Connection	Condition	Specified Condition
E26-6 (IG2) - 1B-8	Always	Below 1 Ω
E26-6 (IG2) or 1B-8 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5.CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - INTEGRATION RELAY (IG2 RELAY) AND BODY GROUND)



a. Disconnect the E2 main body ECU connector.

b. Disconnect the 1B integration relay connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E2-11 (IG2D) - 1B-6	Always	Below 1 Ω
1B-7 - Body ground	Always	Below 1 Ω
E2-11 (IG2D) or 1B-6 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → REPLACE MAIN BODY ECU

DTC B2782 Power Source Control ECU Malfunction

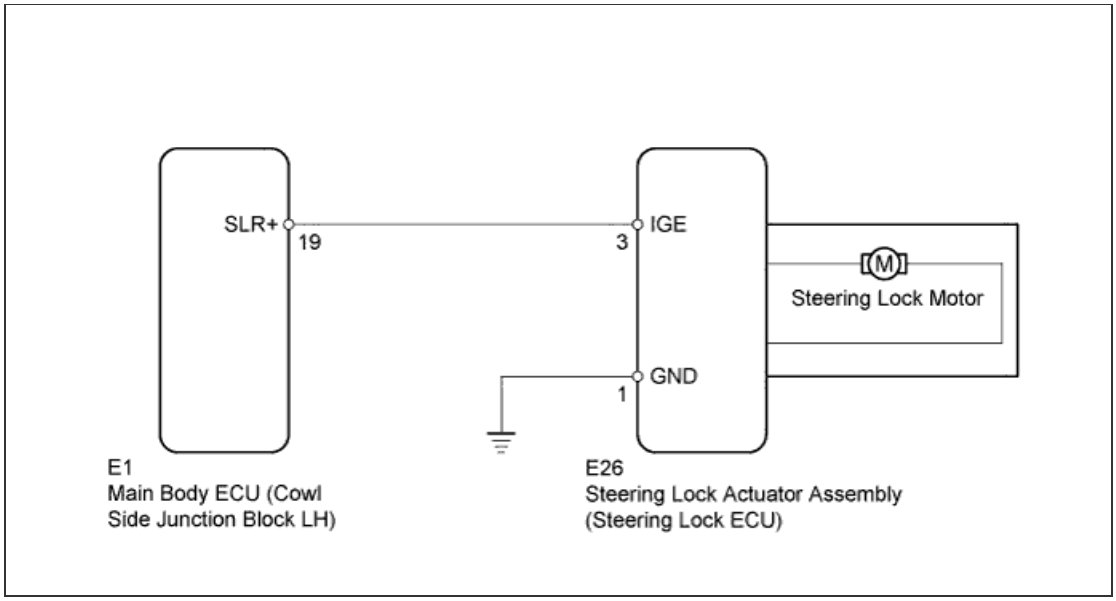
for Preparation Click here

DESCRIPTION

The steering lock ECU activates the steering lock motor by the power from the main body ECU through the IGE circuit. This prevents the steering from being locked while the vehicle is moving.
The diagnosis information of the steering lock ECU is transmitted to the intelligent tester via the certification ECU (smart key ECU assembly) as the steering lock ECU is not connected to the CAN communication system.

DTC Code	Detection Condition	Trouble Area
B2782	IGE power supply circuit malfunction	• Steering lock actuator assembly (steering lock ECU) • Main body ECU • Harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

When the engine switch is off, the main body ECU may occasionally go into a non-active state called sleep mode. Therefore, before proceeding with the inspection, it is necessary to perform the following steps to wake up the ECU:

With the engine switch off, open the driver door. Then (with the engine switch still off) open and close any door several times at 1.5 second intervals.

1.CHECK DTC OUTPUT (B2785)

a. Check for DTCs (Click here).

OK:
DTC B2782 is output, but DTC B2785 is not output.

NG → GO TO LIN COMMUNICATION SYSTEM (B2785) (Click here)

OK ↓

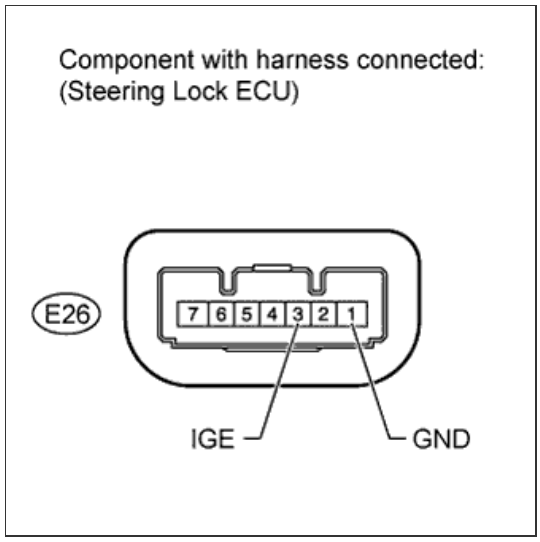
2.INSPECT STEERING LOCK ECU

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

Standard Voltage:

Tester		Specified

Connection	Condition	Condition
E26-3 (IGE) - E26-1 (GND)	• Engine switch on (IG) • Steering lock motor is operating	Below 1 V
E26-3 (IGE) - E26-1 (GND)	• Engine switch on (IG) • Steering lock motor is not operating	11 to 14 V



Result

Result	Proceed to
Within specified range (for Power tilt and telescopic)	A
Outside specified range	B
Within specified range (for Manual tilt and telescopic)	C

HINT:

When the steering lock is activated and the engine switch is turned on (IG), the steering lock motor activates to release the steering lock. The motor operation occurs for 2 to 15 seconds.

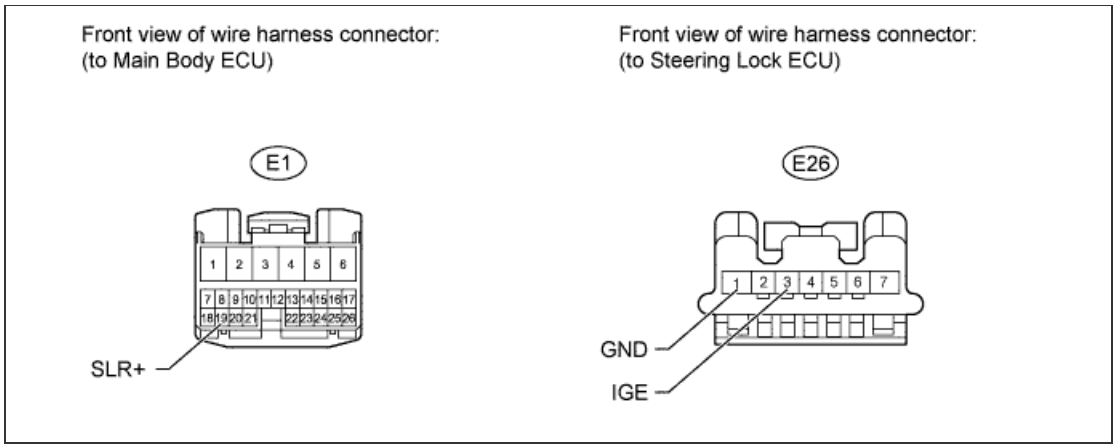
B → Go to step 3

C → REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU) (Click here)

A

REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU) (Click here)

3.CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU - MAIN BODY ECU AND BODY GROUND)



a. Disconnect the E26 steering lock ECU connector.

b. Disconnect the E1 main body ECU connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E26-3 (IGE) - E1-19 (SLR+)	Always	Below 1 Ω

E26-1 (GND) - Body ground	Always	Below 1 Ω
E26-3 (IGE) or E1-19 (SLR+) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

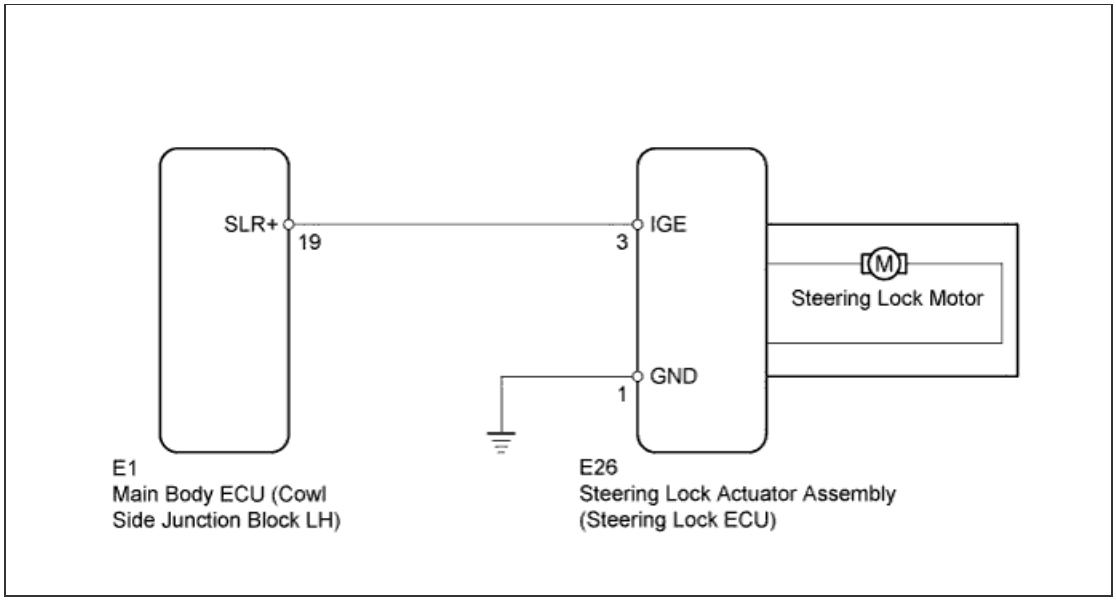
OK → REPLACE MAIN BODY ECU

for Preparation Click here

DESCRIPTION

The main body ECU supplies the power to activate the motor of the steering lock actuator assembly.
The diagnosis information of the steering lock ECU is transmitted to the intelligent tester via the certification ECU (smart key ECU assembly) as the steering lock ECU is not connected to the CAN communication system.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

When the engine switch is off, the main body ECU may occasionally go into a non-active state called sleep mode. Therefore, before proceeding with the inspection, it is necessary to perform the following steps to wake up the ECU:

With the engine switch off, open the driver door. Then (with the engine switch still off) open and close any door several times at 1.5 second intervals.

NOTICE:

If the steering lock actuator assembly (steering lock ECU) is replaced, with the engine switch off and the shift lever in P (for A/T), open and close the driver side door to record the current lock position into the steering lock ECU. If this is not performed, the engine may not start.

1.CHECK VEHICLE CONDITION

a. Check the problem symptom of the steering lock system.

Result

Result	Proceed to
Steering lock cannot be released	A
Steering lock cannot lock	B

B → Go to step 5

A

2.READ VALUE USING INTELLIGENT TESTER (LOCK/UNLOCK RECEIVE)

a. Use the Data List to check if the steering lock command is functioning properly.

Entry&Start

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note

Lock/Unlock Receive	Steering lock command reception record/YES or NO	YES: Steering lock/unlock signal received NO: Steering lock/unlock signal not received	-

OK:

YES is displayed on the intelligent tester screen.

NG → GO TO ENTRY AND START SYSTEM (FOR START FUNCTION) (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

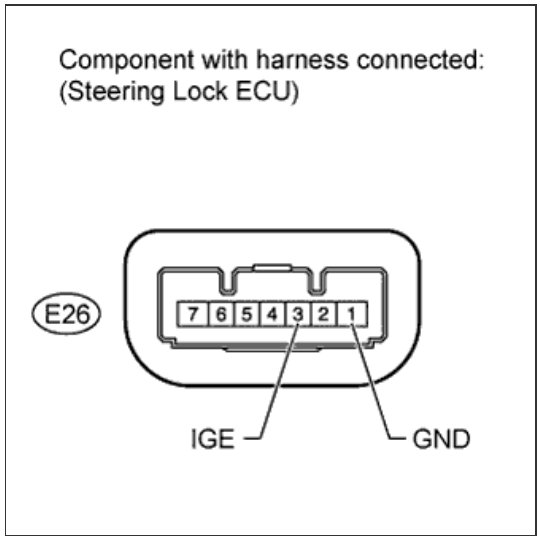
OK

3.INSPECT STEERING LOCK ECU

a. Immediately after turning the engine switch on (IG), measure the voltage between terminals E26-3 (IGE) and E26-1 (GND) of the steering lock ECU.

Result

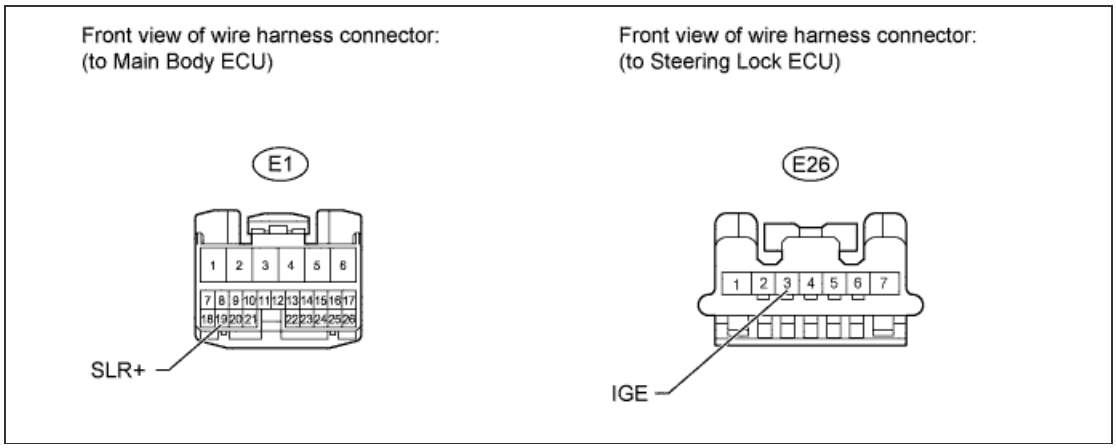
Result	Proceed to
11 to 14 V (measured voltage never becomes below 1 V)	A
Below 1 V	B



B → GO TO ENTRY AND START SYSTEM (FOR START FUNCTION) (PROBLEM SYMPTOMS TABLE) (Click here)

A

4.CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU - MAIN BODY ECU)



a. Disconnect the E26 steering lock ECU connector.

b. Disconnect the E1 main body ECU connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E26-3 (IGE) - E1-19 (SLR+)	Always	Below 1 Ω
E26-3 (IGE) or E1-		

19 (SLR+) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MAIN BODY ECU

5.INSPECT STEERING LOCK ECU

a. Move the shift lever to P (for A/T).

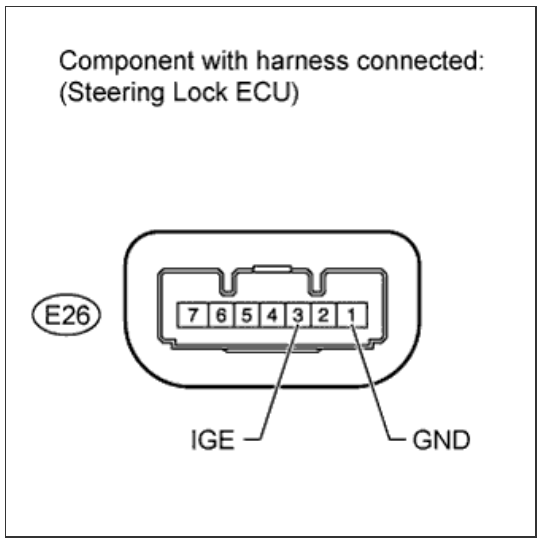
b. Turn the engine switch off.

c. Open the driver side door.

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E26-3 (IGE) - E26-1 (GND)	Steering lock motor operating	Below 1 V
E26-3 (IGE) - E26-1 (GND)	Steering lock motor not operating	11 to 14 V

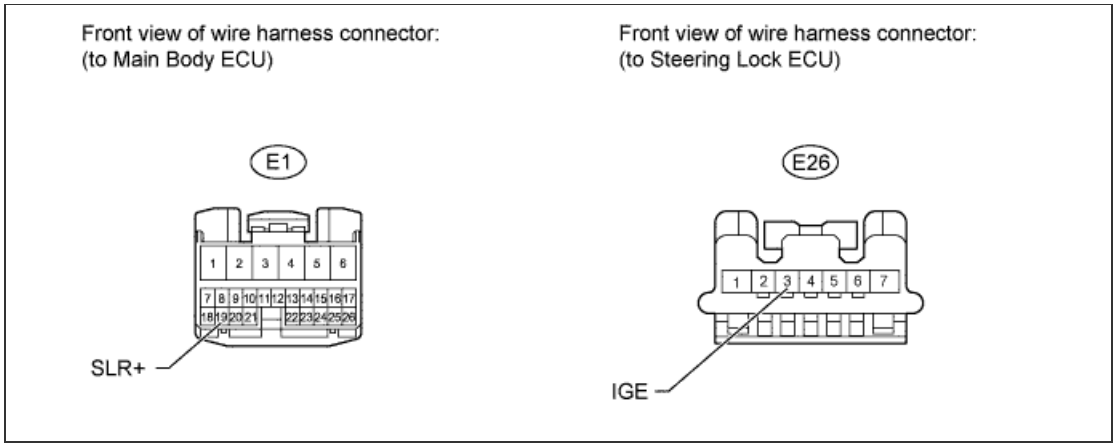


NG → Go to step 6

OK

GO TO ENTRY AND START SYSTEM (FOR START FUNCTION) (PROBLEM SYMPTOMS TABLE) (Click here)

6.CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU - MAIN BODY ECU)



a. Disconnect the E26 steering lock ECU connector.

b. Disconnect the E1 main body ECU connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E26-3 (IGE) - E1-19 (SLR+)	Always	Below 1 Ω
E26-3 (IGE) or E1-19 (SLR+) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

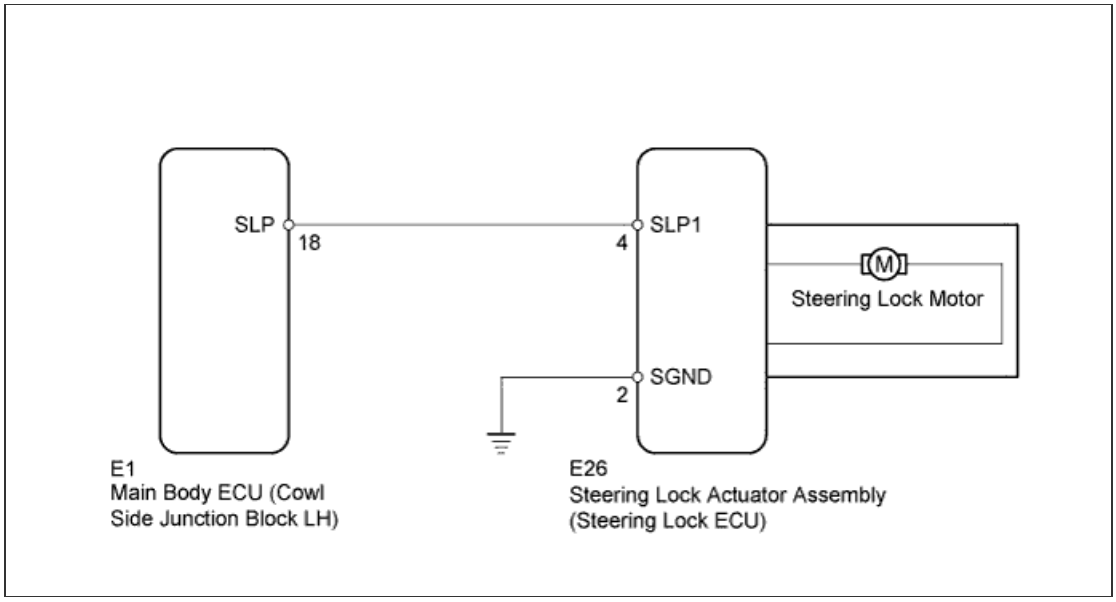
REPLACE MAIN BODY ECU

for Preparation Click here

DESCRIPTION

The steering lock ECU sends an unlock position signal to the main body ECU. On receiving the signal, the main body ECU permits an engine start. This prevents the engine from being started with the steering locked.
The diagnosis information of the steering lock ECU is transmitted to the intelligent tester via the certification ECU (smart key ECU assembly) as the steering lock ECU is not connected to the CAN communication system.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

When the engine switch is off, the main body ECU may occasionally go into a non-active state called sleep mode. Therefore, before proceeding with the inspection, it is necessary to perform the following steps to wake up the ECU:

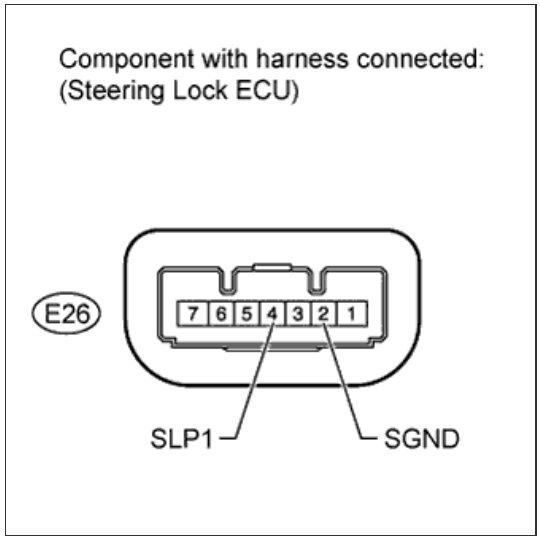
With the engine switch off, open the driver door. Then (with the engine switch still off) open and close any door several times at 1.5 second intervals.

1.INSPECT STEERING LOCK ECU

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

Standard Voltage:

Tester Connection	Condition (Steering Lock Position)	Specified Condition
E26-4 (SLP1) - E26-2 (SGND)	Locked	11 to 14 V
E26-4 (SLP1) - E26-2 (SGND)	Unlocked	Below 1 V

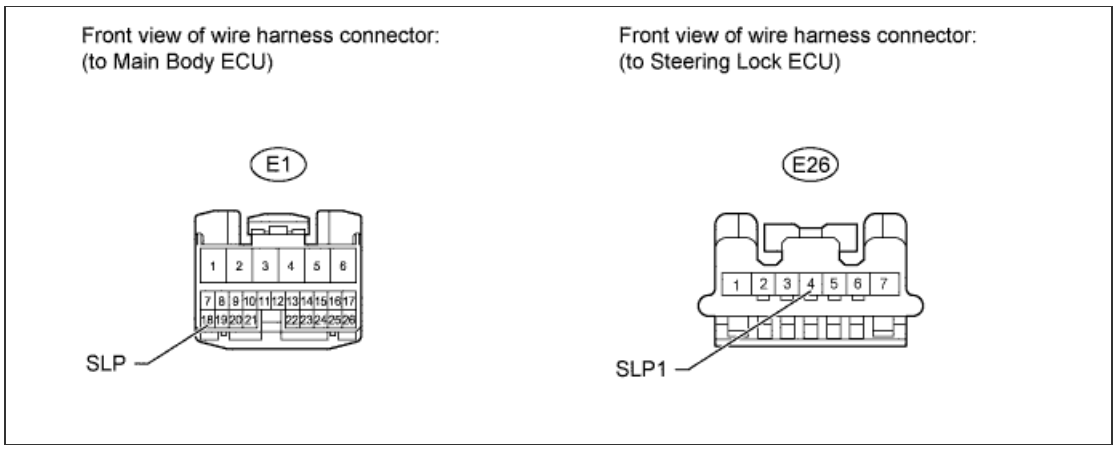


NG → Go to step 2

OK

GO TO ENTRY AND START SYSTEM (FOR START FUNCTION) (HOW TO PROCEED WITH TROUBLESHOOTING) (Click here)

2.CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU - MAIN BODY ECU)



a. Disconnect the E26 steering lock ECU connector.

b. Disconnect the E1 main body ECU connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E26-4 (SLP1) - E1-18 (SLP)	Always	Below 1 Ω
E26-4 (SLP1) or E1-18 (SLP) - Body ground	Always	10 kΩ or higher

Result

Result	Proceed to
Within specified range (for Power tilt and telescopic)	A
Within specified range (for Manual tilt and telescopic)	B
Outside specified range	C

B → REPLACE STEERING LOCK ACTUATOR (STEERING LOCK ECU) (Click here)

C → REPAIR OR REPLACE HARNESS OR CONNECTOR

A

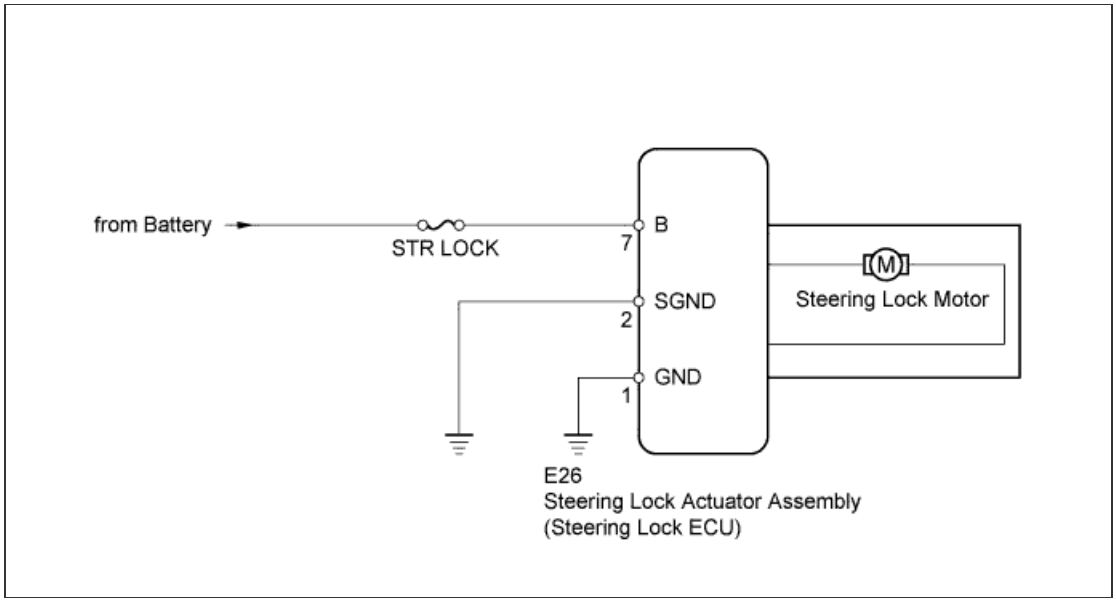
REPLACE STEERING LOCK ACTUATOR (STEERING LOCK ECU) (Click here)

for Preparation Click here

DESCRIPTION

This circuit supplies power source voltage from the battery to terminal B of the steering lock ECU.
The diagnosis information of the steering lock ECU is transmitted to the intelligent tester via the certification ECU (smart key ECU assembly) as the steering lock ECU is not connected to the CAN communication system.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

When the engine switch is off, the main body ECU may occasionally go into a non-active state called sleep mode. Therefore, before proceeding with the inspection, it is necessary to perform the following steps to wake up the ECU:

With the engine switch off, open the driver door. Then (with the engine switch still off) open and close any door several times at 1.5 second intervals.

1.INSPECT FUSE (STR LOCK)

a. Remove the STR LOCK fuse from the engine room relay block.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
STR LOCK fuse	Always	Below 1 Ω

NG → REPLACE FUSE

OK

2.CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU - BATTERY)

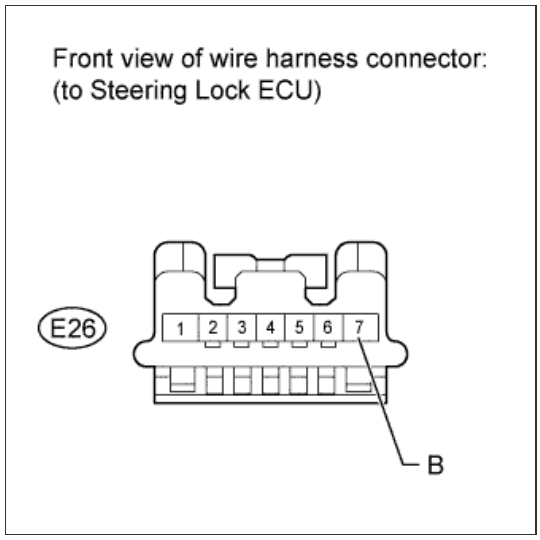
a. Disconnect the E26 steering lock ECU connector.

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

Standard Voltage:

Tester Connection	Condition	Specified Condition
E26-7 (B) - Body		

ground	Always	11 to 14 V



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

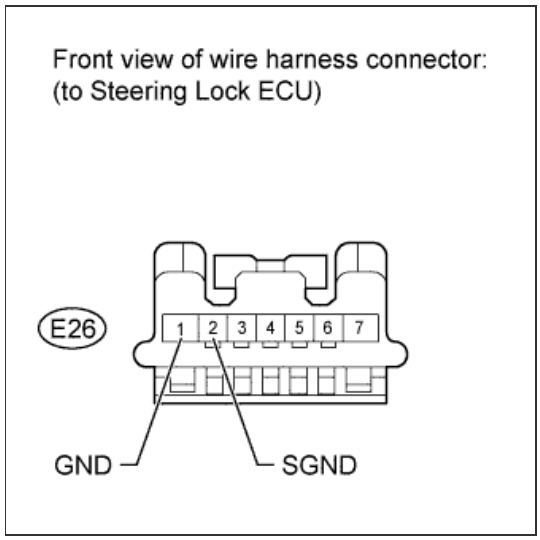
3.CHECK HARNESS AND CONNECTOR (STEERING LOCK ECU - BODY GROUND)

a. Disconnect the E26 steering lock ECU connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E26-1 (GND) - Body ground	Always	Below 1 Ω
E26-2 (SGND) - Body ground	Always	Below 1 Ω



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

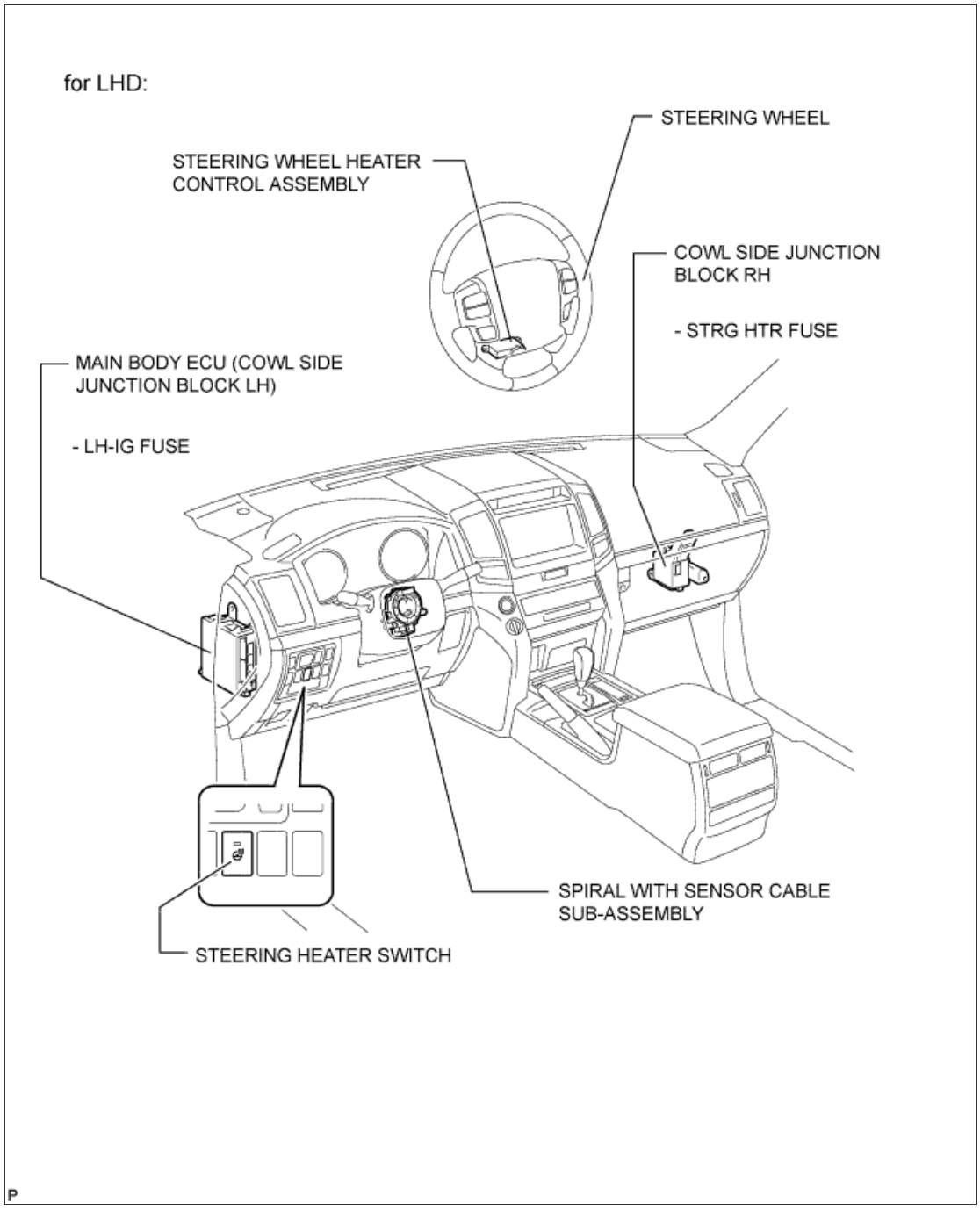
GO TO STEERING LOCK SYSTEM (PROBLEM SYMPTOMS TABLE) (Click here)

for Preparation Click here

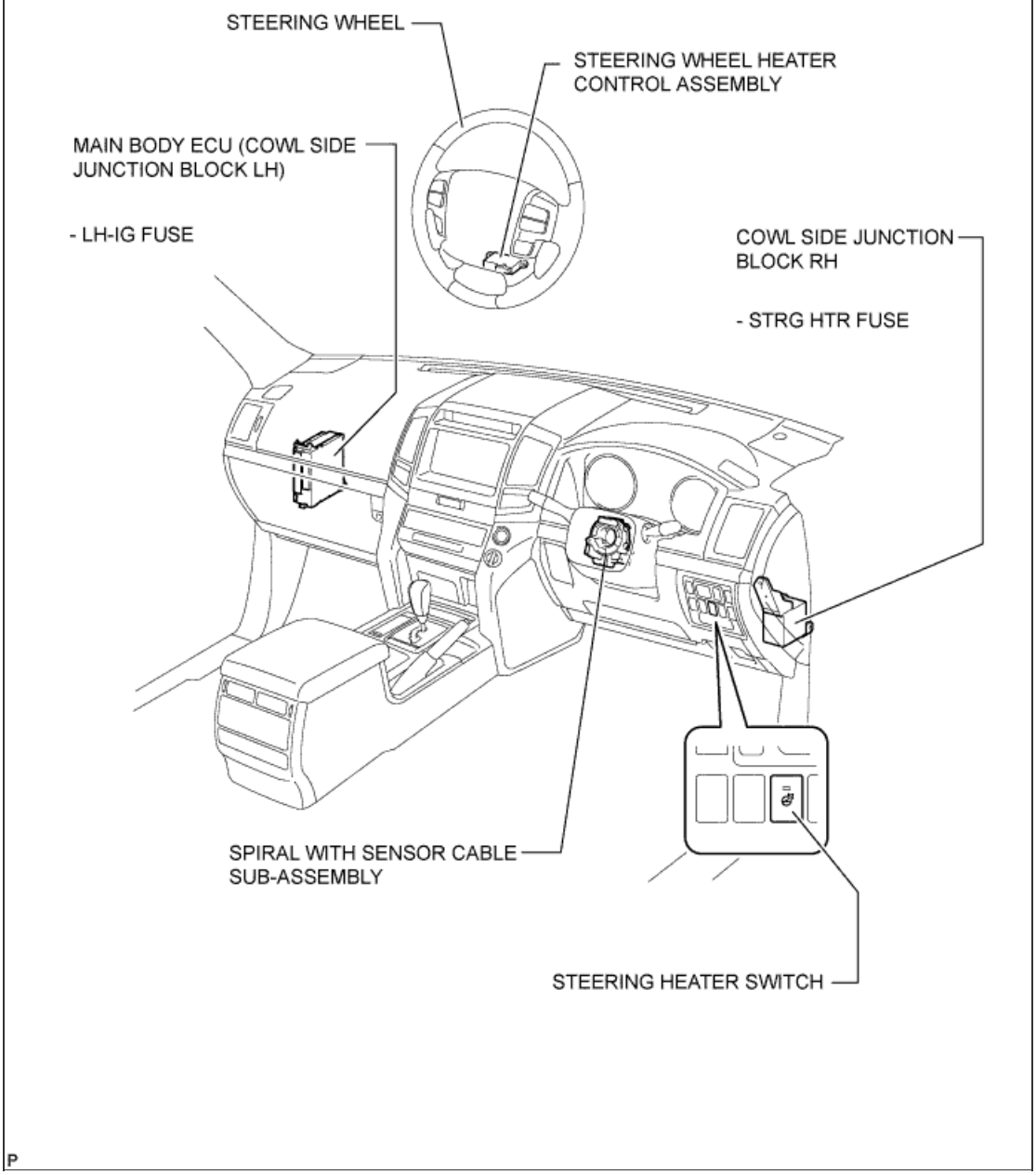
1.HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

a. This vehicle is equipped with a Supplemental Restraint System (SRS). Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident.
Before servicing (including inspection, replacement, removal and installation of parts), be sure to read the precautionary notices for Supplemental Restraint System (Click here).

for Preparation Click here



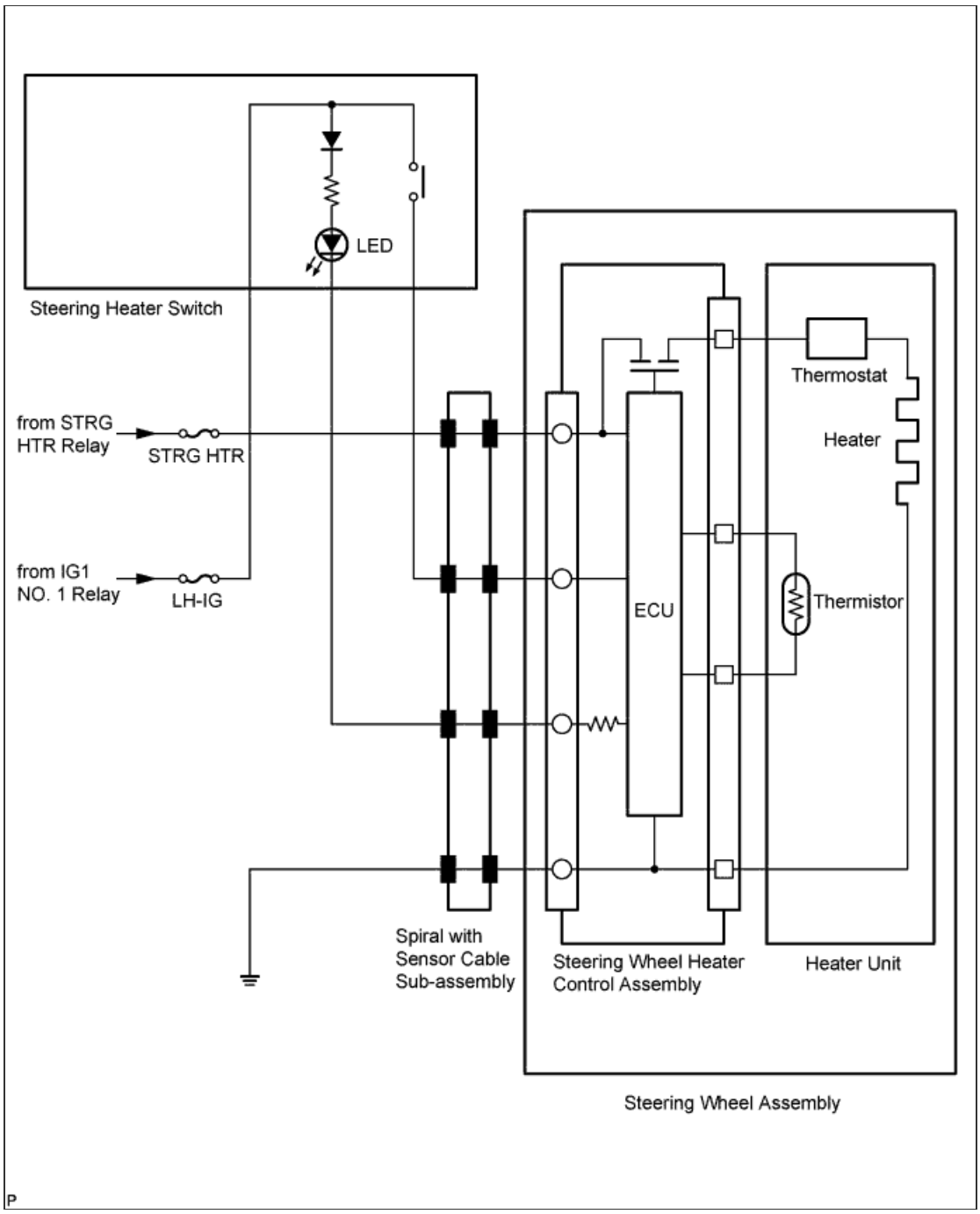
for RHD:


STEERING WHEEL
STEERING WHEEL HEATER CONTROL ASSEMBLY
MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)
- LH-IG FUSE
COWL SIDE JUNCTION BLOCK RH
- STRG HTR FUSE
SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY
STEERING HEATER SWITCH

P

for Preparation Click here

SYSTEM DIAGRAM



for Preparation Click here

HEATED STEERING WHEEL SYSTEM

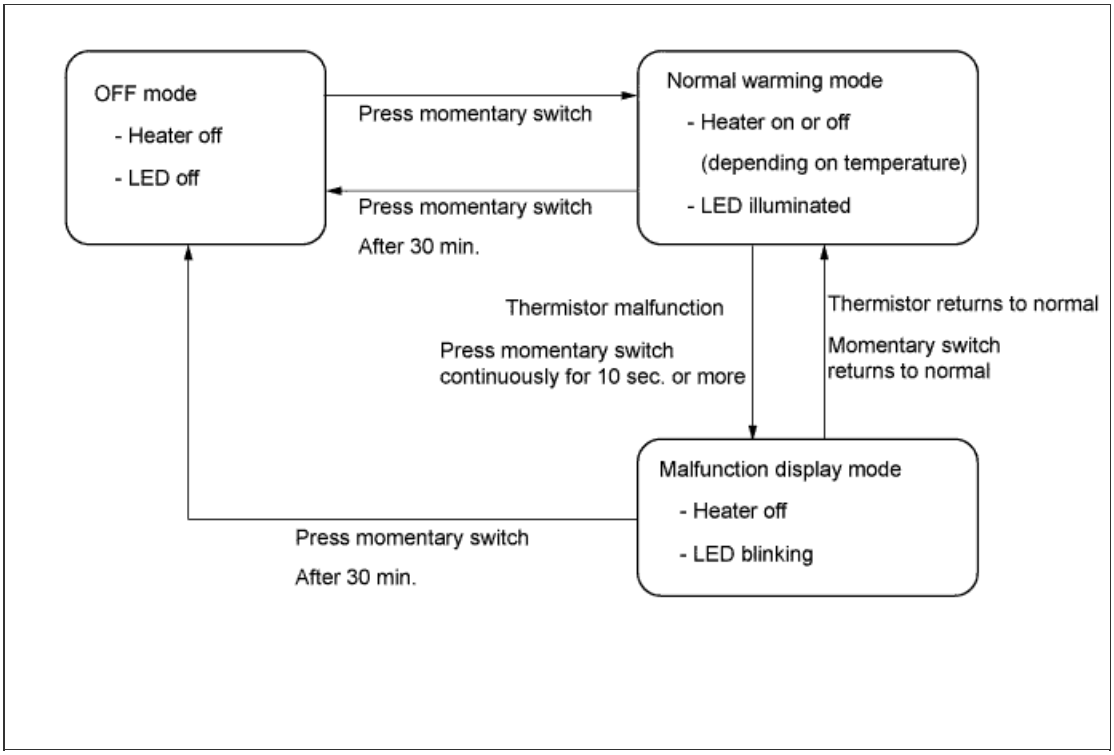
a. The heated steering wheel heats the steering wheel when the steering heater switch is operated.

b. The heated steering wheel uses a thermistor inside of the steering wheel to detect the heater temperature and maintain the set temperature.

c. The heated steering wheel timer function turns off the heater after a predetermined period of time.

HEATER CONTROLLER SYSTEM

a. Operation description



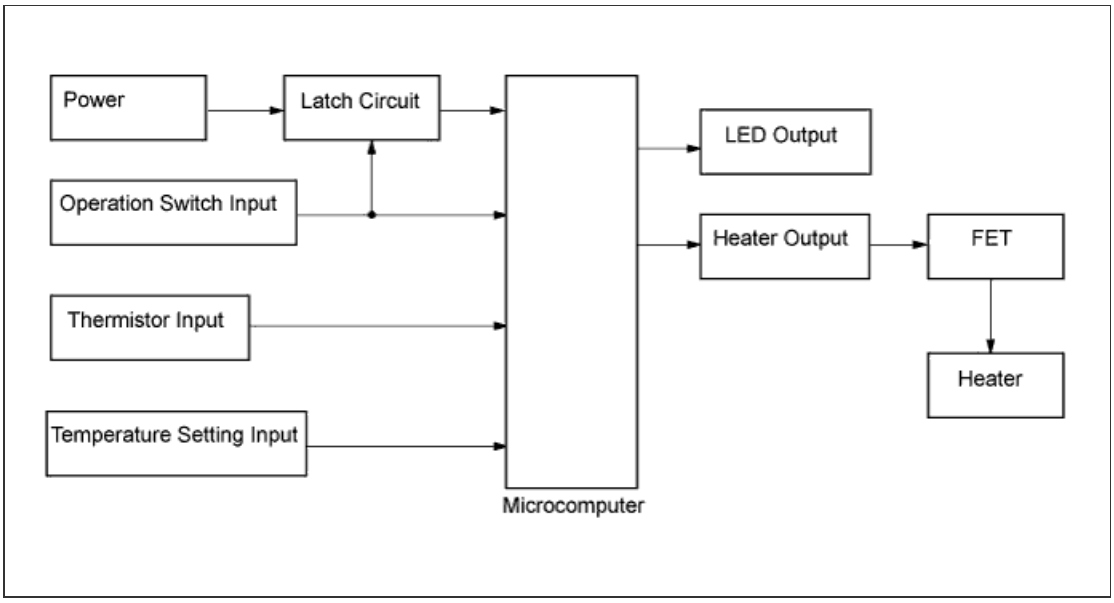
i. When the ignition switch is ON, pressing the steering wheel controller momentary switch on the steering heater switch illuminates the LED and current is output from the steering controller to the heater of the heated steering wheel. Pressing the momentary switch again turns off the LED and stops the current from being output.

ii. A thermostat is installed in the steering wheel as a safety mechanism.

iii. The heated steering wheel switch LED will blink at 0.3 second intervals when either of the following occurs: 1) an open or short in the steering wheel thermistor continues for 2 seconds or more; or 2) the steering heater switch momentary switch is pressed continuously for 10 seconds or more.

iv. If the normal condition is restored for 2 seconds or more, the previous operation before the malfunction occurred continues. However, regardless of if a malfunction is detected and the malfunction operation is occurring, and regardless of if the normal condition is restored and the system is operating normally, the timer will turn off the heater 30 minutes after the switch was first turned on.

b. Signal input / output description



Signal	Signal Name	Function	Signal Type
Input	Thermistor input	Input of voltage corresponding to heater temperature	Analog input
Input	Temperature setting input	Input of voltage corresponding to temperature setting	Analog input
Input	Operating switch input	Input of power circuit latch operation estimate signal	LOW / HI input
Output	LED output	Output of LED	LOW / HI input
Output	Heater output	Output of heater	LOW / HI input
Output	Latch output	Power circuit maintenance	LOW / HI input

c. Safety function

Content	Operation
When thermistor trouble is detected	Heater off
When overheating (175°C (347°F)) of controller is detected	Heater off
When load short current (50 A or more) is detected	Heater off
When undervoltage (4.5 V) is detected	Heater off
OFF timer (30 min.)	After preset time of timer passes, heater off
Reverse voltage protection	Protection circuit operates

for Preparation Click here

HINT:

- **Use these procedures to troubleshoot the heated steering wheel system.**
- ***: Use the GTS.**

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.INSPECT AUXILIARY BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the auxiliary battery before proceeding to the next step.

NEXT

3.PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B. Go to step 5

A

4.OVERALL ANALYSIS AND TROUBLESHOOTING*

a. Terminals of ECU (Click here)

NEXT

5.REPAIR OR REPLACE

NEXT

6.CONFIRMATION TEST

NEXT

END

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.

Heated Steering Wheel System

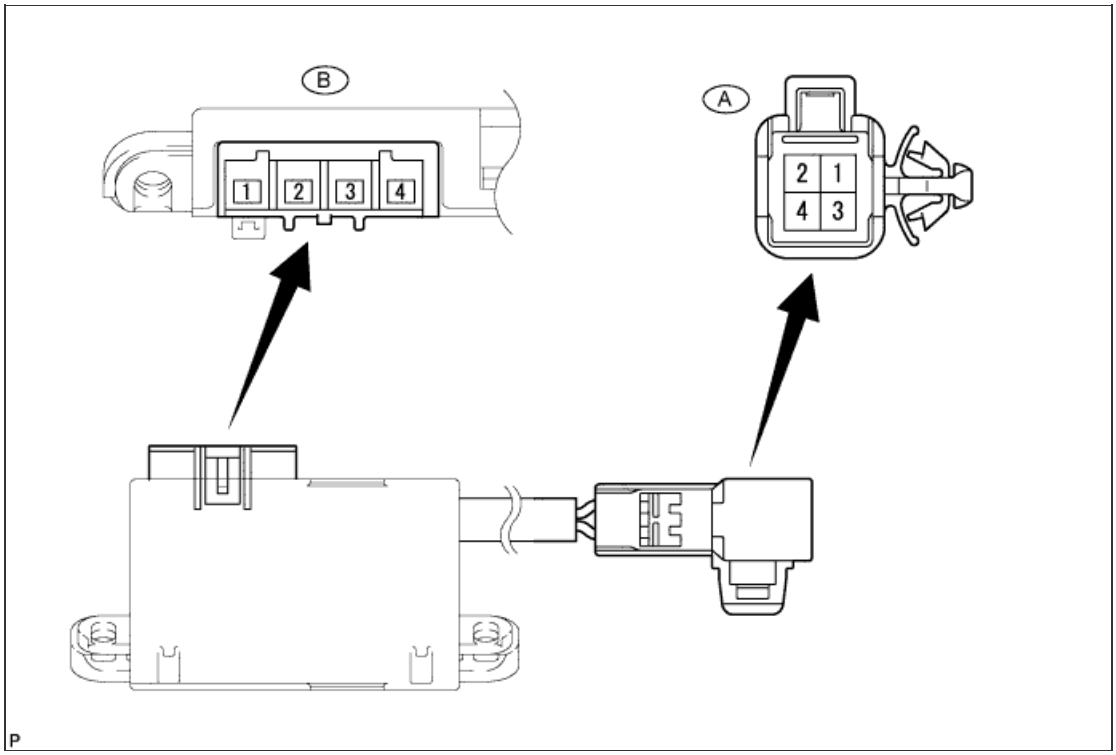
Symptom	Suspected Area	See page
Steering wheel does not heat up when heated steering wheel switch is pressed	Refer to "Steering wheel does not heat up when heated steering wheel switch is pressed"	Click here

for Preparation Click here

CHECK HEATED STEERING WHEEL CONTROLLER

HINT:

Inspect the connectors from the back side while the connectors are connected.



a. Measure the voltage or resistance according to the value(s) in the table below.

Terminal No. (Symbol)	Terminal Description	Condition	Specified Condition
A-1 (CCU) - Body ground	LED output signal	Ignition switch ON, Steering heater switch on	Below 3 V
A-2 (CCV) - Body ground	Steering heater switch input signal	Ignition switch ON, Steering heater switch pressed and held	11 to 14 V
A-3 (CCX) - Body ground	Ground	Always	Below 1 Ω
A-4 (CCW) - Body ground	IG power supply	Ignition switch ON	11 to 14 V
B-1 (TH1) - Body ground	Thermistor input signal	Ignition switch ON, Steering heater switch on at 0 to 40°C (32 to 104°F)	1.5 to 4.5 V*1
B-2 (TH2) - Body ground	Thermistor ground	Ignition switch ON, Steering heater switch on	Below 1 V
B-3 (SH2) - Body ground	Heater output signal	Ignition switch ON, Steering heater switch on	11 to 14 V*2
B-4 (SH1) - Body ground	Heater ground	Ignition switch ON, Steering heater switch on	Below 1 V

HINT:

- ***1: When ambient temperature is 0 to 40°C (32 to 104°F).**
- ***2: The current to the heater turns ON/OFF depending on the temperature of the thermistor. As a result, it may take several minutes before a voltage value is output.**

for Preparation Click here

MALFUNCTION DETECTION

a. Operation when malfunction is detected

Content	Operation
When thermistor trouble is detected	Heater off
When overheating (175°C (347°F)) of controller is detected	Heater off
When load short current (50 A or more) is detected	Heater off
When undervoltage (4.5 V) is detected	Heater off
OFF timer (30 min.)	After preset time of timer passes, heater off
Reverse voltage protection	Protection circuit operates

b. Malfunction detection conditions

i. When an open or short in the steering wheel thermistor continues for 2 seconds or more.

ii. When the steering heater switch momentary switch is pressed continuously for 10 seconds or more.

c. Malfunction display

i. The LED of the steering heater switch blinks at 0.3 second intervals.

d. Restore condition

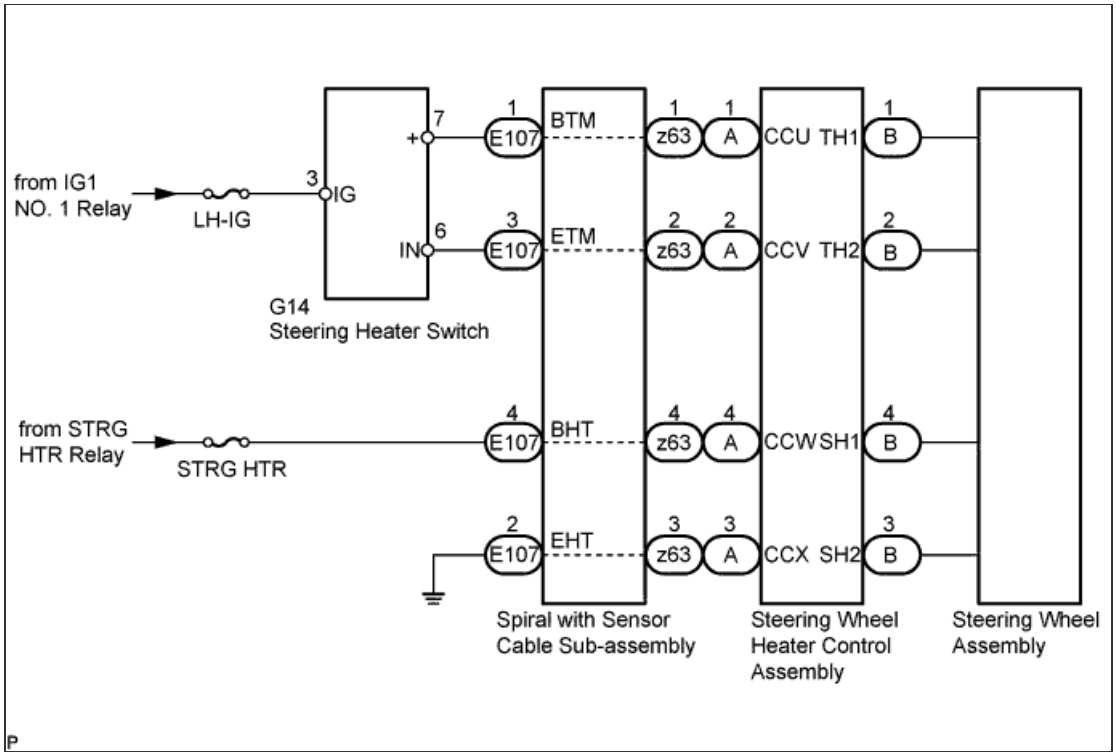
i. If the normal condition is restored for 2 seconds or more, the previous operation before the malfunction occurred continues. However, regardless of if a malfunction is detected and the malfunction operation is occurring, and regardless of if the normal condition is restored and the system is operating normally, the timer will turn off the heater 30 minutes after the switch was first turned on.

for Preparation Click here

DESCRIPTION

(Click here)

WIRING DIAGRAM



INSPECTION PROCEDURE

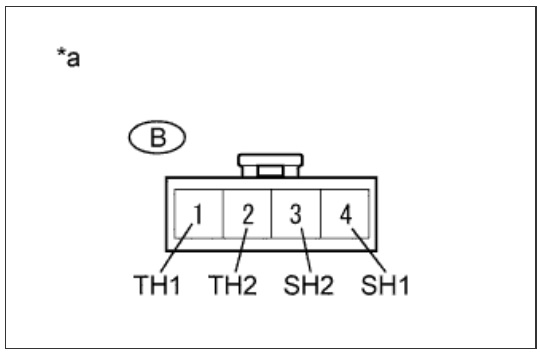
HINT:

- **Inspect the fuses for circuits related to this system before performing the following inspection procedure.**
- **The steering heater unit is built into the steering wheel assembly which cannot be disassembled. Therefore, when the steering heater unit has a malfunction, replace the steering wheel assembly.**

1.INSPECT STEERING WHEEL ASSEMBLY (THERMISTOR·HEATER·THERMOSTAT)

a. Disconnect the B steering wheel controller connector.

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



Standard Resistance:

Tester Connection	Condition	Specified Condition
B-1 (TH1) - B-2 (TH2)	10 to 30°C (50 to 86°F)	8.132 to 18.43 kΩ
B-4 (SH1) - B-3 (SH2)	20°C (68°F)	1.89 to 2.25 Ω

Text in Illustration

*a	Front view of wire harness connector (to Steering Wheel Control Assembly)

NG → REPLACE STEERING WHEEL ASSEMBLY (Click here)

OK

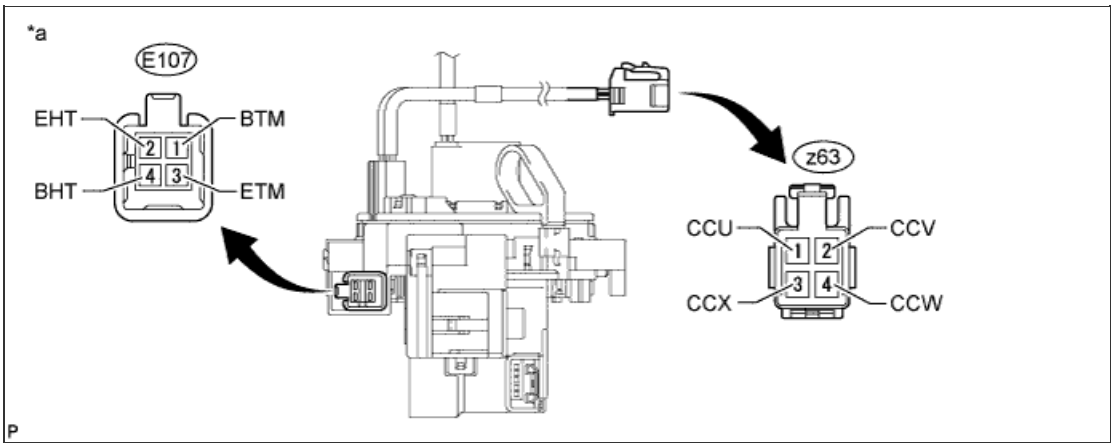
2.INSPECT SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY

a. Check the connectors and cables of the spiral with sensor cable sub-assembly.

OK:

There are no defects such as scratches, cracks, dents or damage on the connectors or cables.

b. Disconnect the E107 and z63 spiral with sensor cable sub-assembly connectors.



c. Disconnect the heated steering wheel controller connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
z63-1 (CCU) - E107-1 (BTM)	Always	Below 1 Ω
z63-2 (CCV) - E107-3 (ETM)	Always	Below 1 Ω
z63-3 (CCX) - E107-2 (EHT)	Always	Below 1 Ω
z63-4 (CCW) - E107-4 (BHT)	Always	Below 1 Ω

Text in Illustration

*a	Component without harness connected (Spiral with Sensor Cable Sub-assembly)	-	-

NG → REPLACE SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY (Click here)

OK

3.CHECK STEERING HEATER SWITCH

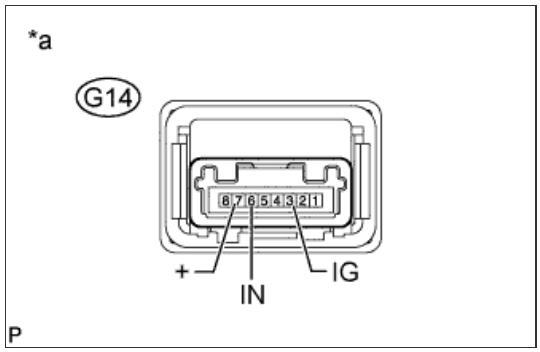
a. Disconnect the G14 steering heater switch connector.

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

HINT:

As the circuit has a diode, perform the measurement in diode test mode, and

do not mistake the polarity.



Standard Voltage:

Tester Connection (Positive (+) tester probe - Negative (-) tester probe)	Condition	Specified Condition
G14-3 (IG) - G14-7 (+)	Always	Below 1.25 V
G14-6 (IN) - G14-7 (+)	Steering heater switch is pushed	Below 1.25 V

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
G14-3 (IG) - G14-6 (IN)	Steering heater switch is pushed	Below 1 Ω
G14-3 (IG) - G14-6 (IN)	Steering heater switch is not pushed	10 kΩ or higher

Text in Illustration

*a	Component without harness connected (Steering Heater Switch)

NG → REPLACE STEERING HEATER SWITCH (Click here)

OK

4.CHECK HARNESS AND CONNECTOR (STEERING HEATER SWITCH - SPIRAL W/ SENSOR CABLE SUB-ASSEMBLY)

a. Disconnect the G14 steering heater switch connector.

b. Disconnect the E107 spiral with sensor cable sub-assembly connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
G14-7 (+) - E107-1 (BTM)	Always	Below 1 Ω
G14-6 (IN) - E107-3 (ETM)	Always	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5.CHECK HARNESS AND CONNECTOR (IG CIRCUIT)

a. Disconnect the G14 steering heater switch connector.

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
G14-3 (IG) - Body ground	Ignition switch ON	11 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6.CHECK HARNESS AND CONNECTOR (IG CIRCUIT)

a. Disconnect the E107 spiral with sensor cable subassembly connector.

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

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
E107-4 (BHT) - Body ground	Ignition switch ON	11 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

7.CHECK HARNESS AND CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY BODY GROUND)

a. Disconnect the E107 spiral with sensor cable sub-assembly connector.

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
E107-2 (EHT) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE STEERING WHEEL HEATER CONTROL ASSEMBLY (Click here)

for Preparation Click here

1.HANDLING PRECAUTIONS FOR STEERING SYSTEM

a. Care must be taken when replacing parts. Incorrect replacement may affect the performance of the steering system and result in driving hazards.

2.HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

a. The vehicle is equipped with an SRS (Supplemental Restraint System). Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident. Before servicing (including inspection, replacement, removal, and installation of parts), be sure to read the precautionary notices for the Supplemental Restraint System (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.

Steering System

Symptom	Suspected Area	See page
Hard steering	Tires (Improperly inflated)	Click here
	Power steering fluid level (Low) for 1VD-FTV without DPF	Click here
	Power steering fluid level (Low) for 1VD-FTV with DPF	Click here
	Drive belt (Loose) for 1UR-FE	Click here
	Drive belt (Loose) for 1GR-FE	Click here
	Drive belt (Loose) for 3UR-FE	Click here
	Front wheel alignment (Incorrect)	Click here
	Steering system joints (Worn)	-
	Suspension arm ball joints (Worn)	Click here
	Steering column (Binding)	-
	Power steering vane pump for 1GR-FE	Click here
	Power steering vane pump for 1UR-FE	Click here
	Power steering vane pump for 1VD-FTV without DPF	Click here
	Power steering vane pump for 1VD-FTV with DPF	Click here
	Power steering vane pump for 3UR-FE	Click here
	Power steering gear	Click here
Poor return	Tires (Improperly inflated)	Click here
	Front wheel alignment (Incorrect)	Click here
	Steering column (Binding)	-
	Power steering gear	Click here
Excessive play	Steering system joints (Worn)	-
	Suspension arm ball joints (Worn)	Click here
	Intermediate shaft, Sliding yoke (Worn)	-
	Front wheel bearing (Worn)	Click here
	Power steering gear	Click here
Abnormal noise	Power steering fluid level (Low) for 1VD-FTV without DPF	Click here
	Power steering fluid level (Low) for 1VD-FTV with DPF	Click here
	Steering system joints (Worn)	-
	Power steering vane pump for 1GR-FE	Click here
	Power steering vane pump for 1UR-FE	Click here
	Power steering vane pump for 1VD-FTV without DPF	Click here
	Power steering vane pump for 1VD-FTV with DPF	Click here
	Power steering vane pump for 3UR-FE	Click here
	Power steering gear	Click here

for Preparation Click here

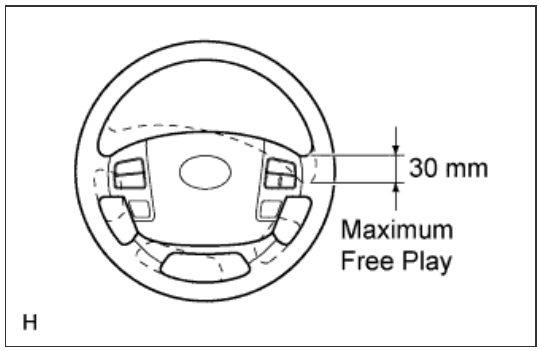
1. INSPECT STEERING WHEEL FREE PLAY

a. Stop the vehicle and align the tires facing straight ahead.

b. Gently turn the steering wheel right and left by hand, and check the steering wheel free play.

Maximum free play:
30 mm (1.18 in.)

If the free play is more than the maximum, check the steering column, steering intermediate shaft, steering sliding yoke, and steering gear.



for Preparation Click here

1. STEERING OFF CENTER ADJUSTMENT PROCEDURE

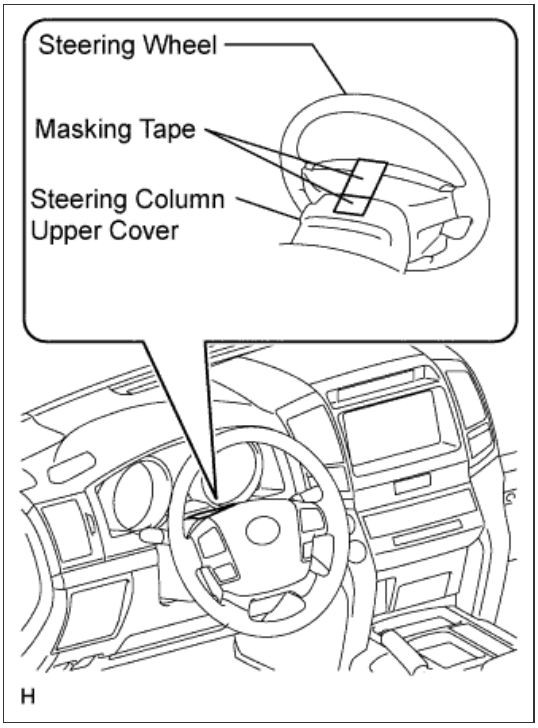
HINT:

This is the adjustment procedure for steering off center.

a. Inspect steering wheel off center.

i. Apply masking tape to the top center of the steering wheel and steering column upper cover.

ii. Drive the vehicle in a straight line for 100 m (328 ft.) at a constant speed of 56 km/h (35 mph), and hold the steering wheel to maintain the course.

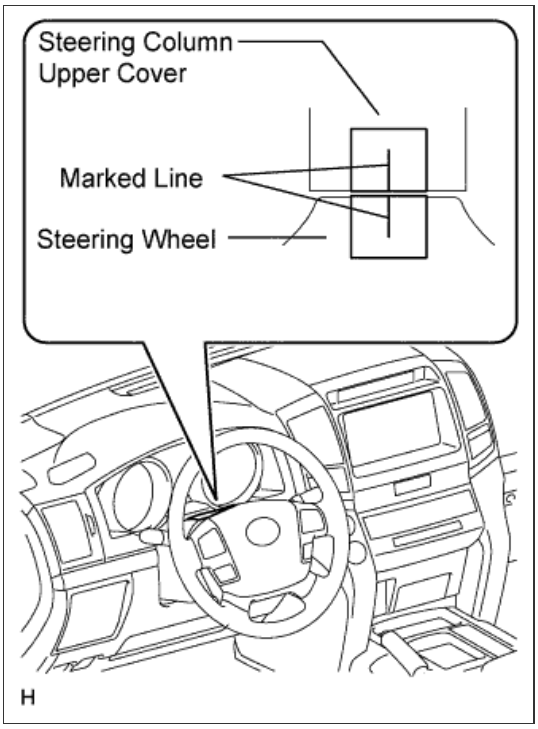


iii. Draw a line on the masking tape as shown in the illustration.

iv. Turn the steering wheel to the center position.

HINT:

Look at the upper surface of the steering wheel, steering spoke and SRS airbag line to find the center position.



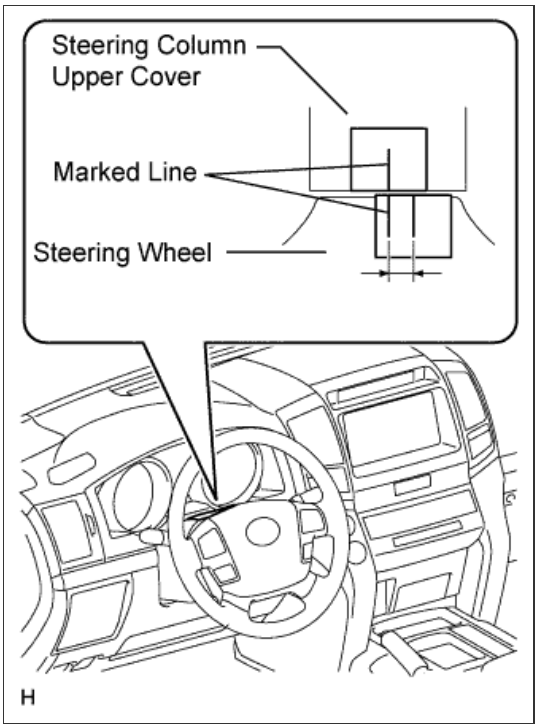
v. Draw a new line on the masking tape on the steering wheel as shown in the illustration.

vi. Measure the distance between the 2 lines on the masking tape on the steering wheel.

vii. Convert the measured distance to steering angle.

HINT:

- **Measured distance 1 mm (0.0394 in.) = Steering angle of approximately 1°.**
- **Make a note of the steering angle.**



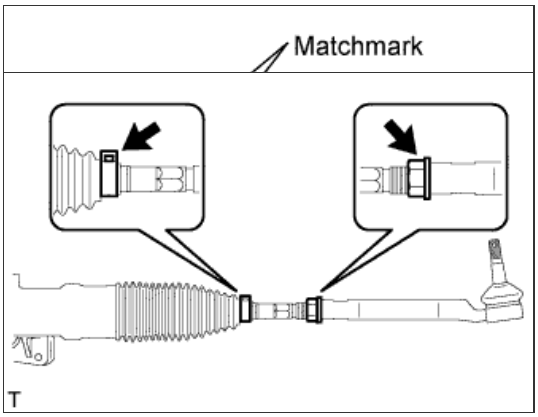
b. Adjust the steering angle.

i. Draw a line on the RH and LH tie rod ends and rack ends respectively where it can be easily seen.

ii. Using a paper gauge, measure the distance from the RH and LH tie rod ends to the rack end screws.

HINT:

- **Measure both the RH and LH sides.**
- **Make a note of the measured values.**



iii. Remove the RH and LH boot clips from the rack boots.

iv. Loosen the RH and LH lock nuts.

v. Turn the RH and LH rack ends by the same amount (but in different directions) according to the steering angle.

HINT:

One 360 °turn of the rack end (1.5 mm (0.0591 in.) horizontal movement) equals 12 °of steering angle.

vi. Tighten the RH and LH lock nuts to the specified torque.

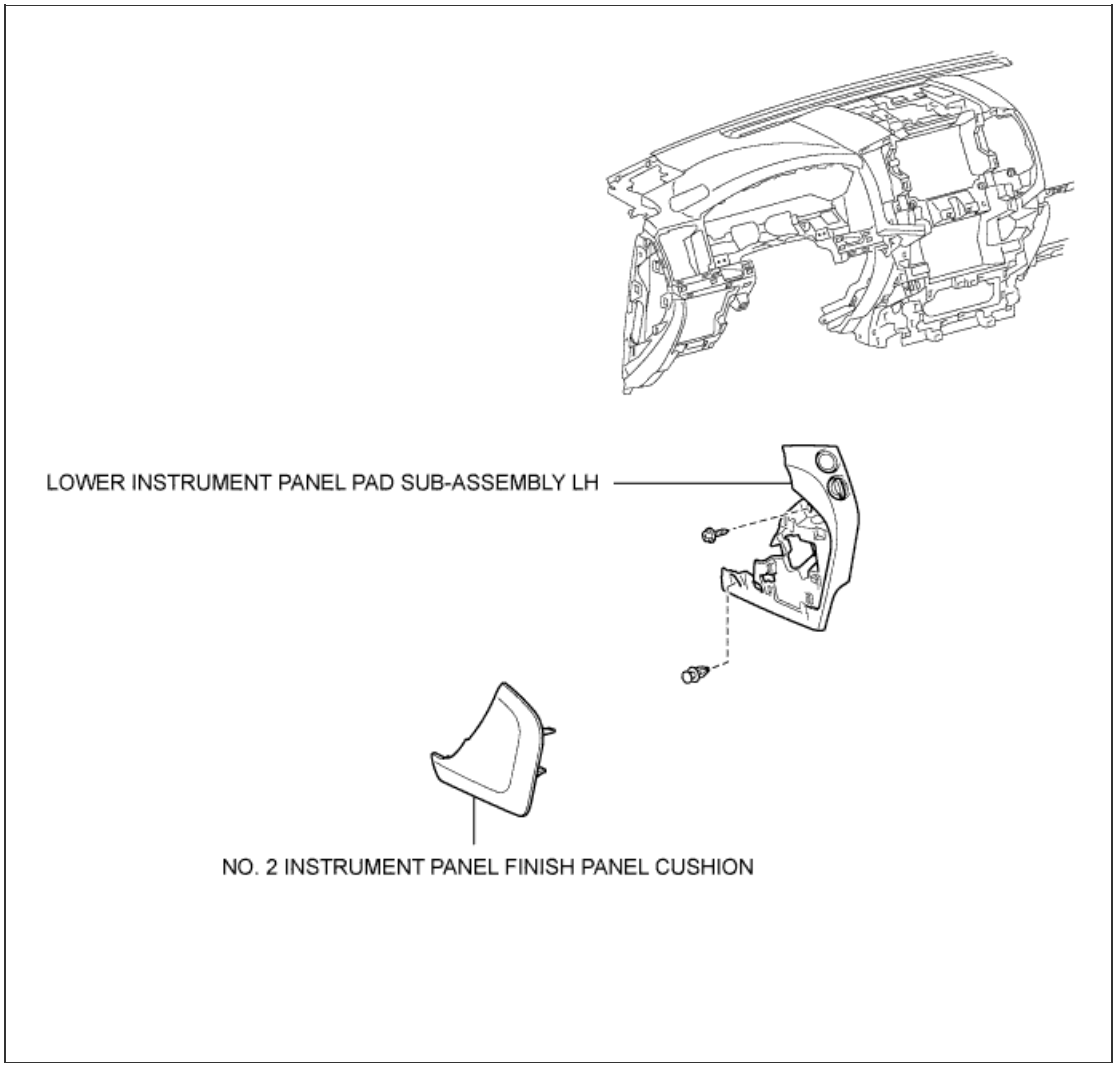
Torque:
82 N*m{ 836 kgf*cm , 60 ft.*lbf }

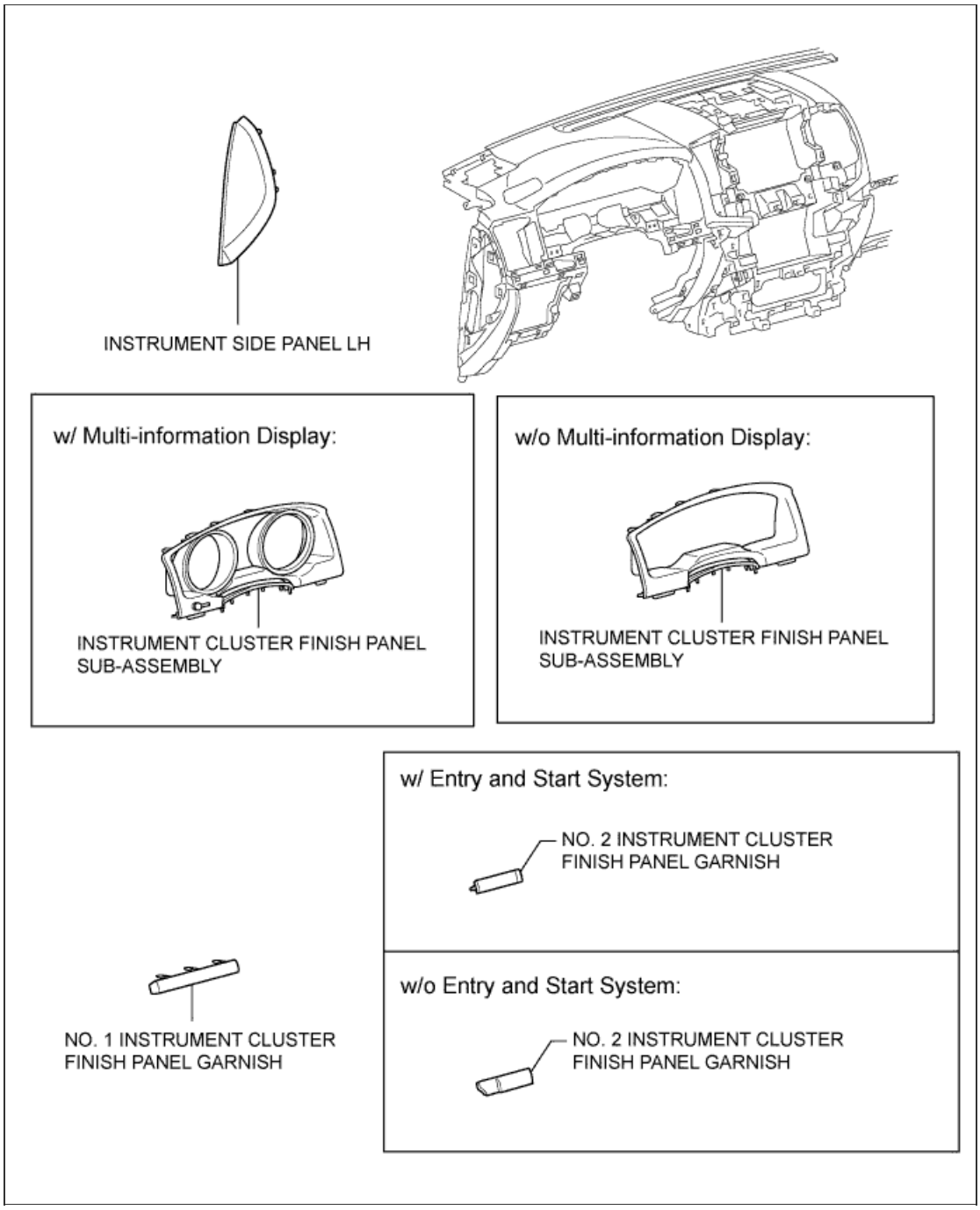
NOTICE:

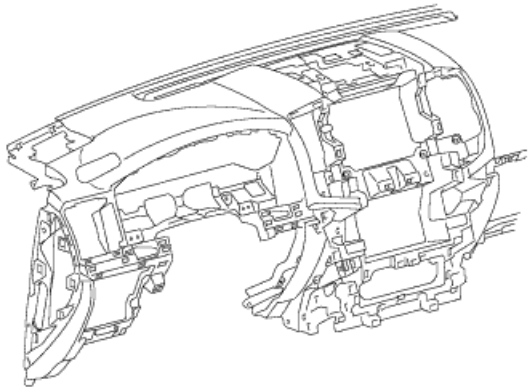
Make sure that the difference in length between the RH and LH tie rod ends and rack end screws is within 1.5 mm (0.0591 in.).

vii. Install the RH and LH boot clips.

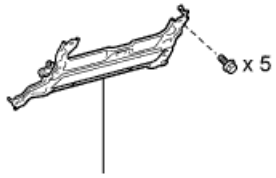
for Preparation Click here




INSTRUMENT SIDE PANEL LH
w/ Multi-information Display:
INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY
w/o Multi-information Display:
INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY
w/ Entry and Start System:
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
w/o Entry and Start System:
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

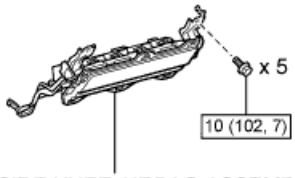


w/o Driver Side Knee Airbag:



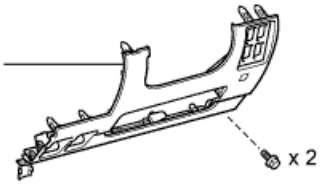
LOWER INSTRUMENT PANEL SUB-ASSEMBLY

w/ Driver Side Knee Airbag:



DRIVER SIDE KNEE AIRBAG ASSEMBLY

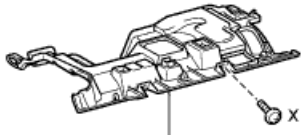
LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL





NO. 1 SWITCH HOLE BASE

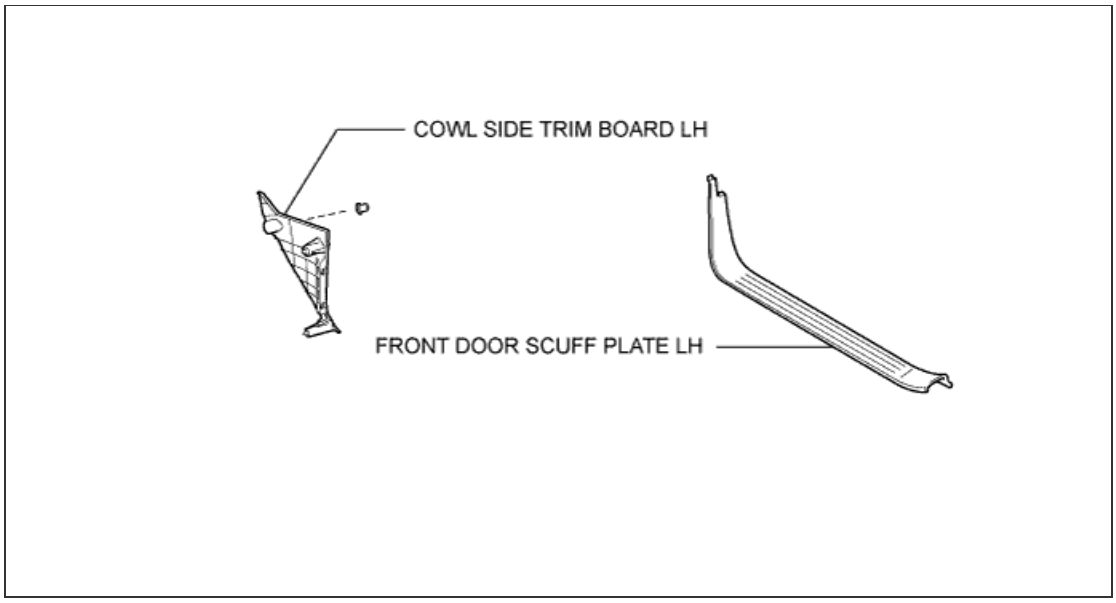
w/ Floor Under Cover:



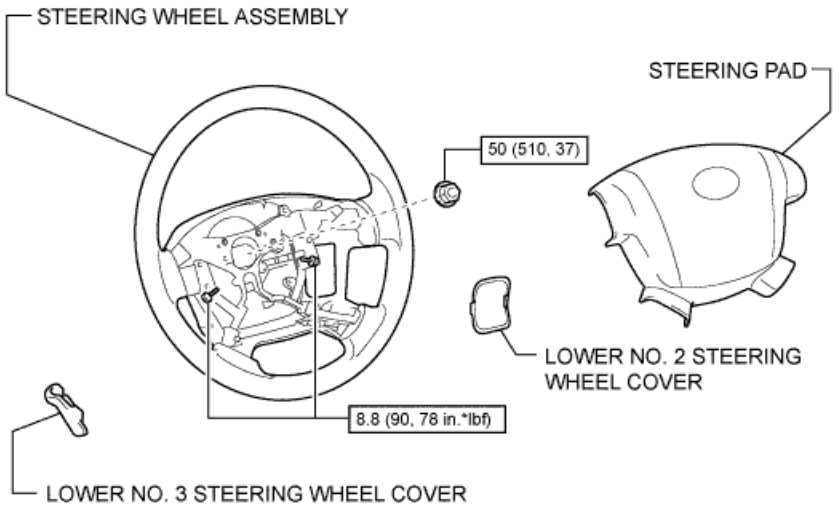
NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

N*m (kgf*cm, ft.*lbf) : Specified torque

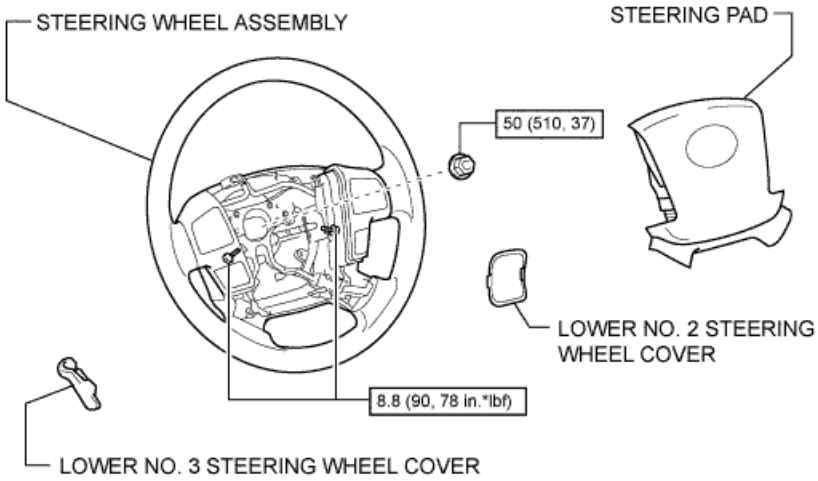
T


COWL SIDE TRIM BOARD LH
FRONT DOOR SCUFF PLATE LH

w/o Steering Pad Switch:

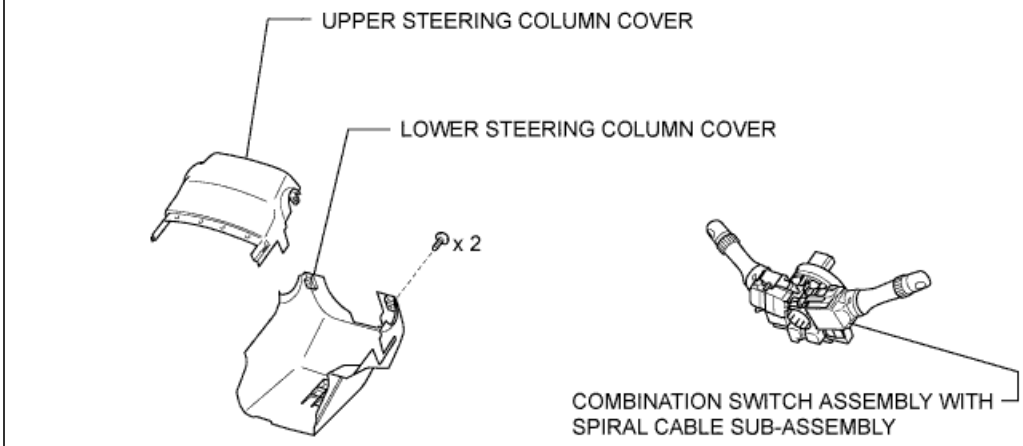


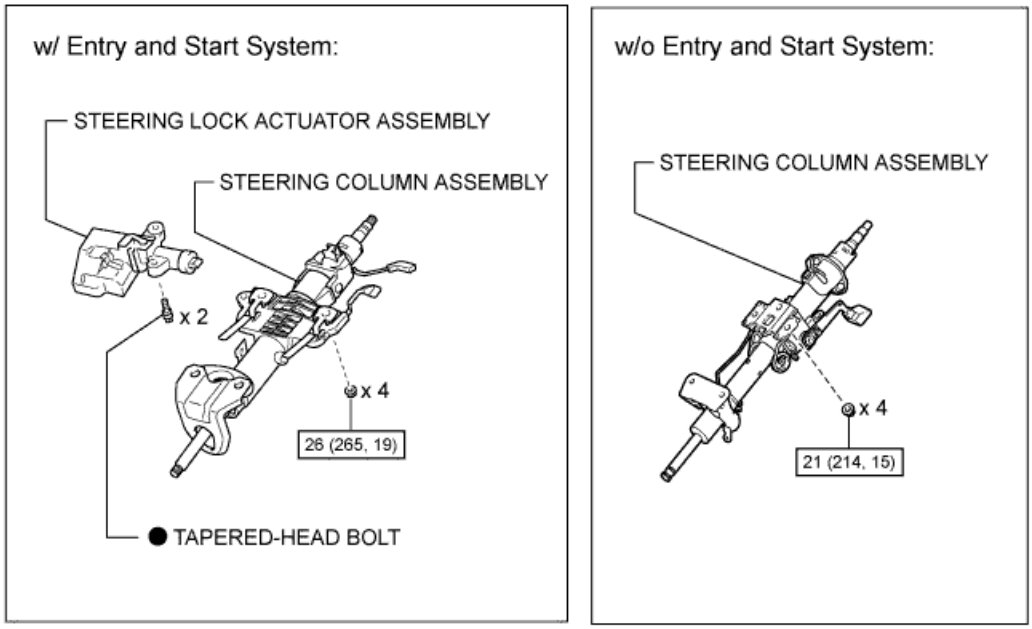
w/ Steering Pad Switch:

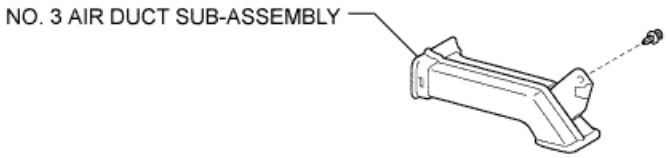


N*m (kgf*cm, ft.*lbf) : Specified torque

H



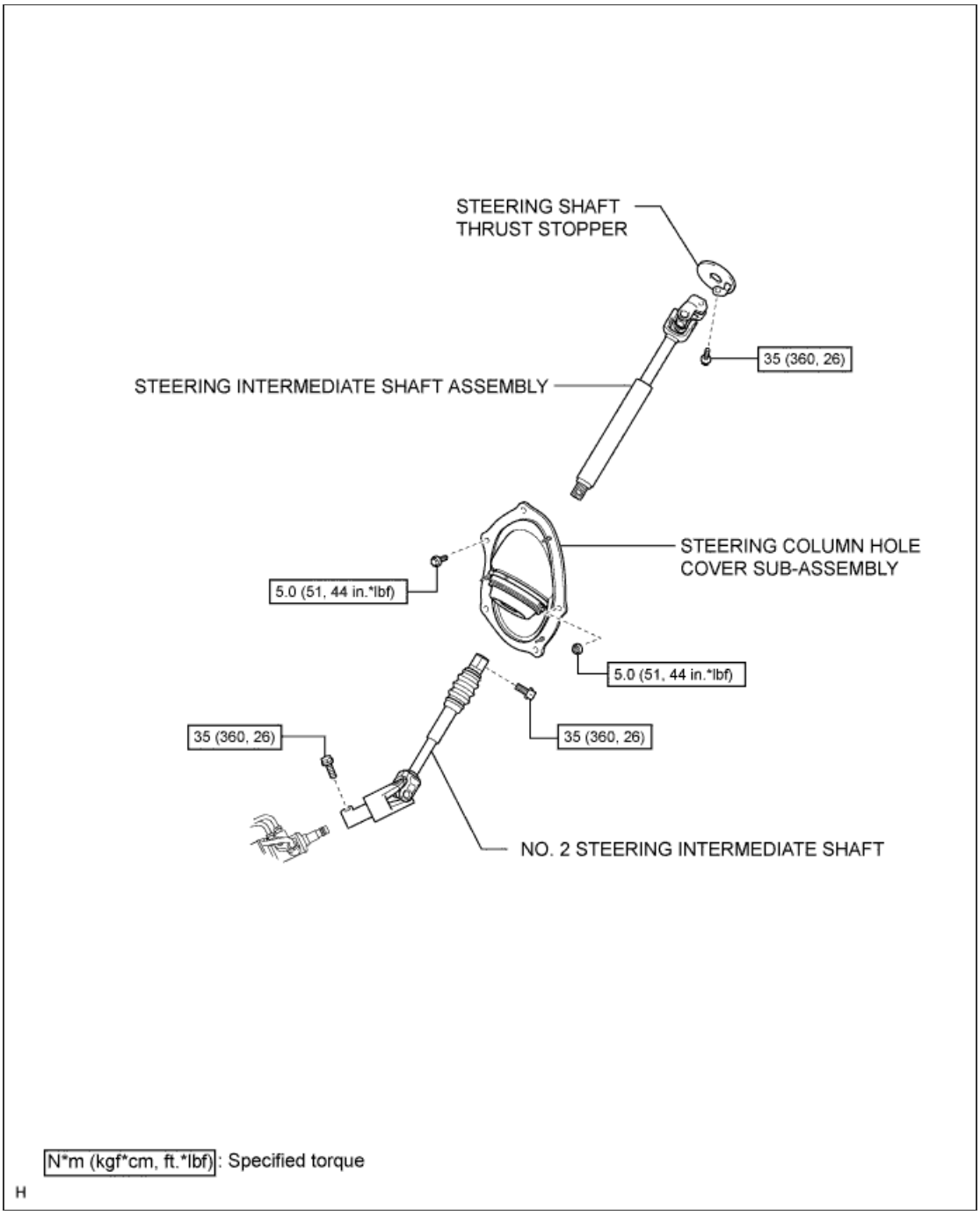




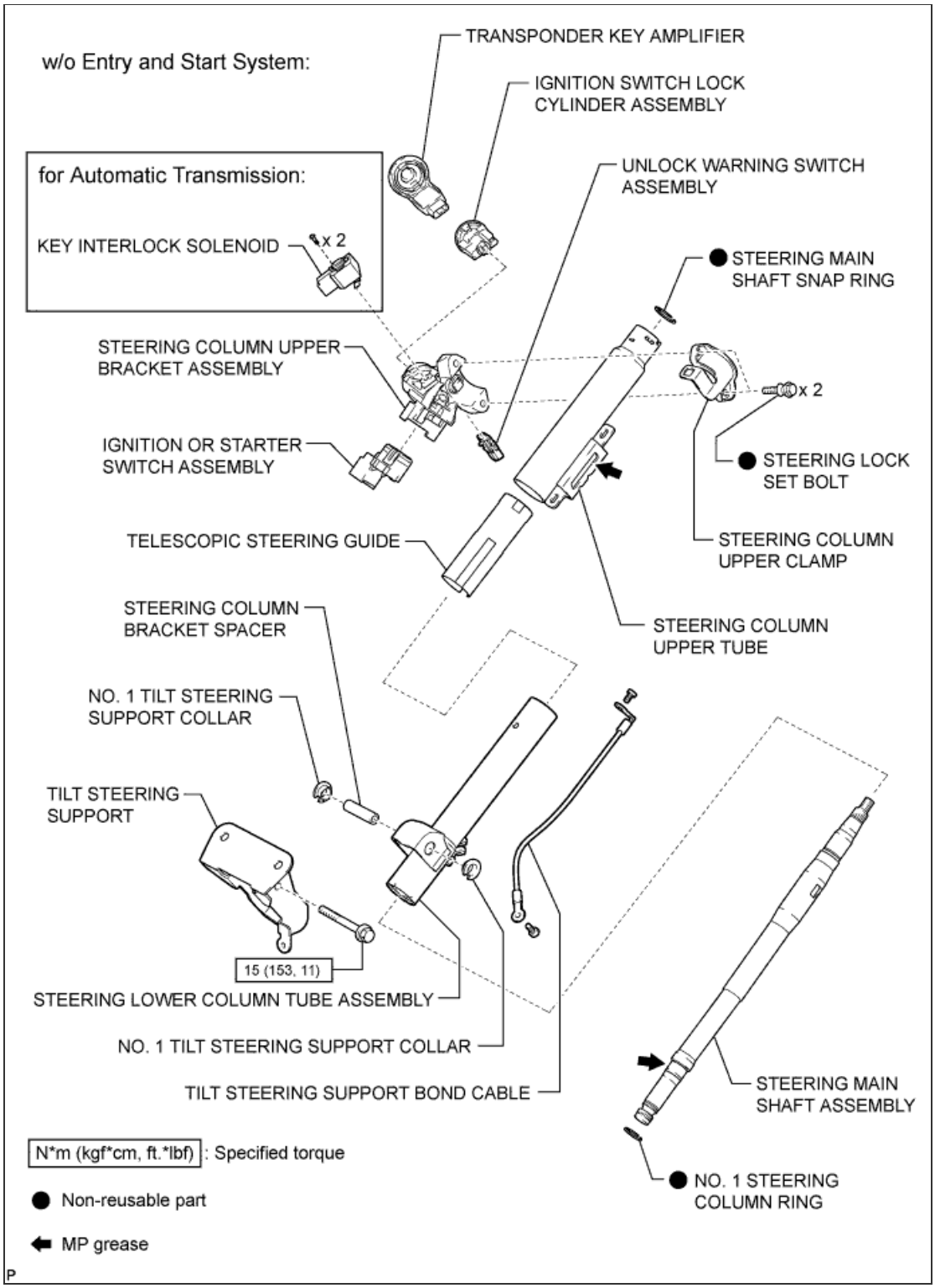
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

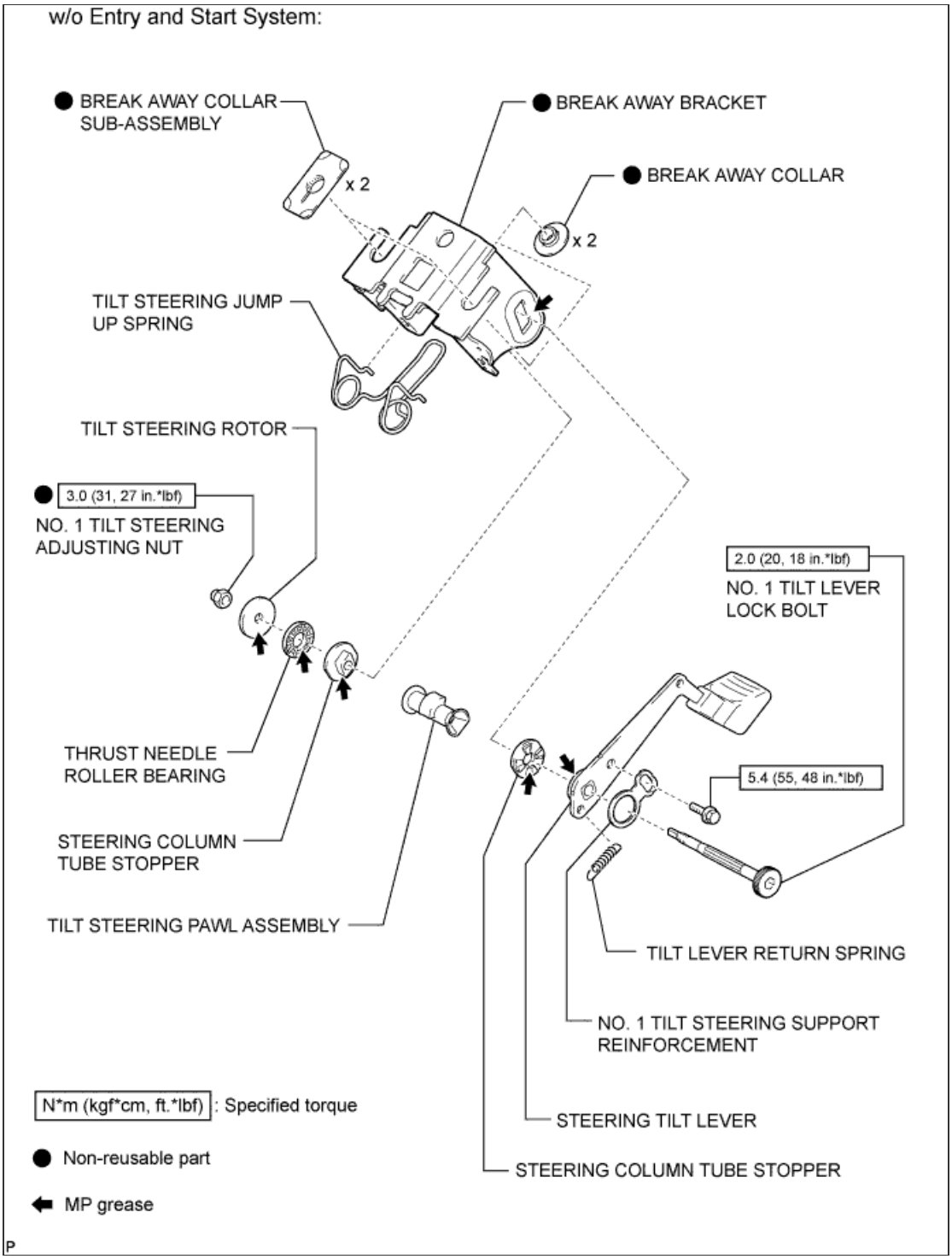
H


STEERING SHAFT
THRUST STOPPER
35 (360, 26)
STEERING INTERMEDIATE SHAFT ASSEMBLY
STEERING COLUMN HOLE
COVER SUB-ASSEMBLY
5.0 (51, 44 in.*lbf)
5.0 (51, 44 in.*lbf)
35 (360, 26)
35 (360, 26)
NO. 2 STEERING INTERMEDIATE SHAFT
N*m (kgf*cm, ft.*lbf): Specified torque

H


w/o Entry and Start System:
TRANSPONDER KEY AMPLIFIER
IGNITION SWITCH LOCK CYLINDER ASSEMBLY
for Automatic Transmission:
KEY INTERLOCK SOLENOID
x 2
UNLOCK WARNING SWITCH ASSEMBLY
STEERING MAIN SHAFT SNAP RING
STEERING COLUMN UPPER BRACKET ASSEMBLY
x 2
IGNITION OR STARTER SWITCH ASSEMBLY
STEERING LOCK SET BOLT
TELESCOPIC STEERING GUIDE
STEERING COLUMN UPPER CLAMP
STEERING COLUMN BRACKET SPACER
STEERING COLUMN UPPER TUBE
NO. 1 TILT STEERING SUPPORT COLLAR
TILT STEERING SUPPORT
15 (153, 11)
STEERING LOWER COLUMN TUBE ASSEMBLY
NO. 1 TILT STEERING SUPPORT COLLAR
TILT STEERING SUPPORT BOND CABLE
STEERING MAIN SHAFT ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
MP grease
NO. 1 STEERING COLUMN RING
P

w/o Entry and Start System:



for Preparation Click here

CAUTION:

Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing the steering column (Click here).

1. FRONT WHEELS FACING STRAIGHT AHEAD

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

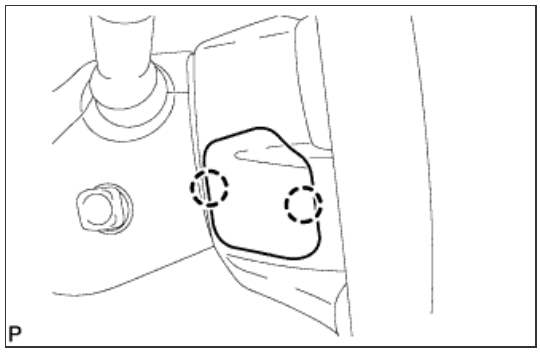
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

- **After the engine switch is turned off, the navigation system requires approximately 90 seconds to record various types of memory and settings. As a result, after turning the engine switch off, wait 90 seconds or more before disconnecting the cable from the negative (-) battery terminal.**
- **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).**

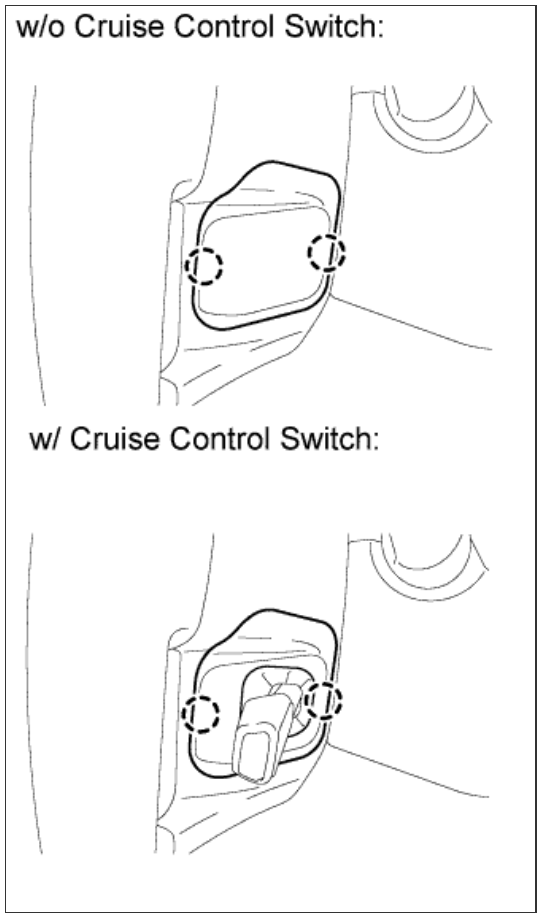
3. REMOVE LOWER NO. 3 STEERING WHEEL COVER

a. Detach the 2 claws and remove the steering wheel cover.



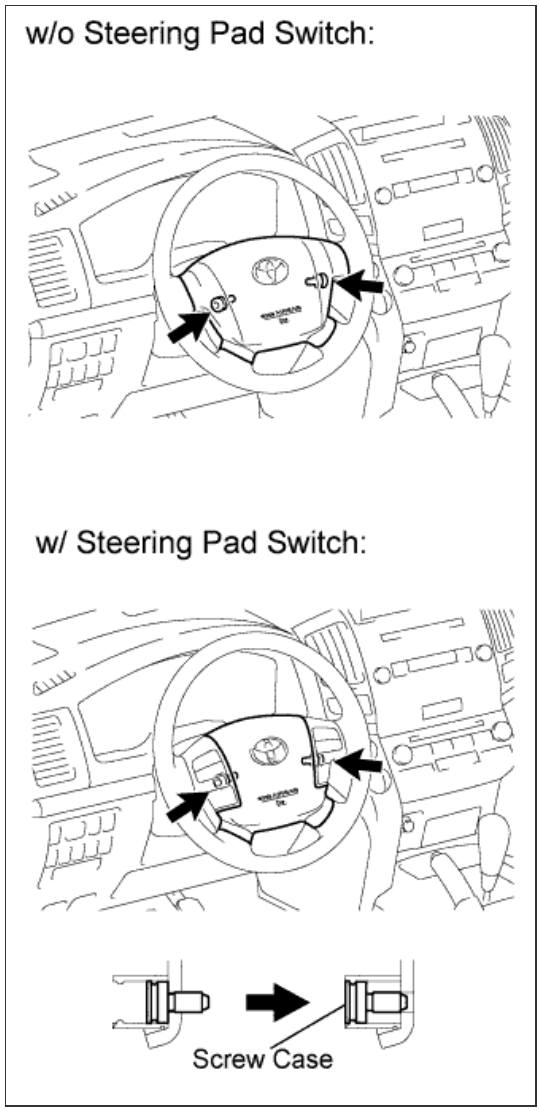
4. REMOVE LOWER NO. 2 STEERING WHEEL COVER

a. Detach the 2 claws and remove the steering wheel cover.



5. REMOVE STEERING PAD

a. Using a T30 "TORX" socket wrench, loosen the 2 screws until the groove along the screw circumference catches on the screw case.



b. Pull out the steering pad from the steering wheel, as shown in the illustration. Then support the steering pad with one hand.

NOTICE:

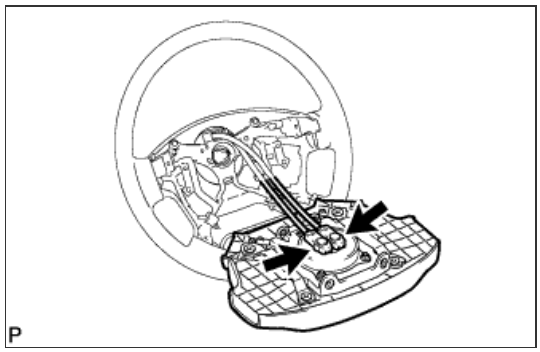
When removing the steering pad, do not pull the airbag wire harness.

c. Disconnect the horn connector.

d. Disconnect the 2 connectors and remove the steering pad.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



6. REMOVE STEERING WHEEL ASSEMBLY

a. Remove the steering wheel set nut.

b. Put matchmarks on the steering wheel and main shaft.

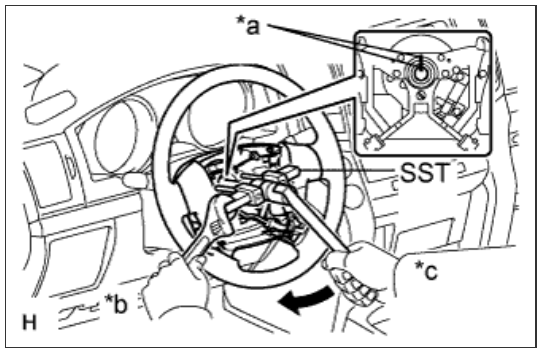
Text in Illustration

*a	Matchmark
*b	Hold
*c	Turn

c. Using SST, remove the steering wheel assembly.

SST

09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05011)



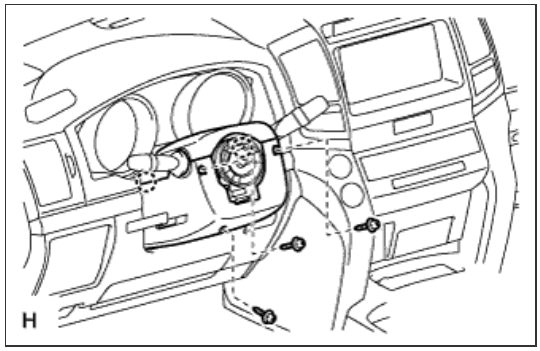
7. REMOVE LOWER STEERING COLUMN COVER

a. Remove the 3 screws.

b. Detach the 2 claws to remove the lower steering column cover.

NOTICE:

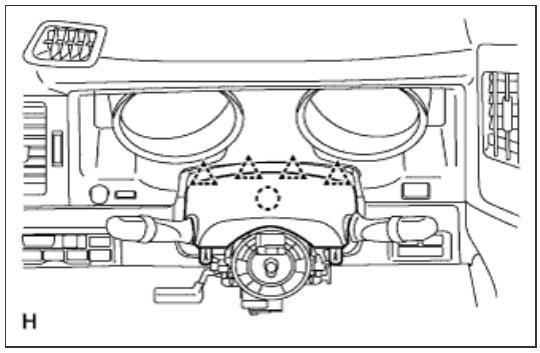
Do not damage the tilt and telescopic switch.



8. REMOVE UPPER STEERING COLUMN COVER

a. Detach the 4 clips.

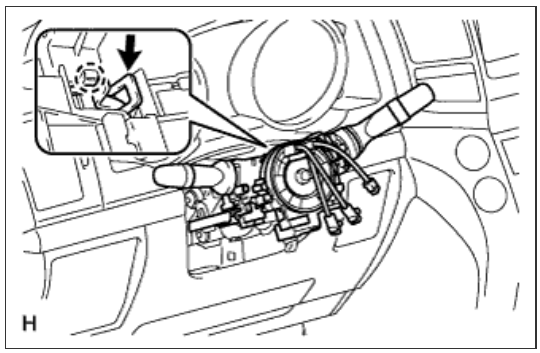
b. Detach the claw to remove the upper steering column cover.



9. REMOVE COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

a. Disconnect the connectors from the combination switch with spiral cable.

b. Using pliers, grip the claws of the clamp and remove the combination switch with spiral cable from the steering column.



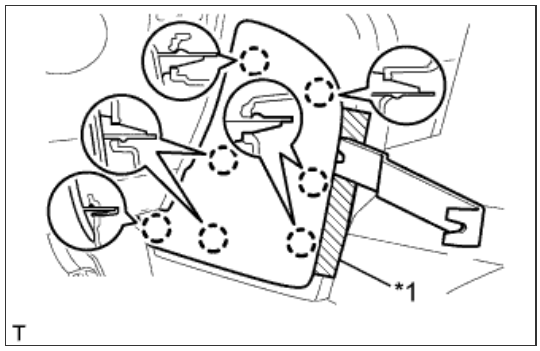
10. REMOVE NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Put protective tape around the No. 2 instrument panel finish panel cushion.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 7 claws and remove the No. 2 instrument panel finish panel cushion.

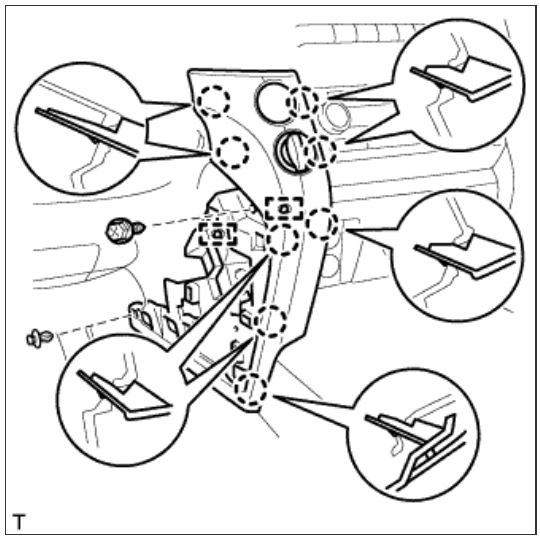


11. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Remove the clip and screw.

b. Detach the 8 claws.

c. Disconnect the connectors, detach the 2 clamps and remove the lower instrument panel pad sub-assembly.



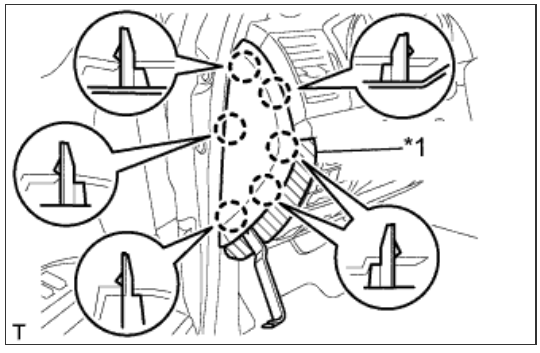
12. REMOVE INSTRUMENT SIDE PANEL LH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 6 claws and remove the instrument side panel.



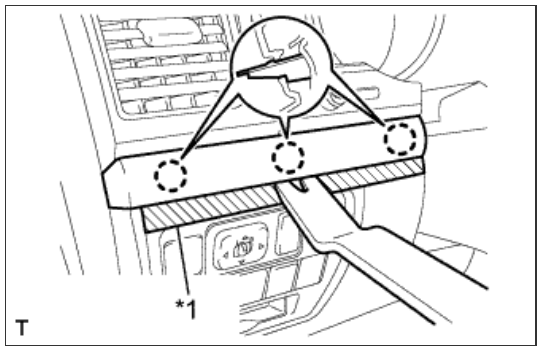
13. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

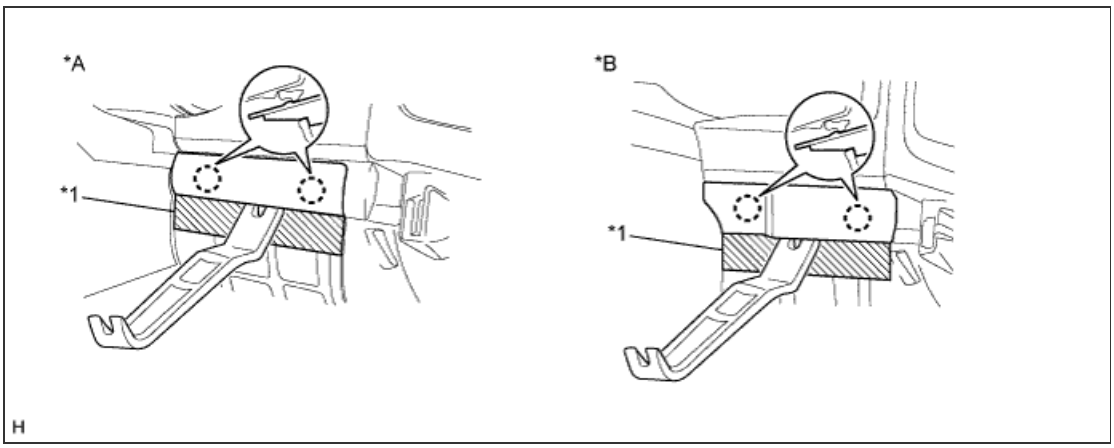
b. Using a moulding remover, detach the 3 claws and remove the No. 1 instrument cluster finish panel garnish.



14. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

b. Using a moulding remover, detach the 2 claws and remove the No. 2 instrument cluster finish panel garnish.



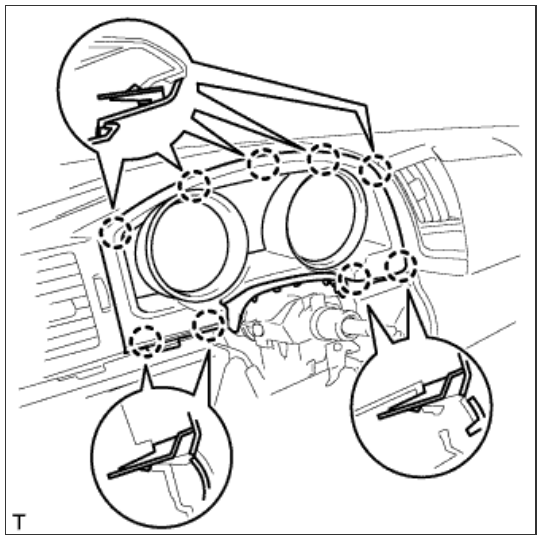
Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System
*1	Protective Tape	-	-

15. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/ Multi-information Display)

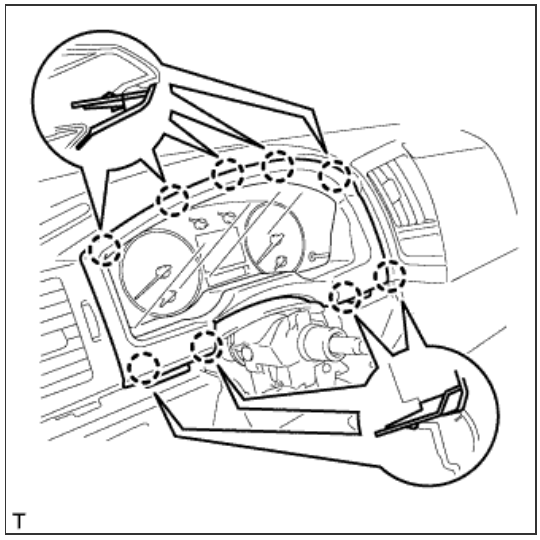
a. Detach the 9 claws.

b. Disconnect the connector and remove the instrument cluster finish panel.



16. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/o Multi-information Display)

a. Detach the 9 claws and remove the instrument cluster finish panel.

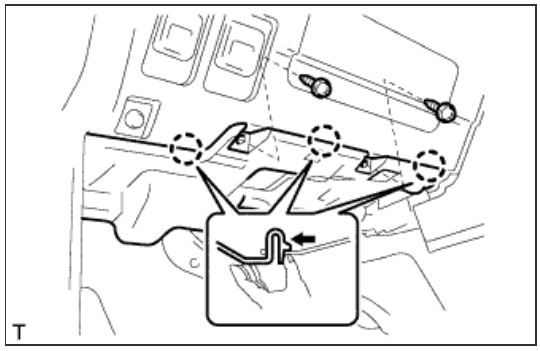


17. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Remove the 2 screws.

b. Detach the 3 claws.

c. Disconnect the connectors and remove the No. 1 instrument panel under cover.

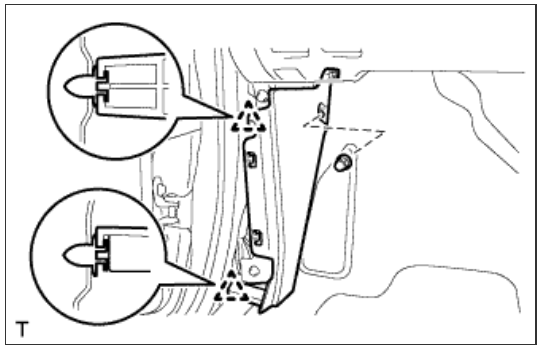


18. REMOVE FRONT DOOR SCUFF PLATE LH

19. REMOVE COWL SIDE TRIM BOARD LH

a. Remove the cap nut.

b. Detach the 2 clips and remove the cowl side trim board.



20. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

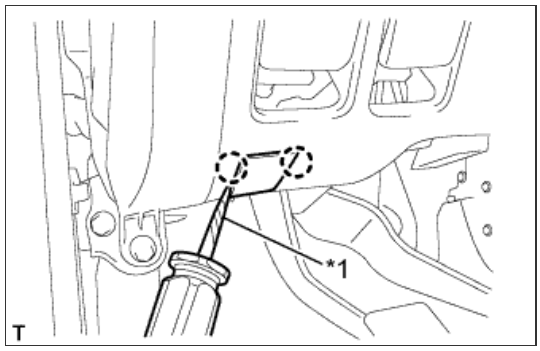
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

Tape the screwdriver tip before use.

Text in Illustration

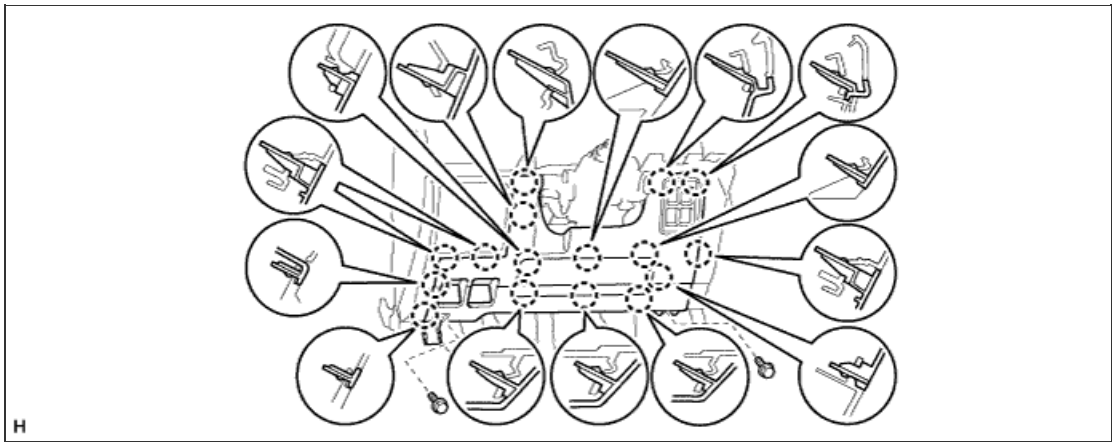
*1	Protective Tape



b. w/ Driver Side Knee Airbag:

i. Remove the 2 bolts.

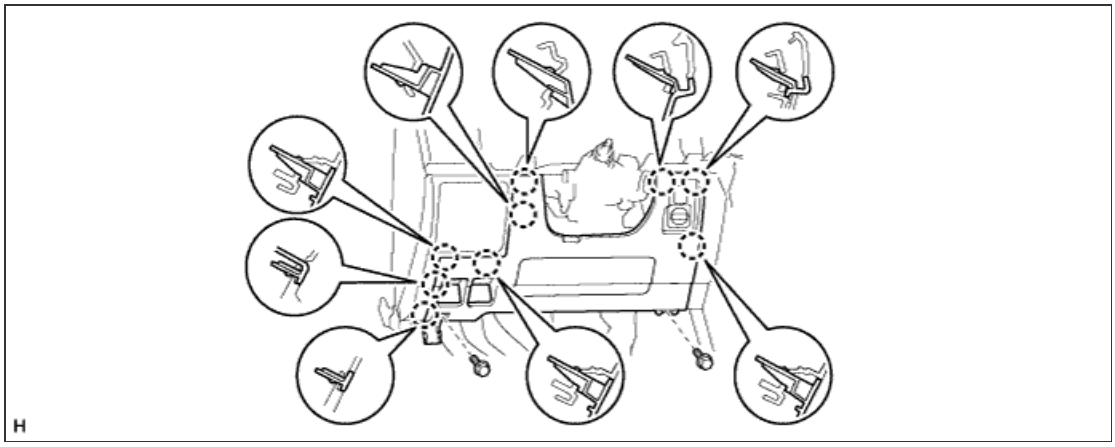
ii. Detach the 16 claws.



c. w/o Driver Side Knee Airbag:

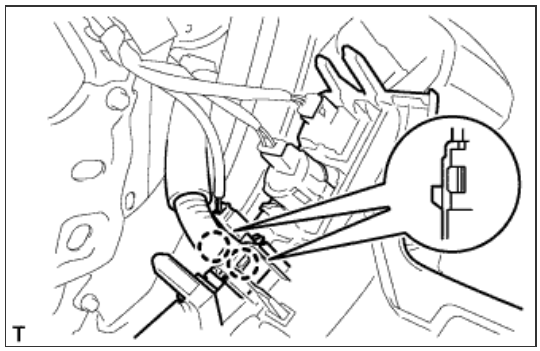
i. Remove the 2 bolts.

ii. Detach the 9 claws.



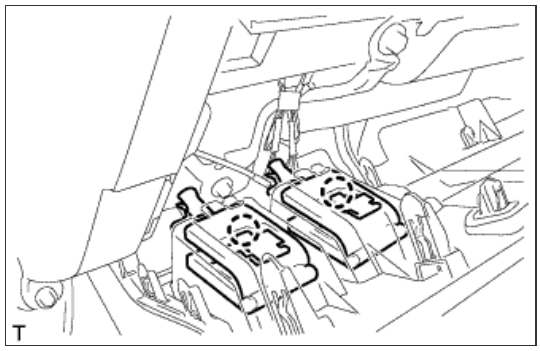
d. for Automatic Air Conditioning System:

i. Detach the 2 claws and remove the room temperature sensor.



e. Detach the 2 claws and disconnect the 2 control cables.

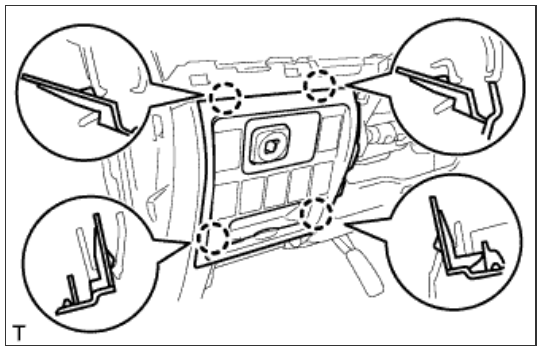
f. Disconnect the connectors and remove the lower No. 1 instrument panel finish panel.



21. REMOVE NO. 1 SWITCH HOLE BASE

a. Detach the 4 claws.

b. Disconnect the connectors and remove the No. 1 switch hole cover.



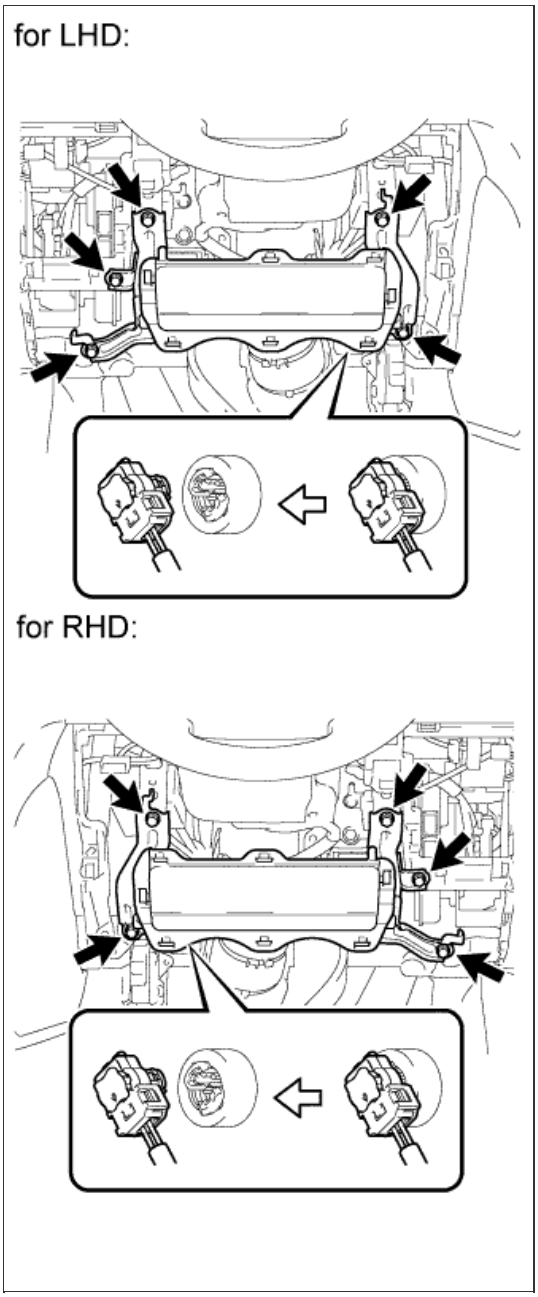
22. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

a. Remove the 5 bolts and driver side knee airbag.

b. Disconnect the connector.

NOTICE:

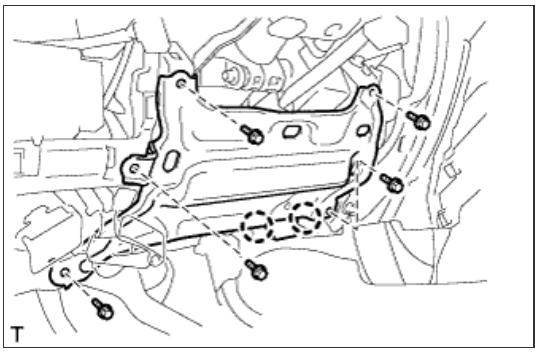
When handling the airbag connector, take care not to damage the airbag wire harness.



23. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (w/o Driver Side Knee Airbag)

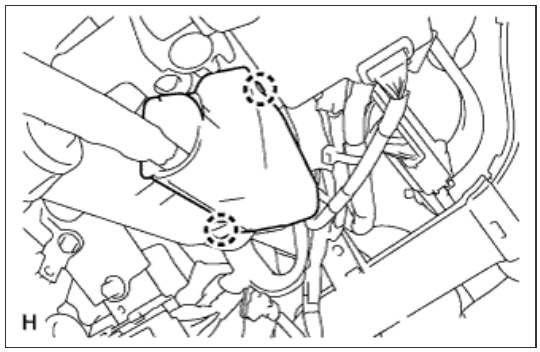
a. Detach the 2 claws and disconnect the DLC3.

b. Remove the 5 bolts and lower instrument panel.



24. DISCONNECT WIRE HARNESS PROTECTOR AND WIRE HARNESS

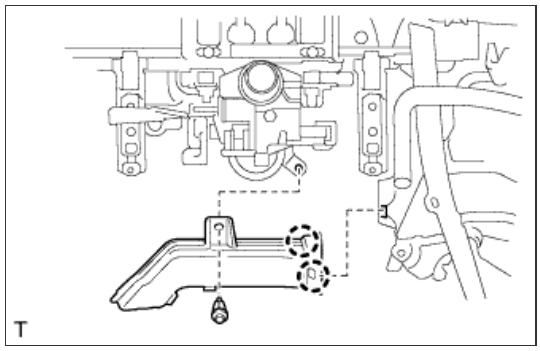
a. Detach the 2 claws to disconnect the wire harness protector and wire harness.



25. REMOVE NO. 3 AIR DUCT SUB-ASSEMBLY

a. Remove the clip.

b. Detach the 2 claws and remove the duct.



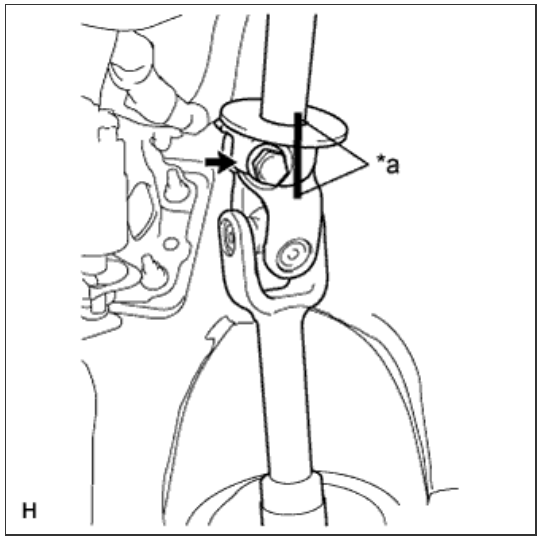
26. REMOVE STEERING COLUMN ASSEMBLY

a. Put matchmarks on the steering intermediate shaft and the steering column.

Text in Illustration

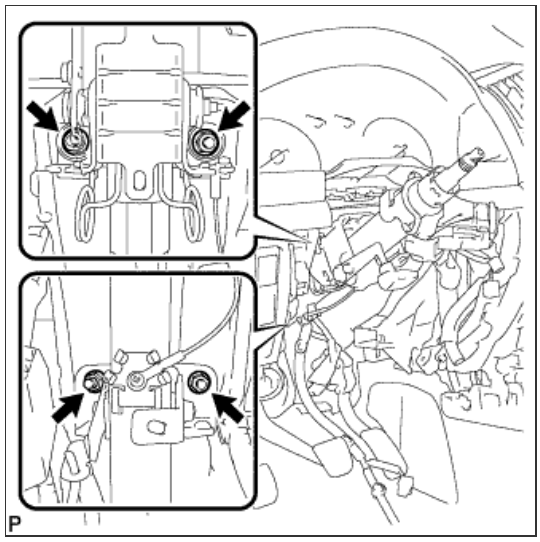
*a	Matchmark

b. Remove the bolt.



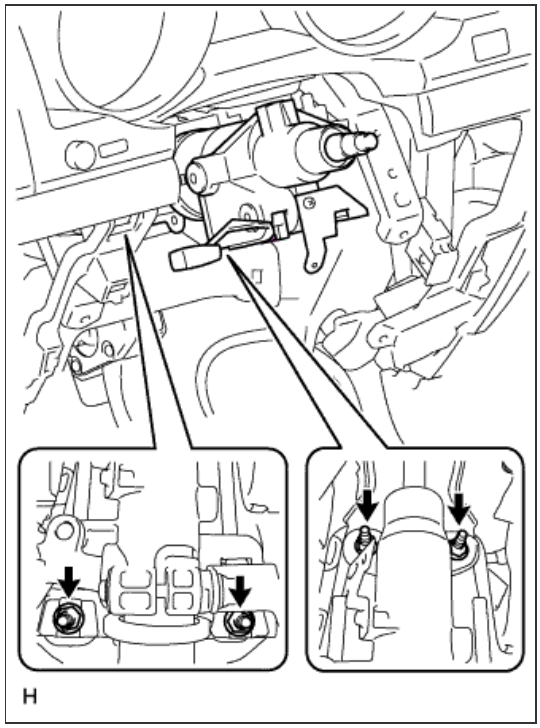
c. w/o Entry and Start System:

i. Remove the 4 nuts and steering column.



d. w/ Entry and Start System:

i. Remove the 4 nuts and steering column.



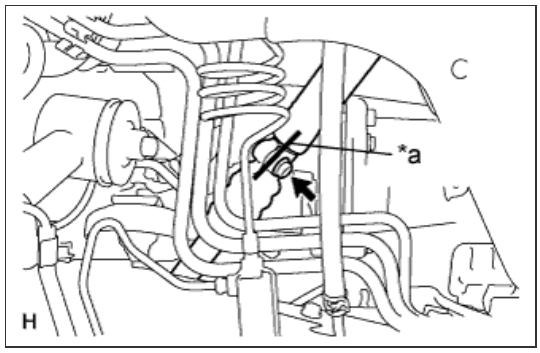
27. DISCONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY

a. Put matchmarks on the steering intermediate shaft and the No. 2 steering intermediate shaft.

Text in Illustration

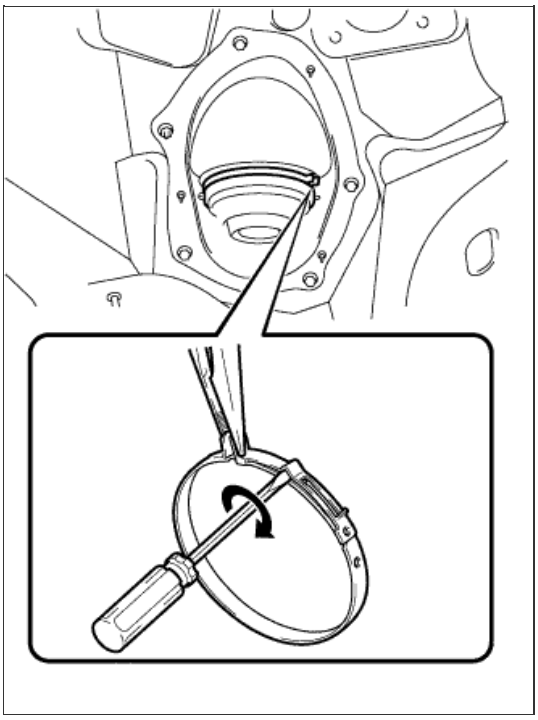
*a	Matchmark

b. Remove the bolt, and then pull out the intermediate shaft toward the inside of the vehicle.

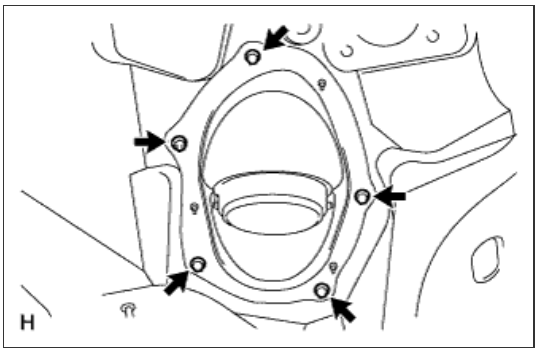


28. REMOVE STEERING COLUMN HOLE COVER SUB-ASSEMBLY

a. Hold the clamp with needle nose pliers, then insert a screwdriver and turn it in the direction shown in the illustration to remove the clamp of the steering column hole cover.



b. Remove the 4 bolts and nut with the steering column hole cover from the vehicle.



29. DISCONNECT NO. 2 STEERING INTERMEDIATE SHAFT

a. Loosen the bolt and remove the No. 2 intermediate shaft.

Text in Illustration

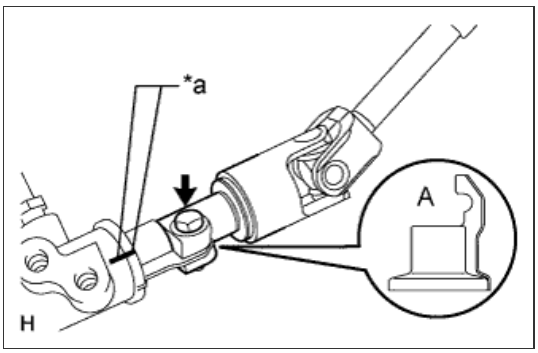
*a	Matchmark

NOTICE:

It is possible to install the intermediate shaft to the same position it was removed from without placing matchmarks due to the dust cover part labeled A. Therefore, do not remove the dust cover from the steering link.

HINT:

If the dust cover is removed/installed or replaced, place matchmarks on the dust cover and steering link.



for Preparation Click here

NOTICE:

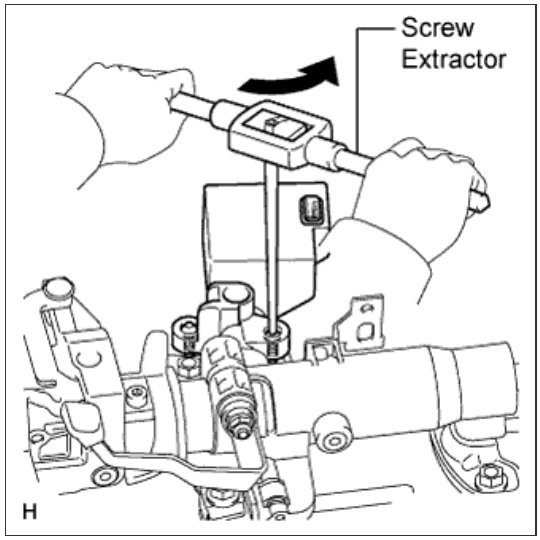
When using a vise, do not overtighten it.

1. REMOVE STEERING LOCK ACTUATOR ASSEMBLY (w/ Entry and Start System)

a. Using a center punch, mark the center of the 2 tapered-head bolts.

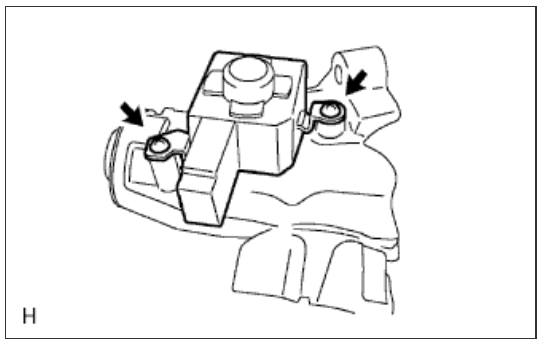
b. Using a 3 to 4 mm (0.118 to 0.157 in.) drill, drill a hole in the 2 bolts.

c. Using a screw extractor, remove the 2 bolts and the steering lock actuator assembly from the steering column assembly.



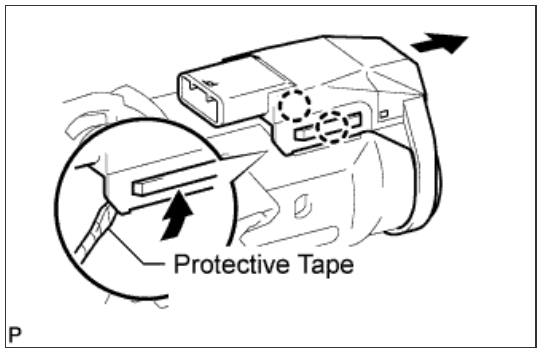
2. REMOVE KEY INTERLOCK SOLENOID (for Automatic Transmission)

a. Remove the 2 screws and solenoid from the steering column upper bracket.



3. REMOVE TRANSPONDER KEY AMPLIFIER (w/o Entry and Start System)

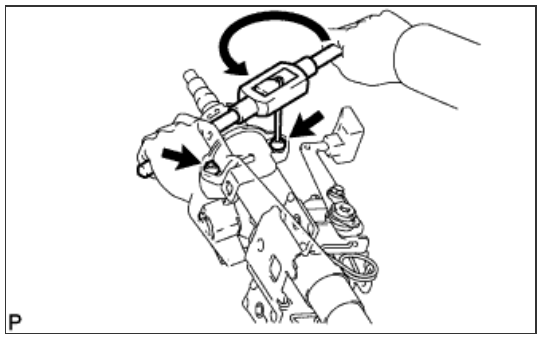
a. Detach the 2 claws, slide the transponder key amplifier in the direction indicated by the arrow in the illustration and remove it from the steering column upper with switch bracket assembly.



4. REMOVE STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY (w/o Entry and Start System)

a. Using a drill, drill a hole to insert a screw extractor into each steering lock bolt.

b. Using a screw extractor, remove the 2 steering lock bolts, steering column upper with switch bracket and steering column upper clamp.



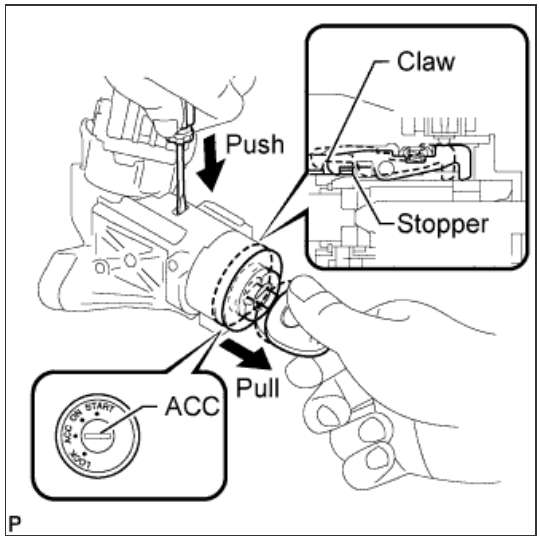
5. REMOVE IGNITION SWITCH LOCK CYLINDER ASSEMBLY (w/o Entry and Start System)

a. Turn the ignition switch lock cylinder assembly to ACC.

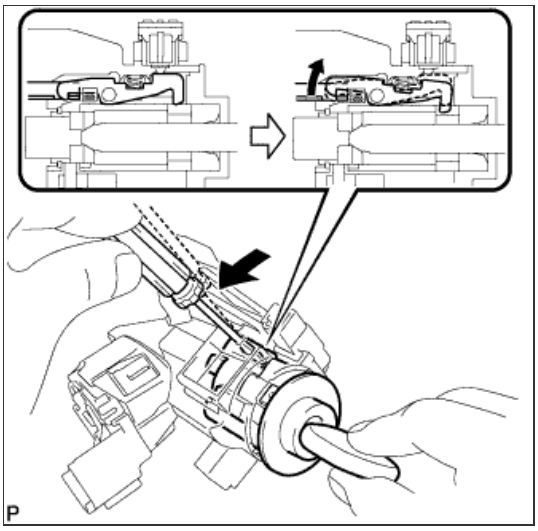
b. Insert a thin-bladed screwdriver into the hole of the steering column upper bracket assembly as shown in the illustration and pull out the key until the claw of the ignition switch lock cylinder assembly contacts the stopper of the steering column upper bracket assembly.

NOTICE:

Be sure to pull out the key until the claw firmly contacts the stopper. There will be problems later if the key is not pulled out until the claw of the ignition switch lock cylinder assembly contacts the stopper of the steering column upper bracket assembly.



c. Insert a thin-bladed screwdriver into the hole of the steering column upper bracket assembly as shown in the illustration, push the thin-bladed screwdriver in the direction shown in the illustration to detach the claw and pull out the ignition switch lock cylinder assembly.

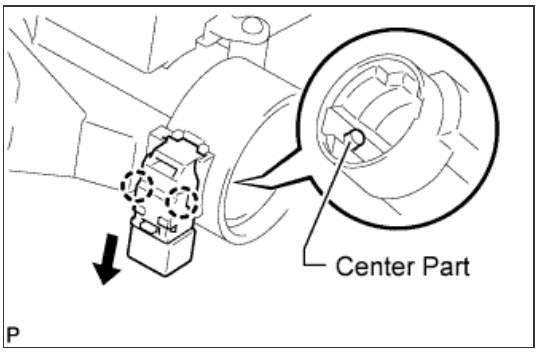


6. REMOVE UNLOCK WARNING SWITCH ASSEMBLY (w/o Entry and Start System)

a. Push up the center part of the unlock warning switch assembly, detach the 2 claws and remove the unlock warning switch assembly.

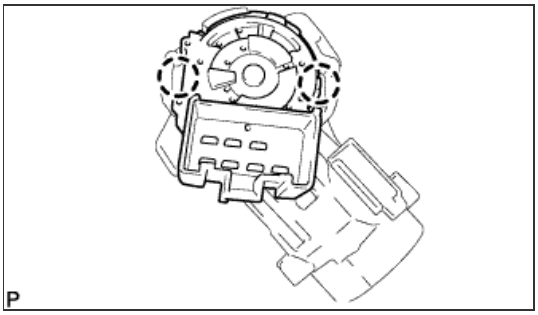
HINT:

Slide the unlock warning switch assembly in the direction indicated by the arrow in the illustration to remove it.



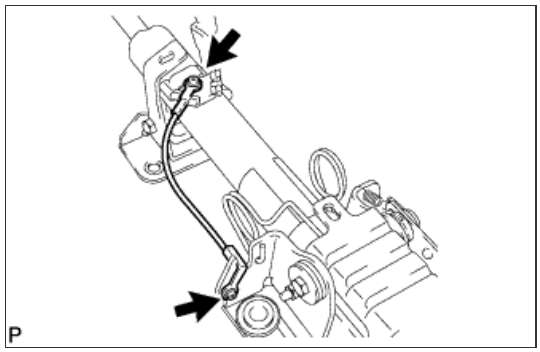
7. REMOVE IGNITION OR STARTER SWITCH ASSEMBLY (w/o Entry and Start System)

a. Detach the 2 claws and remove the ignition or starter switch assembly from the steering column upper bracket assembly.



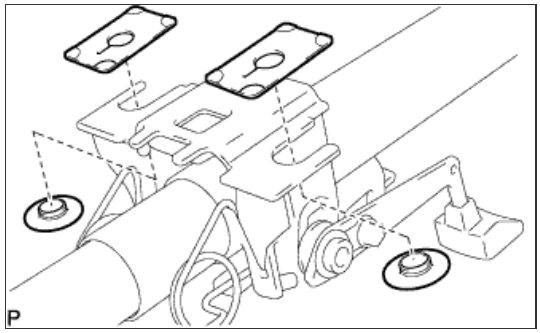
8. REMOVE TILT STEERING SUPPORT BOND CABLE (w/o Entry and Start System)

a. Remove the 2 screws and tilt steering support bond cable.



9. REMOVE BREAK AWAY COLLAR SUB-ASSEMBLY (w/o Entry and Start System)

a. Remove the 2 break away collars and 2 break away capsules from the break away bracket.



10. REMOVE TILT LEVER RETURN SPRING (w/o Entry and Start System)

a. Using SST, remove the tilt lever return spring from the break away bracket and steering tilt lever.

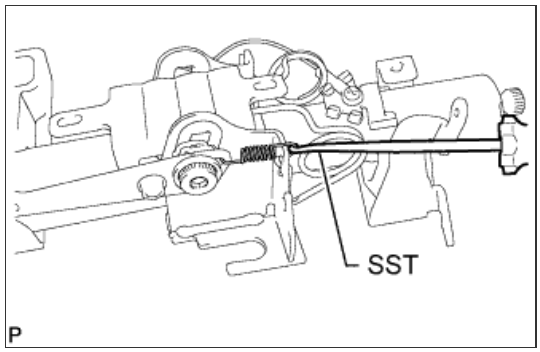
SST
09921-00010

HINT:

To avoid spatter, cover the area with a cloth.

NOTICE:

Do not let the damper fall off of the tilt lever return spring.

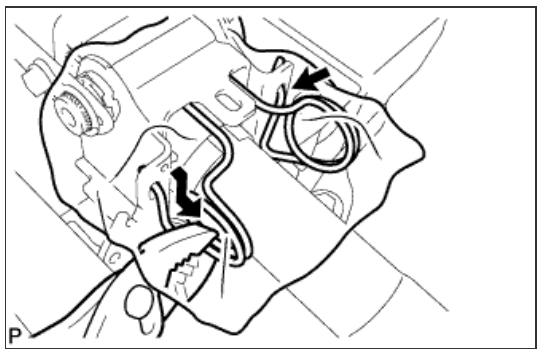


11. REMOVE TILT STEERING JUMP UP SPRING (w/o Entry and Start System)

a. Using pliers, pull the tilt steering jump up spring in the direction indicated by the arrow in the illustration and remove it from the break away bracket.

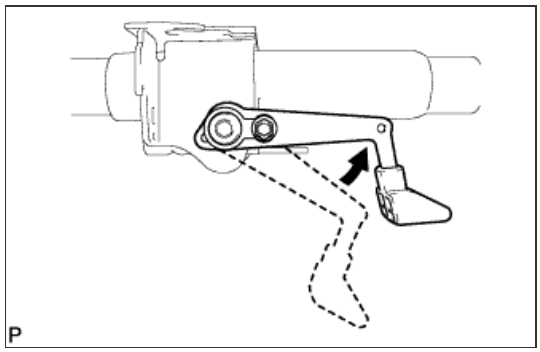
HINT:

To avoid spatter, cover the area with a cloth.

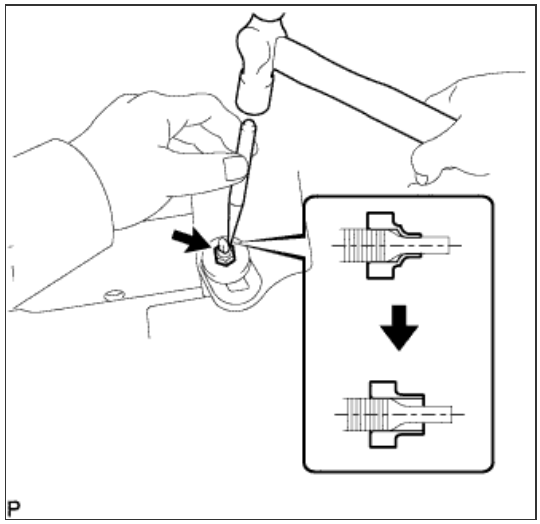


12. LOOSEN NO. 1 TILT STEERING ADJUSTING NUT (w/o Entry and Start System)

a. Lock the steering tilt lever.



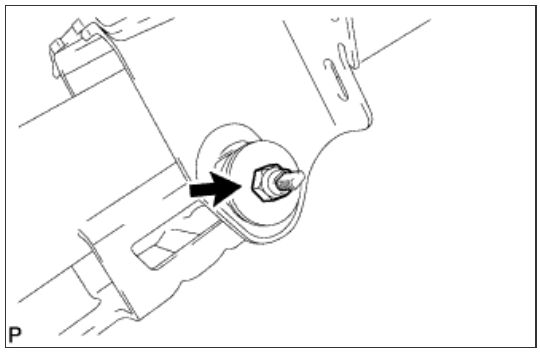
b. Using a hammer and chisel, loosen the staked part of the No. 1 tilt steering adjusting nut.



c. Loosen the No. 1 tilt steering adjusting nut.

NOTICE:

Be sure to only loosen the No. 1 tilt steering adjusting nut. Do not remove it.

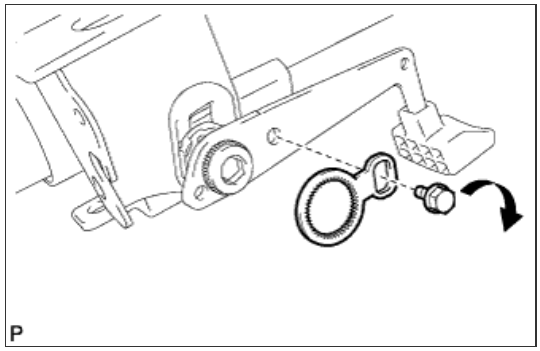


13. REMOVE NO. 1 TILT STEERING SUPPORT REINFORCEMENT (w/o Entry and Start System)

a. Remove the steering tilt lever bolt and No. 1 tilt steering support reinforcement from the steering tilt lever.

NOTICE:

The steering tilt lever bolt has a left-handed thread.

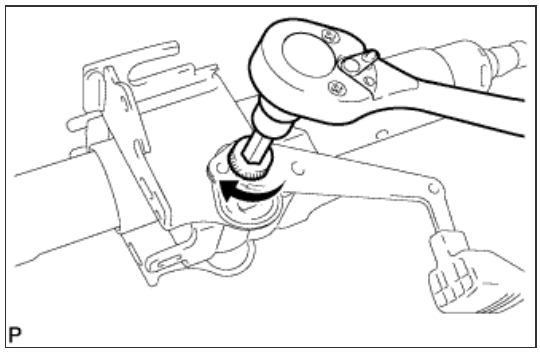


14. REMOVE NO. 1 TILT LEVER LOCK BOLT (w/o Entry and Start System)

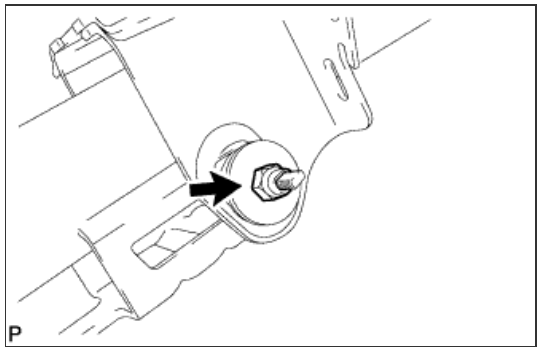
a. Using an 8 mm socket hexagon wrench, loosen the No. 1 tilt lever lock bolt until it can be turned by hand.

NOTICE:

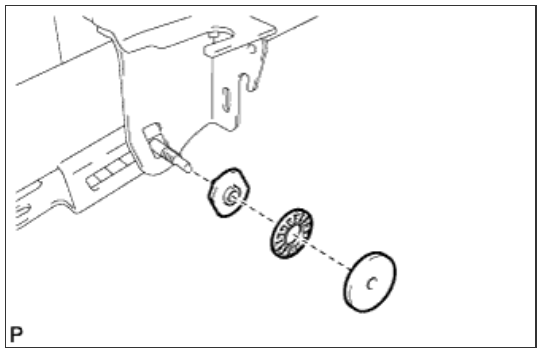
The loosening direction for the No. 1 tilt lever lock bolt is the loosening direction for bolts with a left-handed thread.



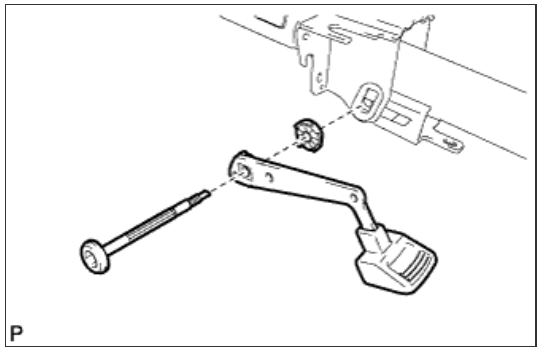
b. Remove the No. 1 tilt steering adjusting nut from the No. 1 tilt lever lock bolt.



c. Remove the tilt steering rotor, thrust needle roller bearing and steering column tube stopper from the No. 1 tilt lever lock bolt.

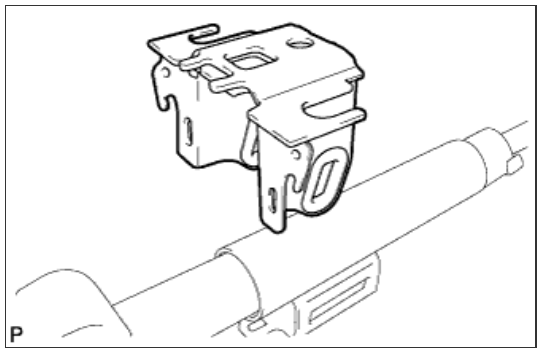


d. Remove the No. 1 tilt lever lock bolt, steering tilt lever and steering column tube stopper from the break away bracket.



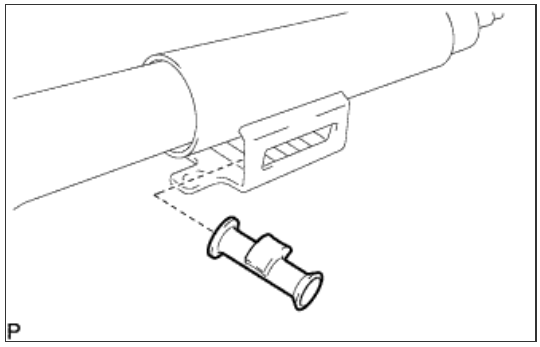
15. REMOVE BREAK AWAY BRACKET (w/o Entry and Start System)

a. Remove the break away bracket from the steering column upper tube.



16. REMOVE TILT STEERING PAWL ASSEMBLY (w/o Entry and Start System)

a. Remove the tilt steering pawl assembly from the steering column upper tube.

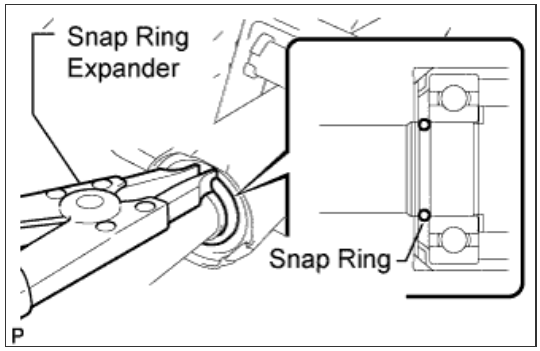


17. REMOVE NO. 1 STEERING COLUMN RING (w/o Entry and Start System)

a. Using a snap ring expander, remove the shaft snap ring from the steering main shaft assembly.

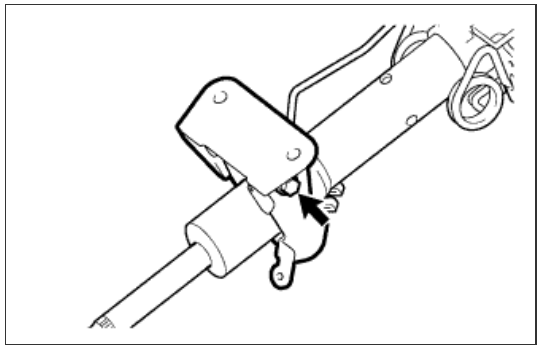
NOTICE:

Do not damage the steering main shaft assembly.



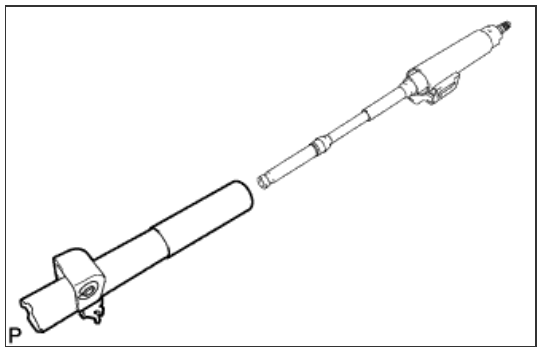
18. REMOVE TILT STEERING SUPPORT (w/o Entry and Start System)

a. Remove the bolt and tilt steering support.



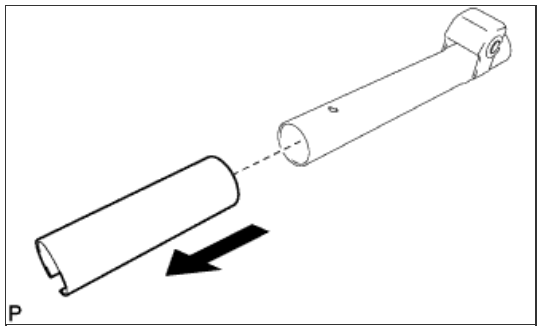
19. REMOVE STEERING LOWER COLUMN TUBE ASSEMBLY (w/o Entry and Start System)

a. Remove the steering column lower tube assembly from the steering column upper tube.



20. REMOVE TELESCOPIC STEERING GUIDE (w/o Entry and Start System)

a. Remove the telescopic steering guide from the steering lower column tube assembly.

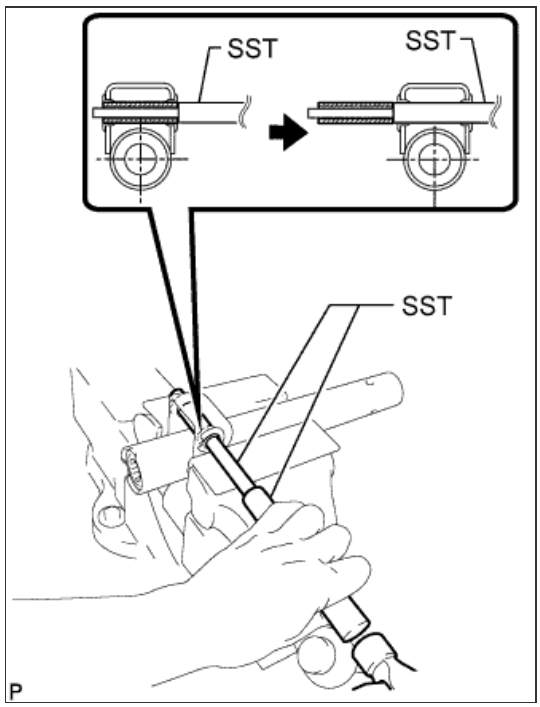


21. REMOVE STEERING COLUMN BRACKET SPACER (w/o Entry and Start System)

a. Using SST and a hammer, tap out the steering column bracket spacer from the steering lower column tube assembly.

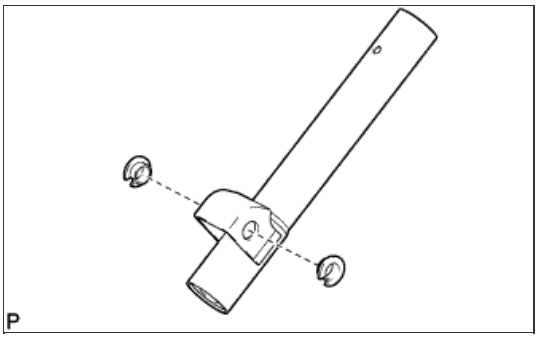
SST

09201-10000 (09201-01080)
09950-70010 (09951-07100)



22. REMOVE NO. 1 TILT STEERING SUPPORT COLLAR (w/o Entry and Start System)

a. Remove the 2 No. 1 tilt steering support collars from the steering lower column tube assembly.



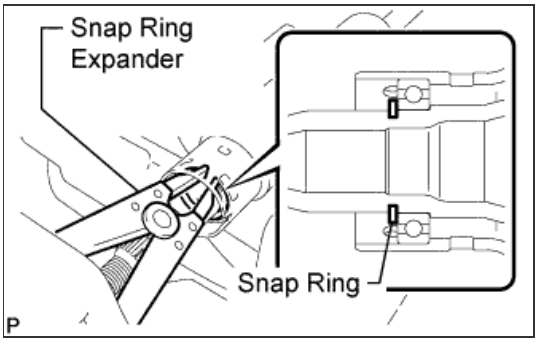
23. REMOVE STEERING MAIN SHAFT ASSEMBLY (w/o Entry and Start System)

a. Using a snap ring expander, remove the shaft snap ring from the steering main shaft assembly.

NOTICE:

Do not damage the steering main shaft assembly.

b. Remove the steering main shaft assembly from the steering column upper tube.

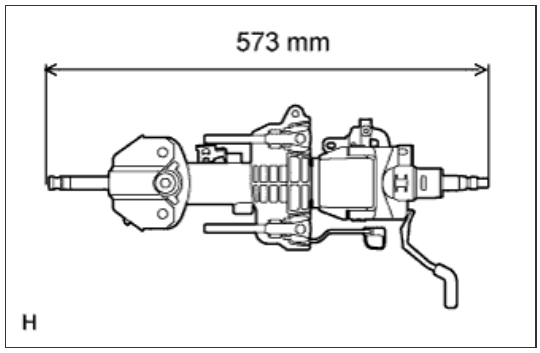


for Preparation Click here

1. INSPECT STEERING COLUMN ASSEMBLY (w/ Entry and Start System)

a. Measure the length of the steering main shaft.

Standard length:
573 mm (1.88 ft.)

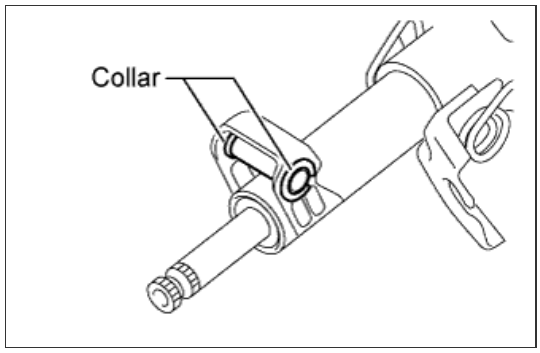


2. INSPECT STEERING COLUMN ASSEMBLY (w/o Entry and Start System)

a. Inspect the collar.

i. Check that the 2 collars are securely installed to the steering column assembly.
If the bushings are missing or damaged, replace the steering column assembly with a new one.

ii. Check the 2 bushings for deformation and damage.
If the bushings are deformed or damaged, replace the steering column assembly with a new one.



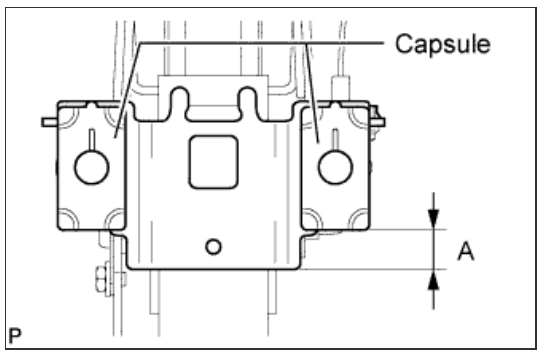
b. Inspect the capsules.

i. Check that the 2 capsules are securely installed to the steering column assembly as shown in the illustration.

Standard Dimension (A):
10 mm (0.394 in.)

If the capsules are not positioned as specified, replace the break away capsule and break away collar, break away bracket with a new one.

ii. Check the 2 capsules for deformation and damage.
If the capsules are not positioned as specified, replace the break away capsule and break away collar, break away bracket with a new one.



for Preparation Click here

NOTICE:

When using a vise, do not overtighten it.

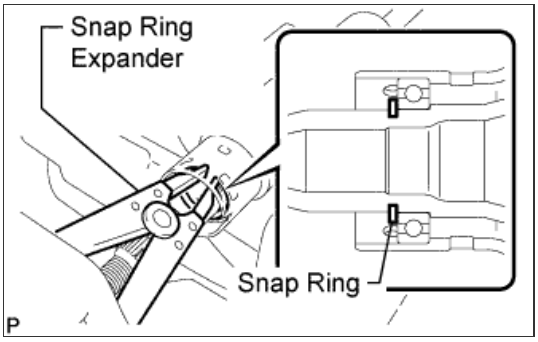
1. INSTALL STEERING MAIN SHAFT ASSEMBLY (w/o Entry and Start System)

a. Install the steering main shaft assembly to the steering column upper tube.

b. Using a snap ring expander, install a new shaft snap ring to the steering main shaft assembly.

NOTICE:

- **Make sure the steering main shaft snap ring is securely installed to the groove.**
- **Do not damage the steering main shaft assembly.**

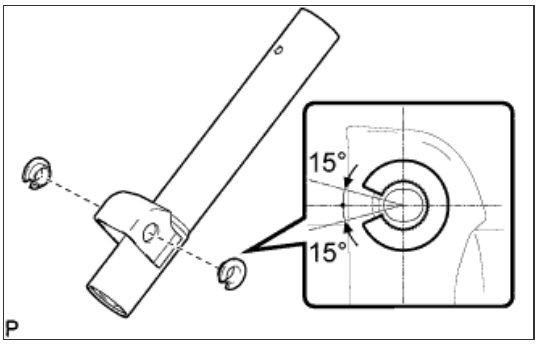


2. INSTALL NO. 1 TILT STEERING SUPPORT COLLAR (w/o Entry and Start System)

a. Install the 2 No. 1 tilt steering support collars to the steering lower column tube assembly.

NOTICE:

When installing the No. 1 tilt steering support collar, make sure that the cutout portion is aligned as shown in the illustration.

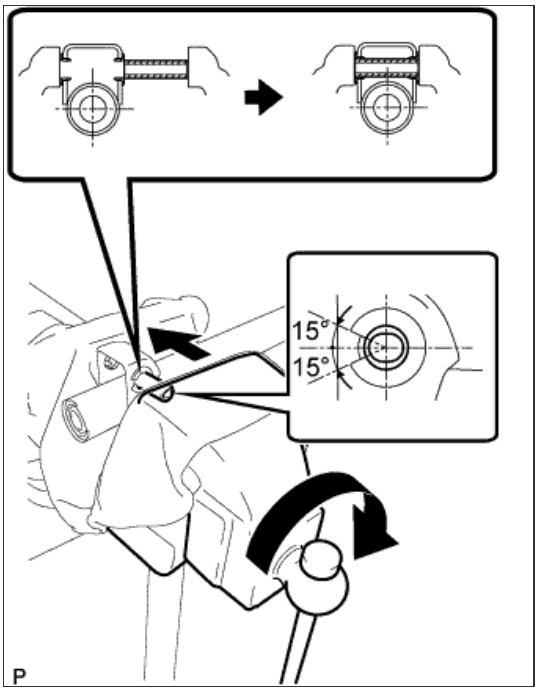


3. INSTALL STEERING COLUMN BRACKET SPACER (w/o Entry and Start System)

a. Clamp the steering column bracket spacer and steering lower column tube assembly in a vise between a cloth and aluminum plates, and install the steering column bracket spacer to the steering lower column tube assembly using the vise.

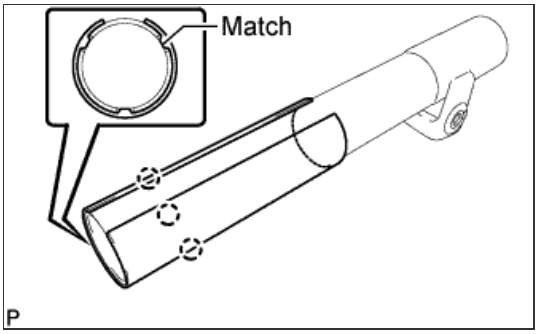
NOTICE:

When installing the steering column bracket spacer, make sure that it is positioned so that the inner diameter is as shown in the illustration.



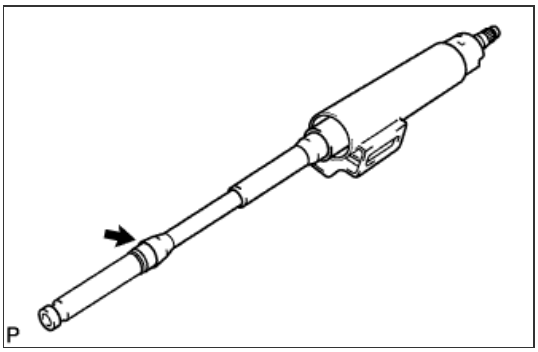
4. INSTALL TELESCOPIC STEERING GUIDE (w/o Entry and Start System)

a. Align the 3 protrusions of the telescopic steering guide with the 3 holes of the steering lower column tube assembly and install the telescopic steering guide.

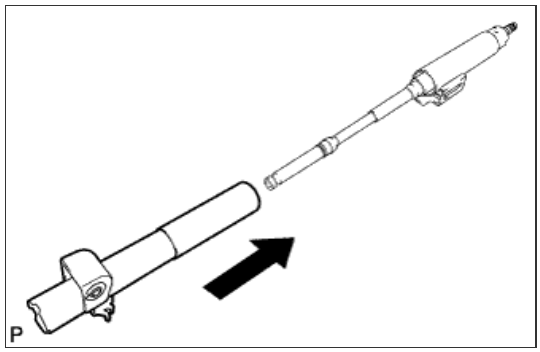


5. INSTALL STEERING LOWER COLUMN TUBE ASSEMBLY (w/o Entry and Start System)

a. Apply MP grease to the area of the steering main shaft assembly indicated by the arrow in the illustration.



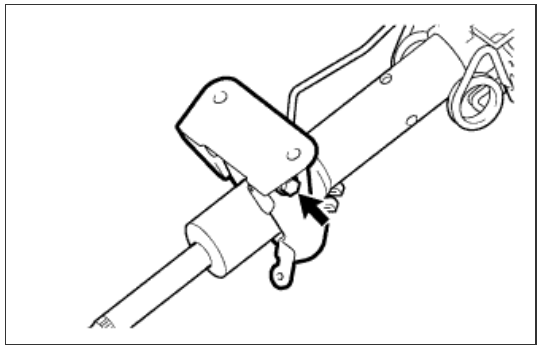
b. Install the steering lower column tube assembly to the steering column upper tube.



6. INSTALL TILT STEERING SUPPORT (w/o Entry and Start System)

a. Install the tilt steering support with the bolt.

Torque:
15 N*m{ 153 kgf*cm , 11 ft.*lbf }

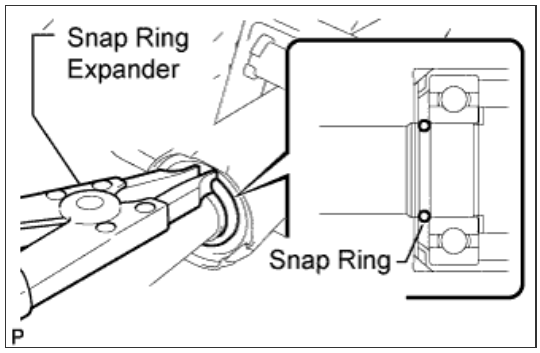


7. INSTALL NO. 1 STEERING COLUMN RING (w/o Entry and Start System)

a. Using a snap ring expander, install a new No. 1 steering column ring to the steering main shaft.

NOTICE:

- **Make sure the No. 1 steering column ring is securely installed to the groove.**
- **Do not damage the steering main shaft assembly.**

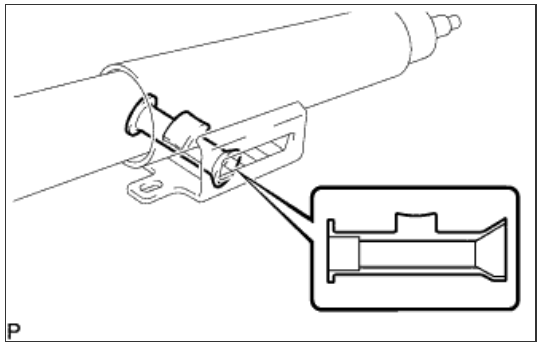


8. INSTALL TILT STEERING PAWL ASSEMBLY (w/o Entry and Start System)

a. Install the tilt steering pawl assembly to the steering column upper tube.

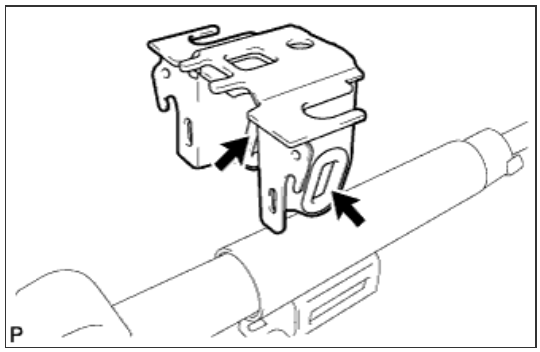
NOTICE:

When installing the tilt steering pawl assembly, position the opening as shown in the illustration.



9. INSTALL BREAK AWAY BRACKET (w/o Entry and Start System)

a. Apply MP grease to the sliding areas of a new break away bracket and install it to the steering column upper tube.

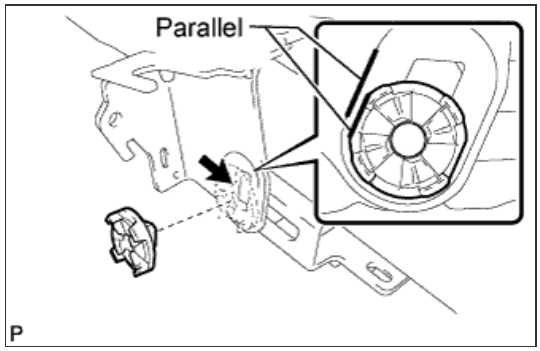


10. INSTALL STEERING COLUMN TUBE STOPPER (w/o Entry and Start System)

a. Apply MP grease to the sliding surface of the steering column tube stopper (the one with the groove) and install it to the break away bracket.

NOTICE:

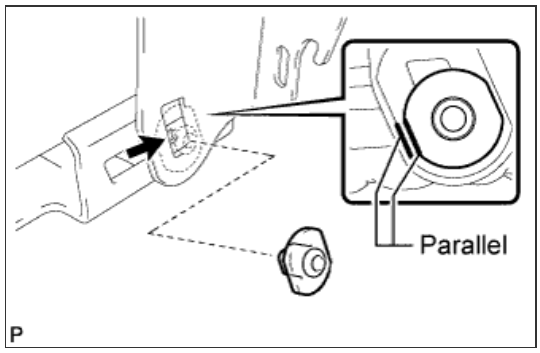
Align the flat edge of the steering column tube stopper and the raised sliding area of the break away bracket as shown in the illustration.



b. Apply MP grease to the sliding surface of the steering column tube stopper (the one without the groove) and install it to the break away bracket.

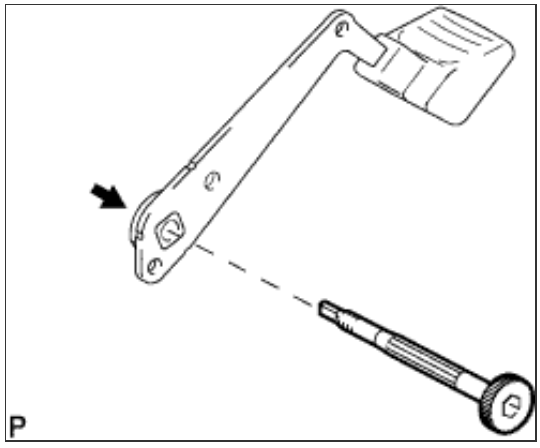
NOTICE:

Align the flat edge of the steering column tube stopper and the raised sliding area of the break away bracket as shown in the illustration.



11. INSTALL NO. 1 TILT LEVER LOCK BOLT (w/o Entry and Start System)

a. Apply MP grease to the sliding surface of the steering tilt lever and install it to the No. 1 tilt lever lock bolt.

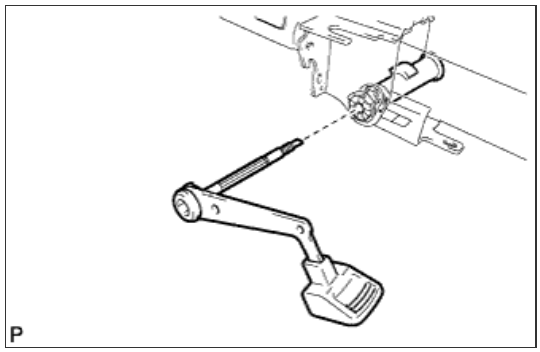


b. Install the No. 1 tilt lever lock bolt to the break away bracket.

b. Install the No. 1 tilt lever lock bolt to the break away bracket.

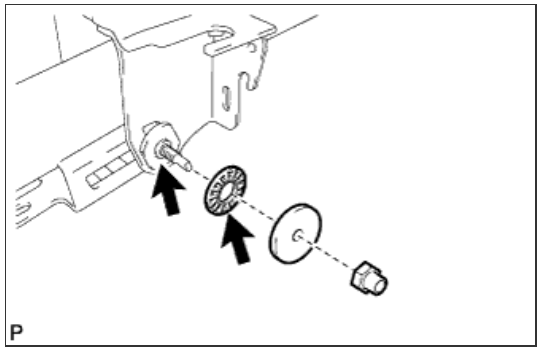
NOTICE:

- **Do not drop the steering column tube stopper.**
- **Pass the No. 1 tilt lever lock bolt through the hole of the tilt steering pawl assembly.**



c. Apply MP grease to the sliding surface of the thrust needle roller bearing and install it to the No. 1 tilt lever lock bolt.

d. Temporarily install the tilt steering rotor to the No. 1 tilt lever lock bolt with a new No. 1 tilt steering adjusting nut.

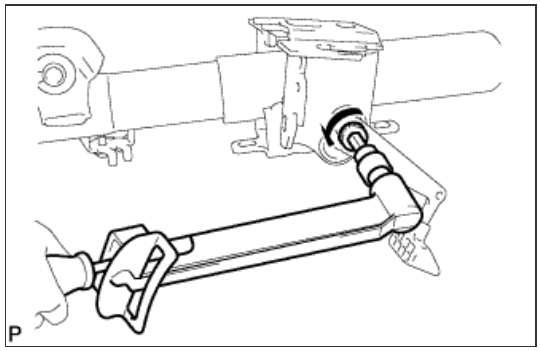


e. Using an 8 mm socket hexagon wrench, tighten the No. 1 tilt lever lock bolt.

Torque:
2.0 N*m{ 20 kgf*cm , 18 in.*lbf }

NOTICE:

The tightening direction for the No. 1 tilt lever lock bolt is the tightening direction for bolts with a left-handed thread.



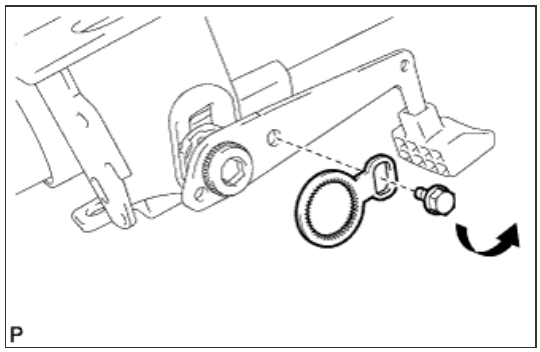
12. INSTALL NO. 1 TILT STEERING SUPPORT REINFORCEMENT (w/o Entry and Start System)

a. Install the No. 1 tilt steering support reinforcement to the steering tilt lever with the steering tilt lever bolt.

Torque:
5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

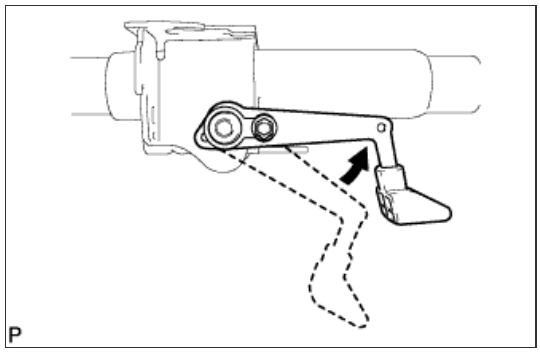
NOTICE:

The tightening direction for the steering tilt lever bolt is the tightening direction for bolts with a left-handed thread.



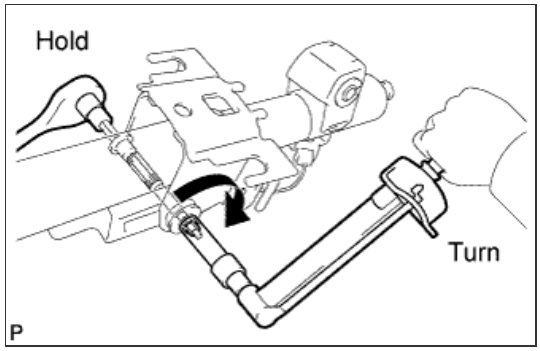
13. TIGHTEN NO. 1 TILT STEERING ADJUSTING NUT (w/o Entry and Start System)

a. Lock the steering tilt lever.



b. Using an 8 mm socket hexagon wrench, hold the No. 1 tilt lever lock bolt in place and tighten the No. 1 tilt steering adjusting nut.

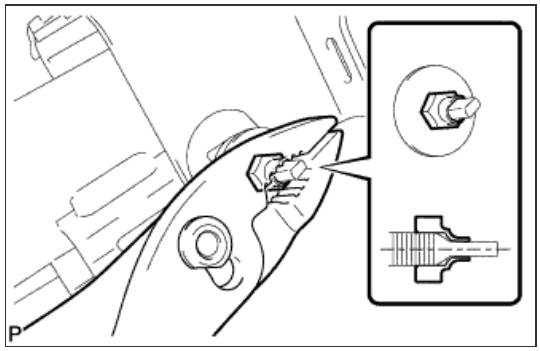
Torque:
3.0 N*m{ 31 kgf*cm , 27 in.*lbf }



c. Using pliers, stake the No. 1 tilt steering adjusting nut as shown in the illustration.

NOTICE:

After staking the No. 1 tilt steering adjusting nut, make sure it is not loose.

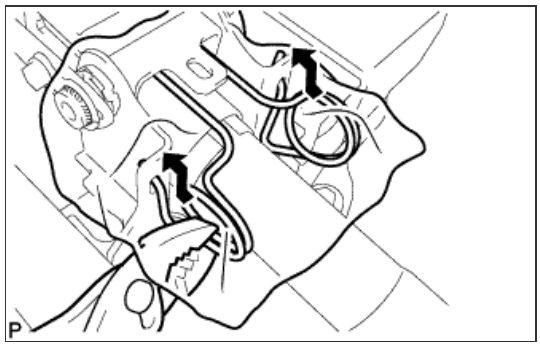


14. INSTALL TILT STEERING JUMP UP SPRING (w/o Entry and Start System)

a. Using pliers, move the tilt steering jump up spring in the direction indicated by the arrow in the illustration to install it to the break away bracket.

NOTICE:

To avoid spatter, cover the area with a cloth.



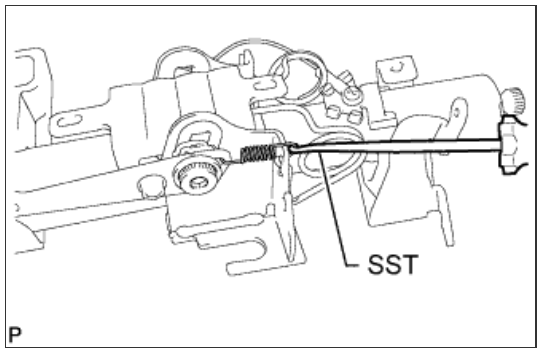
15. INSTALL TILT LEVER RETURN SPRING (w/o Entry and Start System)

a. Using SST, install the tilt lever return spring to the break away bracket and steering tilt lever.

SST
09921-00010

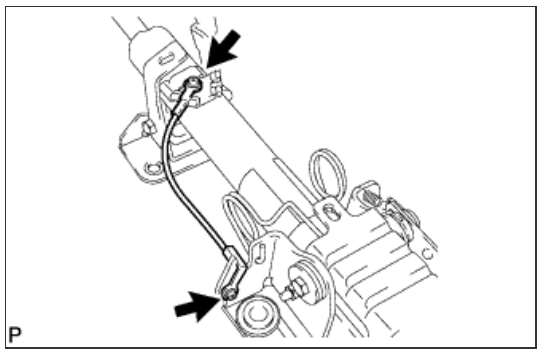
NOTICE:

- To avoid spatter, cover the area with a cloth.
- Do not let the damper fall off of the tilt lever return spring.



16. INSTALL TILT STEERING SUPPORT BOND CABLE (w/o Entry and Start System)

a. Install the steering support bond cable to the steering column with the 2 screws.

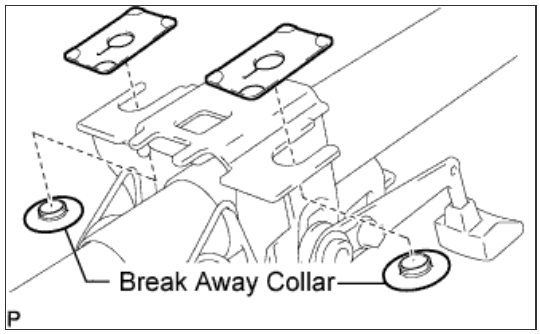


17. INSTALL BREAK AWAY COLLAR SUB-ASSEMBLY (w/o Entry and Start System)

a. Install the 2 new break away collars and 2 new break away capsules to the break away bracket.

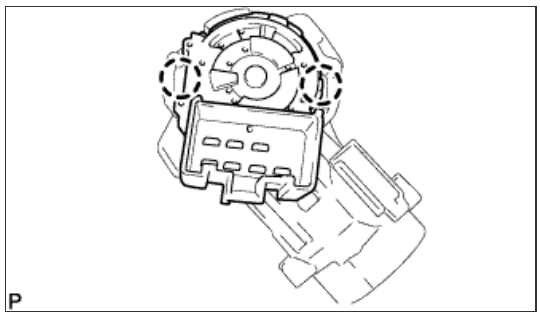
NOTICE:

Do not compress the disc spring portion of the break away collar.



18. INSTALL IGNITION OR STARTER SWITCH ASSEMBLY (w/o Entry and Start System)

a. Attach the 2 claws to install the ignition or starter switch assembly to the steering column upper bracket assembly.

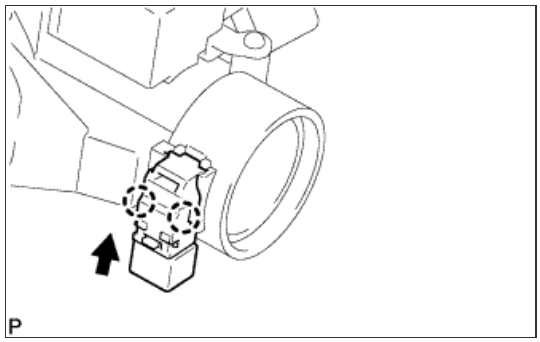


19. INSTALL UNLOCK WARNING SWITCH ASSEMBLY (w/o Entry and Start System)

a. Attach the 2 claws to install the unlock warning switch assembly to the steering column upper bracket assembly.

HINT:

Move the unlock warning switch assembly in the direction indicated by the arrow in the illustration to install it.

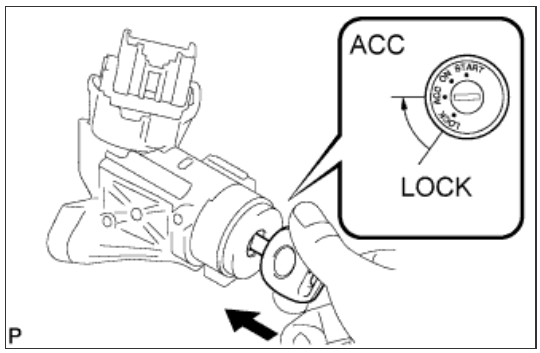


20. INSTALL IGNITION SWITCH LOCK CYLINDER ASSEMBLY (w/o Entry and Start System)

a. Turn the ignition switch lock cylinder assembly to ACC.

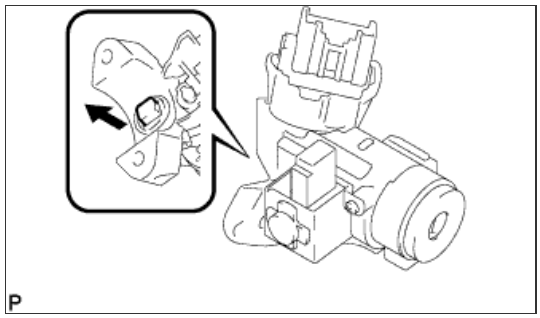
b. Insert the ignition switch lock cylinder assembly into the steering column upper bracket assembly to install it.

c. Check that the ignition switch lock cylinder assembly is securely fixed in place.

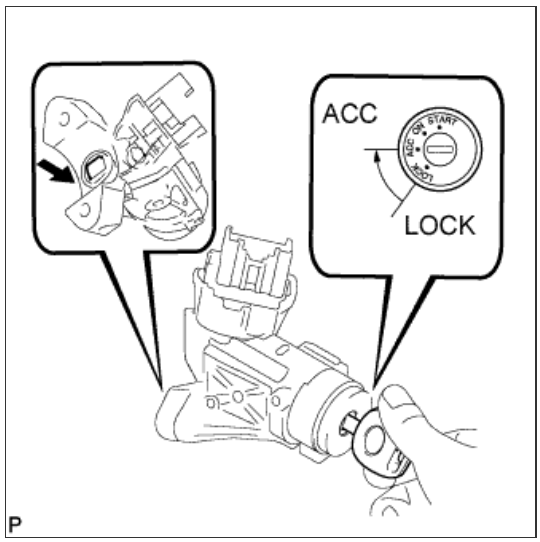


21. INSPECT STEERING LOCK OPERATION (w/o Entry and Start System)

a. Remove the key and check that the steering lock operates.

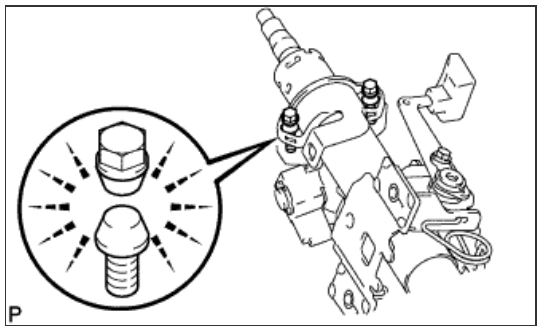


b. Insert the key, turn the ignition switch to ACC and check that the steering lock disengages.



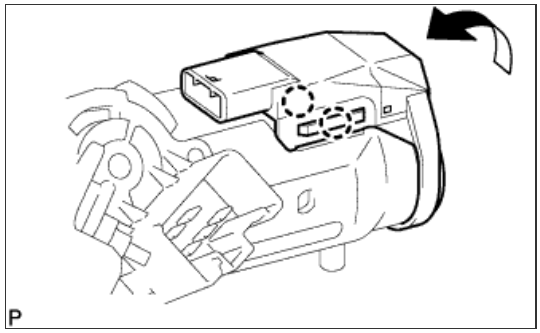
22. INSTALL STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY (w/o Entry and Start System)

a. Install the steering column upper with switch bracket assembly and steering column upper clamp with 2 new steering lock set bolts, and tighten the bolts until the heads break off.



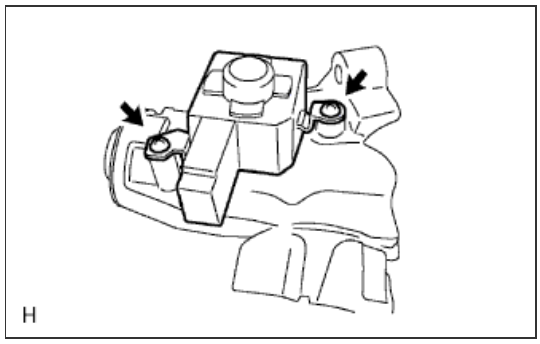
23. INSTALL TRANSPONDER KEY AMPLIFIER (w/o Entry and Start System)

a. Attach the 2 claws to install the transponder key amplifier to the steering column upper with switch bracket assembly.



24. INSTALL KEY INTERLOCK SOLENOID (for Automatic Transmission)

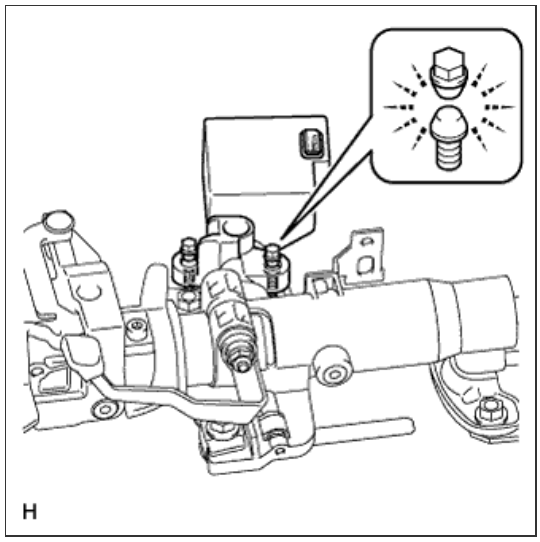
a. Install the key interlock solenoid to the steering column upper bracket with the 2 screws.



25. INSTALL STEERING LOCK ACTUATOR ASSEMBLY (w/ Entry and Start System)

a. Temporarily install the steering lock actuator assembly with 2 new tapered-head bolts.

b. Tighten the 2 tapered-head bolts until the bolt heads break off.

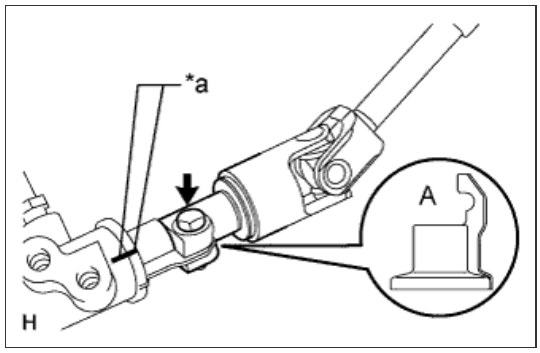


H

for Preparation Click here

1. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT

a. Align the part of the dust cover labeled A with the No. 2 steering intermediate shaft, and install the No. 2 steering intermediate shaft assembly to the steering link assembly.



Text in Illustration

*a	Matchmark

b. Install the bolt.

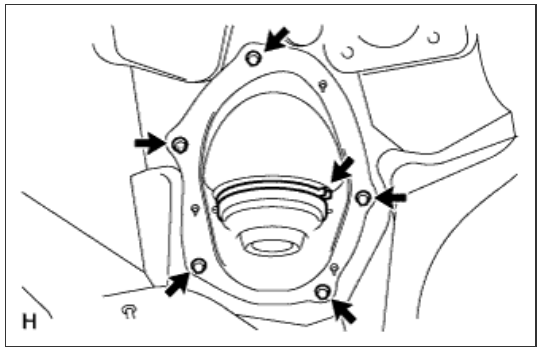
Torque:
35 N*m{ 360 kgf*cm , 26 ft.*lbf }

NOTICE:

Be careful not to damage the dust cover.

2. INSTALL STEERING COLUMN HOLE COVER SUB-ASSEMBLY

a. Install the 4 bolts and nut.



Torque:
5.0 N*m{ 51 kgf*cm , 44 in.*lbf }

NOTICE:

Do not fold back the boot part of the steering hole cover or extend it excessively. if it is extended excessively, return it to its original position.

HINT:

Install the steering intermediate shaft assembly from the inside of the vehicle.

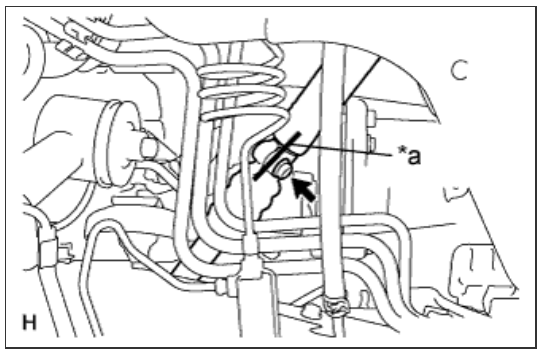
b. Using needle nose pliers, lock the clamp to the steering column hole cover to install it.

NOTICE:

Be careful when performing the operation as the clamp may not lock if the claws of the clamp are deformed.

3. CONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY

a. Align the matchmarks on the No. 2 steering intermediate shaft assembly and the steering intermediate shaft assembly.



Text in Illustration

*a	Matchmark

HINT:

Install the steering intermediate shaft from the inside of the vehicle.

b. Install the bolt.

Torque:
35 N*m{ 360 kgf*cm , 26 ft.*lbf }

4. INSTALL STEERING COLUMN ASSEMBLY

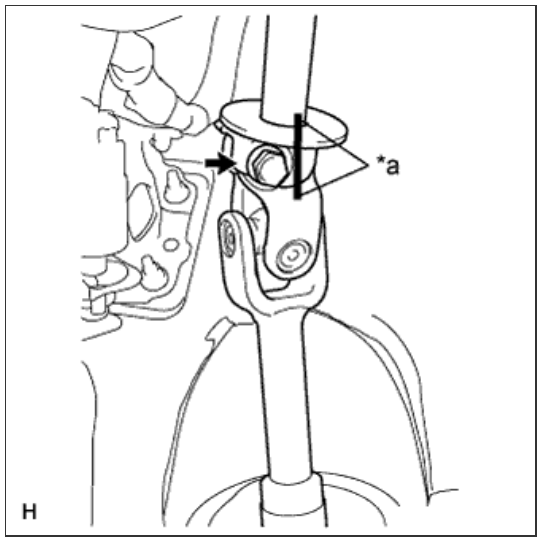
a. Align the matchmarks on the steering intermediate shaft and the steering column.

b. Install the bolt.

Text in Illustration

*a	Matchmark

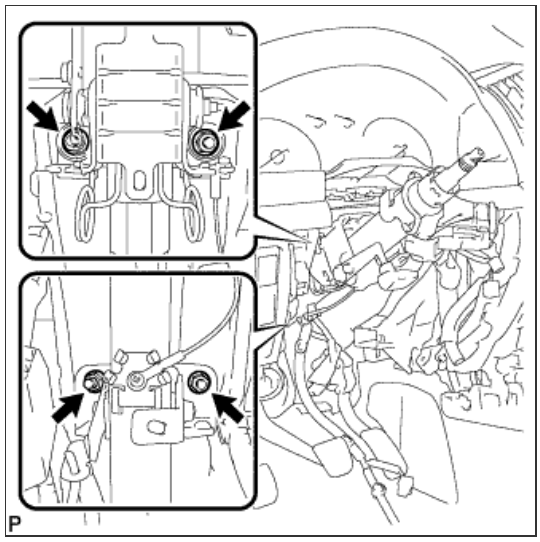
Torque:
35 N*m{ 360 kgf*cm , 26 ft.*lbf }



c. w/o Entry and Start System:

i. Install the steering column with the 4 nuts.

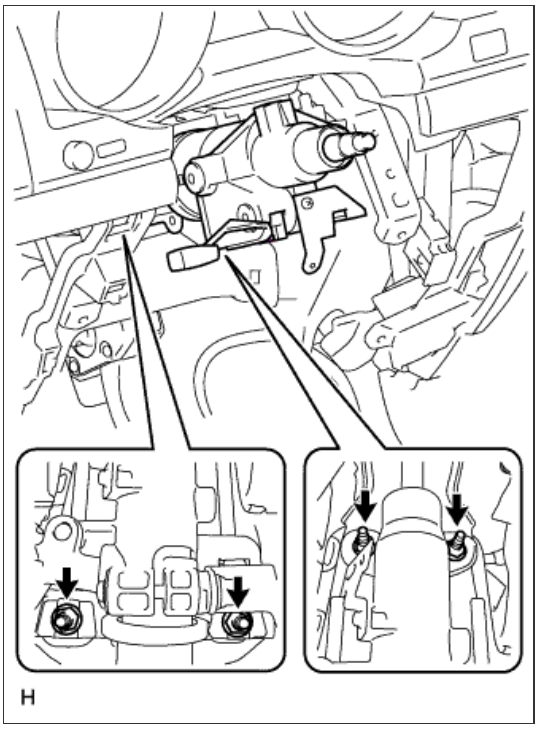
Torque:
21 N*m{ 214 kgf*cm , 15 ft.*lbf }



d. w/ Entry and Start System

i. Install the steering column with the 4 nuts.

Torque:
26 N*m{ 265 kgf*cm , 19 ft.*lbf }



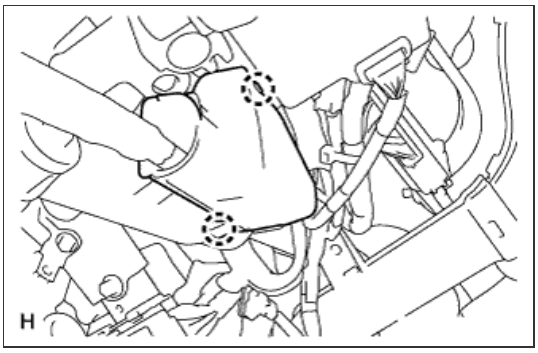
5. INSTALL NO. 3 AIR DUCT SUB-ASSEMBLY

a. Attach the 2 claws to install the duct.

b. Install the clip.

6. INSTALL WIRE HARNESS PROTECTOR AND WIRE HARNESS

a. Attach the 2 claws to connect the wire harness protector and wire harness.



7. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

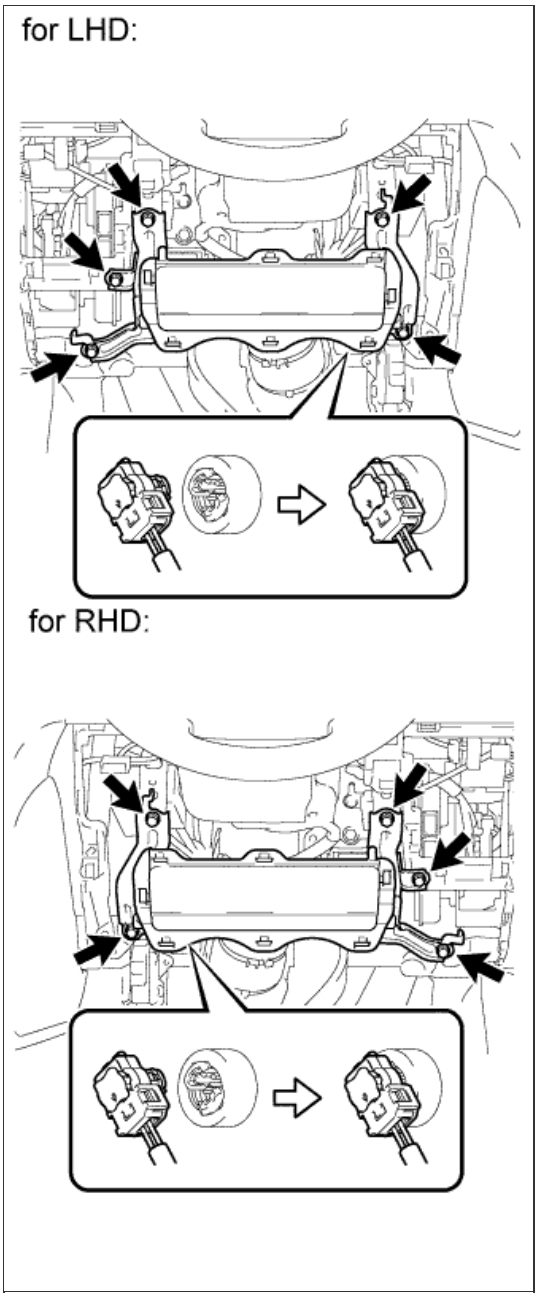
a. Connect the connector.

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.

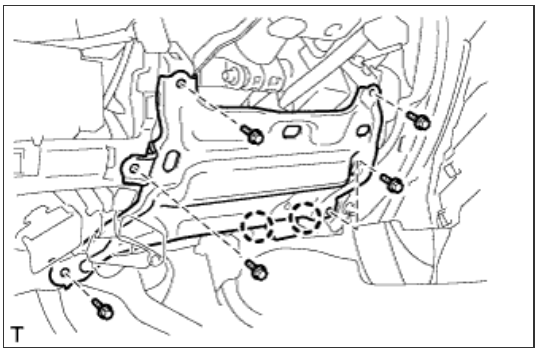
Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



8. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (w/o Driver Side Knee Airbag)

a. Attach the 2 claws and connect the DLC3.

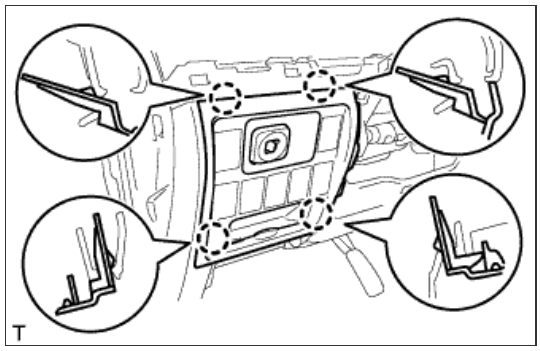
b. Install the lower instrument panel with the 5 bolts.



9. INSTALL NO. 1 SWITCH HOLE BASE

a. Connect the connectors.

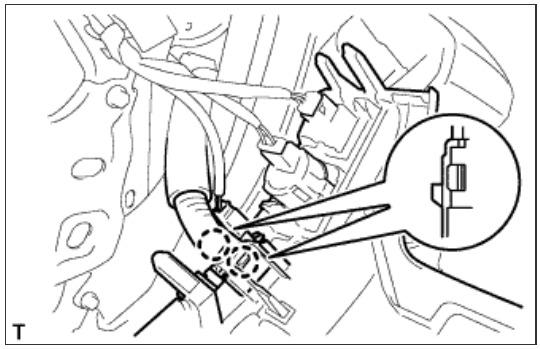
b. Attach the 4 claws to install the No. 1 switch hole base.



10. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

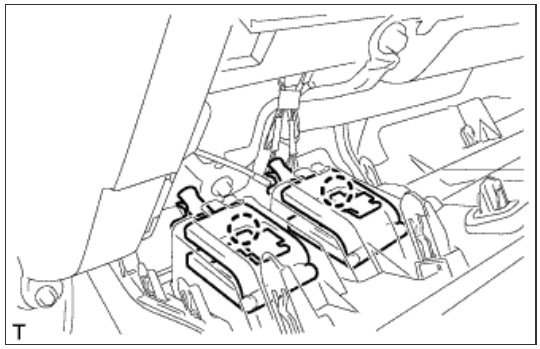
a. Connect the connectors.

b. for Automatic Air Conditioning System:



i. Attach the 2 claws to install the room temperature sensor.

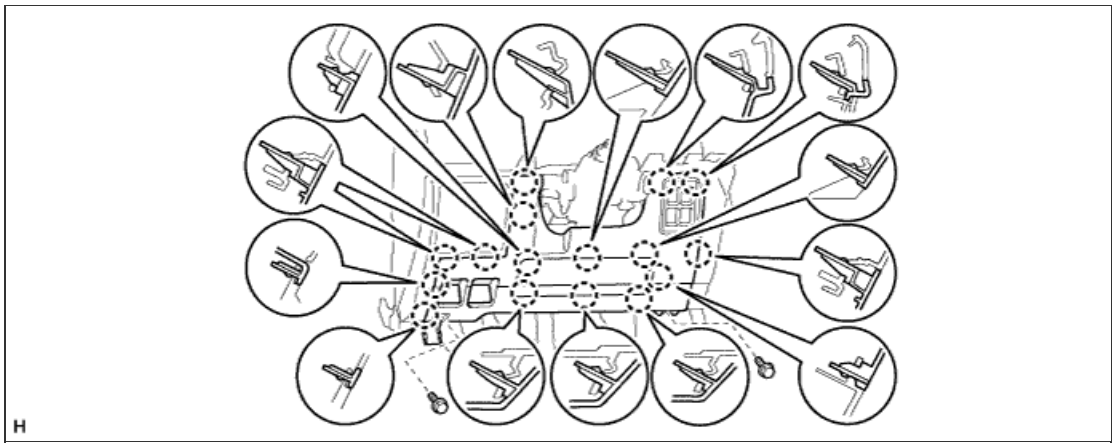
c. Attach the 2 claws to connect the 2 control cables.



d. w/ Driver Side Knee Airbag:

i. Attach the 16 claws to install the lower No. 1 instrument panel finish panel.

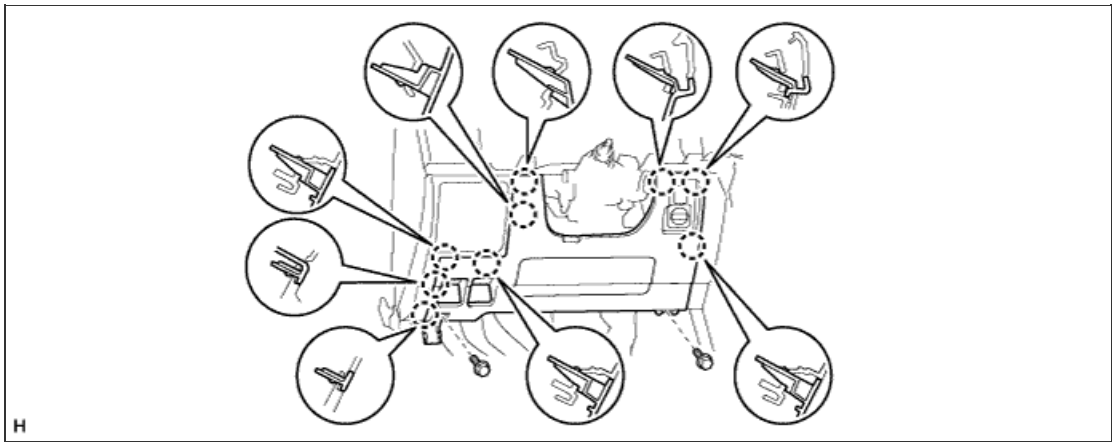
ii. Install the 2 bolts.



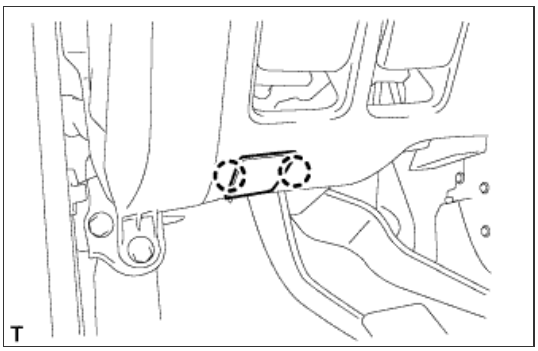
e. w/o Driver Side Knee Airbag:

i. Attach the 9 claws to install the lower No. 1 instrument panel finish panel.

ii. Install the 2 bolts.



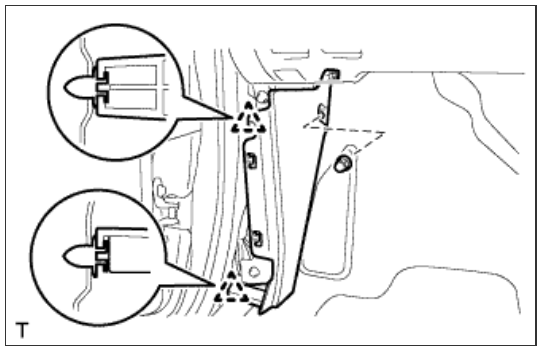
f. Attach the 2 claws to close the hole cover.



11. INSTALL COWL SIDE TRIM BOARD LH

a. Attach the 2 clips to install the cowl side trim board.

b. Install the cap nut.

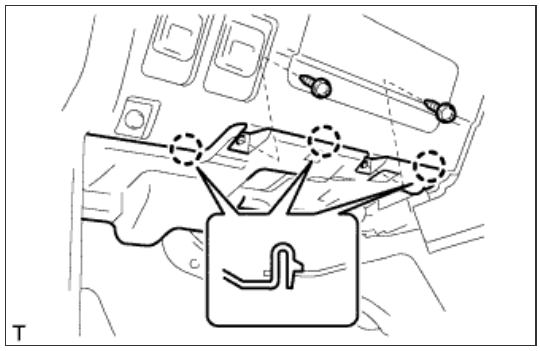


12. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Connect the connectors.

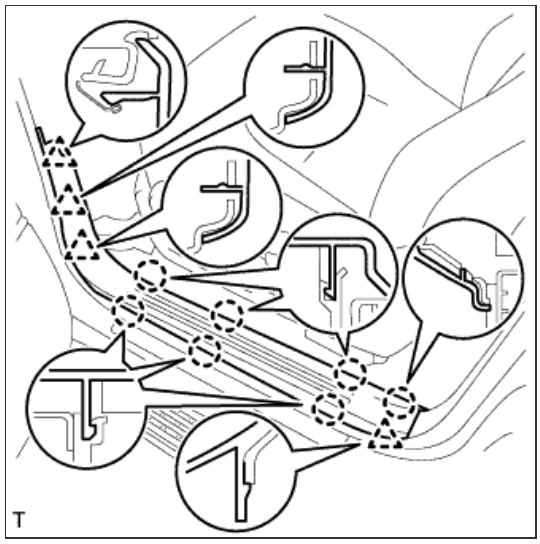
b. Attach the 3 claws to install the No. 1 instrument panel under cover.

c. Install the 2 screws.



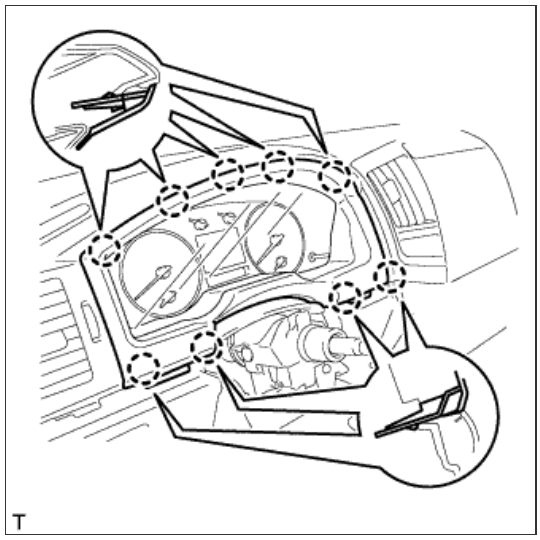
13. INSTALL FRONT DOOR SCUFF PLATE LH

a. Attach the 7 claws and 4 clips to install the scuff plate.



14. INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/o Multi-information Display)

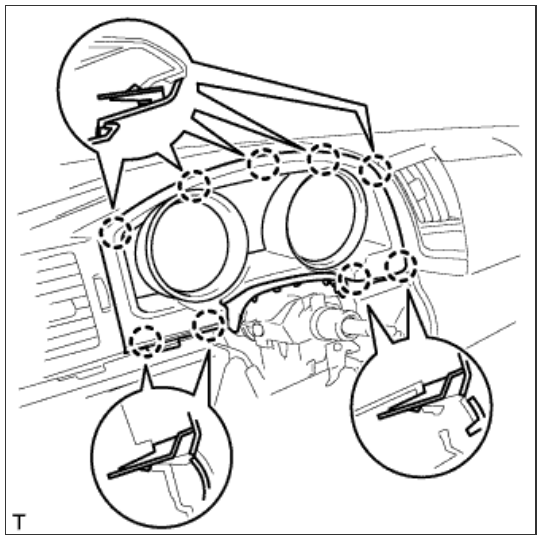
a. Attach the 9 claws to install the instrument cluster finish panel.



15. INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/ Multi-information Display)

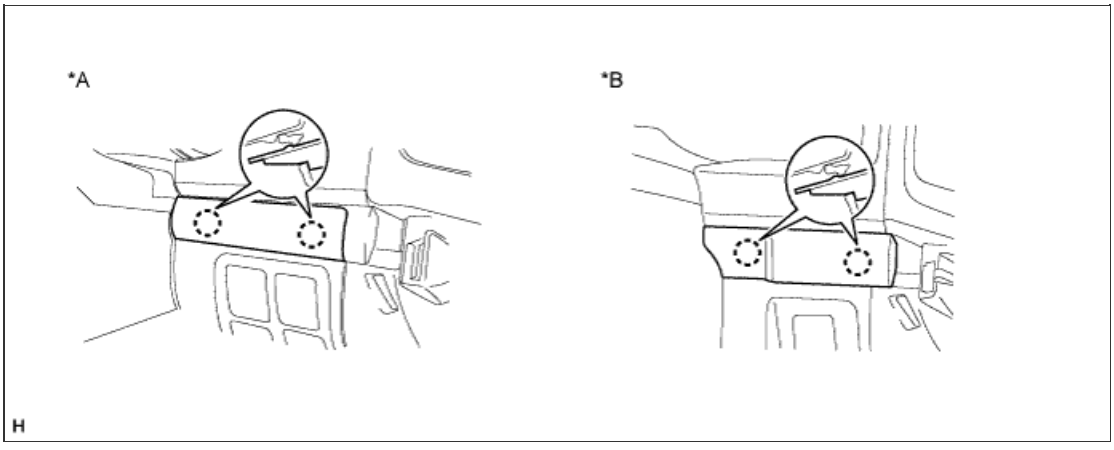
a. Connect the connector.

b. Attach the 9 claws to install the instrument cluster finish panel.



16. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 2 claws to install the No. 2 instrument cluster finish panel garnish.

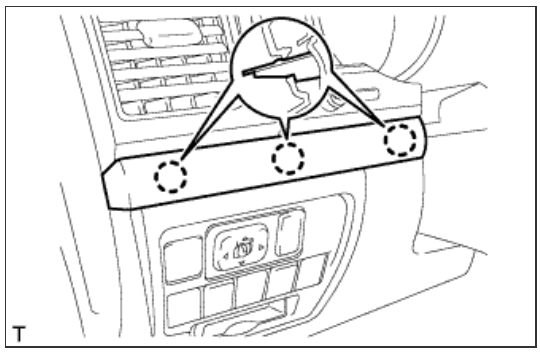


Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System

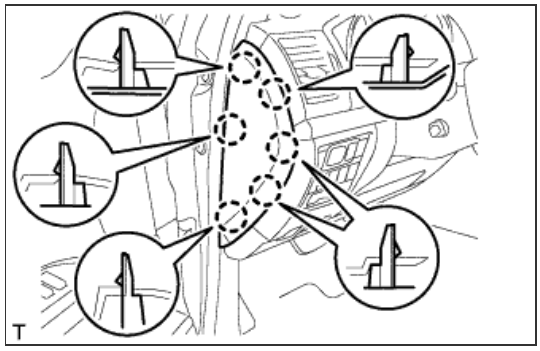
17. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 3 claws to install the No. 1 instrument cluster finish panel garnish.



18. INSTALL INSTRUMENT SIDE PANEL LH

a. Attach the 6 claws to install the instrument side panel.

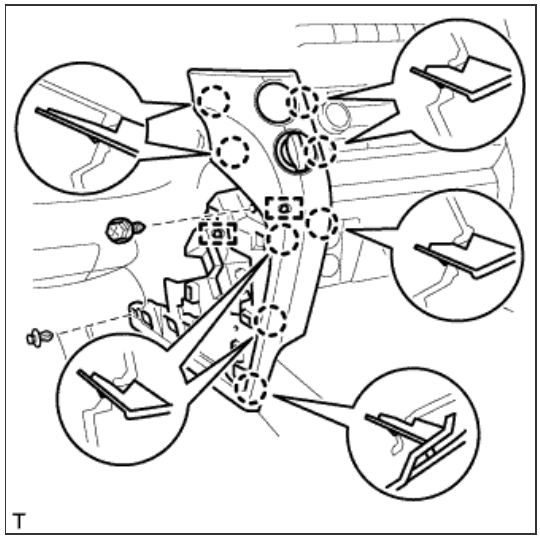


19. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Connect the connectors and attach the 2 clamps.

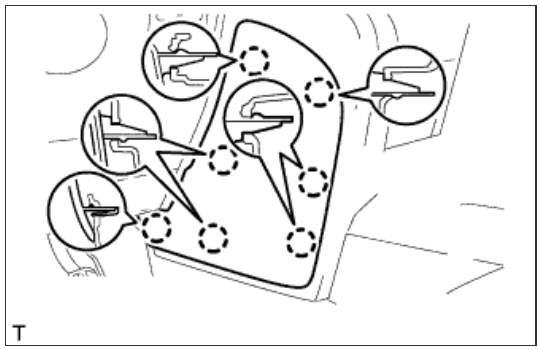
b. Attach the 8 claws to install the lower instrument panel pad sub-assembly.

c. Install the clip and screw.



20. INSTALL NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

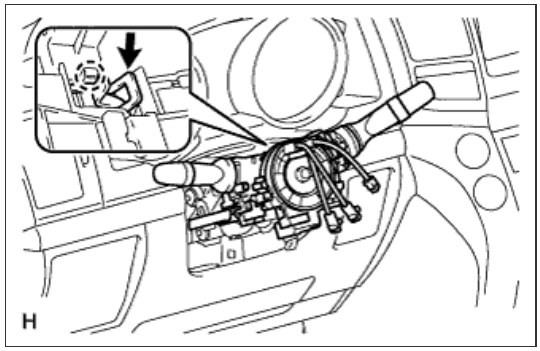
a. Attach the 7 claws to install the No. 2 instrument panel finish panel cushion.



21. INSTALL COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

a. Using pliers, grip the claws of the clamp and install the combination switch assembly with spiral cable sub-assembly to the steering column assembly with the clamp.

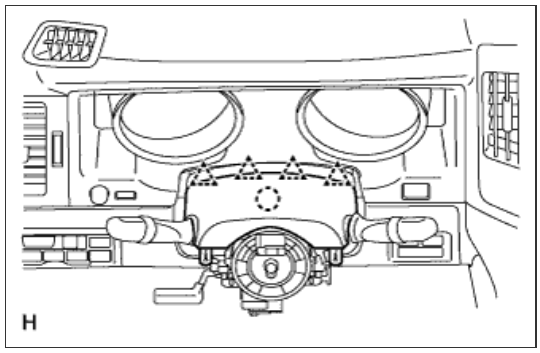
b. Connect the connectors to the combination switch with spiral cable.



22. INSTALL UPPER STEERING COLUMN COVER

a. Attach the claw to install the upper steering column cover.

b. Attach the 4 clips to install the upper steering column cover onto the instrument cluster finish panel.



23. INSTALL LOWER STEERING COLUMN COVER

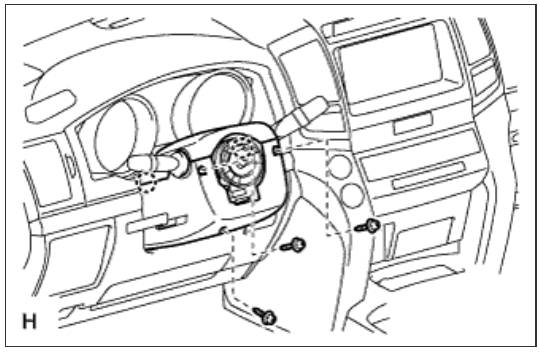
a. Attach the 2 claws to install the lower steering column cover.

NOTICE:

Do not damage the tilt and telescopic switch.

b. Install the 3 screws.

Torque:
2.0 N*m{ 20 kgf*cm , 18 in.*lbf }

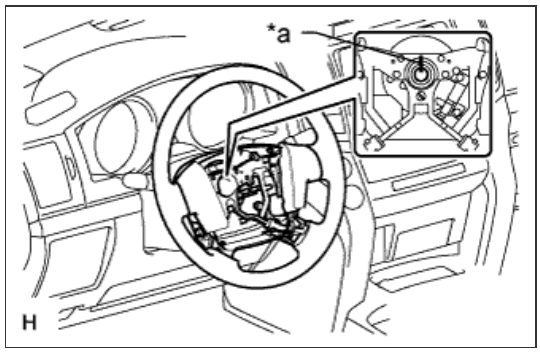


24. INSTALL STEERING WHEEL ASSEMBLY

a. Align the matchmarks on the steering wheel assembly and steering main shaft assembly.

Text in Illustration

*a	Matchmark



b. Install the steering wheel assembly set nut.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }

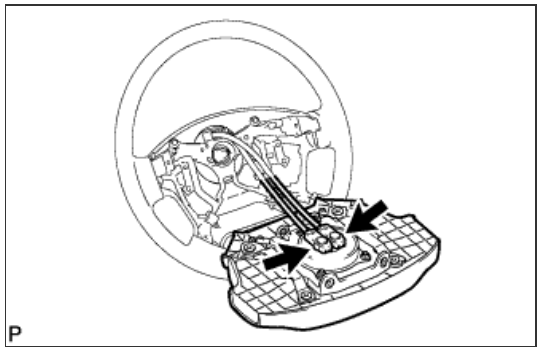
25. INSTALL STEERING PAD

a. Support the steering pad with one hand.

b. Connect the 2 connectors to the steering pad.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



c. Connect the horn connector.

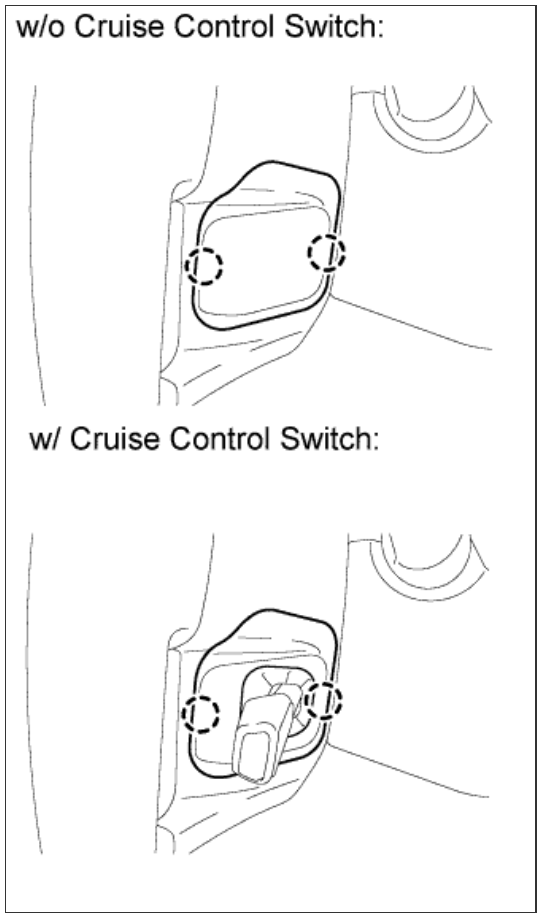
d. Confirm that the circumference groove of the "TORX" screw fits in the screw case, and place the steering pad onto the steering wheel.

e. Using a T30 "TORX" socket wrench, tighten the 2 screws.

Torque:
8.8 N*m{ 90 kgf*cm , 78 in.*lbf }

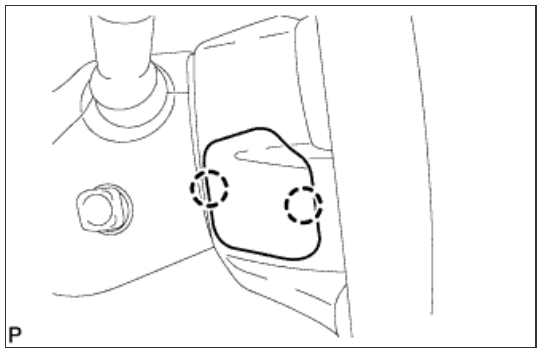
26. INSTALL LOWER NO. 2 STEERING WHEEL COVER

a. Attach the 2 claws to install the cover.



27. INSTALL LOWER NO. 3 STEERING WHEEL COVER

a. Attach the 2 claws to install the cover.



28. CHECK FRONT WHEELS FACING STRAIGHT AHEAD

29. INSTALL FRONT WHEELS

30. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

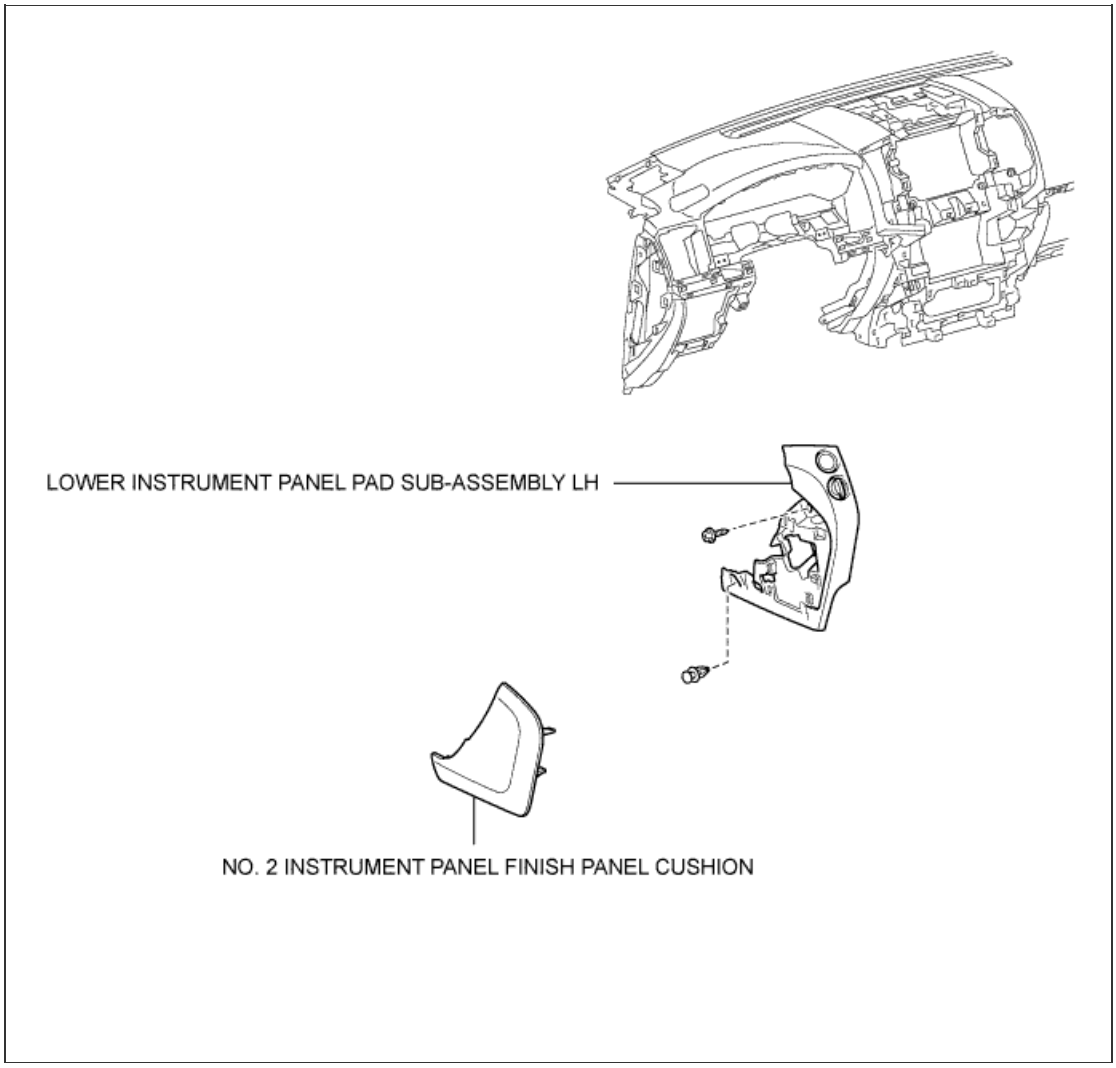
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

31. INSPECT SRS WARNING LIGHT

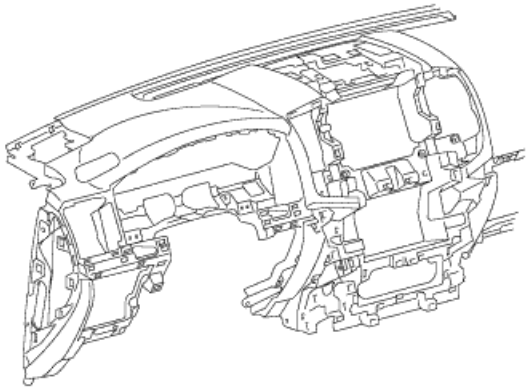
a. Inspect the SRS warning light (Click here).

for Preparation Click here

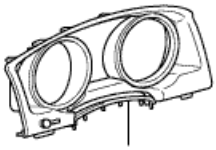




INSTRUMENT SIDE PANEL LH

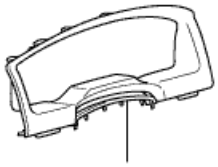


w/ Multi-information Display:



INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

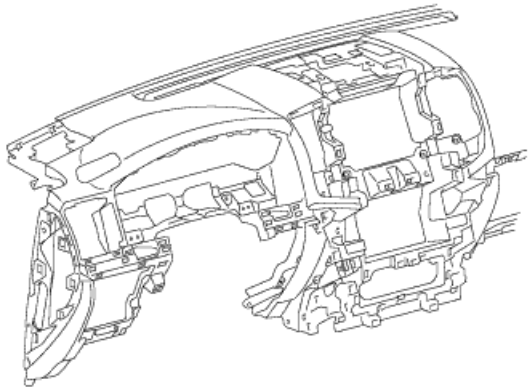
w/o Multi-information Display:



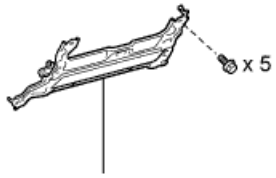
INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

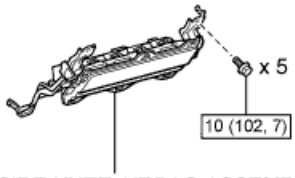


w/o Driver Side Knee Airbag:



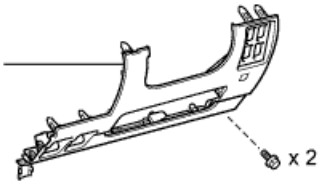
LOWER INSTRUMENT PANEL SUB-ASSEMBLY

w/ Driver Side Knee Airbag:



DRIVER SIDE KNEE AIRBAG ASSEMBLY

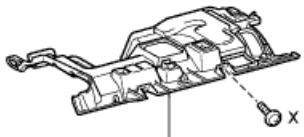
LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL





NO. 1 SWITCH HOLE BASE

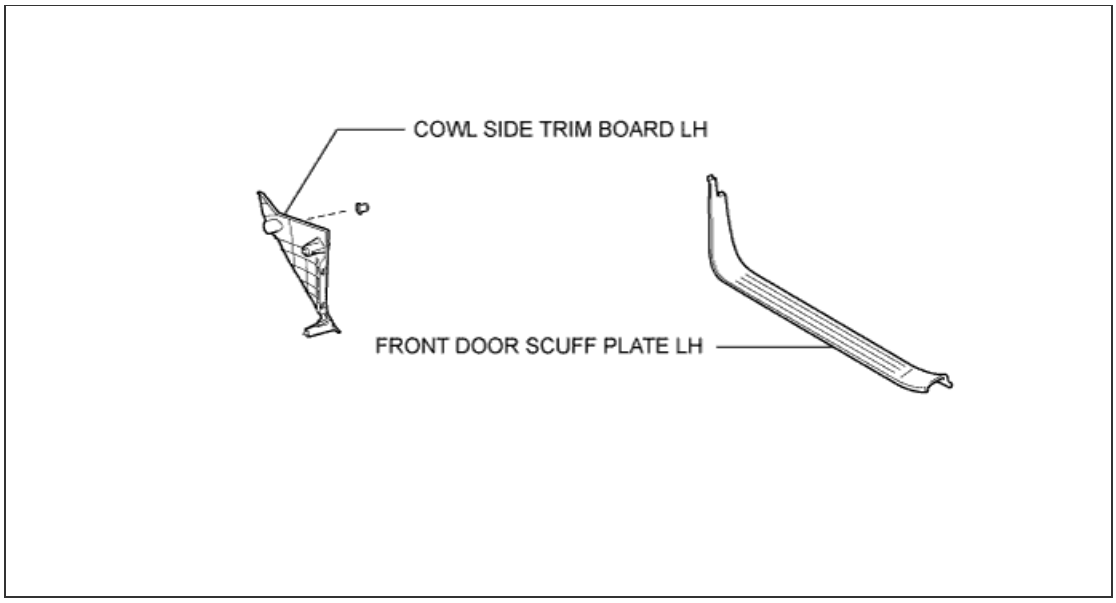
w/ Floor Under Cover:

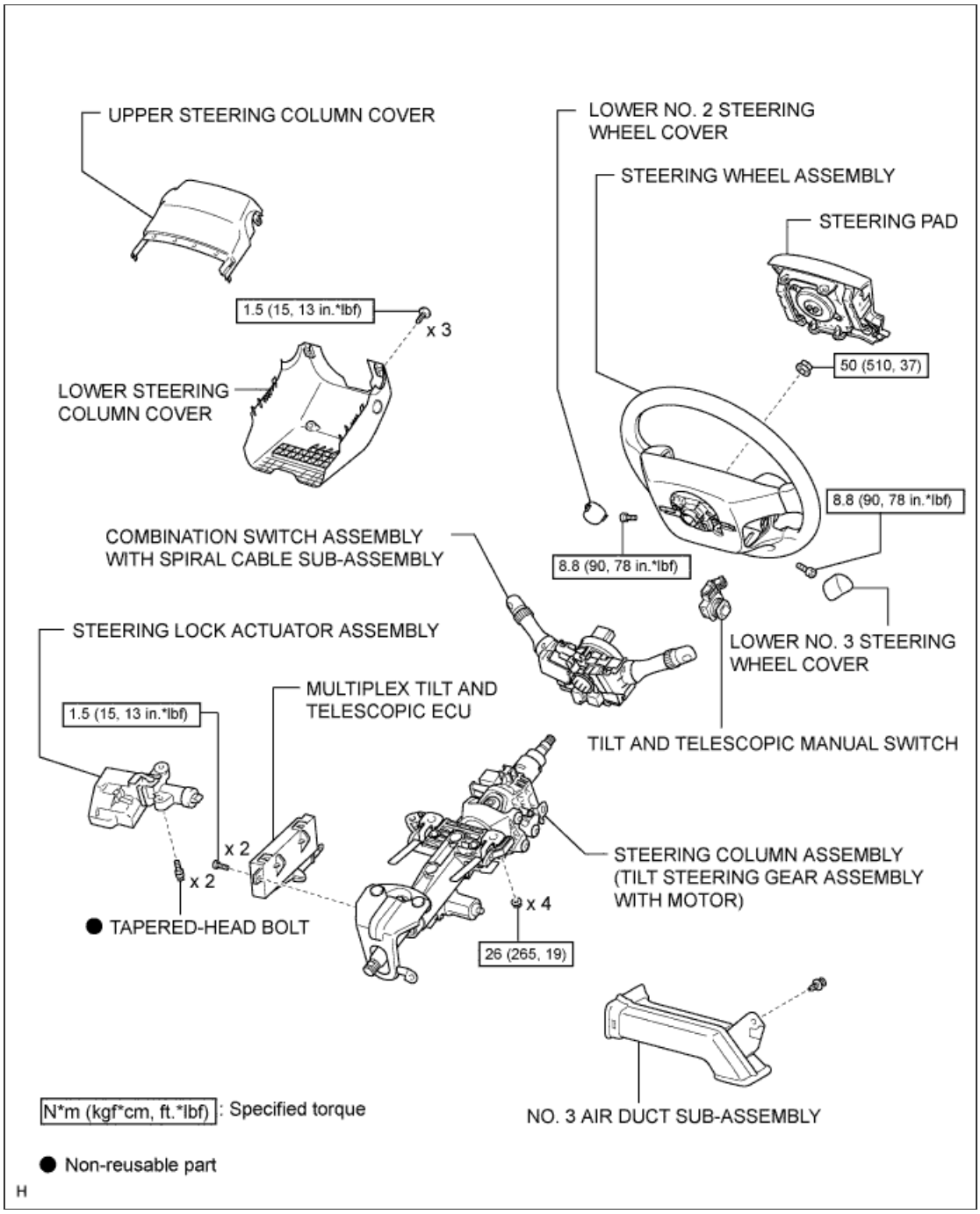


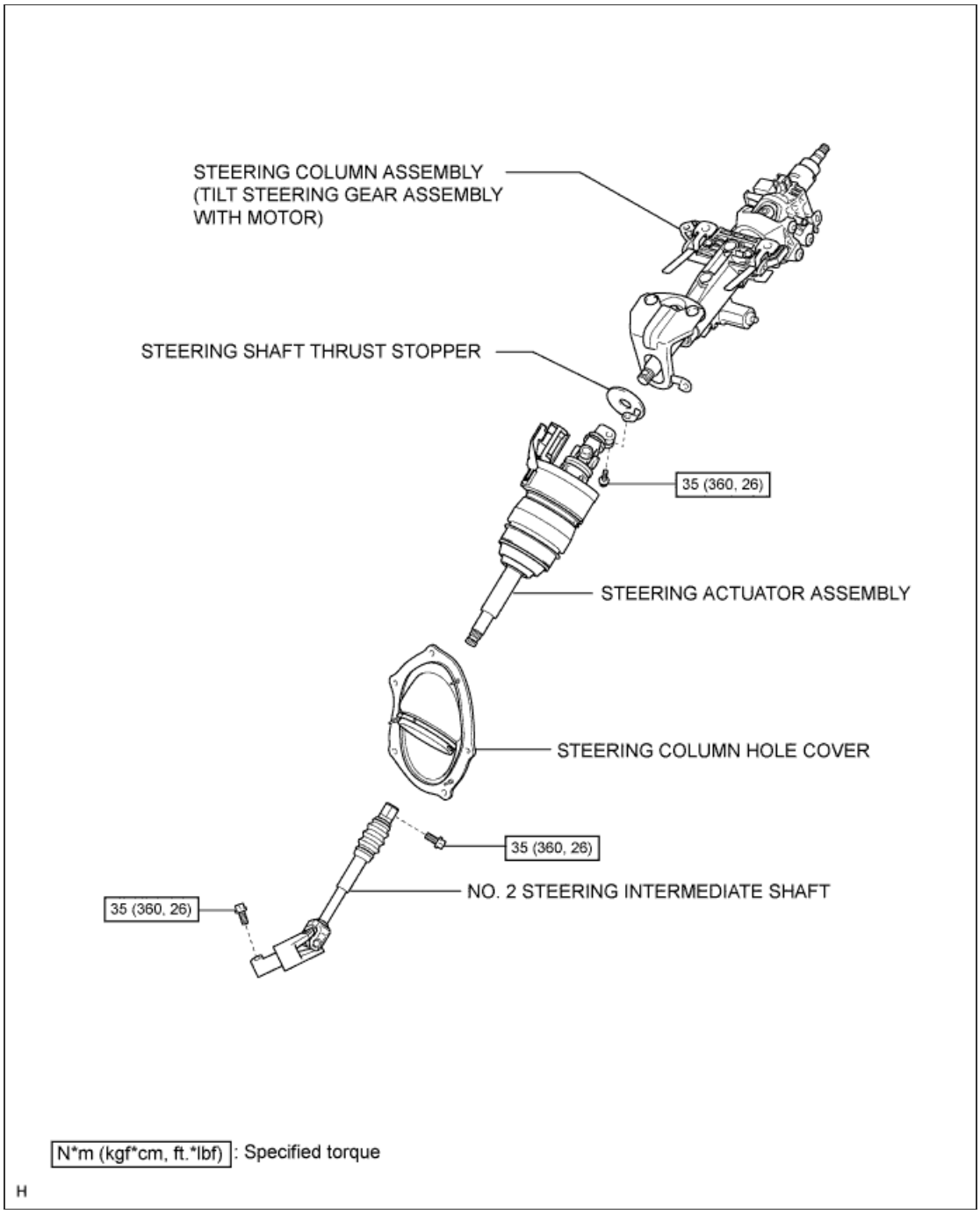
NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

N*m (kgf*cm, ft.*lbf) : Specified torque

T


COWL SIDE TRIM BOARD LH
FRONT DOOR SCUFF PLATE LH


UPPER STEERING COLUMN COVER
LOWER NO. 2 STEERING WHEEL COVER
STEERING WHEEL ASSEMBLY
STEERING PAD
1.5 (15, 13 in.*lbf)
x 3
LOWER STEERING COLUMN COVER
50 (510, 37)
8.8 (90, 78 in.*lbf)
COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY
8.8 (90, 78 in.*lbf)
LOWER NO. 3 STEERING WHEEL COVER
STEERING LOCK ACTUATOR ASSEMBLY
MULTIPLEX TILT AND TELESCOPIC ECU
1.5 (15, 13 in.*lbf)
TILT AND TELESCOPIC MANUAL SWITCH
x 2
x 2
STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR)
x 4
● TAPERED-HEAD BOLT
26 (265, 19)
N*m (kgf*cm, ft.*lbf) : Specified torque
NO. 3 AIR DUCT SUB-ASSEMBLY
● Non-reusable part
H


STEERING COLUMN ASSEMBLY
(TILT STEERING GEAR ASSEMBLY
WITH MOTOR)
STEERING SHAFT THRUST STOPPER
35 (360, 26)
STEERING ACTUATOR ASSEMBLY
STEERING COLUMN HOLE COVER
35 (360, 26)
NO. 2 STEERING INTERMEDIATE SHAFT
35 (360, 26)
N*m (kgf*cm, ft.*lbf) : Specified torque
H

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:

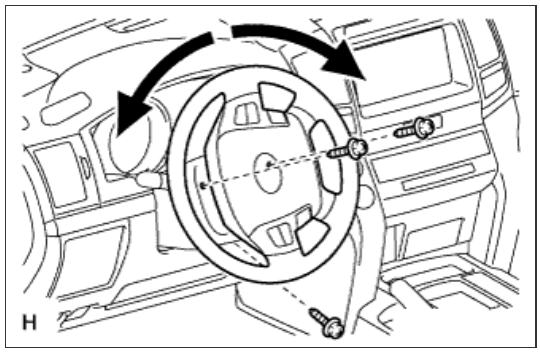
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

2. REMOVE LOWER STEERING COLUMN COVER

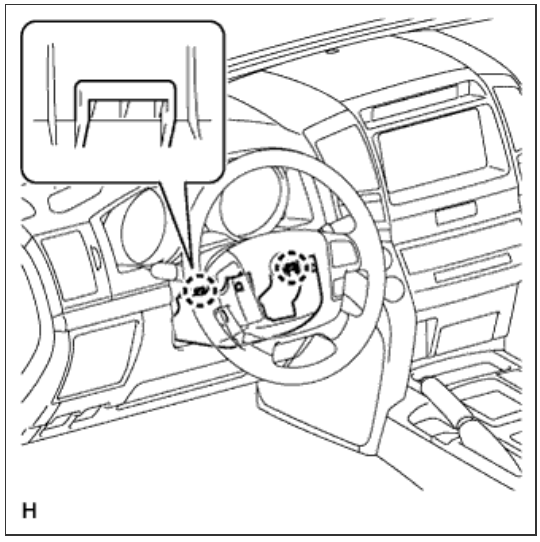
a. Remove the 3 screws.

HINT:

Turn the steering wheel to the right and left as necessary to remove the 2 screws.



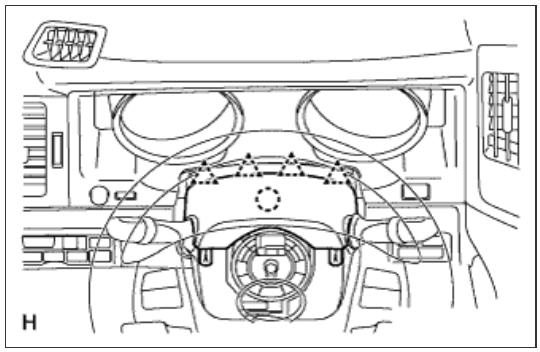
b. Detach the 2 claws to remove the lower steering column cover.



3. REMOVE UPPER STEERING COLUMN COVER

a. Detach the 4 clips.

b. Detach the claw to remove the upper steering column cover.



4. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY

a. Remove the driver side knee airbag assembly (Click here).

5. INSPECT TILT MOTOR

a. Inspect the tilt motor.

i. Disconnect connector A from the multiplex tilt and telescopic ECU.

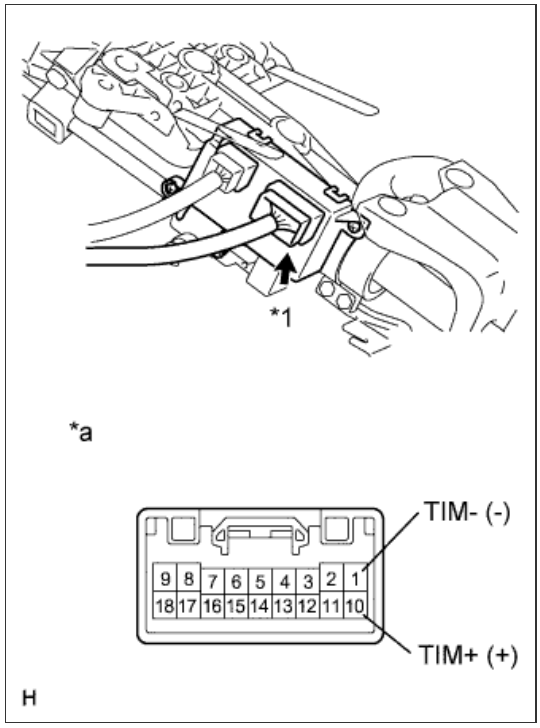
ii. Apply battery voltage to the tilt motor connector, and check the steering wheel tilt operation.

Text in Illustration

*1	Connector A
*a	Front view of wire harness connector (to Multiplex Tilt and Telescopic ECU)

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 10 (TIM+) Battery negative (-) → Terminal 1(TIM-)	Steering wheel tilts up



iii. Apply battery voltage to the tilt motor connector, and check the steering wheel tilt operation.

Text in Illustration

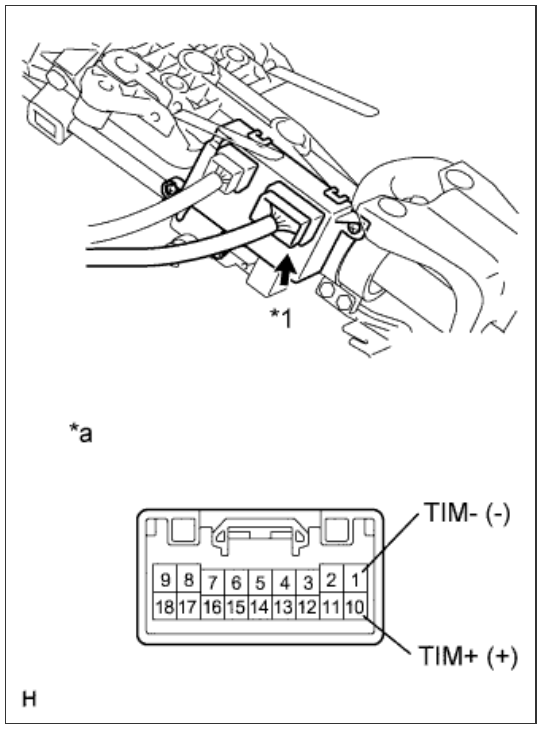
*1	Connector A
*a	Front view of wire harness connector (to Multiplex Tilt and Telescopic ECU)

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 (TIM-) Battery negative (-) → Terminal	Steering wheel tilts down

10 (TIM+)	

If the steering wheel does not tilt down, replace the steering column assembly.



6. INSPECT TELESCOPIC MOTOR

a. Inspect the telescopic motor.

i. Disconnect connector B from the multiplex tilt and telescopic ECU.

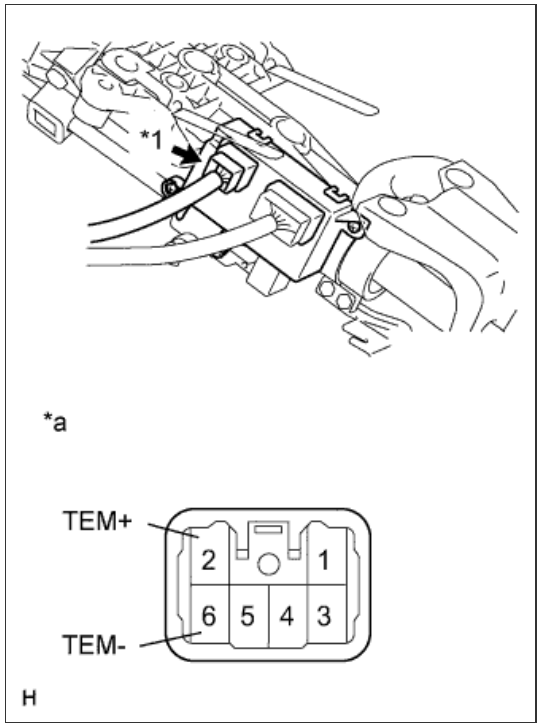
ii. Apply battery voltage to the telescopic motor connector, and check the steering column operation.

Text in Illustration

*1	Connector B
*a	Front view of wire harness connector (to Multiplex Tilt and Telescopic ECU)

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 (TEM+) Battery negative (-) → Terminal 6 (TEM-)	Steering column contracts



iii. Apply battery voltage to the telescopic motor connector, and check the steering column operation.

Text in Illustration

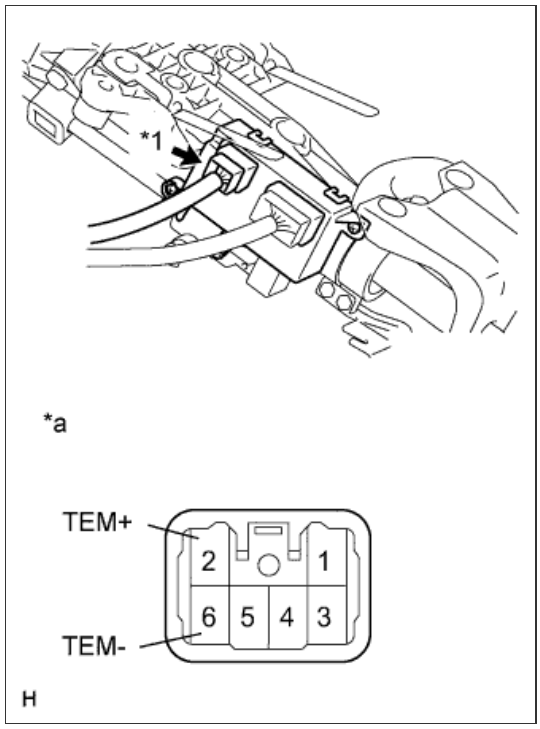
*1	Connector B
	Front view of wire harness connector

*a	(to Multiplex Tilt and Telescopic ECU)

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 6 (TEM-) Battery negative (-) → Terminal 2 (TEM+)	Steering column extends

If the steering column operation does not match the specified condition, replace the steering column.

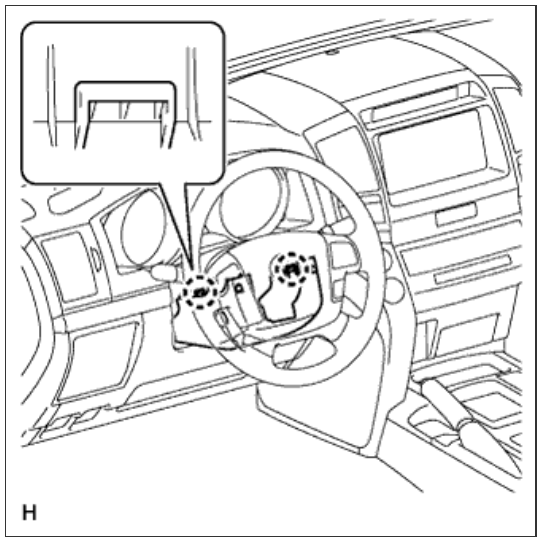


7. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY

a. Install driver side knee airbag assembly (Click here).

8. INSTALL LOWER STEERING COLUMN COVER

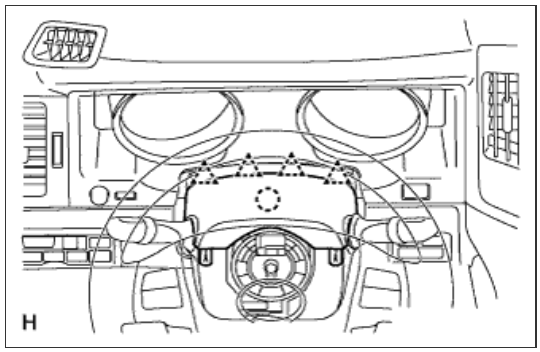
a. Attach the 2 claws to install the lower steering column cover.



9. INSTALL UPPER STEERING COLUMN COVER

a. Attach the claw to install the upper steering column cover.

b. Attach the 4 clips to install the upper steering cover onto the instrument panel cluster finish panel.

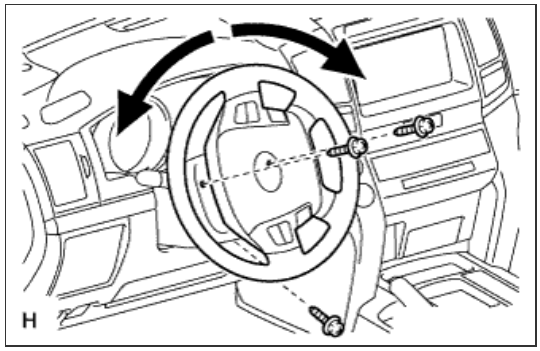


c. Install the 3 screws.

Torque:
2.0 N*m{ 20 kgf*cm , 18 in.*lbf }

HINT:

Turn the steering wheel to the right and left as necessary to install the 2 screws.



10. INSPECT SRS WARNING LIGHT

a. Inspect the SRS warning light (Click here).

11. 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

CAUTION:

Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing the steering column (Click here).

1. FRONT WHEELS FACING STRAIGHT AHEAD

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

a. Disable the AUTO TILT AWAY function by changing the customize parameter (Click here).

NOTICE:

Record the current customize parameter setting (whether the AUTO TILT AWAY function is enabled or disabled) in order to restore the current setting after finishing the operation.

HINT:

Performing the above operation causes the AUTO TILT AWAY function to be disabled when the engine switch is turned off.

b. Turn the engine switch on (IG). Operate the tilt and telescopic switch to fully extend and lower the steering column assembly.

c. Turn the engine switch off and disconnect the cable from the negative (-) battery terminal.

CAUTION:

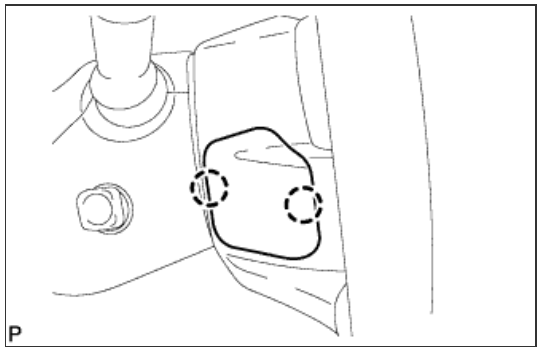
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

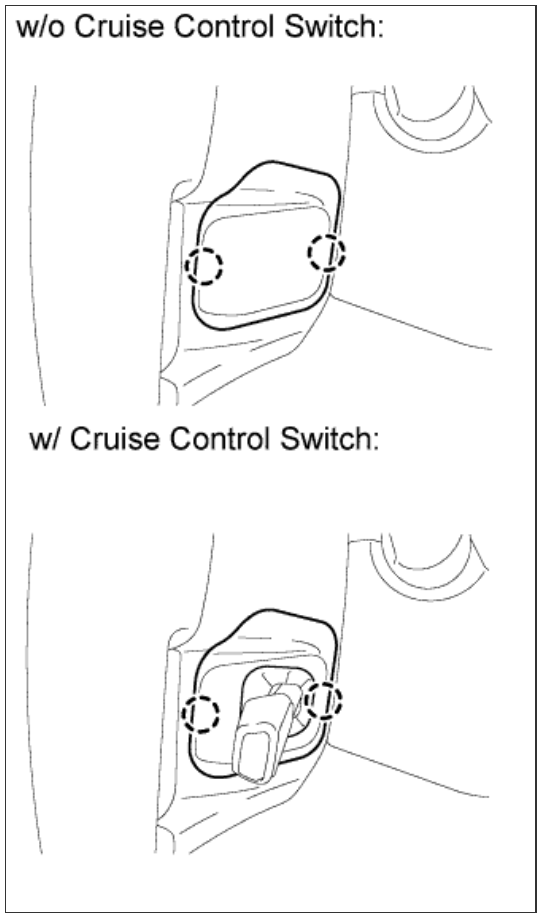
3. REMOVE LOWER NO. 3 STEERING WHEEL COVER

a. Detach the 2 claws and remove the steering wheel cover.



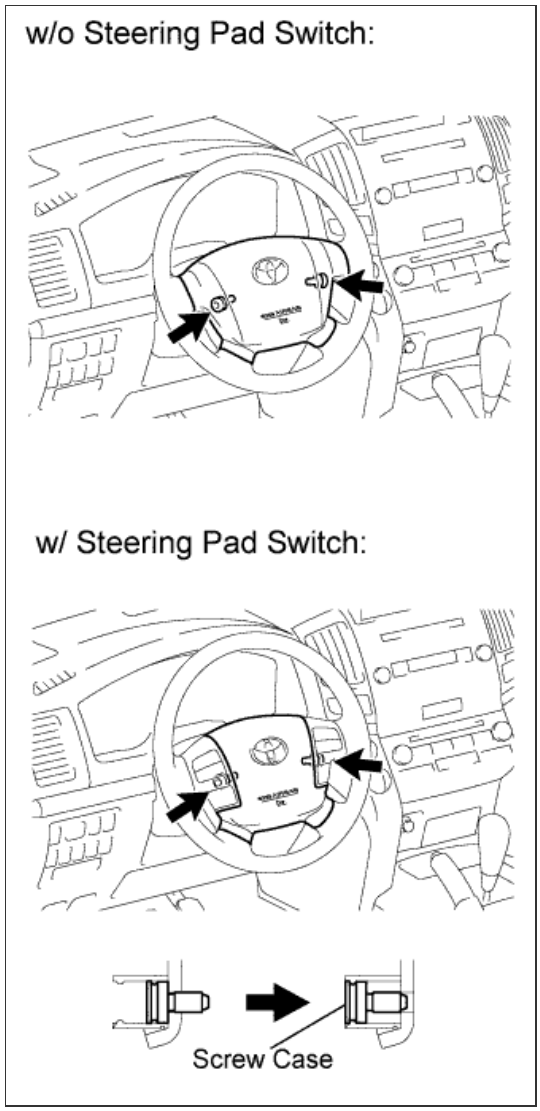
4. REMOVE LOWER NO. 2 STEERING WHEEL COVER

a. Detach the 2 claws and remove the steering wheel cover.



5. REMOVE STEERING PAD

a. Using a T30 "TORX" socket wrench, loosen the 2 screws until the groove along the screw circumference catches on the screw case.



b. Pull out the steering pad from the steering wheel, as shown in the illustration. Then support the steering pad with one hand.

NOTICE:

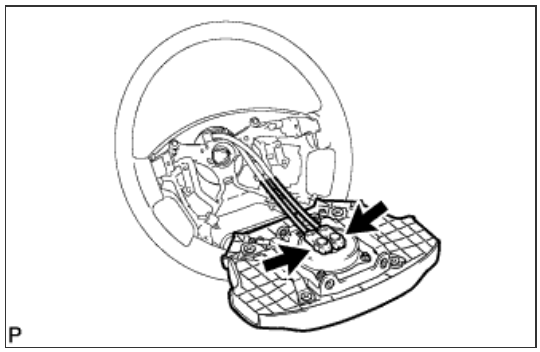
When removing the steering pad, do not pull the airbag wire harness.

c. Disconnect the horn connector.

d. Disconnect the 2 connectors and remove the steering pad.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



6. REMOVE STEERING WHEEL ASSEMBLY

a. Remove the steering wheel set nut.

b. Put matchmarks on the steering wheel and main shaft.

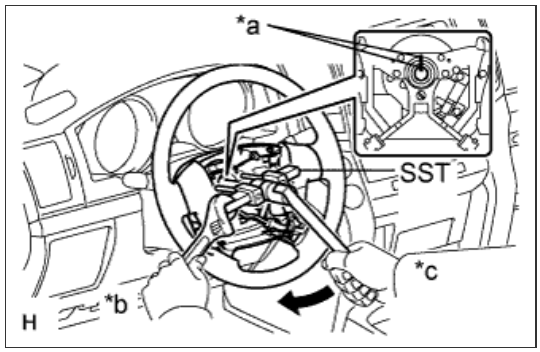
Text in Illustration

*a	Matchmark
*b	Hold
*c	Turn

c. Using SST, remove the steering wheel assembly.

SST

09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05011)



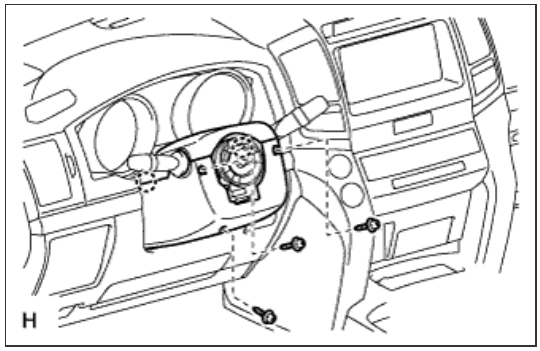
7. REMOVE LOWER STEERING COLUMN COVER

a. Remove the 3 screws.

b. Detach the 2 claws to remove the lower steering column cover.

NOTICE:

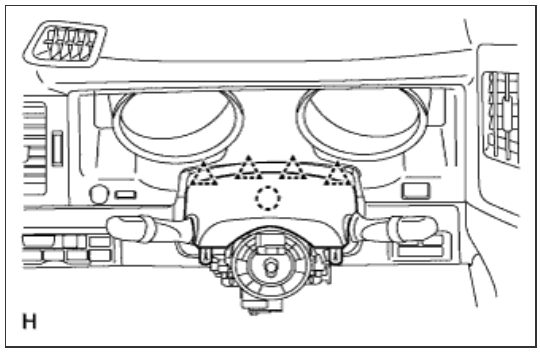
Do not damage the tilt and telescopic switch.



8. REMOVE UPPER STEERING COLUMN COVER

a. Detach the 4 clips.

b. Detach the claw to remove the upper steering column cover.



9. REMOVE TILT AND TELESCOPIC SWITCH

a. Disconnect the switch connector.

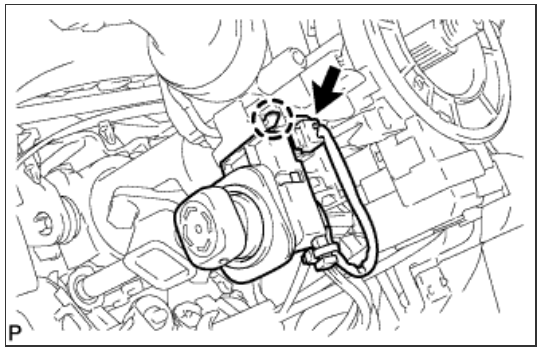
b. Using a screwdriver, detach the claw and pull out the switch.

NOTICE:

Pushing on the claw too hard will break the claw.

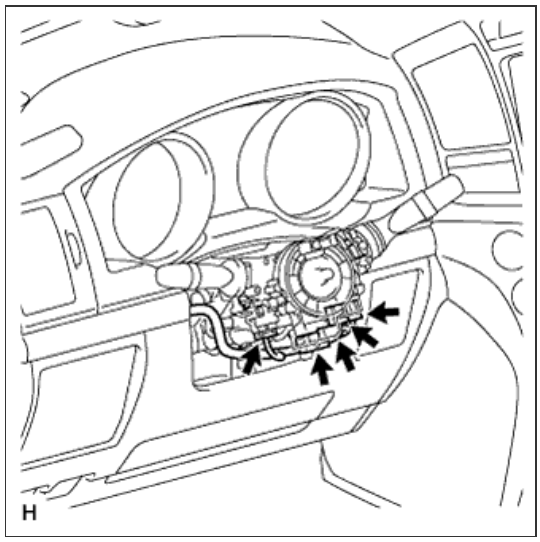
HINT:

Tape the screwdriver tip before use.

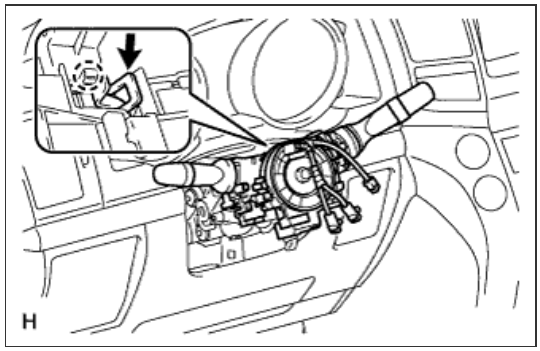


10. REMOVE COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

a. Disconnect the 5 connectors from the turn signal switch with spiral cable.



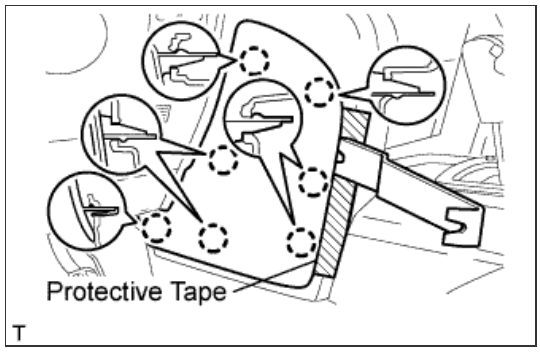
b. Using pliers, grip the claws of the clamp and remove the turn signal switch with spiral cable from the steering column.



11. REMOVE NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Place protective tape as shown in the illustration.

b. Using a moulding remover, detach the 7 claws and remove the panel cushion.



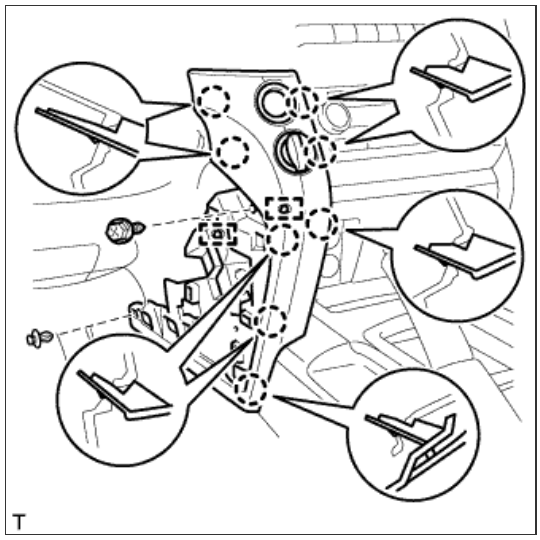
12. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Remove the clip.

b. Remove the screw.

c. Detach the 8 claws.

d. Remove the panel pad and disconnect the connectors and 2 clamps.



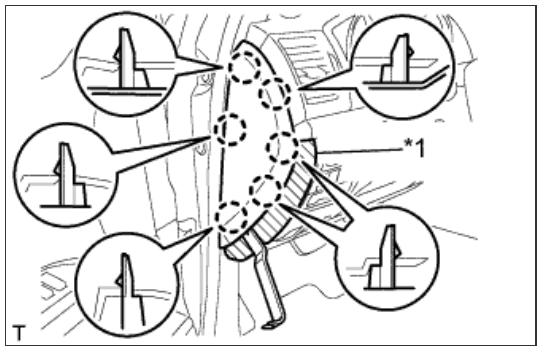
13. REMOVE INSTRUMENT SIDE PANEL LH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 6 claws and remove the instrument side panel.



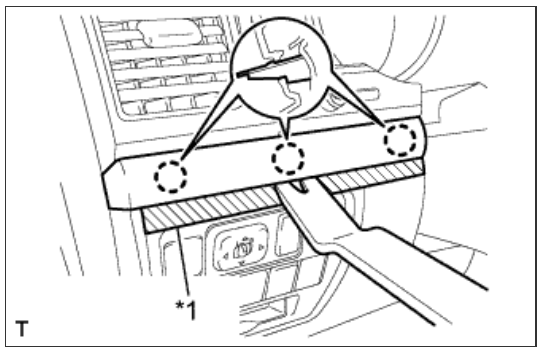
14. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

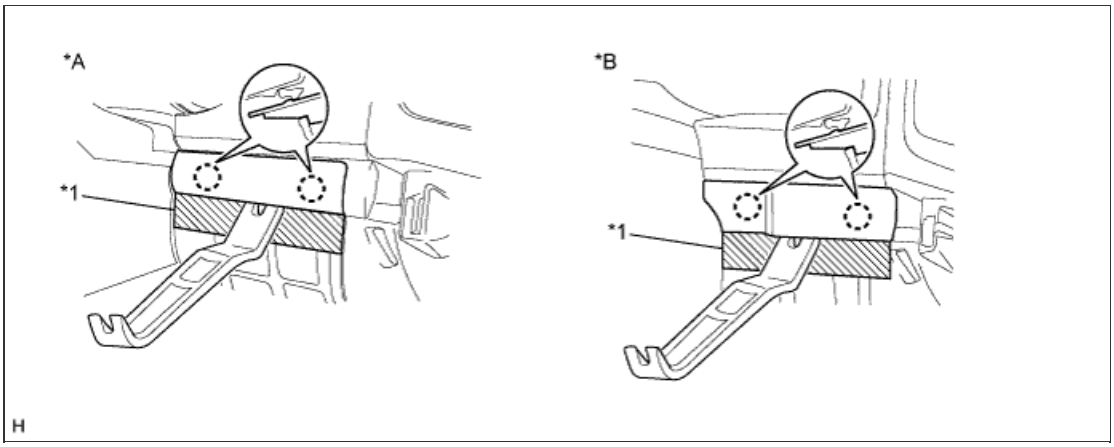
b. Using a moulding remover, detach the 3 claws and remove the No. 1 instrument cluster finish panel garnish.



15. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

b. Using a moulding remover, detach the 2 claws and remove the No. 2 instrument cluster finish panel garnish.



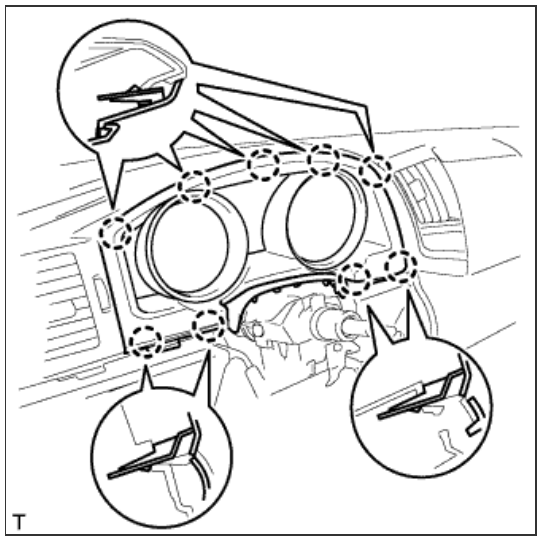
Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System
*1	Protective Tape	-	-

16. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/ Multi-information Display)

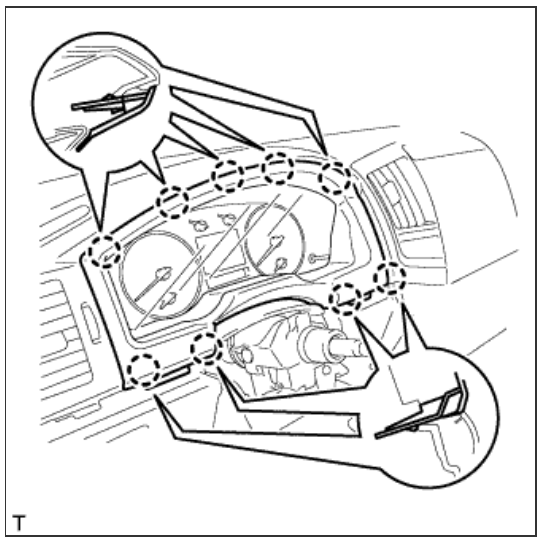
a. Detach the 9 claws.

b. Disconnect the connector and remove the instrument cluster finish panel.



17. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/o Multi-information Display)

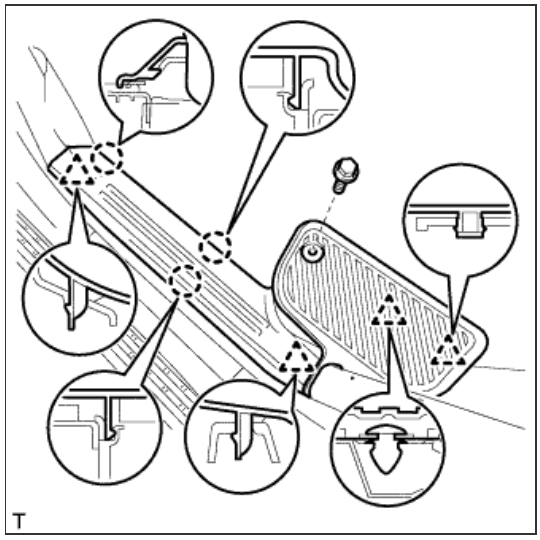
a. Detach the 9 claws and remove the instrument cluster finish panel.



18. REMOVE FRONT DOOR SCUFF PLATE LH

a. Remove the screw.

b. Detach the 3 claws and 4 clips, and remove the scuff plate.

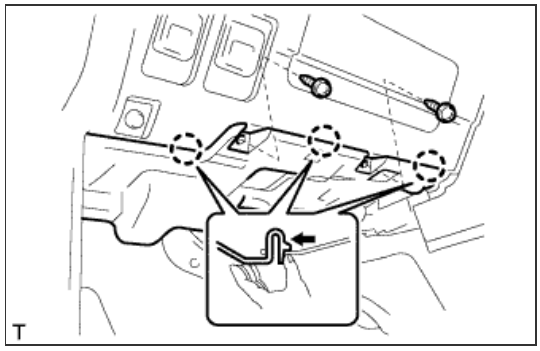


19. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Remove the 2 screws.

b. Detach the 3 claws.

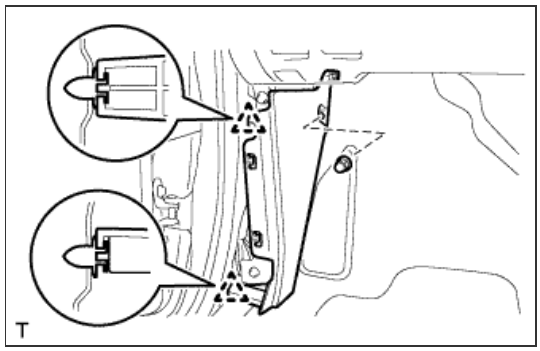
c. Disconnect the connectors and remove the No. 1 instrument panel under cover.



20. REMOVE COWL SIDE TRIM BOARD LH

a. Remove the cap nut.

b. Detach the 2 clips and remove the cowl side trim board.



21. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

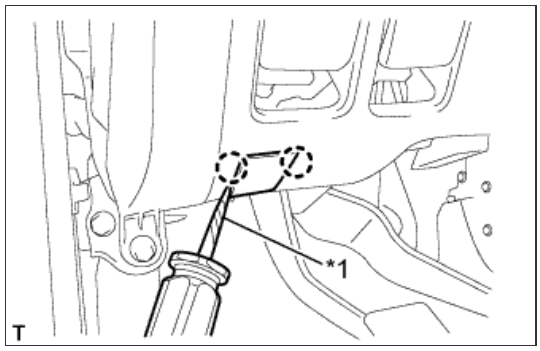
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

Tape the screwdriver tip before use.

Text in Illustration

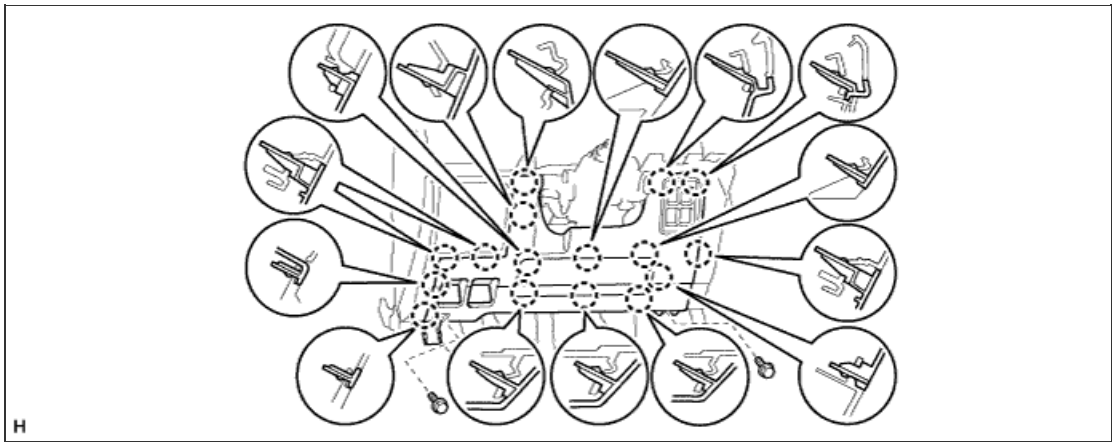
*1	Protective Tape



b. w/ Driver Side Knee Airbag:

i. Remove the 2 bolts.

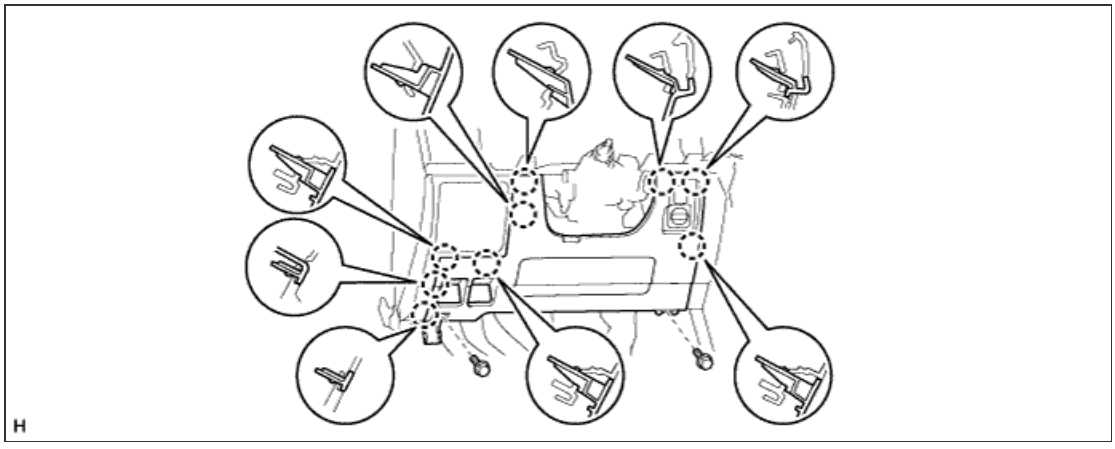
ii. Detach the 16 claws.



c. w/o Driver Side Knee Airbag:

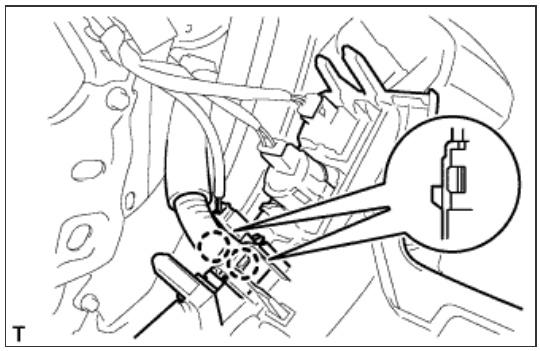
i. Remove the 2 bolts.

ii. Detach the 9 claws.



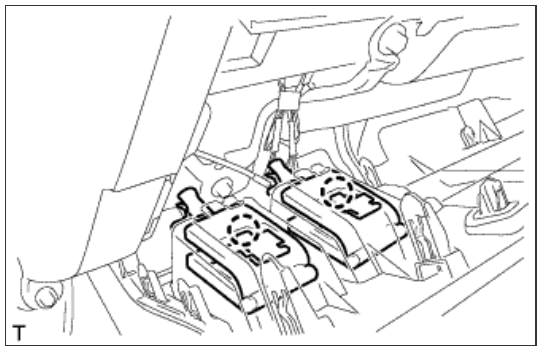
d. for Automatic Air Conditioning System:

i. Detach the 2 claws and remove the room temperature sensor.



e. Detach the 2 claws and disconnect the 2 control cables.

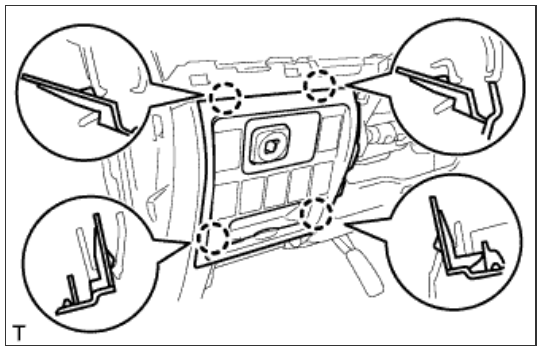
f. Disconnect the connectors and remove the lower No. 1 instrument panel finish panel.



22. REMOVE NO. 1 SWITCH HOLE BASE

a. Detach the 4 claws.

b. Disconnect the connectors and remove the No. 1 switch hole cover.



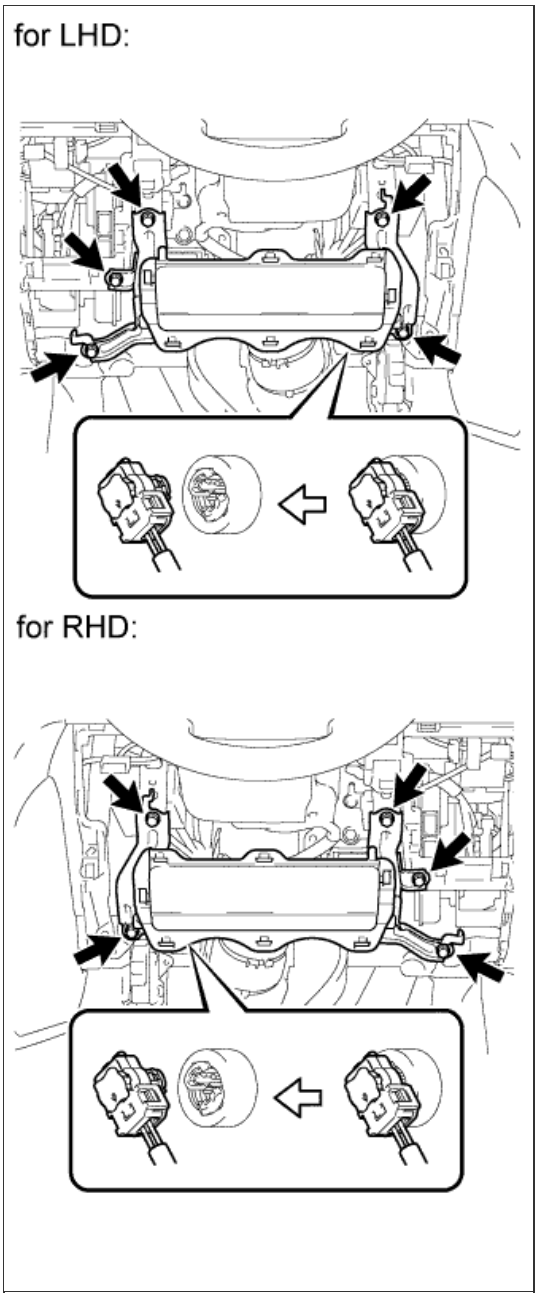
23. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

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.

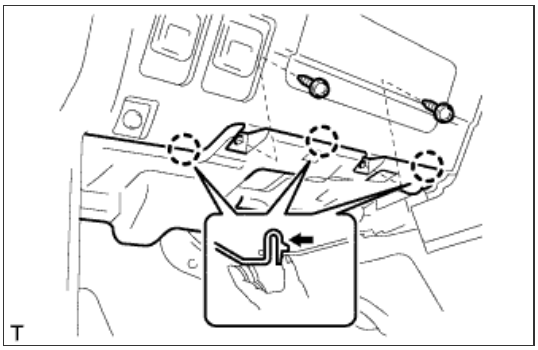


24. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Remove the 2 screws.

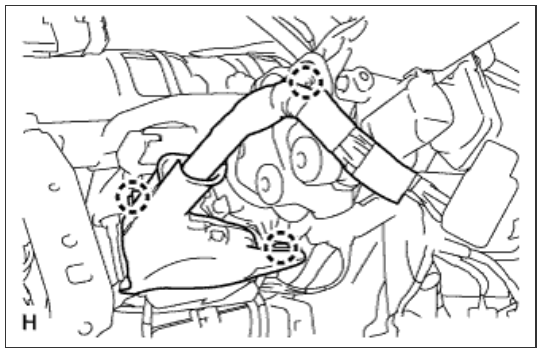
b. Detach the 3 claws.

c. Disconnect the connectors and remove the No. 1 instrument panel under cover.



25. REMOVE WIRE HARNESS PROTECTOR AND WIRE HARNESS

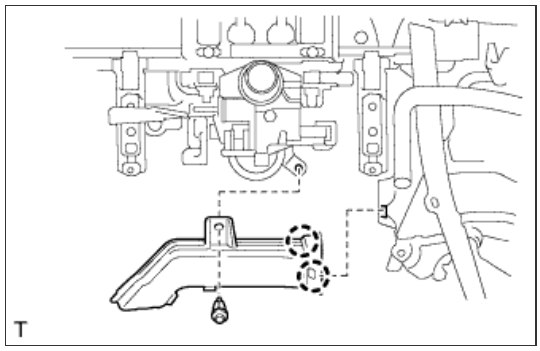
a. Detach the 3 claws to remove the wire harness protector and wire harness.



26. REMOVE NO. 3 AIR DUCT SUB-ASSEMBLY

a. Remove the clip.

b. Detach the 2 claws and remove the duct.



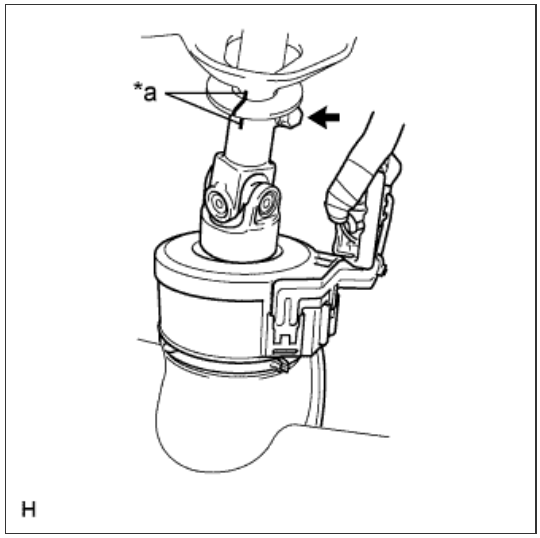
27. REMOVE STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR)

a. Put matchmarks on the steering actuator and steering column.

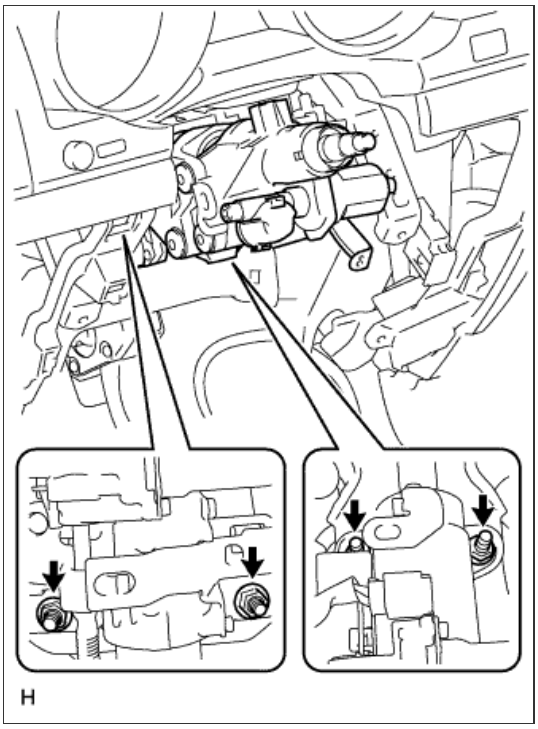
Text in Illustration

*a	Matchmark

b. Remove the bolt.



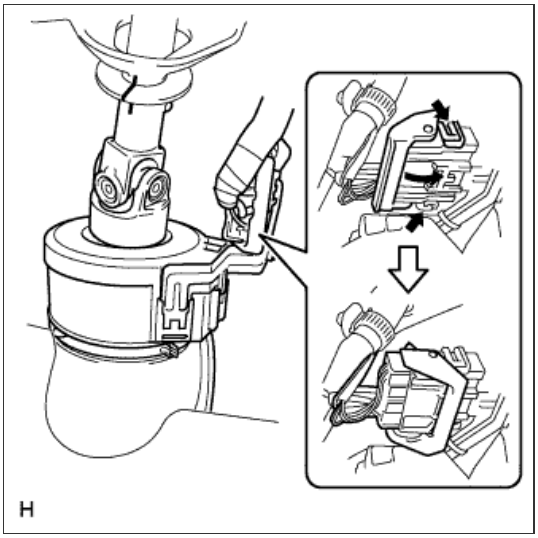
c. Remove the 4 nuts and steering column.



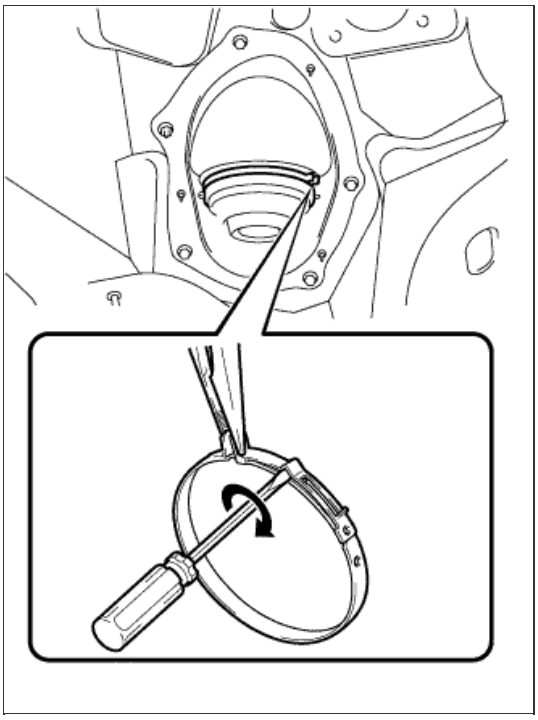
28. DISCONNECT STEERING ACTUATOR ASSEMBLY

a. While pushing the claws on both sides of the connector, move the lock in the direction of the arrow.

b. Disconnect the connector.

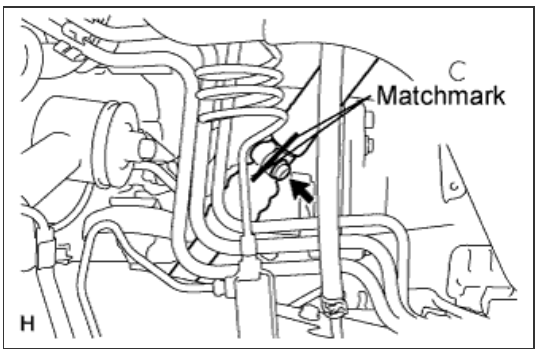


c. Hold the clamp with needle nose pliers, then insert a screwdriver and turn it in the direction shown in the illustration to remove the clamp of the steering column hole cover.



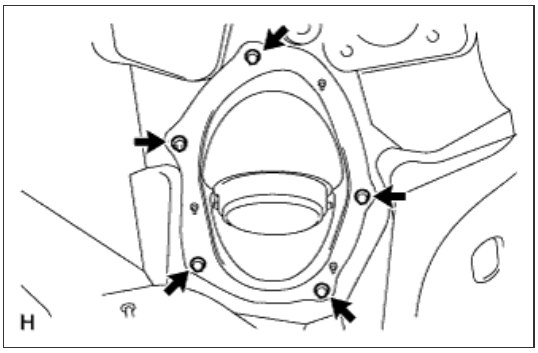
d. Put matchmarks on the steering actuator and No. 2 steering intermediate shaft.

e. Remove the bolt, and then pull out the actuator assembly toward the inside of the vehicle.



29. REMOVE STEERING COLUMN HOLE COVER SUB-ASSEMBLY

a. Remove the 4 bolts and nut with the steering column hole cover from the vehicle.



30. DISCONNECT NO. 2 STEERING INTERMEDIATE SHAFT

a. Loosen the bolt and remove the No. 2 intermediate shaft.

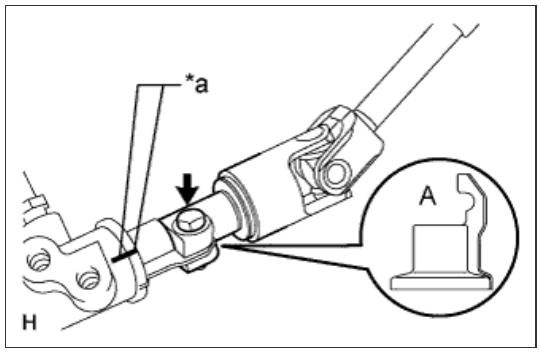
Text in Illustration

*a	Matchmark

NOTICE:

It is possible to install the intermediate shaft to the same position it was removed from without placing matchmarks due to the dust cover part labeled

A. Therefore, do not remove the dust cover from the steering link.



HINT:

If the dust cover is removed/installed or replaced, place matchmarks on the dust cover and steering link.

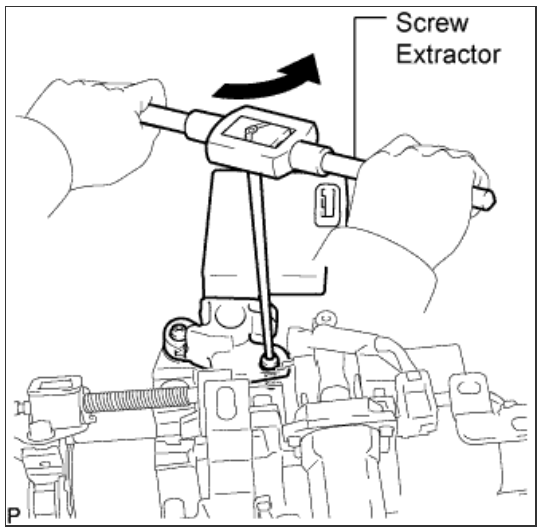
for Preparation Click here

1. REMOVE STEERING LOCK ACTUATOR ASSEMBLY

a. Using a center punch, mark the center of the 2 tapered-head bolts.

b. Using a 3 to 4 mm (0.118 to 0.157 in.) drill, drill a hole in the 2 bolts.

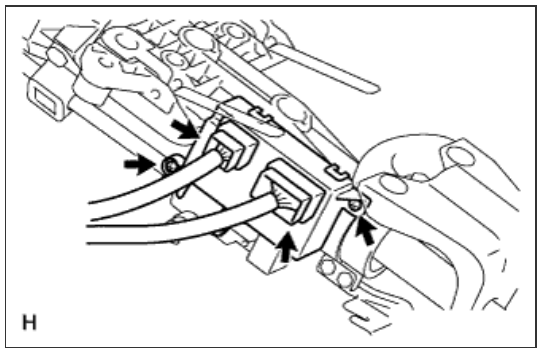
c. Using a screw extractor, remove the 2 bolts and the steering lock actuator assembly from the steering column assembly.



2. REMOVE MULTIPLEX TILT AND TELESCOPIC ECU

a. Disconnect the 2 connectors.

b. Remove the 2 screws and ECU.

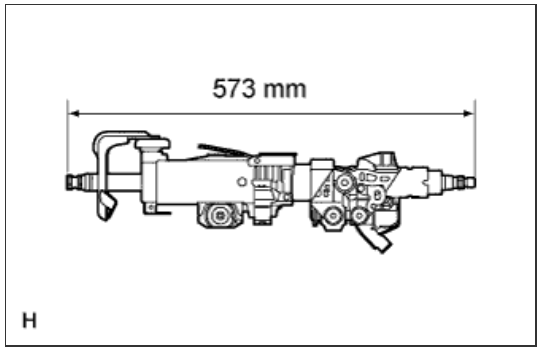


for Preparation Click here

1. INSPECT STEERING COLUMN ASSEMBLY

a. Measure the length of the steering main shaft.

Standard length:
573 mm (1.88 ft.)



for Preparation Click here

1. INSTALL MULTIPLEX TILT AND TELESCOPIC ECU

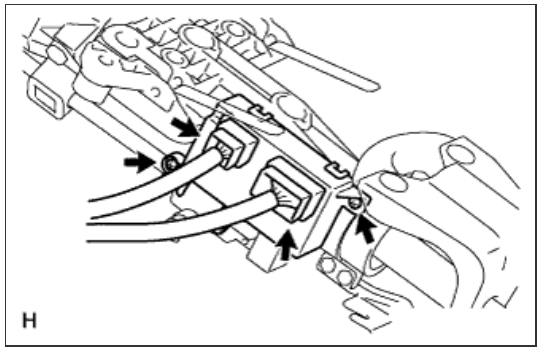
a. Install the ECU with the 2 screws.

Torque:
1.5 N*m{ 15 kgf*cm , 13 in.*lbf }

b. Connect the 2 connectors.

NOTICE:

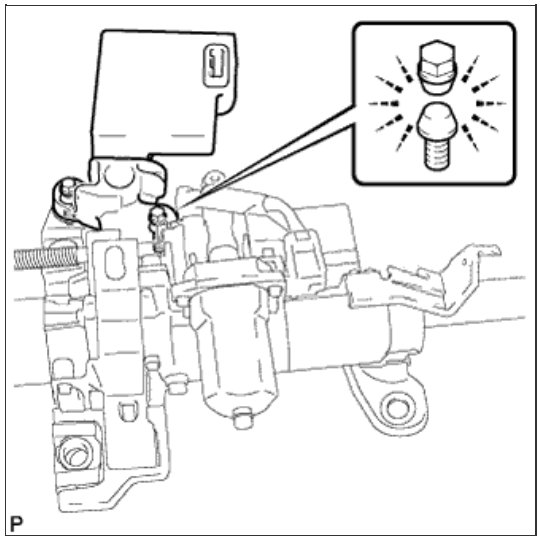
The connectors on both ends of the wire harness between the telescopic motor and ECU are the same shape. When installing them, connect the connectors of the same color.



2. INSTALL STEERING LOCK ACTUATOR ASSEMBLY

a. Temporarily install the steering lock actuator assembly with 2 new tapered-head bolts.

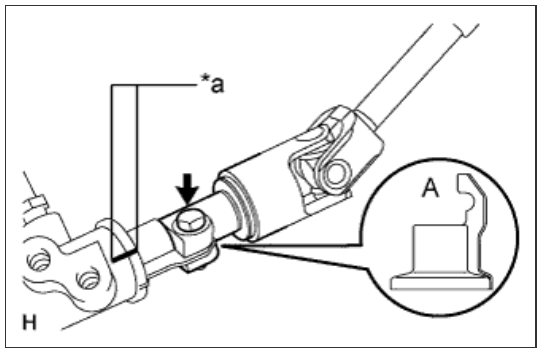
b. Tighten the 2 tapered-head bolts until the bolt heads break off.



for Preparation Click here

1. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT

a. Align the part of the dust cover labeled A with the No. 2 steering intermediate shaft, and install the No. 2 steering intermediate shaft assembly to the steering link assembly.



Text in Illustration

*a	Matchmark

b. Install the bolt.

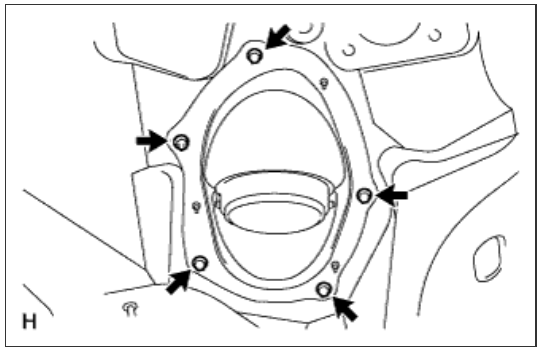
Torque:
35 N*m{ 360 kgf*cm , 26 ft.*lbf }

NOTICE:

Be careful not to damage the dust cover.

2. INSTALL STEERING COLUMN HOLE COVER SUB-ASSEMBLY

a. Install the 4 bolts and nut.



Torque:
5.0 N*m{ 51 kgf*cm , 44 in.*lbf }

NOTICE:

Do not fold back the boot part of the steering hole cover or extend it excessively. if it is extended excessively, return it to its original position.

HINT:

Install the steering intermediate shaft assembly from the inside of the vehicle.

b. Install the clamp to the steering column hole cover.

3. CONNECT STEERING ACTUATOR ASSEMBLY

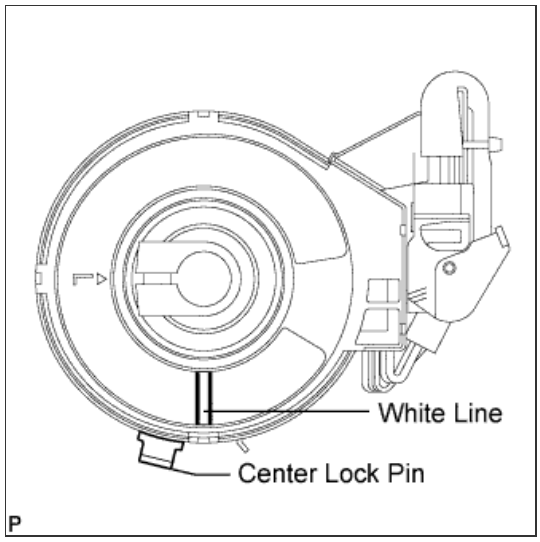
a. Make sure that the power steering link assembly is centered.

b. Install the steering actuator assembly.

i. If installing a new steering actuator assembly:
Install the steering actuator assembly with the white paint on the upper surface of the spiral case facing down.

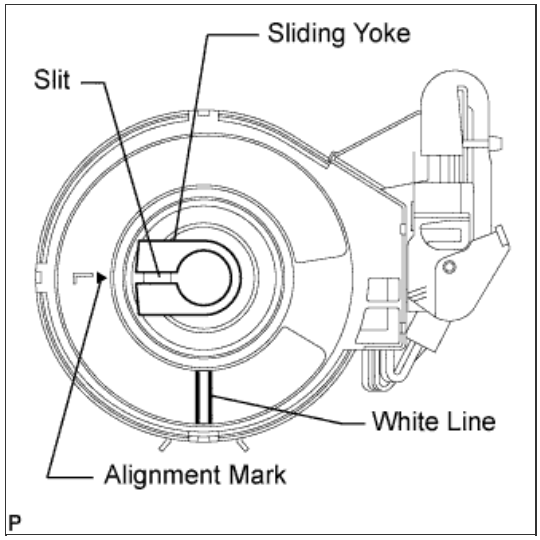
NOTICE:

Do not pull out the center lock pin.



ii. If reinstalling the removed steering actuator assembly:

1. Slowly turn the spiral case clockwise until it locks.
2. Turn the spiral case two turns counterclockwise from the lock position.
3. Align the slit of the sliding yoke with the alignment mark (▲).
4. Install the steering actuator assembly with the white paint on the upper surface of the spiral case facing down.



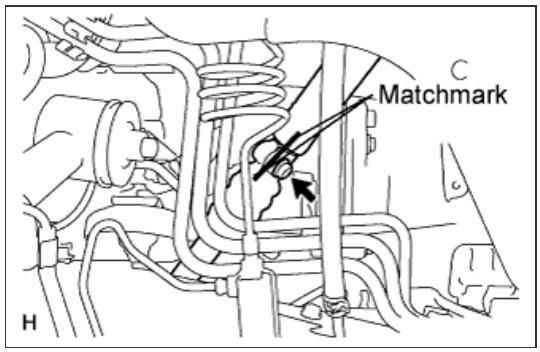
c. Align the matchmarks on the No. 2 steering intermediate shaft and steering actuator.

NOTICE:

- **Do not fold back the boot part of the steering hole cover or turn it excessively. If it is turned excessively, return it to its original position.**
- **Do not turn the actuator body and the spiral case.**

HINT:

Install the steering actuator from the inside of the vehicle.



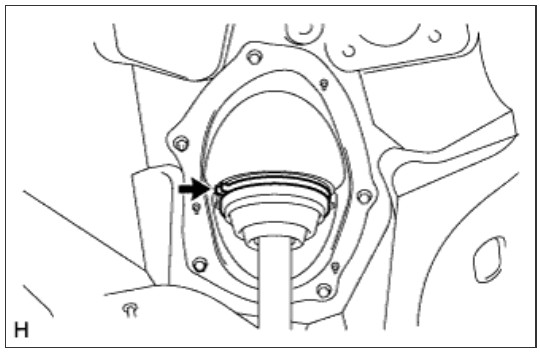
d. Install the bolt.

Torque:
35 N*m{ 360 kgf*cm , 26 ft.*lbf }

e. Using needle nose pliers, lock the clamp to the steering column hole cover to install it.

NOTICE:

Be careful when performing the operation as the clamp may not lock if the claws of the clamp are deformed.

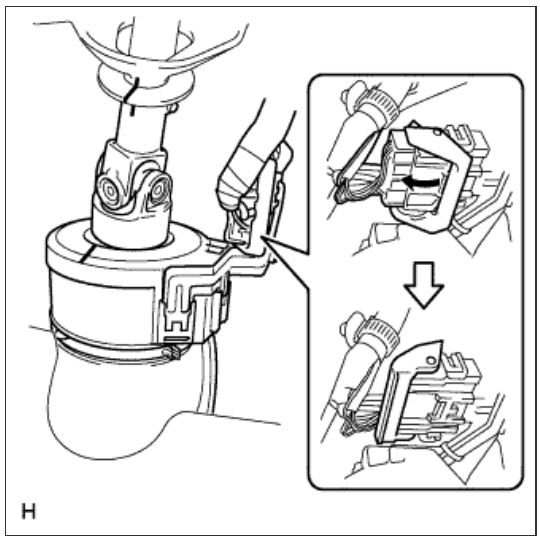


f. Move the lock in the direction of the arrow and connect the steering actuator connector.

HINT:

When a new actuator is installed, remove the center lock pin.

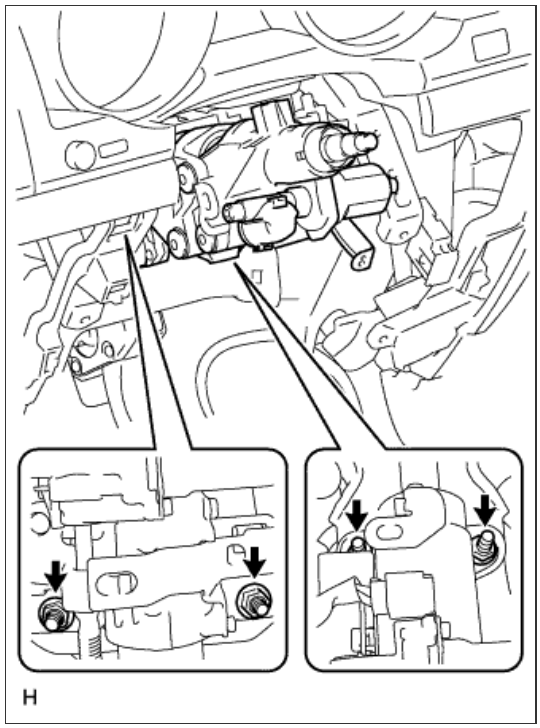
g. Connect the connector.



4. INSTALL STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR)

a. Install the 4 nuts and steering column.

Torque:
26 N*m{ 265 kgf*cm , 19 ft.*lbf }



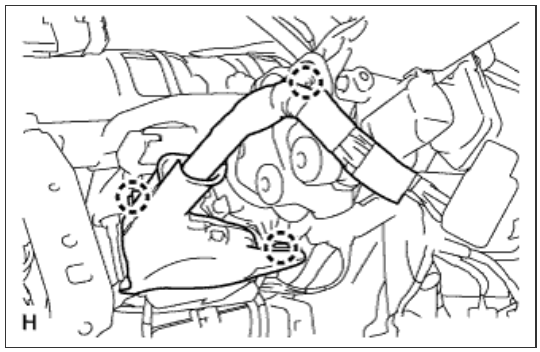
5. INSTALL NO. 3 AIR DUCT SUB-ASSEMBLY

a. Attach the 2 claws to install the duct.

b. Install the clip.

6. INSTALL WIRE HARNESS PROTECTOR AND WIRE HARNESS

a. Attach the 3 claws and install the wiring harness protector and wire harness.



7. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (w/ Driver Side Knee Airbag)

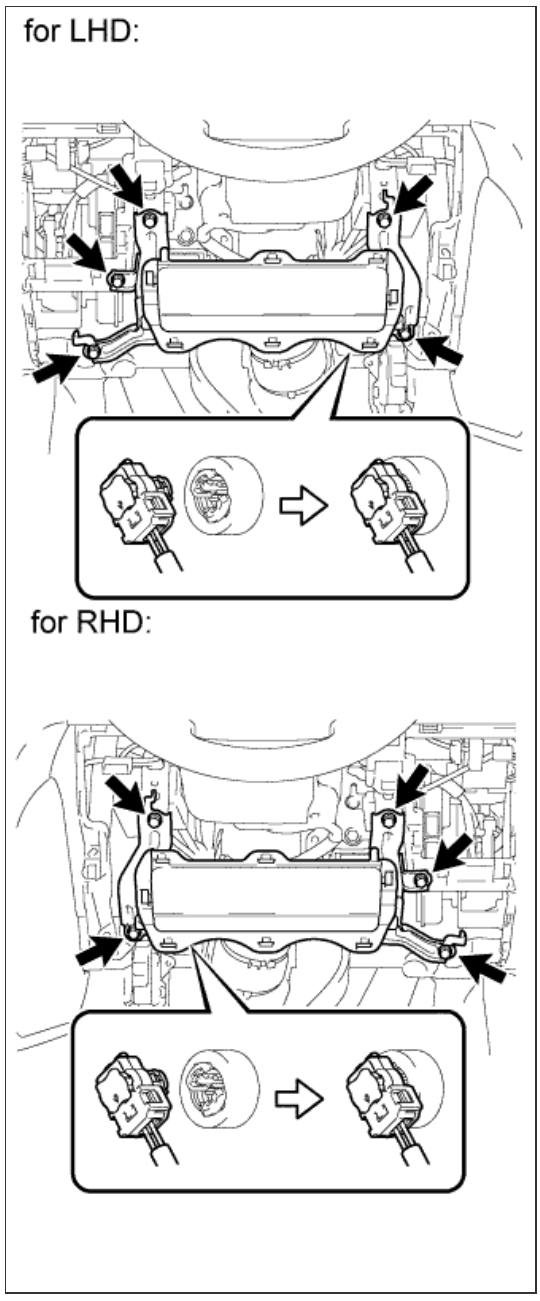
a. Connect the connector.

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.

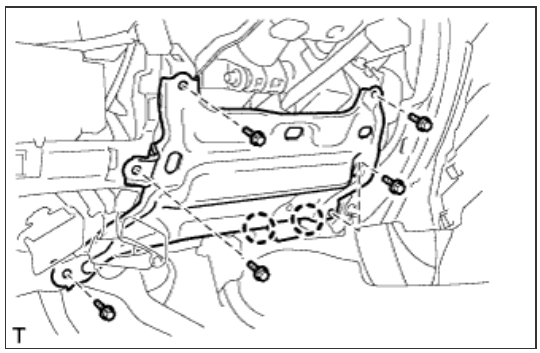
Torque:
10 N*m{ 102 kgf*cm , 7 ft.*lbf }



8. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (w/o Driver Side Knee Airbag)

a. Attach the 2 claws and connect the DLC3.

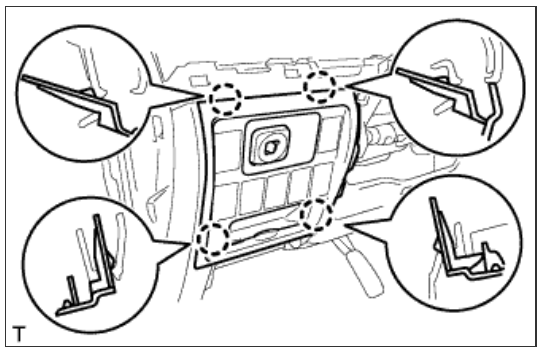
b. Install the lower instrument panel with the 5 bolts.



9. INSTALL NO. 1 SWITCH HOLE BASE

a. Connect the connectors.

b. Attach the 4 claws to install the No. 1 switch hole base.

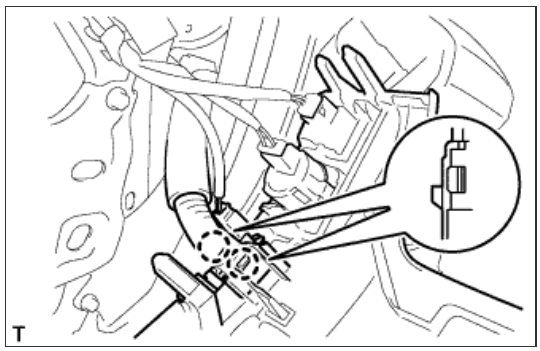


10. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

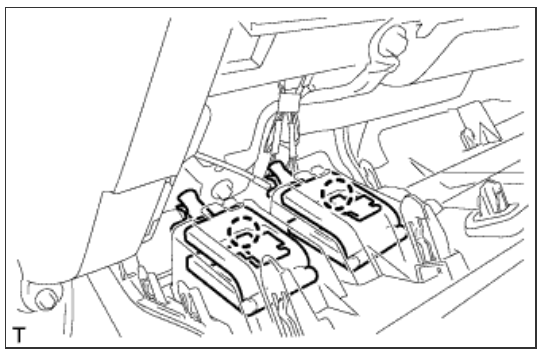
a. Connect the connectors.

b. for Automatic Air Conditioning System:

i. Attach the 2 claws to install the room temperature sensor.



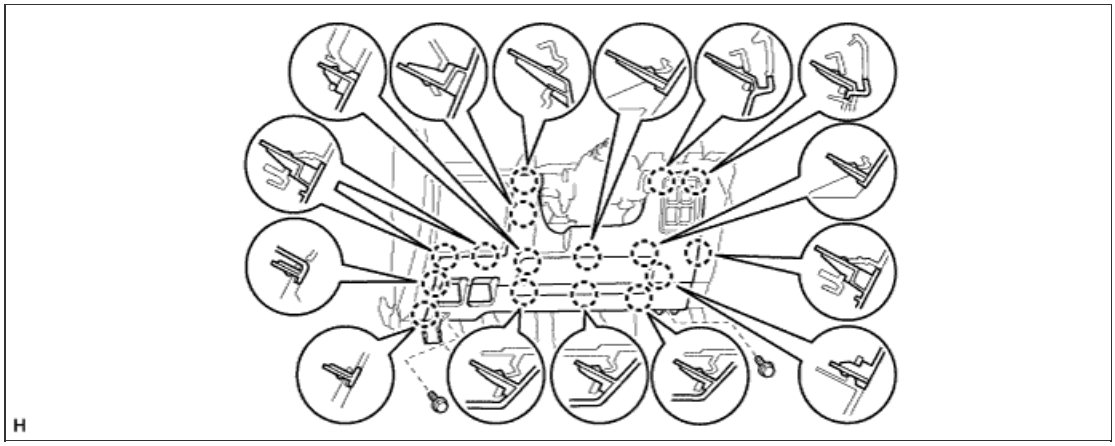
c. Attach the 2 claws to connect the 2 control cables.



d. w/ Driver Side Knee Airbag:

i. Attach the 16 claws to install the lower No. 1 instrument panel finish panel.

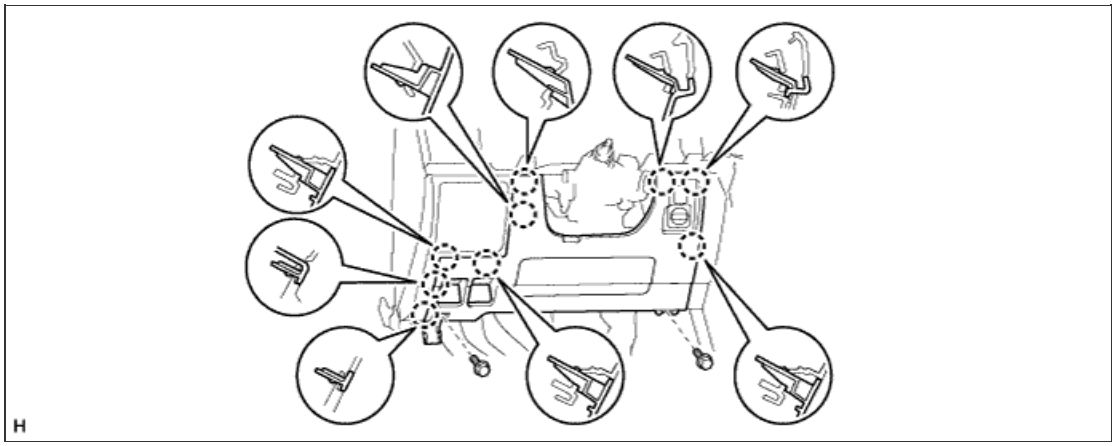
ii. Install the 2 bolts.



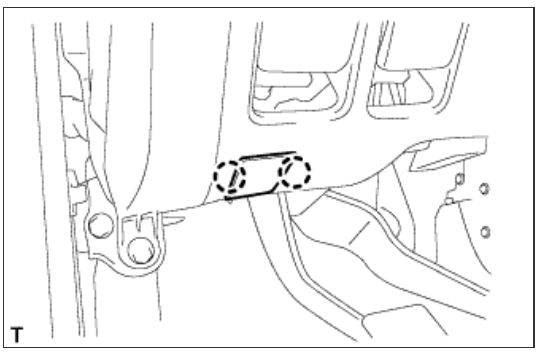
e. w/o Driver Side Knee Airbag:

i. Attach the 9 claws to install the lower No. 1 instrument panel finish panel.

ii. Install the 2 bolts.



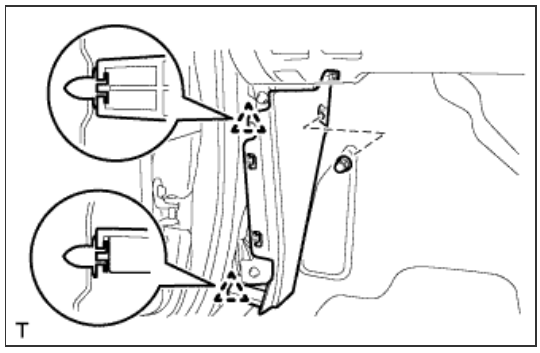
f. Attach the 2 claws to close the hole cover.



11. INSTALL COWL SIDE TRIM BOARD LH

a. Attach the 2 clips to install the cowl side trim board.

b. Install the cap nut.

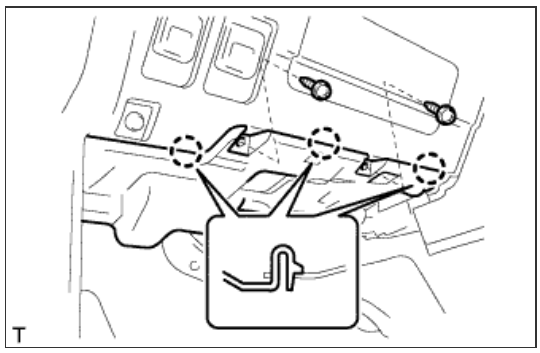


12. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

a. Connect the connectors.

b. Attach the 3 claws to install the No. 1 instrument panel under cover.

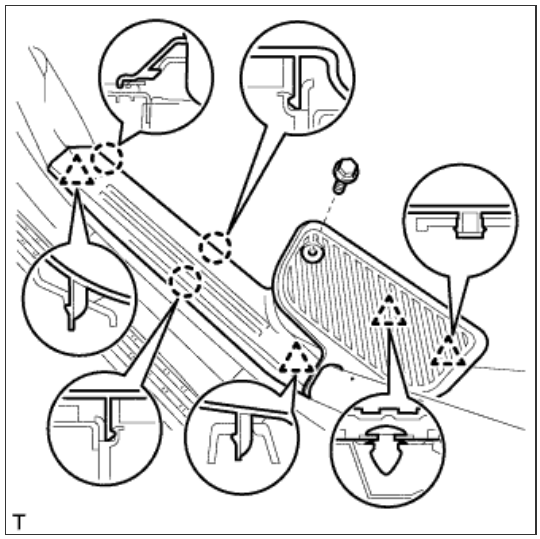
c. Install the 2 screws.



13. INSTALL FRONT DOOR SCUFF PLATE LH

a. Attach the 3 claws and 4 clips to install the scuff plate.

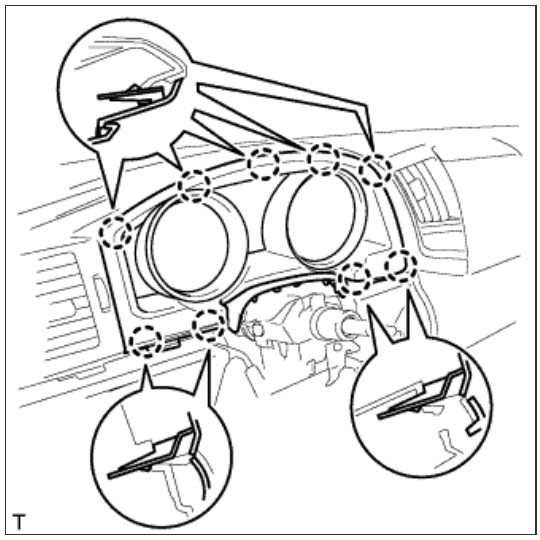
b. Install the screw.



14. INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/ Multi-information Display)

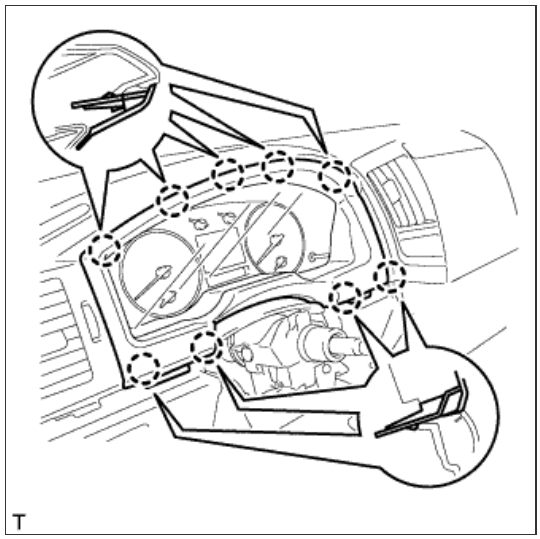
a. Connect the connector.

b. Attach the 9 claws to install the instrument cluster finish panel.



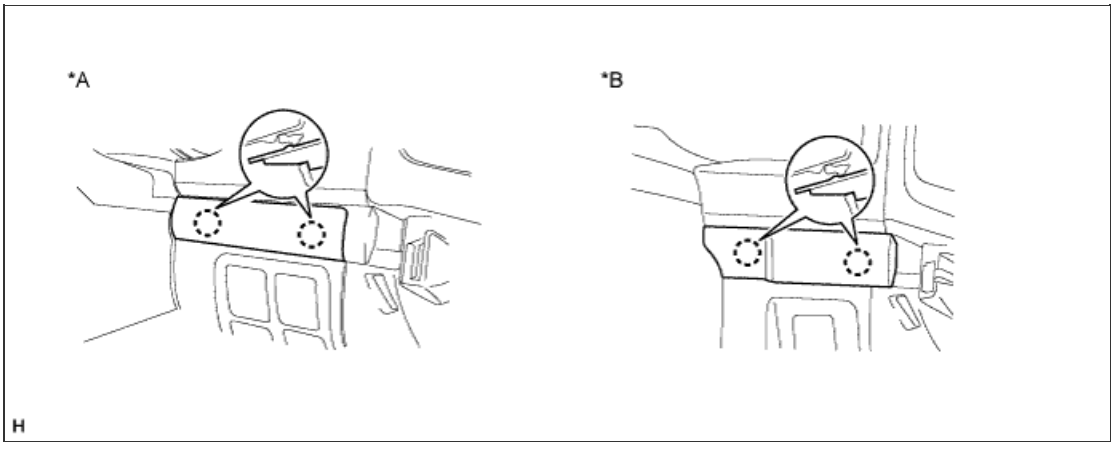
15. INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/o Multi-information Display)

a. Attach the 9 claws to install the instrument cluster finish panel.



16. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 2 claws to install the No. 2 instrument cluster finish panel garnish.

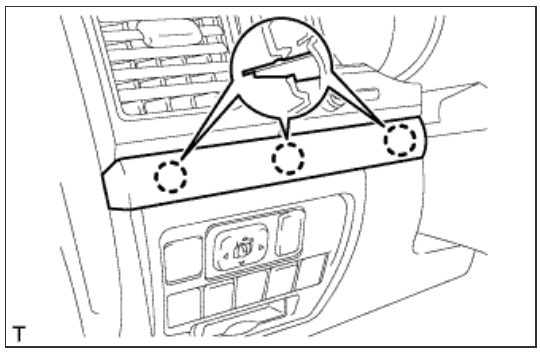


Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System

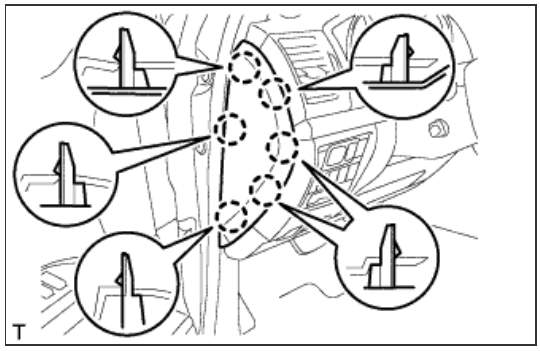
17. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 3 claws to install the No. 1 instrument cluster finish panel garnish.



18. INSTALL INSTRUMENT SIDE PANEL LH

a. Attach the 6 claws to install the instrument side panel.



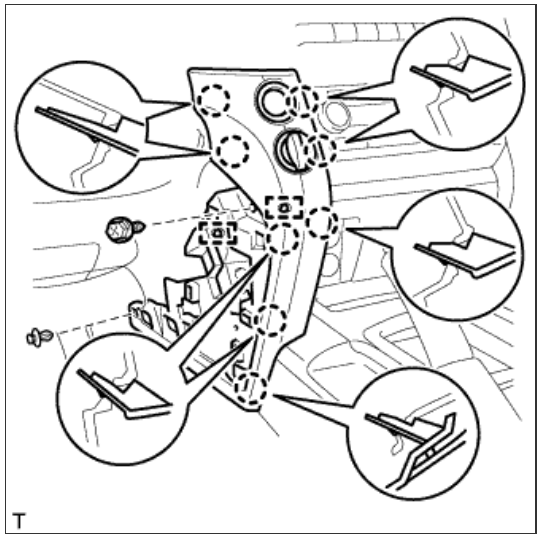
19. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Connect the connectors and 2 clamps.

b. Attach the 8 claws to install the panel pad.

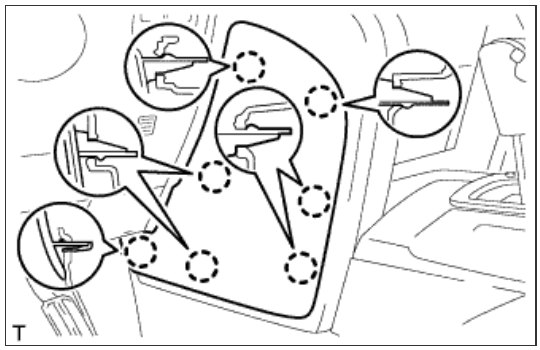
c. Install the screw.

d. Install the clip.



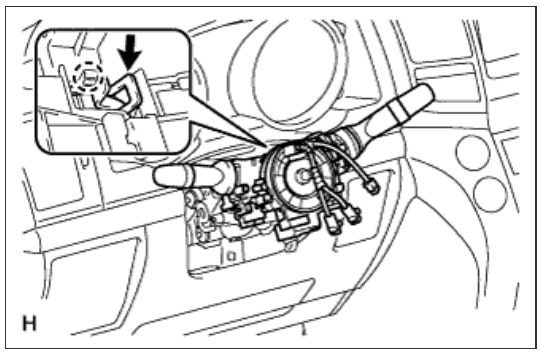
20. INSTALL NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Attach the 7 claws to install the panel cushion.

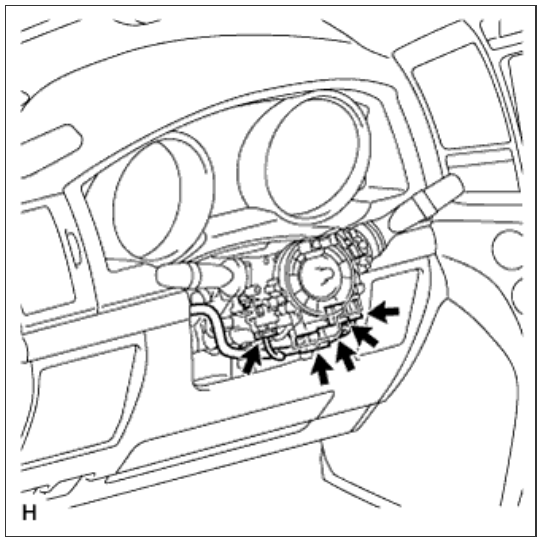


21. INSTALL COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

a. Using pliers, grip the claws of the clamp and install the turn signal switch assembly with spiral cable sub-assembly to the steering column assembly with the clamp.



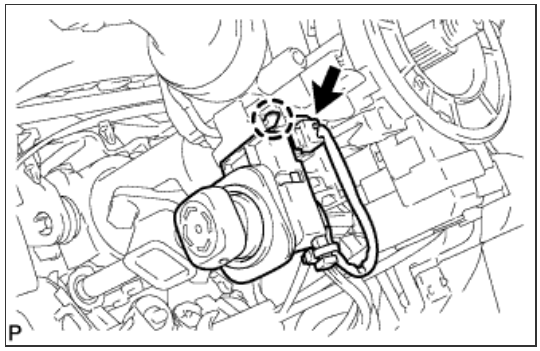
b. Connect the 5 connectors to the turn signal switch with spiral cable.



22. INSTALL TILT AND TELESCOPIC SWITCH

a. Attach the claw to install the switch.

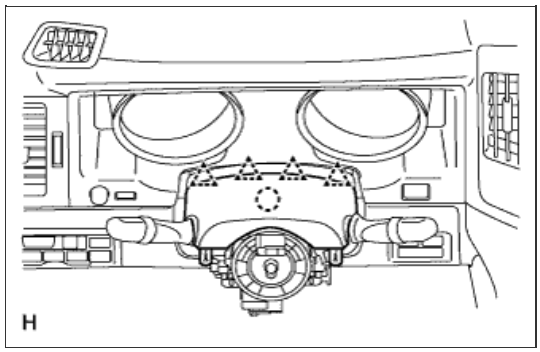
b. Connect the switch connector.



23. INSTALL UPPER STEERING COLUMN COVER

a. Attach the claw to install the upper steering column cover.

b. Attach the 4 clips to install the upper steering column cover onto the instrument cluster finish panel.



24. INSTALL LOWER STEERING COLUMN COVER

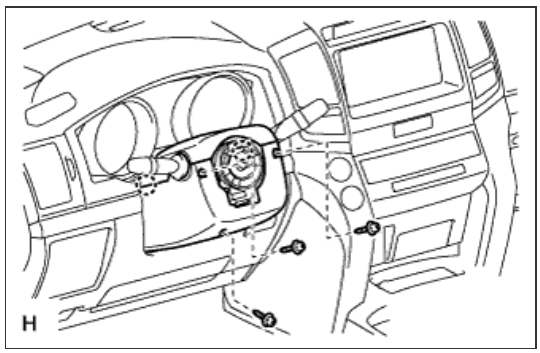
a. Attach the 2 claws to install the lower steering column cover.

NOTICE:

Do not damage the tilt and telescopic switch.

b. Install the 3 screws.

Torque:
1.5 N*m{ 15 kgf*cm , 13 in.*lbf }



25. INSTALL STEERING WHEEL ASSEMBLY

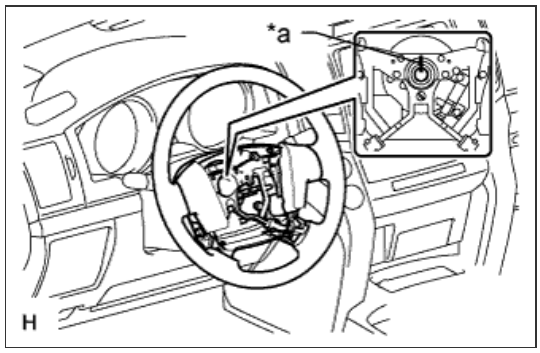
a. Align the matchmarks on the steering wheel assembly and steering main shaft assembly.

Text in Illustration

*a	Matchmark

b. Install the steering wheel assembly set nut.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }



26. INSTALL STEERING PAD

a. Support the steering pad with one hand.

b. Connect the 2 connectors to the steering pad.

NOTICE:

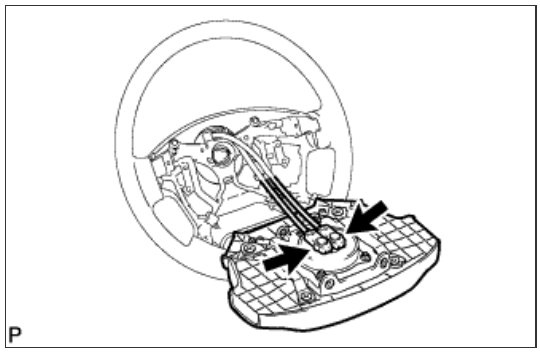
When handling the airbag connector, take care not to damage the airbag wire harness.

c. Connect the horn connector.

d. Confirm that the circumference groove of the "TORX" screw fits in the screw case, and place the steering pad onto the steering wheel.

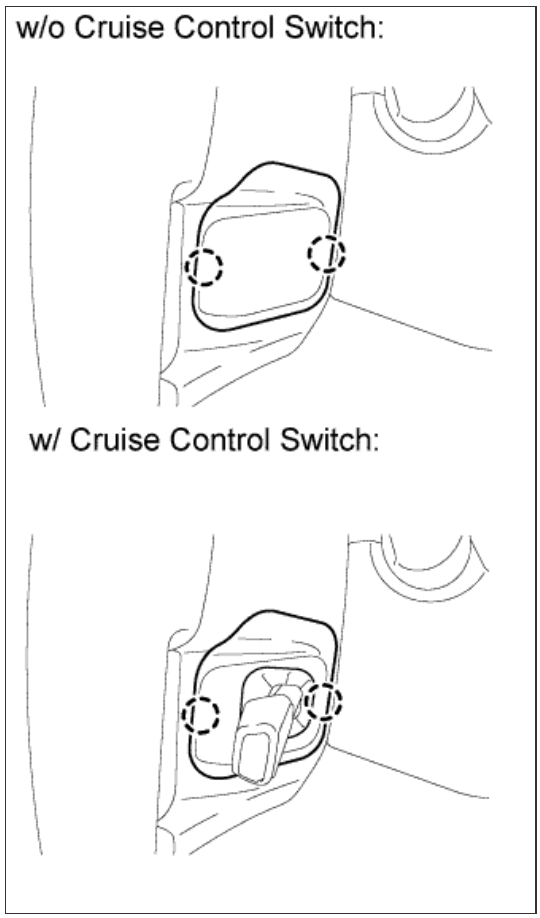
e. Using a T30 "TORX" socket wrench, tighten the 2 screws.

Torque:
8.8 N*m{ 90 kgf*cm , 78 in.*lbf }



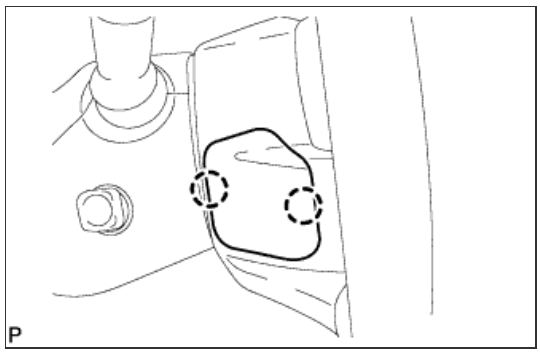
27. INSTALL LOWER NO. 2 STEERING WHEEL COVER

a. Attach the 2 claws to install the cover.



28. INSTALL LOWER NO. 3 STEERING WHEEL COVER

a. Attach the 2 claws to install the cover.



29. CHECK FRONT WHEELS FACING STRAIGHT AHEAD

30. INSTALL FRONT WHEELS

31. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

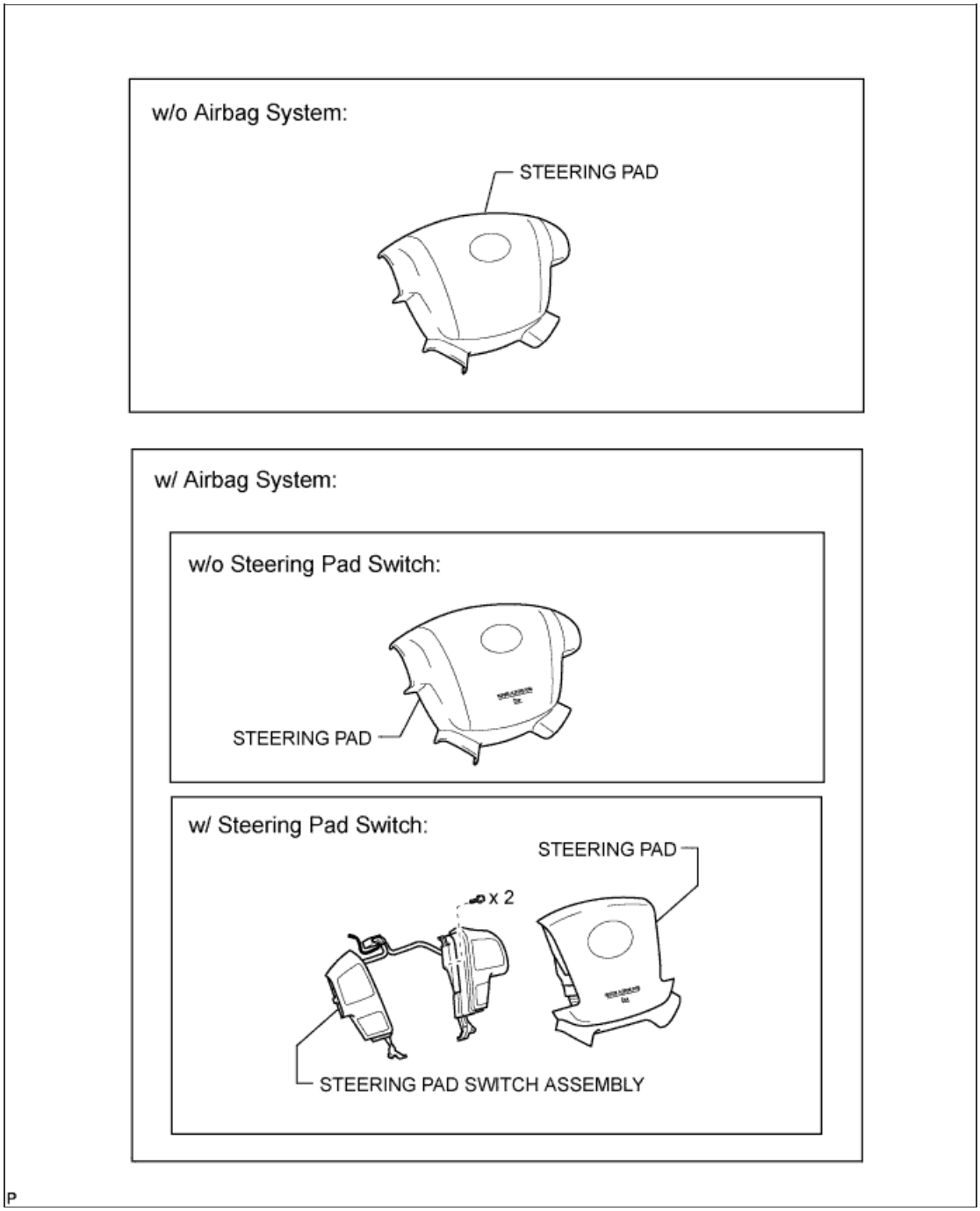
NOTICE:

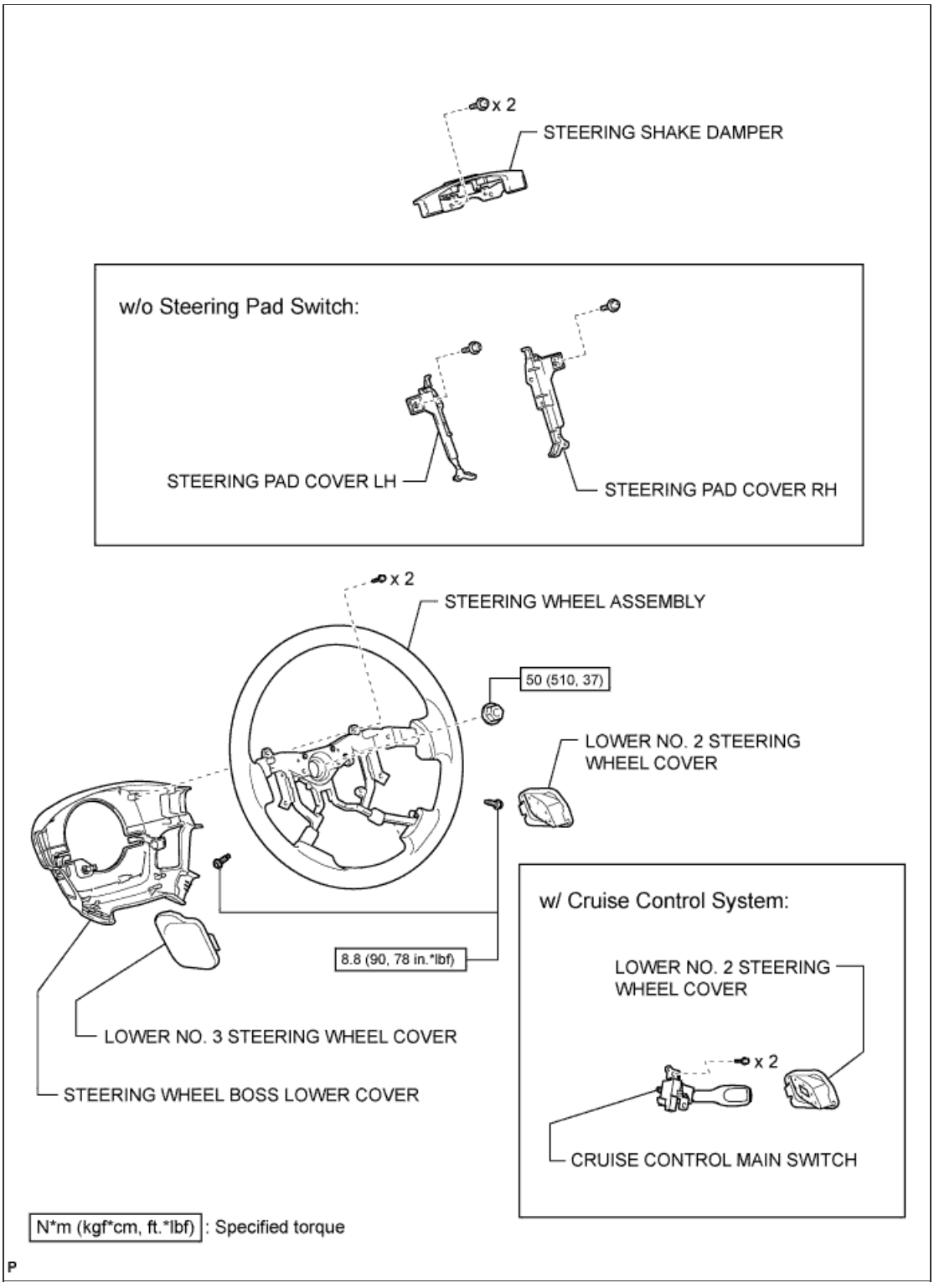
- **Reset the AUTO TILT AWAY function setting to the previous condition by changing the customize parameter (Click here).**
- **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).**

32. INSPECT SRS WARNING LIGHT

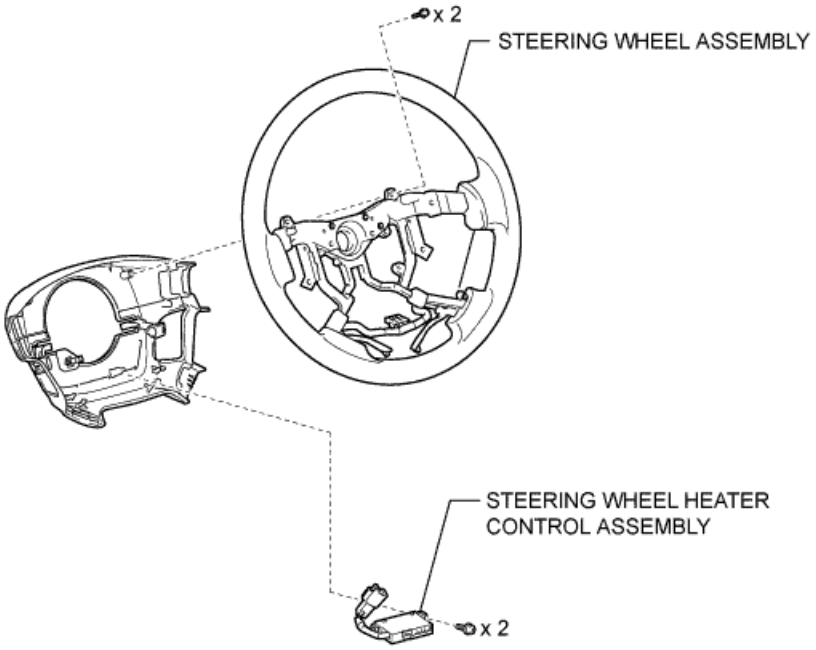
a. Inspect the SRS warning light (Click here).

for Preparation Click here




x 2
STEERING SHAKE DAMPER
w/o Steering Pad Switch:
STEERING PAD COVER LH
STEERING PAD COVER RH
x 2
STEERING WHEEL ASSEMBLY
50 (510, 37)
LOWER NO. 2 STEERING WHEEL COVER
8.8 (90, 78 in.*lbf)
LOWER NO. 3 STEERING WHEEL COVER
STEERING WHEEL BOSS LOWER COVER
w/ Cruise Control System:
LOWER NO. 2 STEERING WHEEL COVER
x 2
CRUISE CONTROL MAIN SWITCH
N*m (kgf*cm, ft.*lbf) : Specified torque
P

w/ Steering Heater:



P

for Preparation Click here

CAUTION:

Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing the steering column (Click here).

1. FRONT WHEELS FACING STRAIGHT AHEAD

2. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM

3. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

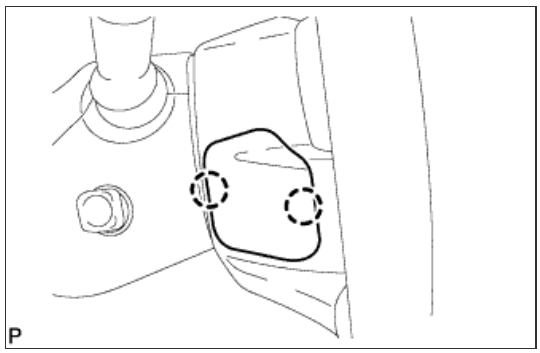
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

- **After the engine switch is turned off, the navigation system requires approximately 90 seconds to record various types of memory and settings. As a result, after turning the engine switch off, wait 90 seconds or more before disconnecting the cable from the negative (-) battery terminal.**
- **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).**

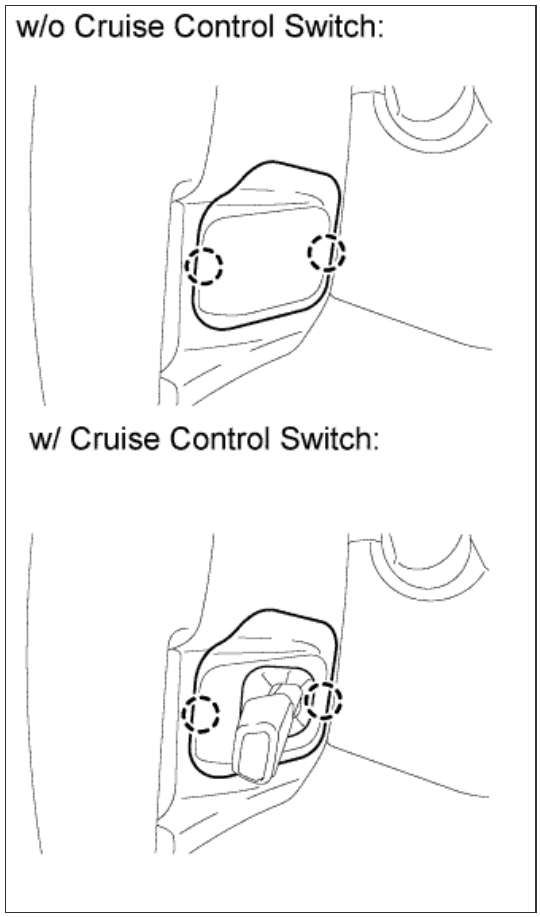
4. REMOVE LOWER NO. 3 STEERING WHEEL COVER

a. Detach the 2 claws and remove the steering wheel cover.



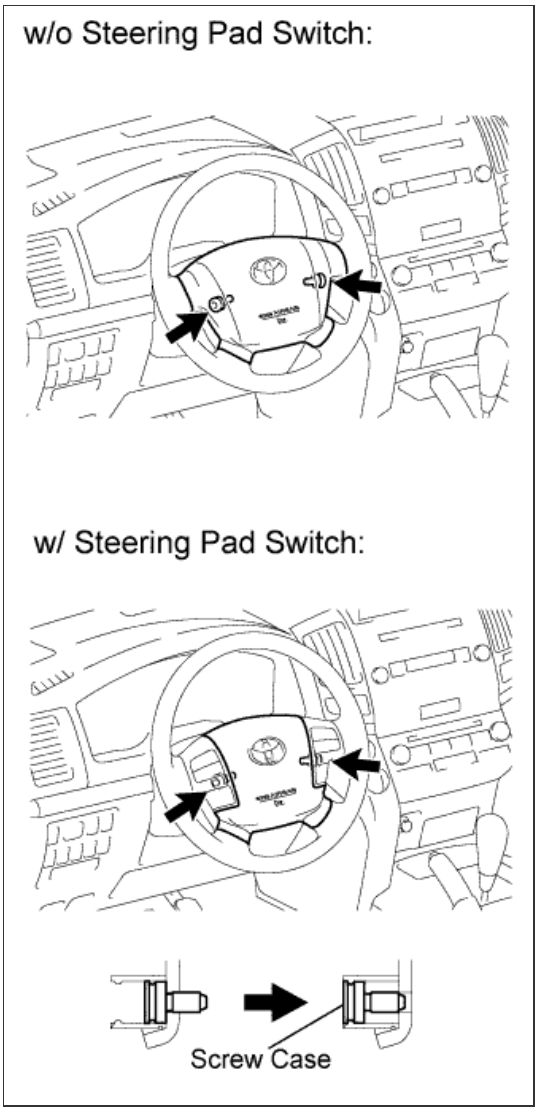
5. REMOVE LOWER NO. 2 STEERING WHEEL COVER

a. Detach the 2 claws and remove the steering wheel cover.



6. REMOVE STEERING PAD (w/ Airbag System)

a. Using a T30 "TORX" socket wrench, loosen the 2 screws until the groove along the screw circumference catches on the screw case.



b. Pull out the steering pad from the steering wheel, as shown in the illustration. Then support the steering pad with one hand.

NOTICE:

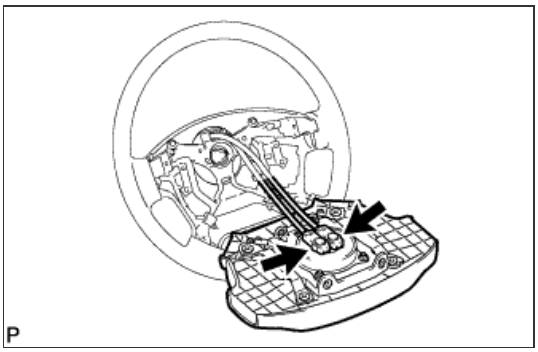
When removing the steering pad, do not pull the airbag wire harness.

c. Disconnect the horn connector.

d. Disconnect the 2 connectors and remove the steering pad.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



7. REMOVE STEERING PAD (w/o Airbag System)

HINT:

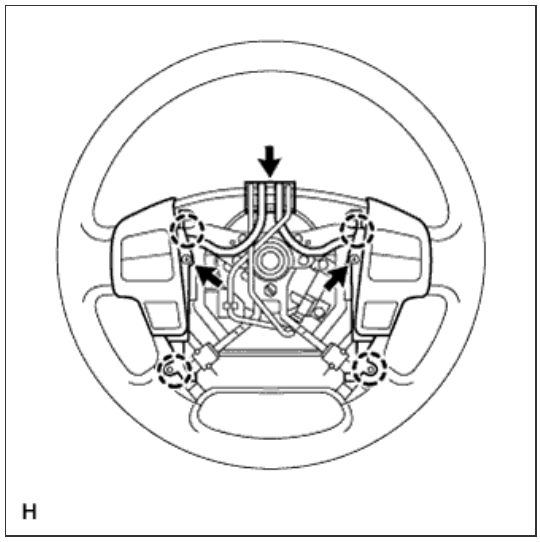
Refer to the step "REMOVE STEERING PAD (w/ Airbag System)".

8. REMOVE STEERING PAD SWITCH ASSEMBLY (w/ Steering Pad Switch)

a. Disconnect the connector.

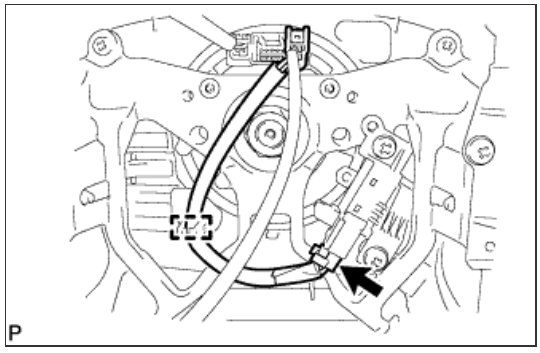
b. Remove the 2 screws.

c. Detach the 4 claws and remove the steering pad switch.

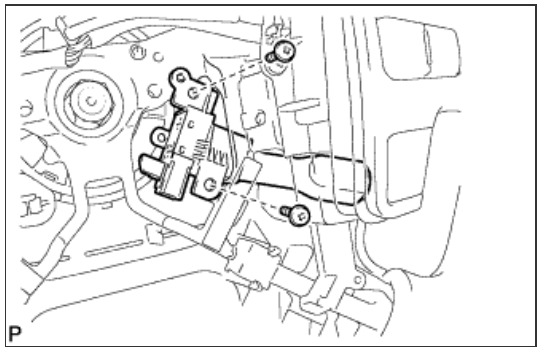


9. REMOVE CRUISE CONTROL MAIN SWITCH (w/ Cruise Control System)

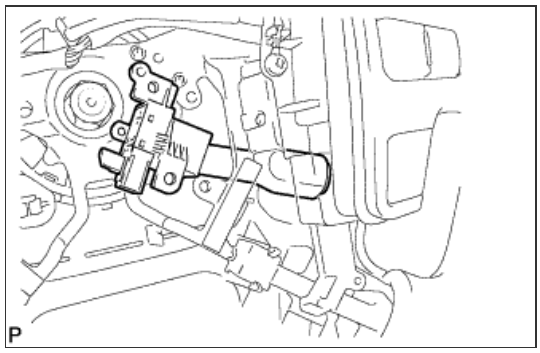
a. Disconnect the connector and clamp.



b. Remove the 2 screws.



c. Remove the switch.



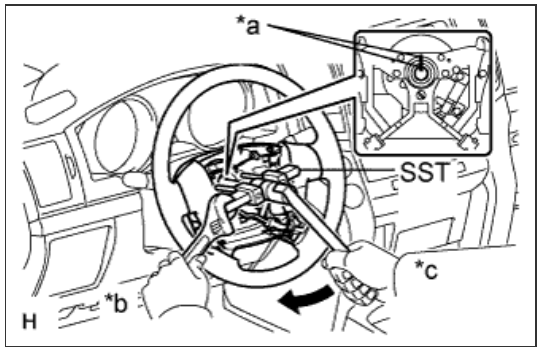
10. REMOVE STEERING WHEEL ASSEMBLY

a. Remove the steering wheel set nut.

b. Put matchmarks on the steering wheel and main shaft.

Text in Illustration

*a	Matchmark
*b	Hold
*c	Turn



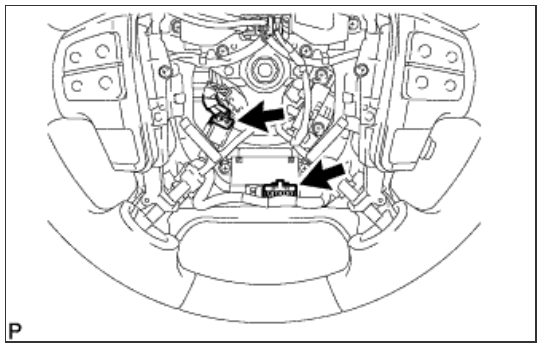
c. Using SST, remove the steering wheel assembly.

SST

09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05011)

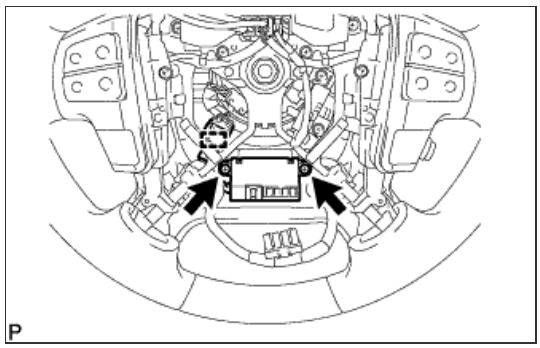
11. REMOVE STEERING WHEEL HEATER CONTROL ASSEMBLY (w/ Steering Heater)

a. Disconnect the 2 connectors.



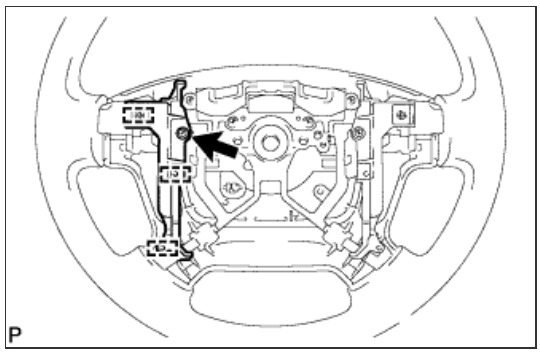
b. Detach the connector clamp.

c. Remove the 2 screws and steering wheel heater control assembly from the lower steering wheel boss cover.



12. REMOVE STEERING PAD COVER LH (w/o Steering Pad Switch)

a. Remove the screw and 3 guide pins, remove the steering pad cover.



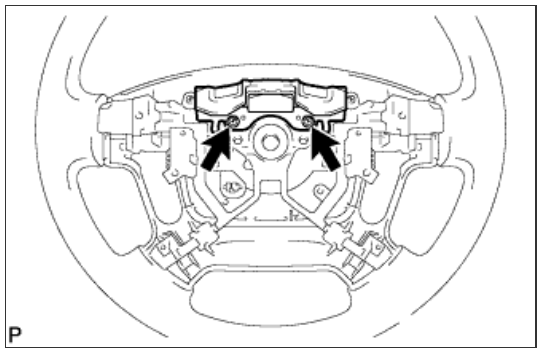
13. REMOVE STEERING PAD COVER RH (w/o Steering Pad Switch)

HINT:

Use the same procedures described for the LH side.

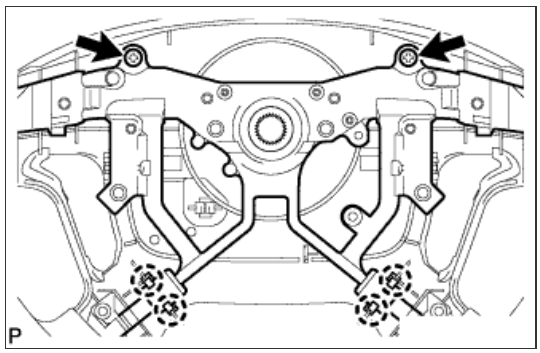
14. REMOVE STEERING SHAKE DAMPER

a. Remove the 2 screws and remove the steering shake damper.



15. REMOVE STEERING WHEEL BOSS LOWER COVER

a. Remove the 2 screws and 4 claws, and remove the steering wheel boss lower cover.



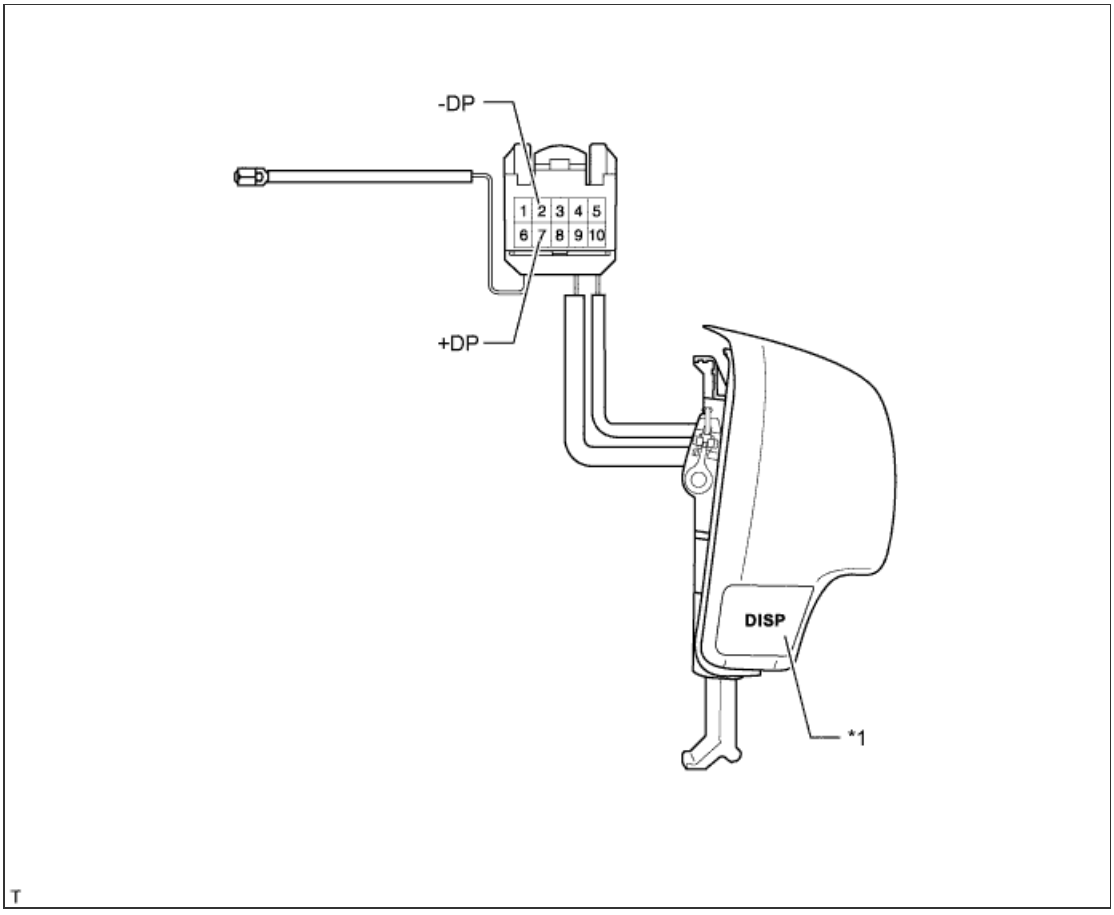
for Preparation Click here

CAUTION:

The vehicle is equipped with an SRS (Supplemental Restraint System) which includes components such as airbags. Before servicing (including removal or installation of parts), be sure to read the PRECAUTION in the SRS (Click here).

1. INSPECT STEERING PAD SWITCH ASSEMBLY (w/ DISP Switch)

a. Disconnect the z36 switch connector.



Text in Illustration

*1	DISP Switch	-	-

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

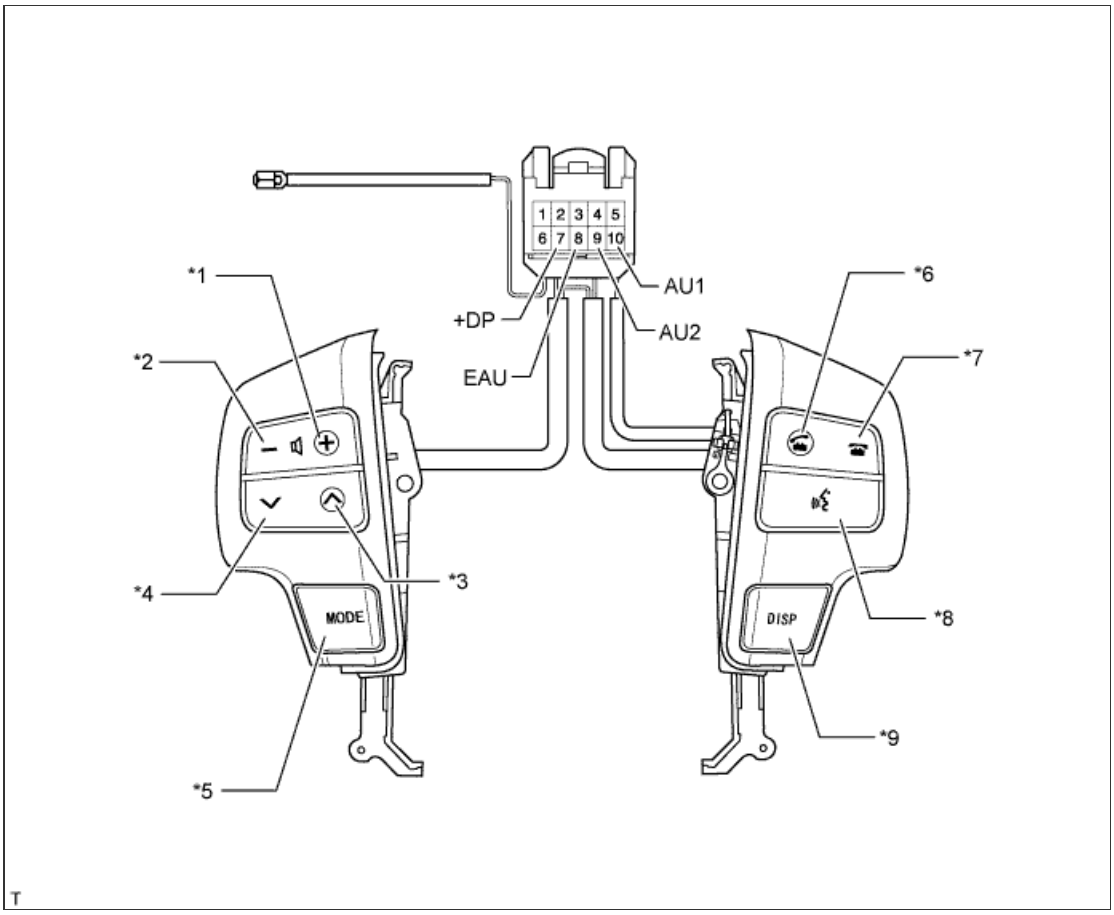
Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
2 (-DP) - 7 (+DP)	DISP switch pushed	Below 2.5 Ω

If the result is not as specified, replace the steering switch assembly.

2. INSPECT STEERING PAD SWITCH ASSEMBLY (w/ AUDIO + TEL + VOICE + DISP Switch)

a. Disconnect the z36 switch connector.



Text in Illustration

*1	Volume+ Switch	*2	Volume- Switch
*3	Seek+ Switch	*4	Seek- Switch
*5	MODE Switch	*6	Off Hook Switch
*7	On Hook Switch	*8	Voice Switch
*9	DISP Switch	-	-

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

Standard Resistance:

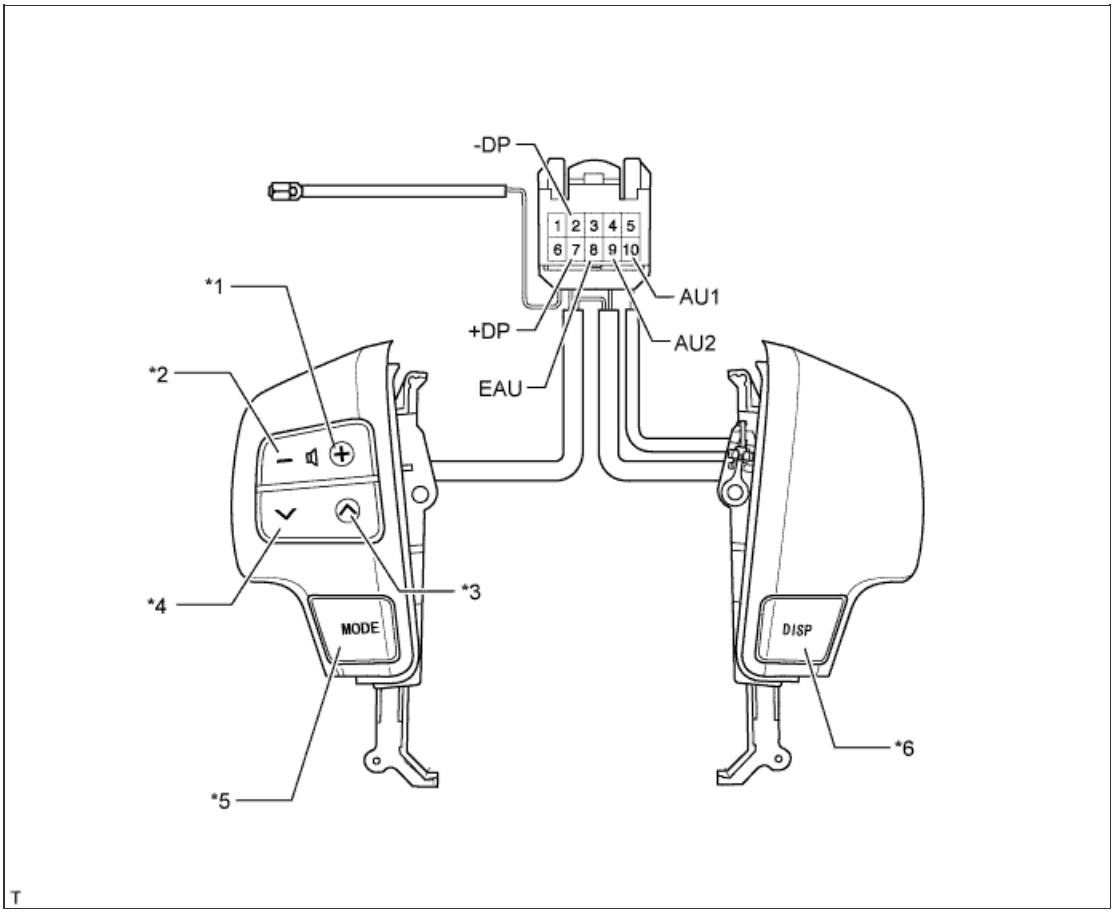
Tester Connection	Switch Condition	Specified Condition
10 (AU1) - 8 (EAU)	No switch is pushed	100 kΩ
	Seek+ switch pushed	Below 2.5 Ω
	Seek- switch pushed	329 Ω
	Volume+ switch pushed	1000 Ω
	Volume- switch pushed	3110 Ω
9 (AU2) - 8 (EAU)	No switch is pushed	100 kΩ
	MODE switch pushed	Below 2.5 Ω
	ON Hook switch pushed	329 Ω
	OFF Hook switch pushed	1000 Ω

	Voice switch pushed	3110 Ω
2 (+DP) - 8 (EAU)	DISP switch pushed	Below 2.5 Ω

If the result is not as specified, replace the steering switch assembly.

3. INSPECT STEERING PAD SWITCH ASSEMBLY (w/ AUDIO + DISP Switch)

a. Disconnect the z36 switch connector.



Text in Illustration

*1	Volume+ Switch	*2	Volume- Switch
*3	Seek+ Switch	*4	Seek- Switch
*5	MODE Switch	*6	DISP Switch

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

Standard Resistance:

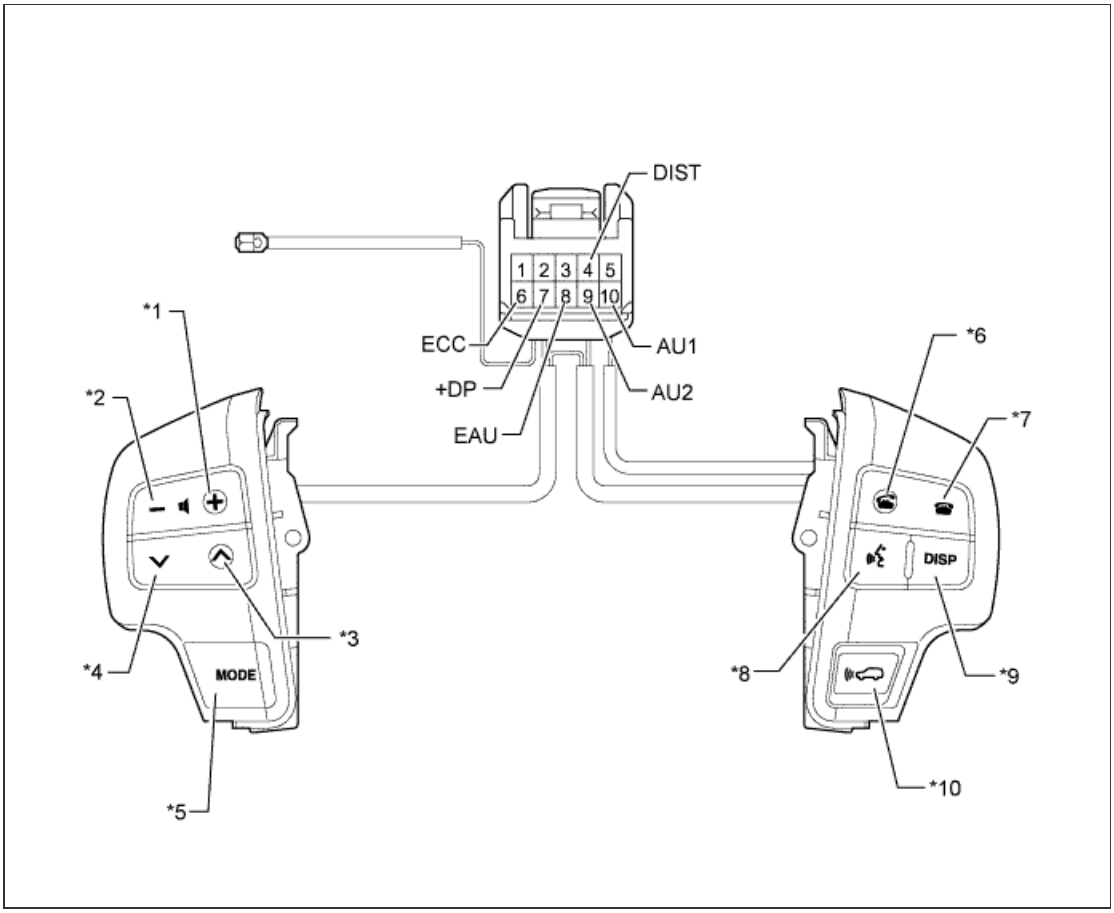
Tester Connection	Switch Condition	Specified Condition
10 (AU1) - 8 (EAU)	No switch is pushed	100 kΩ
	Seek+ switch pushed	Below 2.5 Ω
	Seek- switch pushed	329 Ω
	Volume+ switch pushed	1000 Ω
	Volume- switch pushed	3110 Ω

9 (AU2) - 8 (EAU)	No switch is pushed	100 kΩ
	MODE switch pushed	Below 2.5 Ω
2 (-DP) - 7 (+DP)	DISP switch pushed	Below 2.5 Ω

If the result is not as specified, replace the steering pad switch assembly.

4. INSPECT STEERING PAD SWITCH ASSEMBLY (w/ AUDIO + TEL + VOICE + DISP + Distance Control Switch)

a. Disconnect the z36 switch connector.



Text in Illustration

*1	Volume+ Switch	*2	Volume- Switch
*3	Seek+ Switch	*4	Seek- Switch
*5	MODE Switch	*6	Off Hook Switch
*7	On Hook Switch	*8	Voice Switch
*9	DISP Switch	*10	Distance Control Switch

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

Standard Resistance:

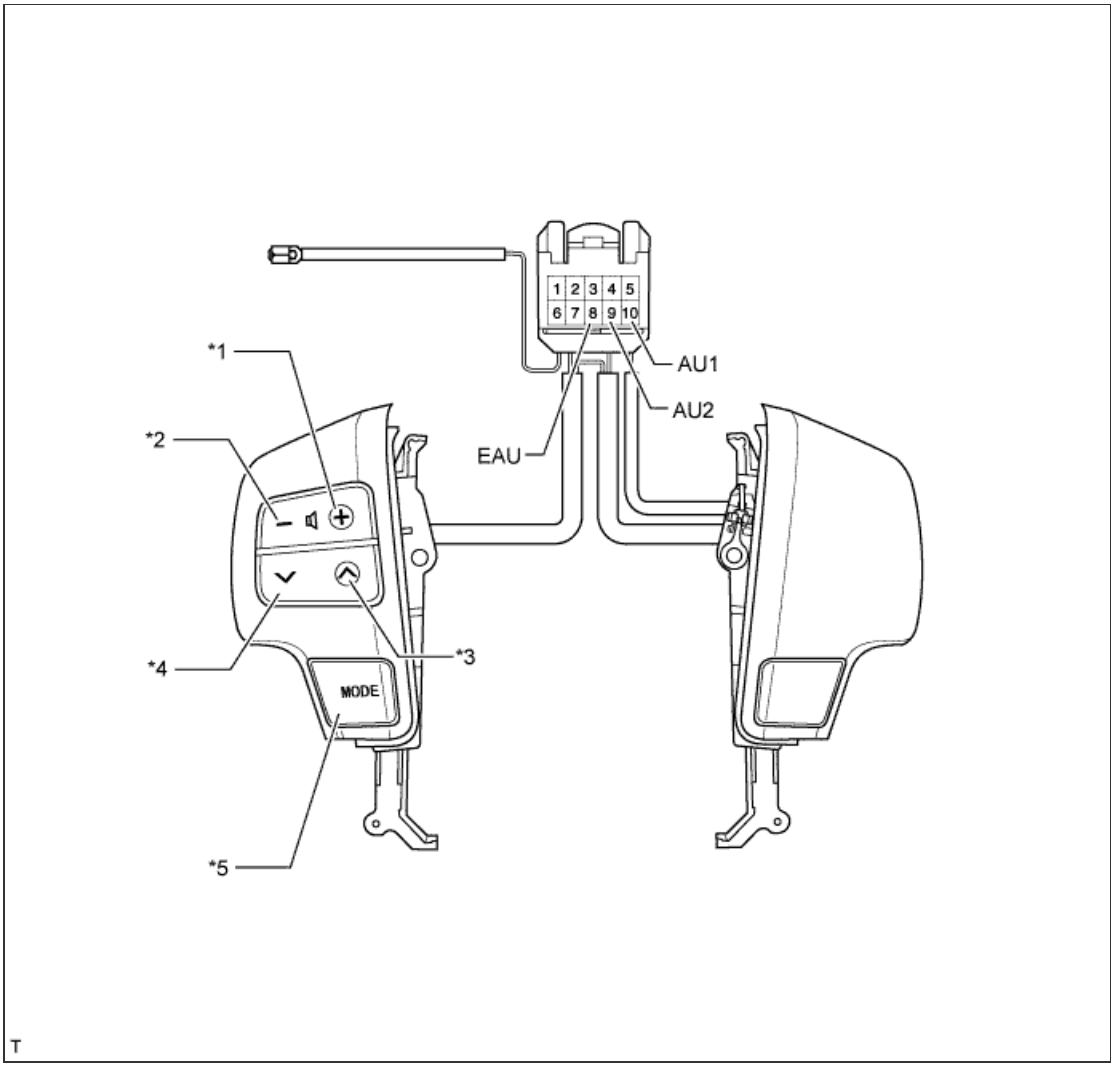
Tester Connection	Switch Condition	Specified Condition
10 (AU1) - 8 (EAU)	No switch is pushed	100 kΩ
	Seek+ switch pushed	Below 2.5 Ω
	Seek- switch	329 Ω

	pushed Volume+ switch pushed	1000 Ω
	Volume- switch pushed	3110 Ω
9 (AU2) - 8 (EAU)	No switch is pushed	100 kΩ
	MODE switch pushed	Below 2.5 Ω
	ON Hook switch pushed	329 Ω
	OFF Hook switch pushed	1000 Ω
	Voice switch pushed	3110 Ω
7 (+DP) - 8 (EAU)	DISP switch pushed	Below 2.5 Ω
4 (DIST) - 6 (ECC)	Distance Control Switch pushed	Below 2.5 Ω

If the result is not as specified, replace the steering switch assembly.

5. INSPECT STEERING PAD SWITCH ASSEMBLY (w/ AUDIO Switch)

a. Disconnect the z36 switch connector.



Text in Illustration

*1	Volume+ Switch	*2	Volume- Switch
*3	Seek+ Switch	*4	Seek- Switch
*5	MODE Switch	-	-

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

Standard Resistance:

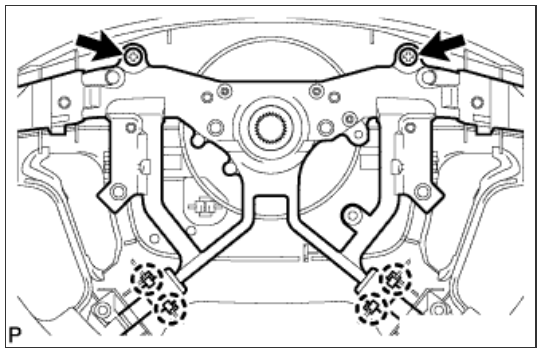
Tester Connection	Switch Condition	Specified Condition
10 (AU1) - 8 (EAU)	No switch is pushed	100 kΩ
	Seek+ switch pushed	Below 2.5 Ω
	Seek- switch pushed	329 Ω
	Volume+ switch pushed	1000 Ω
	Volume- switch pushed	3110 Ω
9 (AU2) - 8 (EAU)	No switch is pushed	100 kΩ
	MODE switch pushed	Below 2.5 Ω

If the result is not as specified, replace the steering switch assembly.

for Preparation Click here

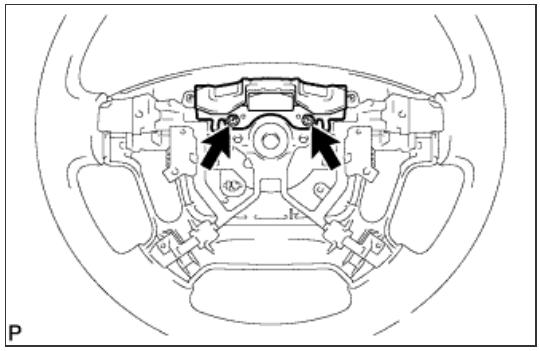
1. INSTALL STEERING WHEEL BOSS LOWER COVER

a. Attach the 4 claws and 2 screws and install the steering wheel boss lower cover.



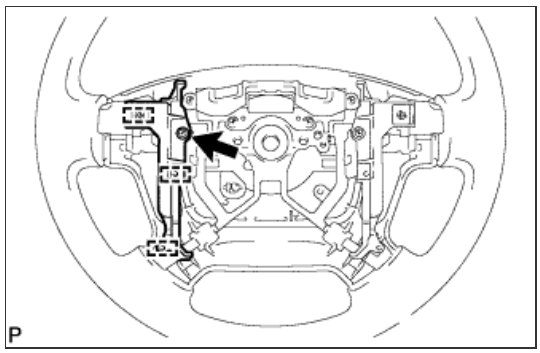
2. INSTALL STEERING SHAKE DAMPER

a. Install the 2 screws to steering shake damper.



3. INSTALL STEERING PAD COVER LH (w/o Steering Pad Switch)

a. Install the screw and 4 guide pins, install the steering pad cover LH.



4. INSTALL STEERING PAD COVER RH (w/o Steering Pad Switch)

HINT:

Use the same procedures described for the LH side.

5. INSTALL STEERING WHEEL HEATER CONTROL ASSEMBLY (w/ Steering Heater)

a. Install the steering wheel heater control assembly to the lower steering wheel boss cover with the 2 screws.

b. Attach the connector clamp.

c. Connect the 2 connectors.

6. ADJUST SPIRAL CABLE

a. Check that the ignition switch is off.

b. Check that the cable is disconnected from the battery negative (-) terminal.

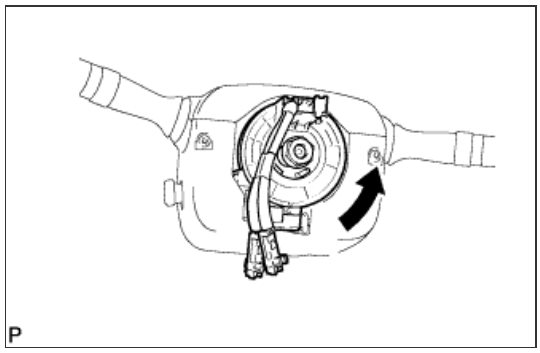
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

c. Rotate the spiral cable with steering sensor counterclockwise slowly by hand until it feels firm.

CAUTION:

Do not turn the spiral cable with steering sensor by the airbag wire harness.



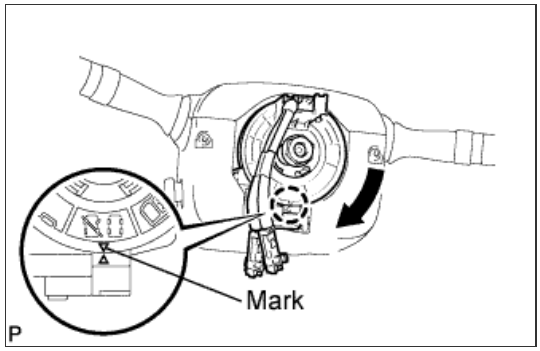
d. Rotate the spiral cable with steering sensor clockwise approximately 2.5 turns to align the marks.

CAUTION:

Do not turn the spiral cable with spiral sensor by the airbag wire harness.

HINT:

The spiral cable with steering sensor will rotate approximately 2.5 turns to both the left and right from the center.



7. INSTALL STEERING WHEEL ASSEMBLY

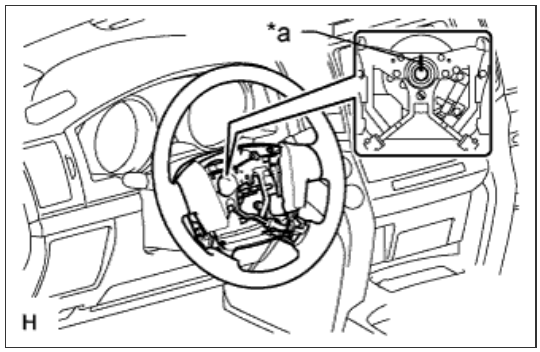
a. Align the matchmarks on the steering wheel assembly and steering main shaft assembly.

Text in Illumination

*a	Matchmark

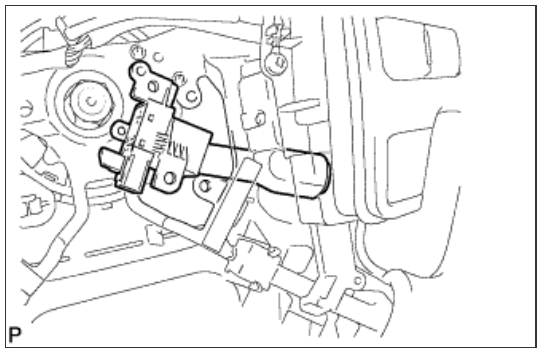
b. Install the steering wheel assembly set nut.

Torque:
50 N*m{ 510 kgf*cm , 37 ft.*lbf }

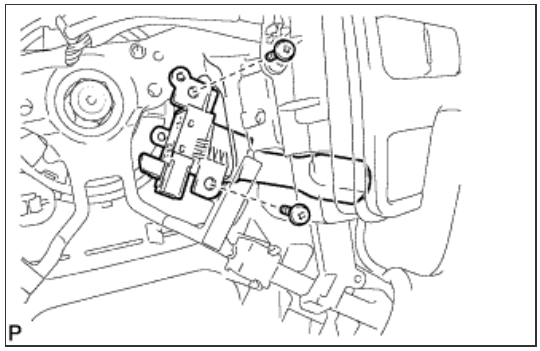


8. INSTALL CRUISE CONTROL MAIN SWITCH (w/ Cruise Control System)

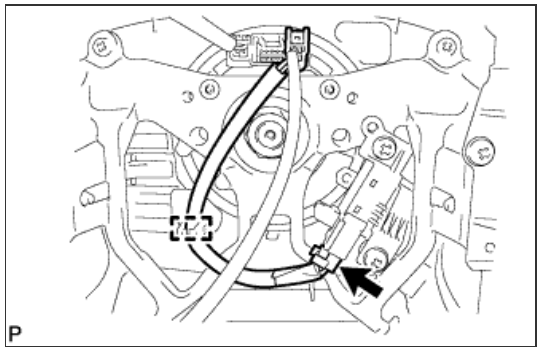
a. Install the switch.



b. Install the 2 screws.



c. Connect the connector and clamp.

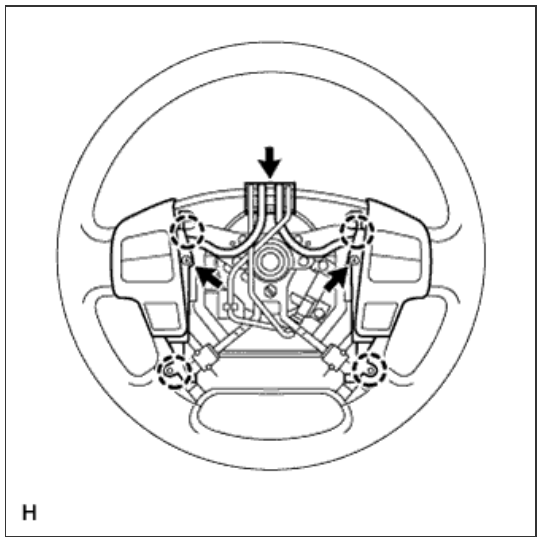


9. INSTALL STEERING PAD SWITCH ASSEMBLY (w/ Steering Pad Switch)

a. Attach the 4 claws to install the steering pad switch.

b. Install the 2 screws.

c. Connect the connector.



10. INSTALL STEERING PAD (w/ Airbag System)

a. Support the steering pad with one hand.

b. Connect the 2 connectors to the steering pad.

NOTICE:

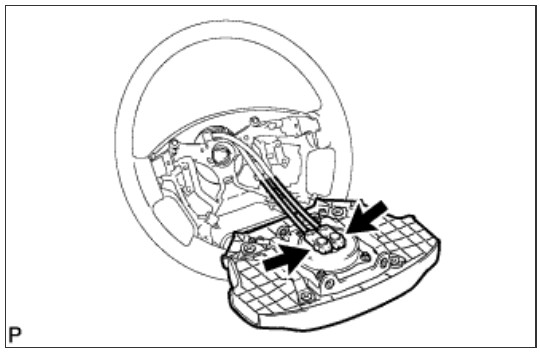
When handling the airbag connector, take care not to damage the airbag wire harness.

c. Connect the horn connector.

d. Confirm that the circumference groove of the "TORX" screw fits in the screw case, and place the steering pad onto the steering wheel.

e. Using a T30 "TORX" socket wrench, tighten the 2 screws.

Torque:
8.8 N*m{ 90 kgf*cm , 78 in.*lbf }



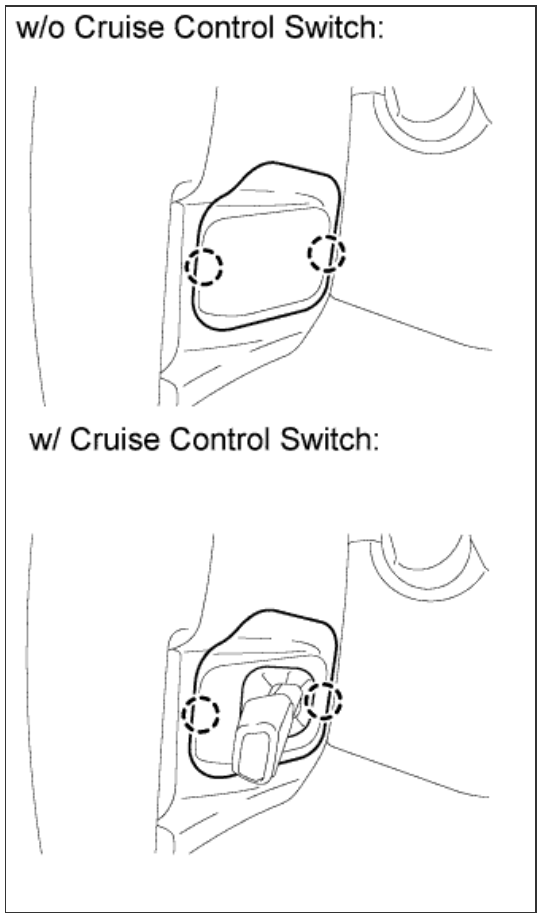
11. INSTALL STEERING PAD (w/o Airbag System)

HINT:

Refer to the step "INSTALL STEERING PAD (w/ Airbag System)".

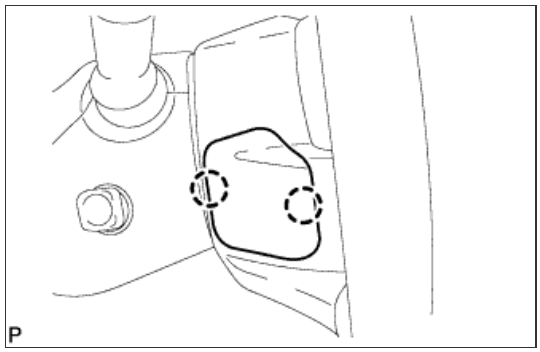
12. INSTALL LOWER NO. 2 STEERING WHEEL COVER

a. Attach the 2 claws to install the cover.



13. INSTALL LOWER NO. 3 STEERING WHEEL COVER

a. Attach the 2 claws to install the cover.



14. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

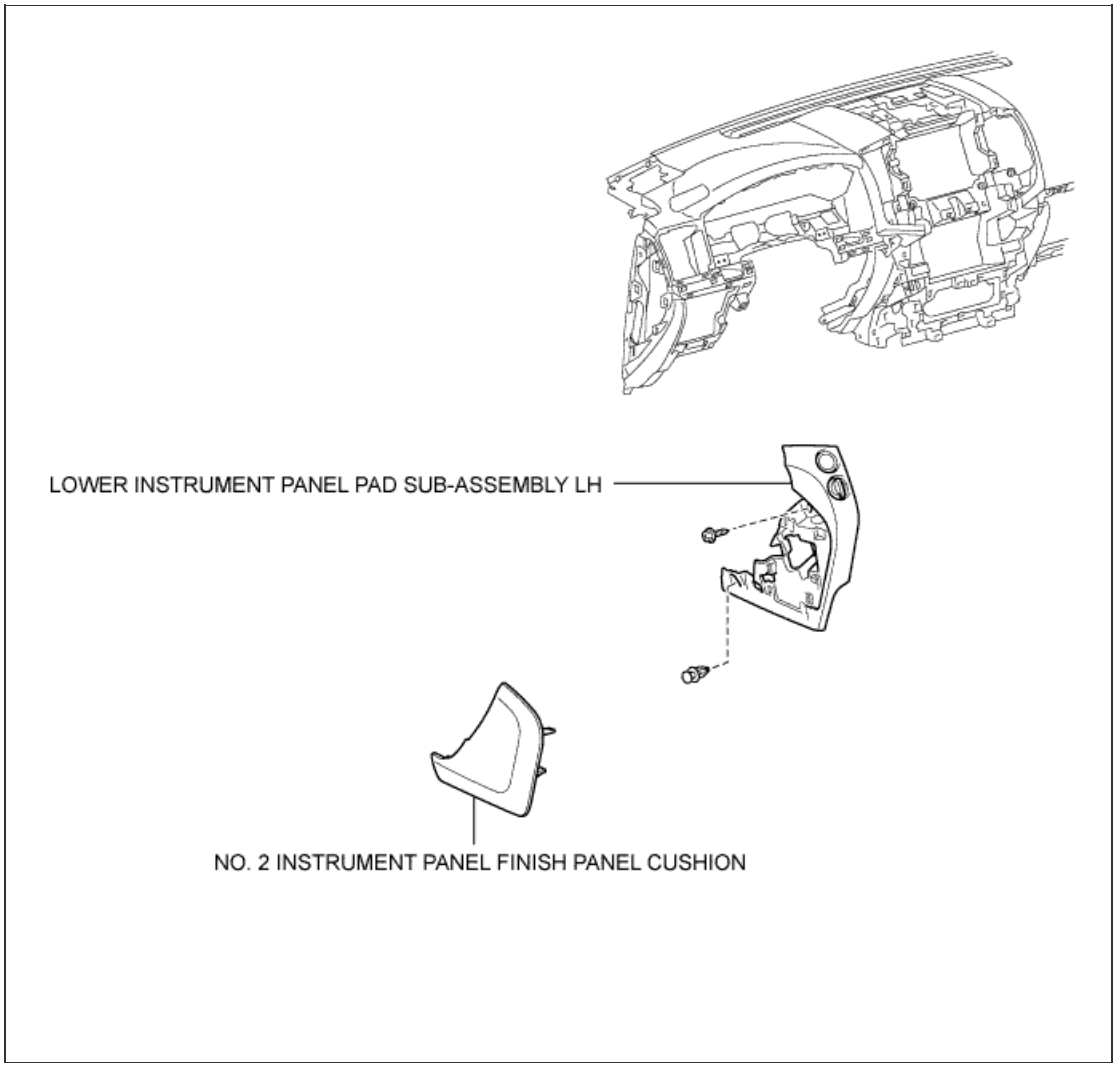
NOTICE:

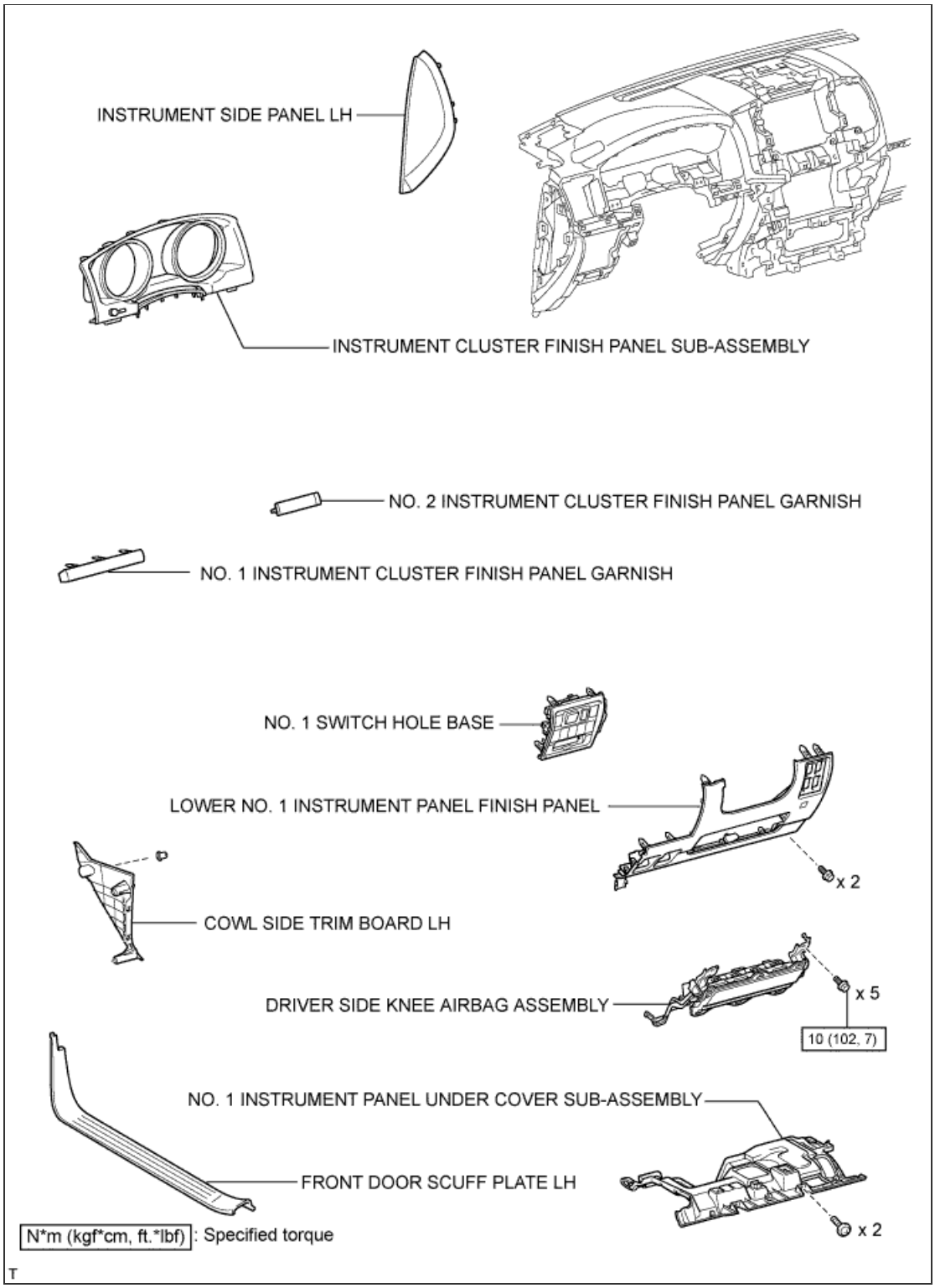
When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

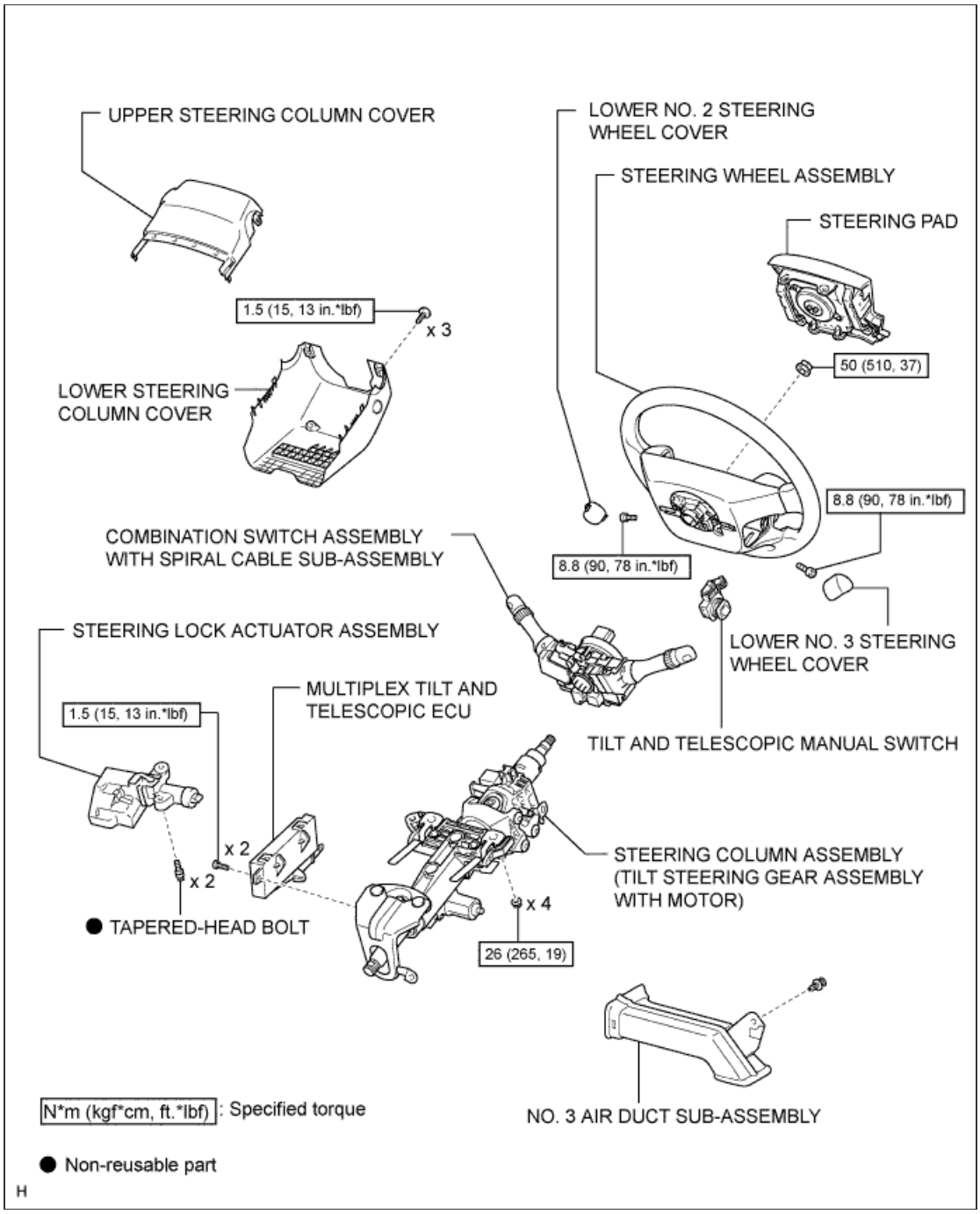
15. CHECK SRS WARNING LIGHT

a. Check the SRS warning light (Click here).

for Preparation [Click here]




INSTRUMENT SIDE PANEL LH
INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 1 SWITCH HOLE BASE
LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL
x 2
COWL SIDE TRIM BOARD LH
DRIVER SIDE KNEE AIRBAG ASSEMBLY
x 5
10 (102, 7)
NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY
FRONT DOOR SCUFF PLATE LH
x 2
N*m (kgf*cm, ft.*lbf) : Specified torque
T


UPPER STEERING COLUMN COVER
LOWER NO. 2 STEERING WHEEL COVER
STEERING WHEEL ASSEMBLY
STEERING PAD
1.5 (15, 13 in.*lbf)
x 3
LOWER STEERING COLUMN COVER
50 (510, 37)
8.8 (90, 78 in.*lbf)
8.8 (90, 78 in.*lbf)
COMBINATION SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY
LOWER NO. 3 STEERING WHEEL COVER
STEERING LOCK ACTUATOR ASSEMBLY
MULTIPLEX TILT AND TELESCOPIC ECU
1.5 (15, 13 in.*lbf)
TILT AND TELESCOPIC MANUAL SWITCH
x 2
x 2
STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR)
x 4
● TAPERED-HEAD BOLT
26 (265, 19)
NO. 3 AIR DUCT SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
H

for Preparation Click here

1. REMOVE STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR)

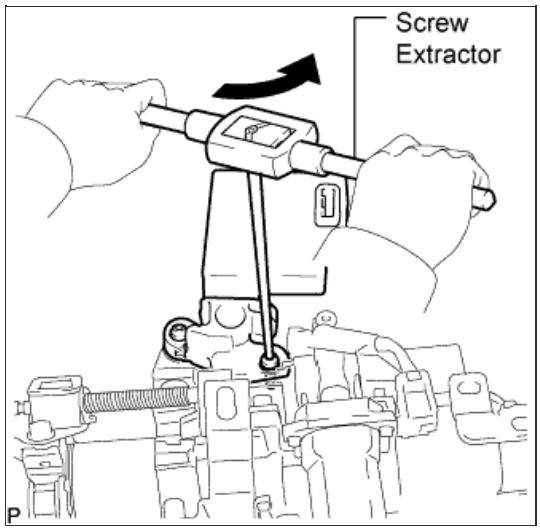
(Click here)

2. REMOVE STEERING LOCK ACTUATOR ASSEMBLY

a. Using a center punch, mark the center of the 2 tapered-head bolts.

b. Using a 3 to 4 mm (0.118 to 0.157 in.) drill, drill a hole in the 2 bolts.

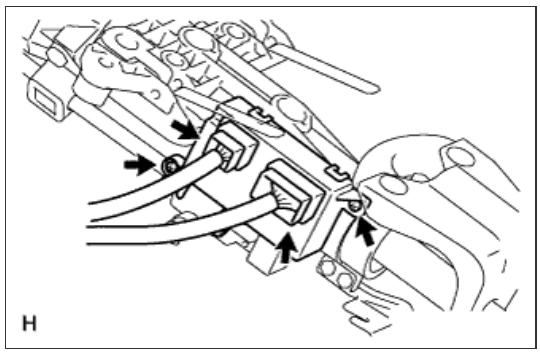
c. Using a screw extractor, remove the 2 bolts and the steering lock actuator assembly from the steering column assembly.



3. REMOVE MULTIPLEX TILT AND TELESCOPIC ECU

a. Disconnect the 2 connectors.

b. Remove the 2 screws and ECU.



for Preparation Click here

1. INSTALL MULTIPLEX TILT AND TELESCOPIC ECU

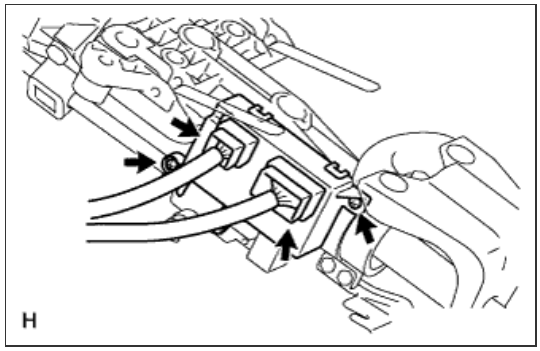
a. Install the ECU with the 2 screws.

Torque:
1.5 N*m{ 15 kgf*cm , 13 in.*lbf }

b. Connect the 2 connectors.

NOTICE:

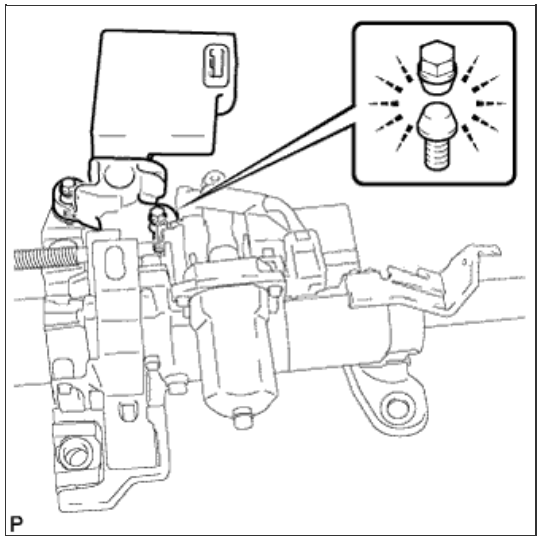
The connectors on both ends of the wire harness between the telescopic motor and ECU are the same shape. When installing them, connect the connectors of the same color.



2. INSTALL STEERING LOCK ACTUATOR ASSEMBLY

a. Temporarily install the steering lock actuator assembly with 2 new tapered-head bolts.

b. Tighten the 2 tapered-head bolts until the bolt heads break off.

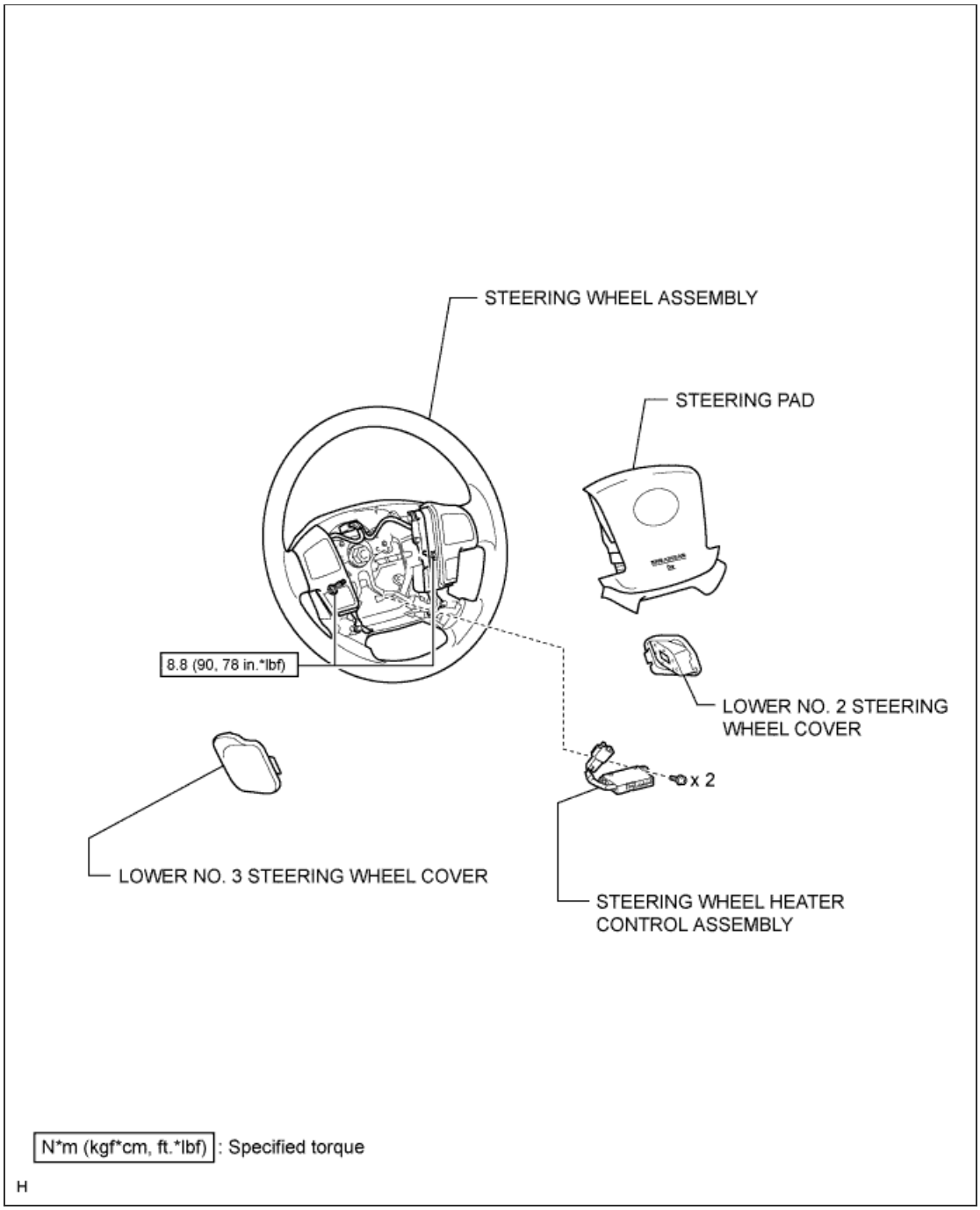


3. INSTALL STEERING COLUMN ASSEMBLY (TILT STEERING GEAR ASSEMBLY WITH MOTOR)

HINT:

Refer to the instructions for installation of the steering column assembly (Click here).

for Preparation Click here



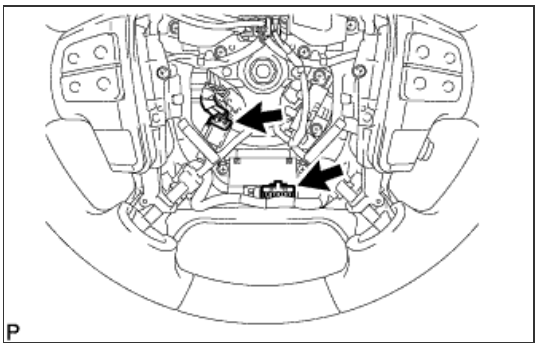
for Preparation Click here

1. REMOVE STEERING PAD

(Click here)

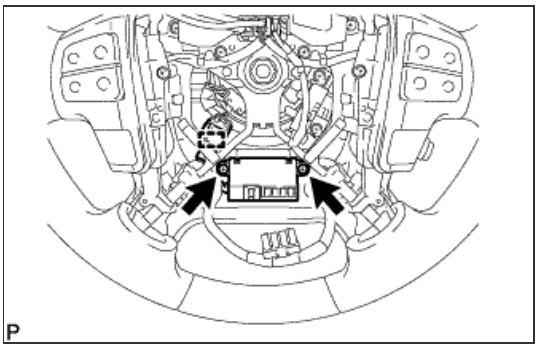
2. REMOVE STEERING WHEEL HEATER CONTROL ASSEMBLY

a. Disconnect the 2 connectors.



b. Detach the connector clamp.

c. Remove the 2 screws and steering wheel heater control assembly from the lower steering wheel boss cover.



for Preparation Click here

1. INSTALL STEERING WHEEL HEATER CONTROL ASSEMBLY

a. Install the steering wheel heater control assembly to the lower steering wheel boss cover with the 2 screws.

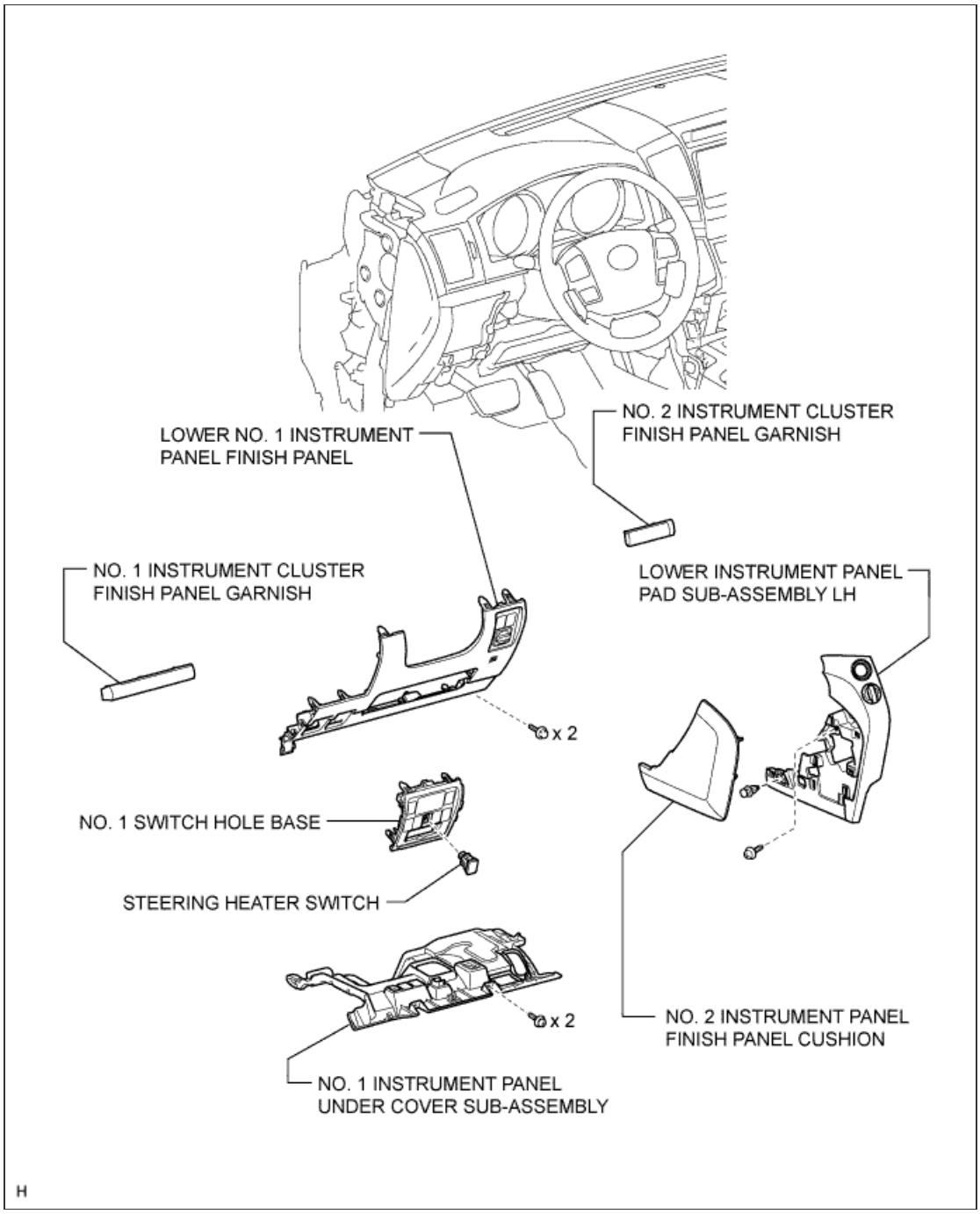
b. Attach the connector clamp.

c. Connect the 2 connectors.

2. INSTALL STEERING PAD

(Click here)

for Preparation Click here



for Preparation Click here

HINT:

- **Use the same procedure for RHD and LHD vehicles.**
- **The procedure listed below is for LHD vehicles.**

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).

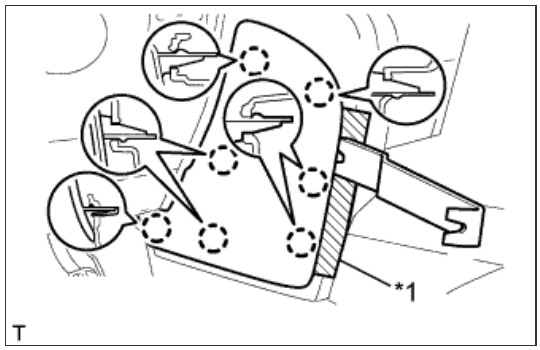
2. REMOVE NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Put protective tape around the No. 2 instrument panel finish panel cushion.

Text in Illustration

*1	Protective Tape

b. Using a moulding remover, detach the 7 claws and remove the No. 2 instrument panel finish panel cushion.



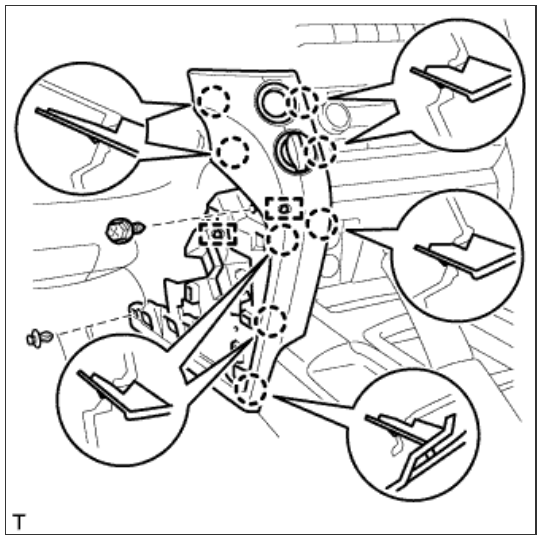
3. REMOVE LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Remove the clip.

b. Remove the screw.

c. Detach the 8 claws.

d. Remove the panel pad and disconnect the connectors and 2 clamps.



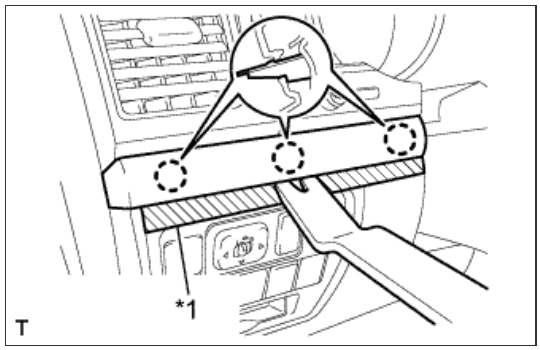
4. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

Text in Illustration

*1	Protective Tape

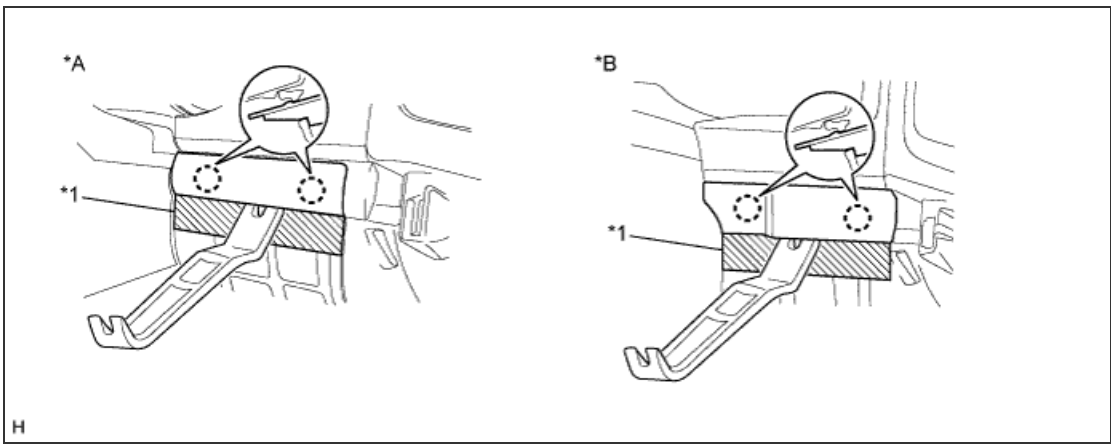
b. Using a moulding remover, detach the 3 claws and remove the No. 1 instrument cluster finish panel garnish.



5. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Place protective tape as shown in the illustration.

b. Using a moulding remover, detach the 2 claws and remove the No. 2 instrument cluster finish panel garnish.



Text in Illustration

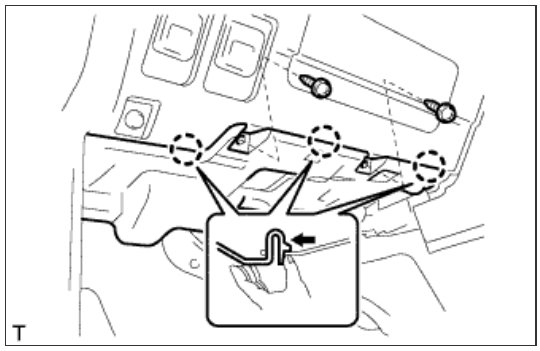
*A	w/ Entry and Start System	*B	w/o Entry and Start System
*1	Protective Tape	-	-

6. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

a. Remove the 2 screws.

b. Detach the 3 claws.

c. Disconnect the connectors and remove the No. 1 instrument panel under cover.



7. REMOVE LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

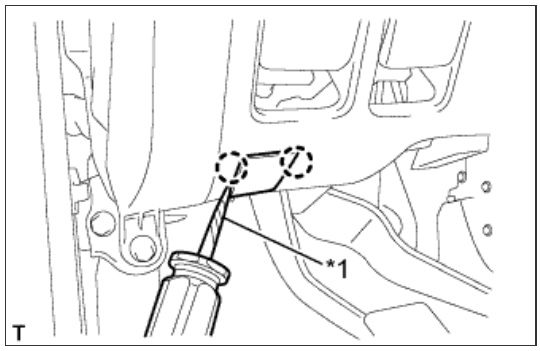
a. Using a screwdriver, detach the 2 claws and open the hole cover.

HINT:

Tape the screwdriver tip before use.

Text in Illustration

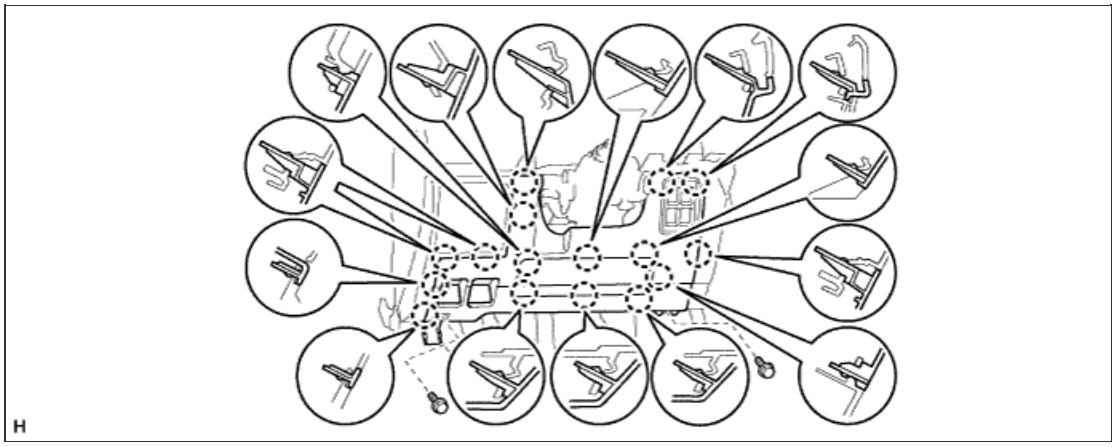
*1	Protective Tape



b. w/ Driver Side Knee Airbag:

i. Remove the 2 bolts.

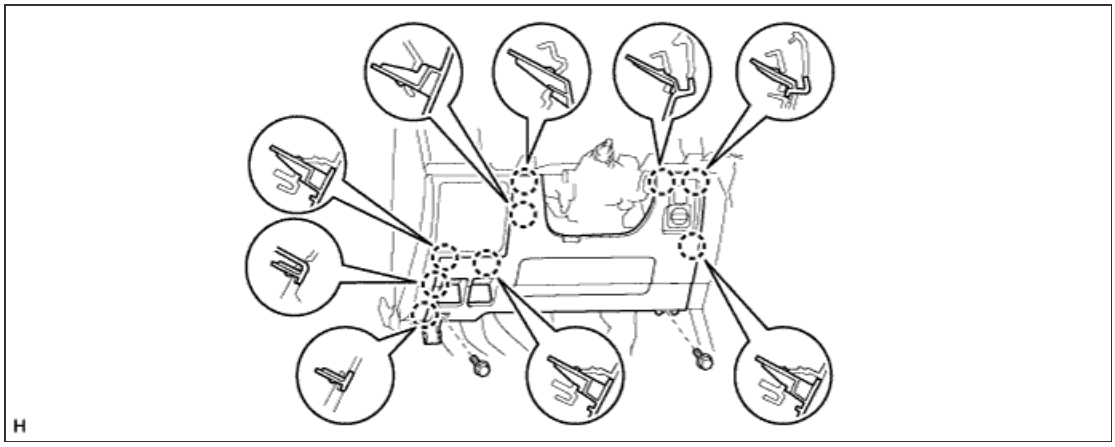
ii. Detach the 16 claws.



c. w/o Driver Side Knee Airbag:

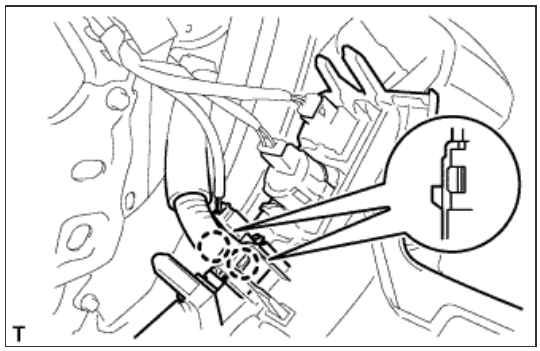
i. Remove the 2 bolts.

ii. Detach the 9 claws.



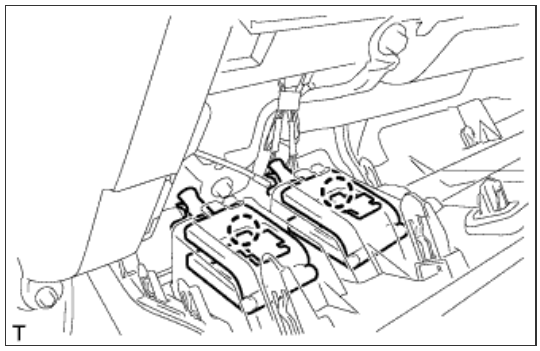
d. for Automatic Air Conditioning System:

i. Detach the 2 claws and remove the room temperature sensor.



e. Detach the 2 claws and disconnect the 2 control cables.

f. Disconnect the connectors and remove the lower No. 1 instrument panel finish panel.

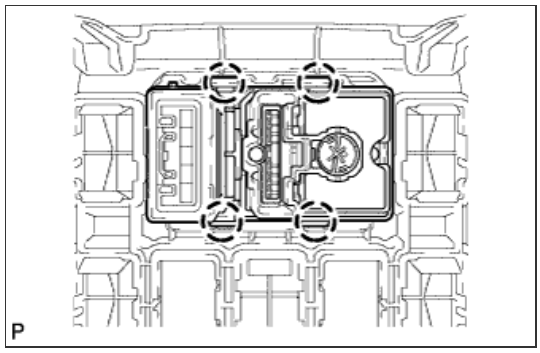


8. REMOVE NO. 1 SWITCH HOLE BASE

a. Using a screwdriver, detach the 4 claws and remove the switch.

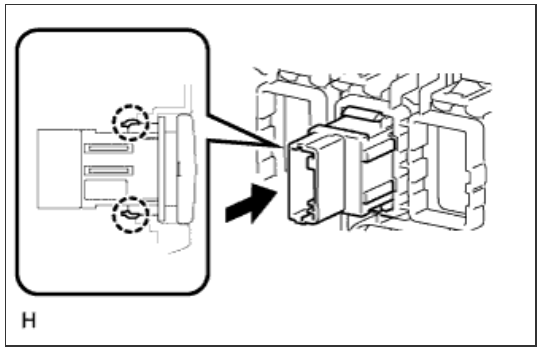
HINT:

Tape the screwdriver tip before use.



9. REMOVE STEERING HEATER SWITCH

a. Detach the 2 claws to remove the steering heater switch from the lower instrument panel finish panel sub-assembly.



for Preparation Click here

1. INSPECT STEERING HEATER SWITCH

a. Disconnect the steering heater switch connector.

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

HINT:

As the circuit has a diode, perform the measurement in diode test mode, and do not mistake the polarity.

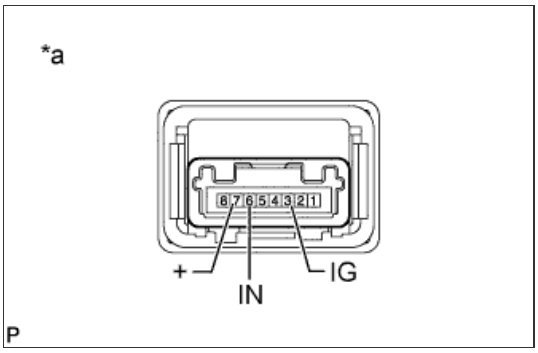
Standard Voltage:

Tester Connection (Positive (+) tester probe - Negative (-) tester probe)	Condition	Specified Condition
3 (IG) - 7 (+)	Always	Below 1.25 V
6 (IN) - 7 (+)	Steering heater switch is pushed	Below 1.25 V

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

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 (IG) - 6 (IN)	Steering heater switch is pushed	Below 1 Ω
3 (IG) - 6 (IN)	Steering heater switch is not pushed	10 kΩ or higher



Text in Illustration

*a	Component without harness connected (Steering Heater Switch)

for Preparation Click here

HINT:

- **Use the same procedure for RHD and LHD vehicles.**
- **The procedure listed below is for LHD vehicles.**

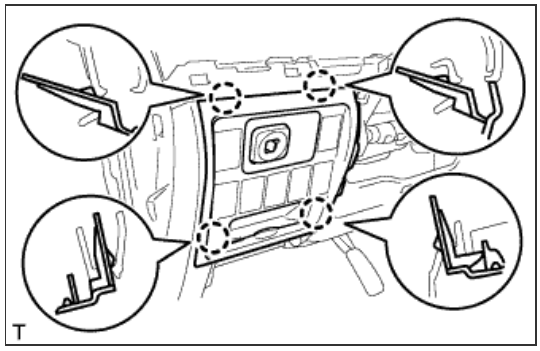
1. INSTALL STEERING HEATER SWITCH

a. Attach the 2 claws to install the steering heater switch to the lower instrument panel finish panel sub-assembly.

2. INSTALL NO. 1 SWITCH HOLE BASE

a. Connect the connectors.

b. Attach the 4 claws to install the No. 1 switch hole base.

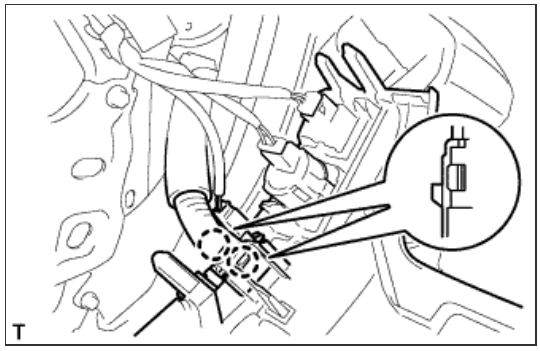


3. INSTALL LOWER NO. 1 INSTRUMENT PANEL FINISH PANEL

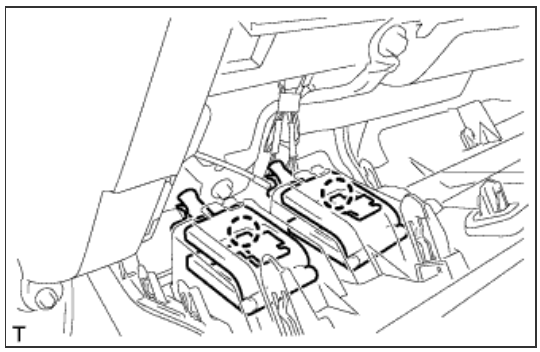
a. Connect the connectors.

b. for Automatic Air Conditioning System:

i. Attach the 2 claws to install the room temperature sensor.



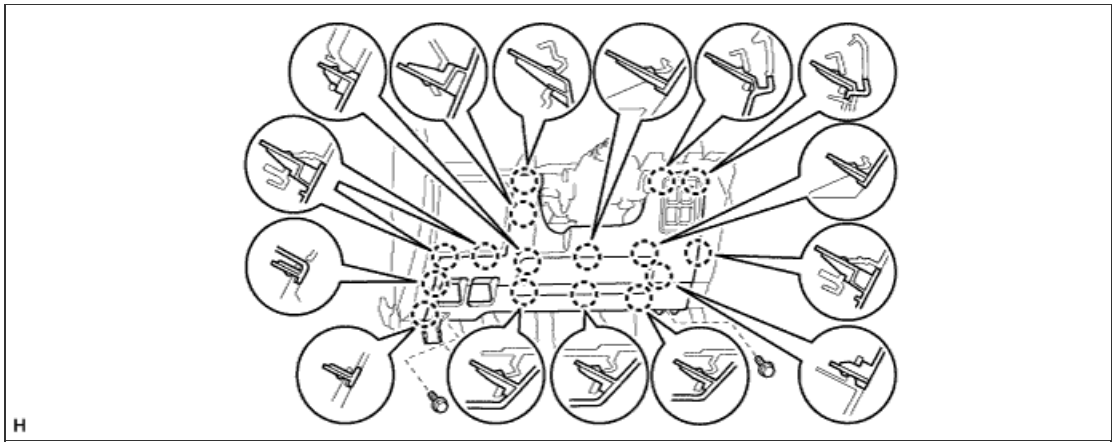
c. Attach the 2 claws to connect the 2 control cables.



d. w/ Driver Side Knee Airbag:

i. Attach the 16 claws to install the lower No. 1 instrument panel finish panel.

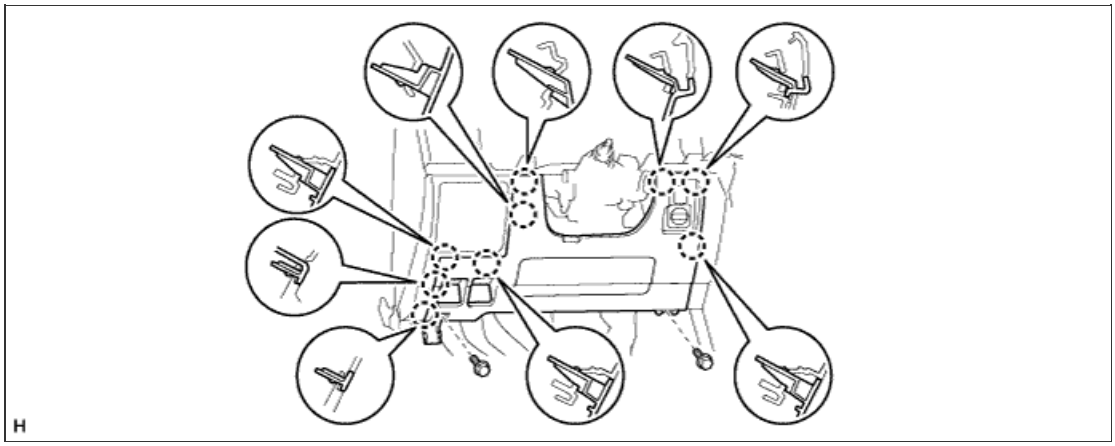
ii. Install the 2 bolts.



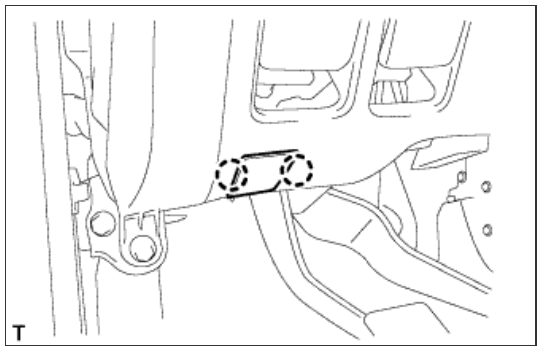
e. w/o Driver Side Knee Airbag:

i. Attach the 9 claws to install the lower No. 1 instrument panel finish panel.

ii. Install the 2 bolts.



f. Attach the 2 claws to close the hole cover.

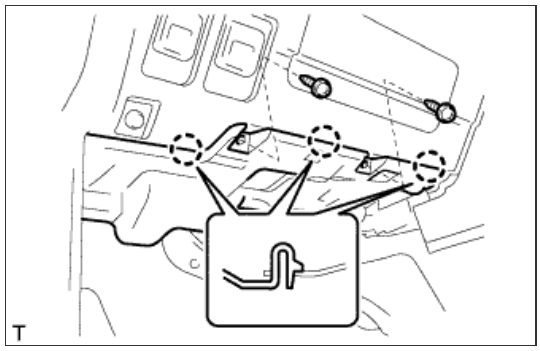


4. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

a. Connect the connectors.

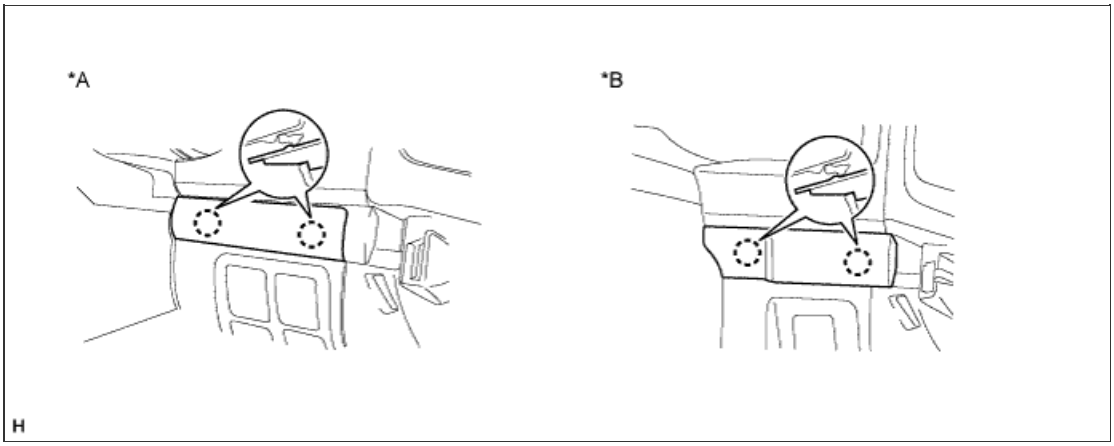
b. Attach the 3 claws to install the No. 1 instrument panel under cover.

c. Install the 2 screws.



5. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 2 claws to install the No. 2 instrument cluster finish panel garnish.

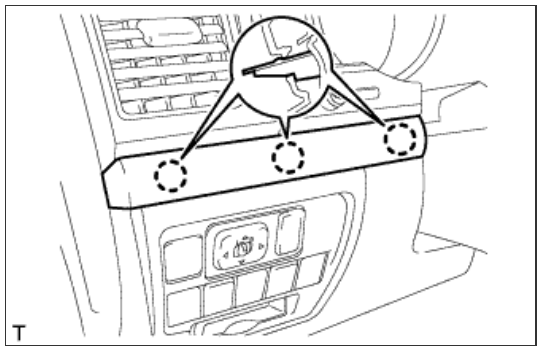


Text in Illustration

*A	w/ Entry and Start System	*B	w/o Entry and Start System

6. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

a. Attach the 3 claws to install the No. 1 instrument cluster finish panel garnish.

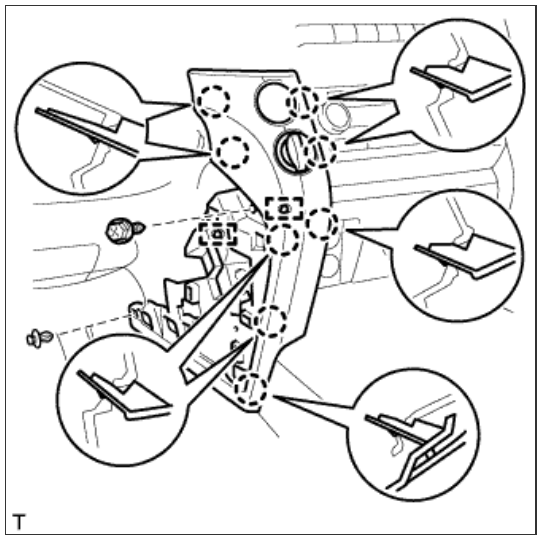


7. INSTALL LOWER INSTRUMENT PANEL PAD SUB-ASSEMBLY LH

a. Connect the connectors and attach the 2 clamps.

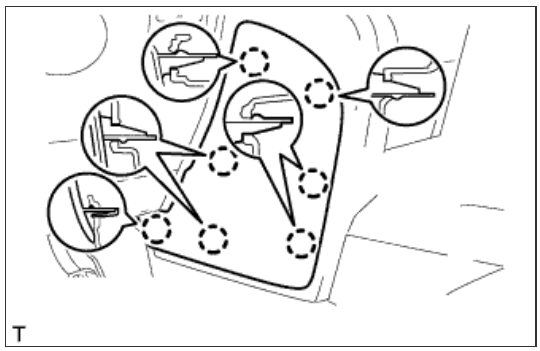
b. Attach the 8 claws to install the lower instrument panel pad sub-assembly.

c. Install the clip and screw.



8. INSTALL NO. 2 INSTRUMENT PANEL FINISH PANEL CUSHION

a. Attach the 7 claws to install the No. 2 instrument panel finish panel cushion.

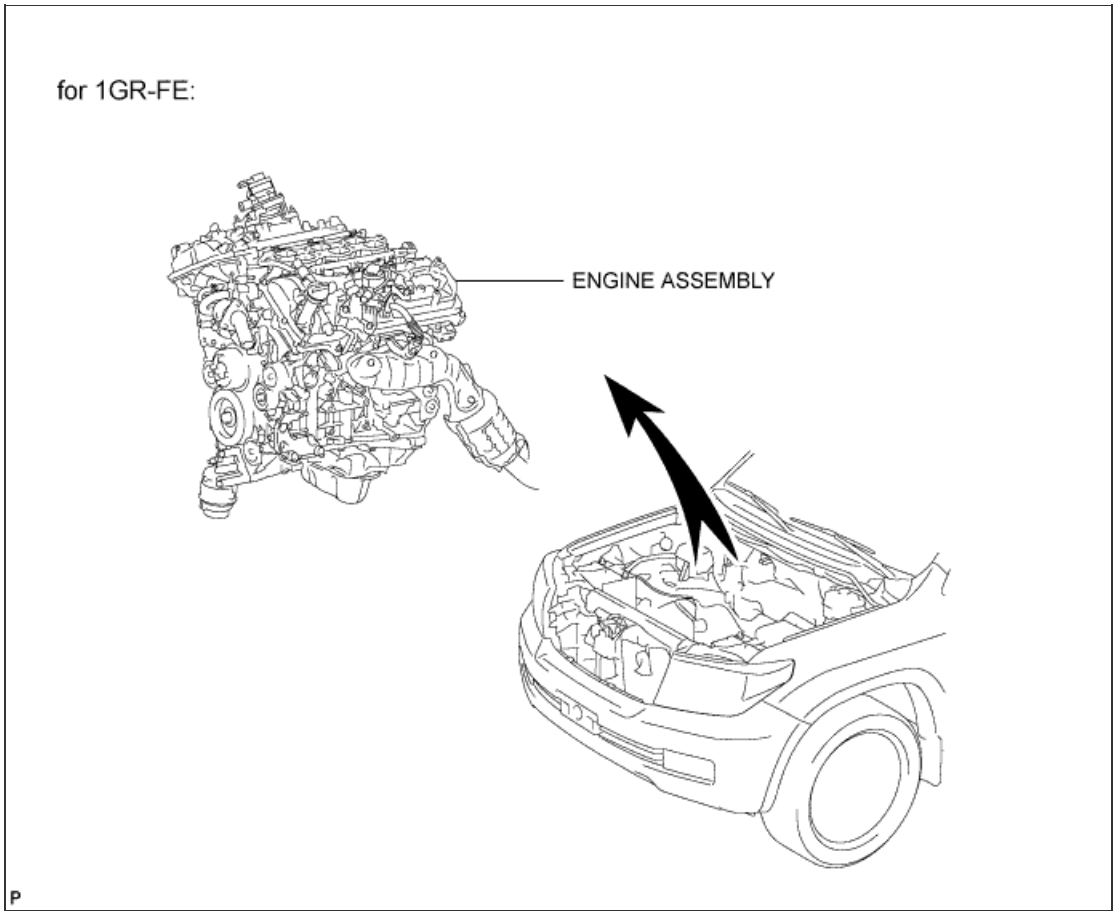


9. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

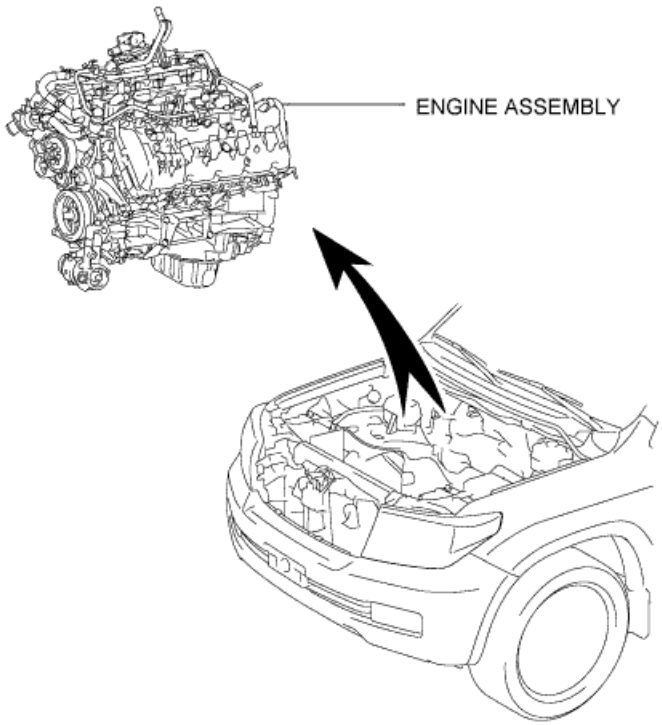
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

for Preparation Click here

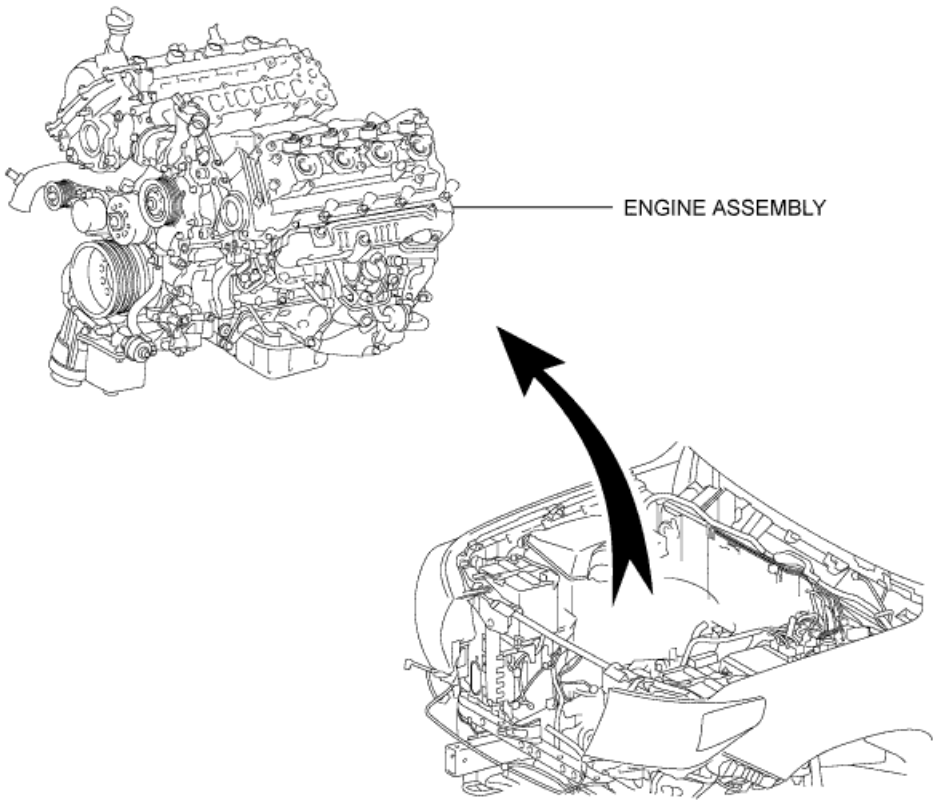


for 1UR-FE:



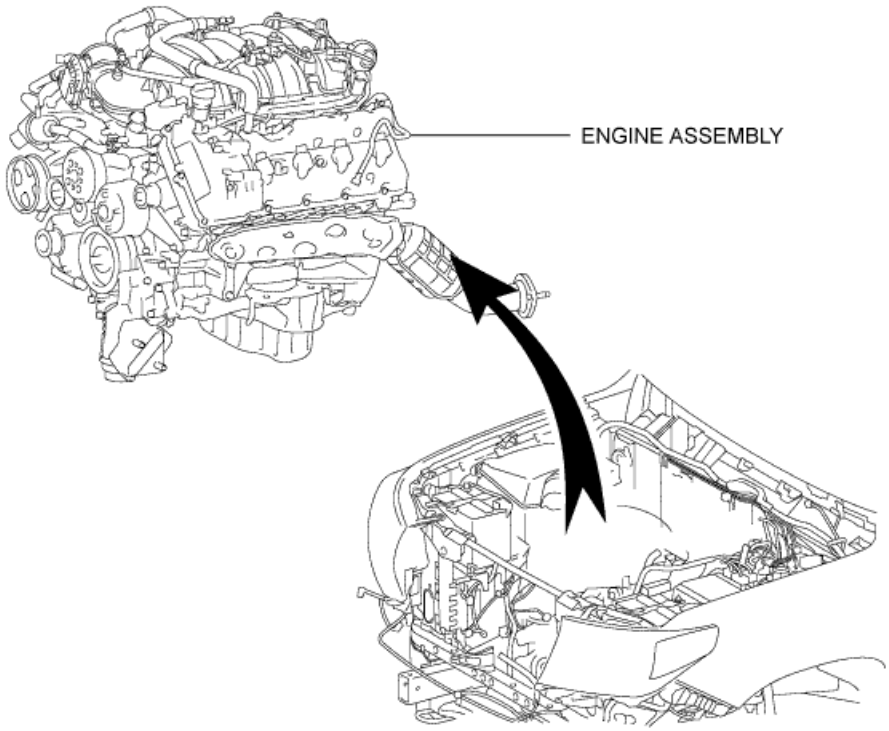
P

for 1VD-FTV:



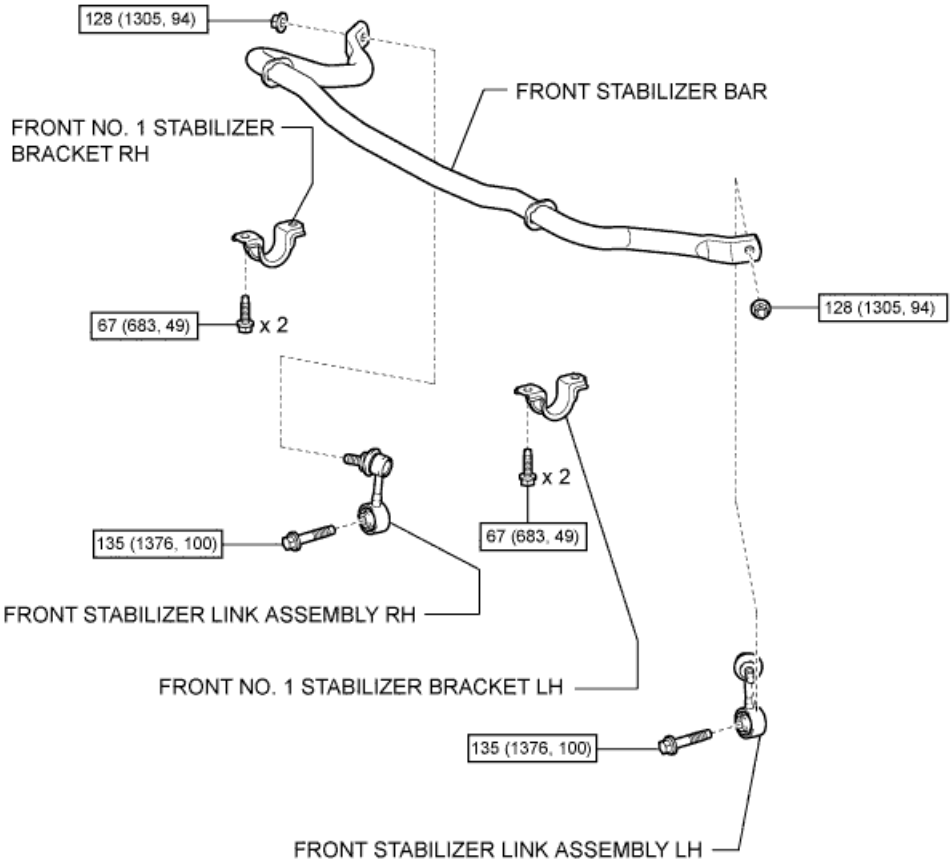
T

for 3UR-FE:



T

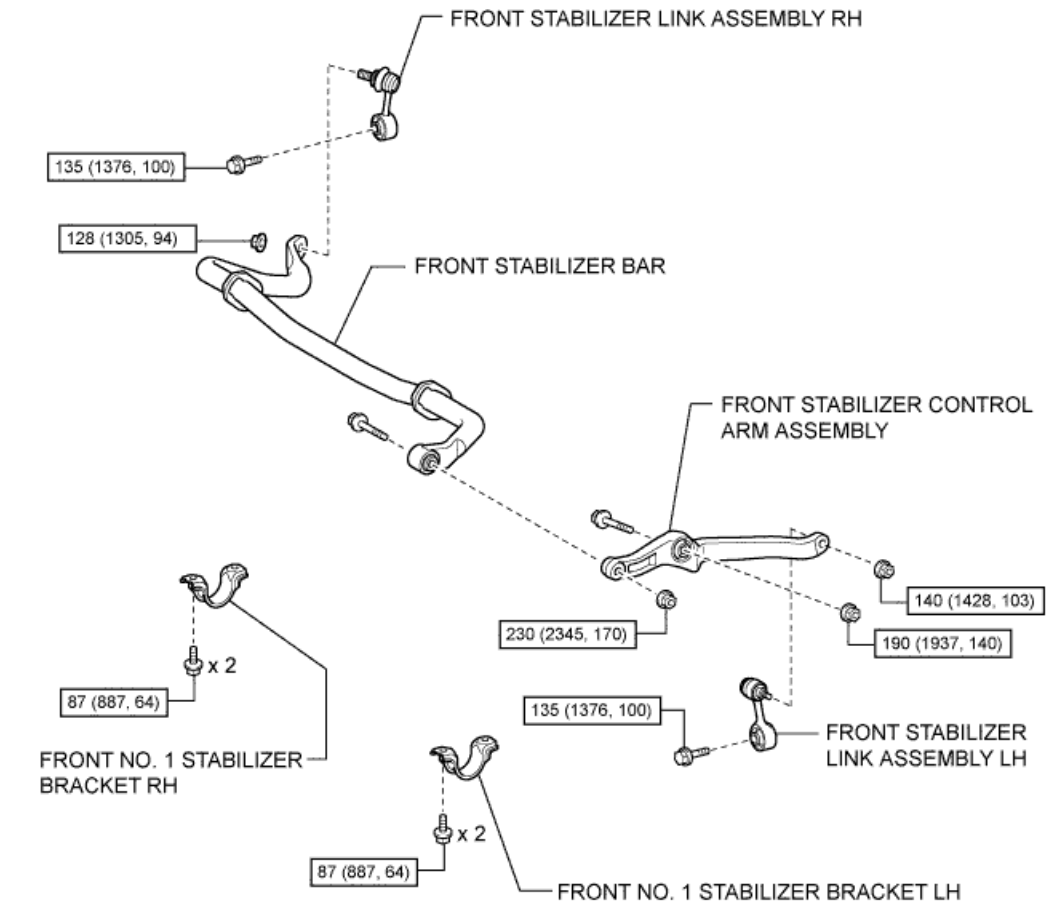
w/o KDSS:



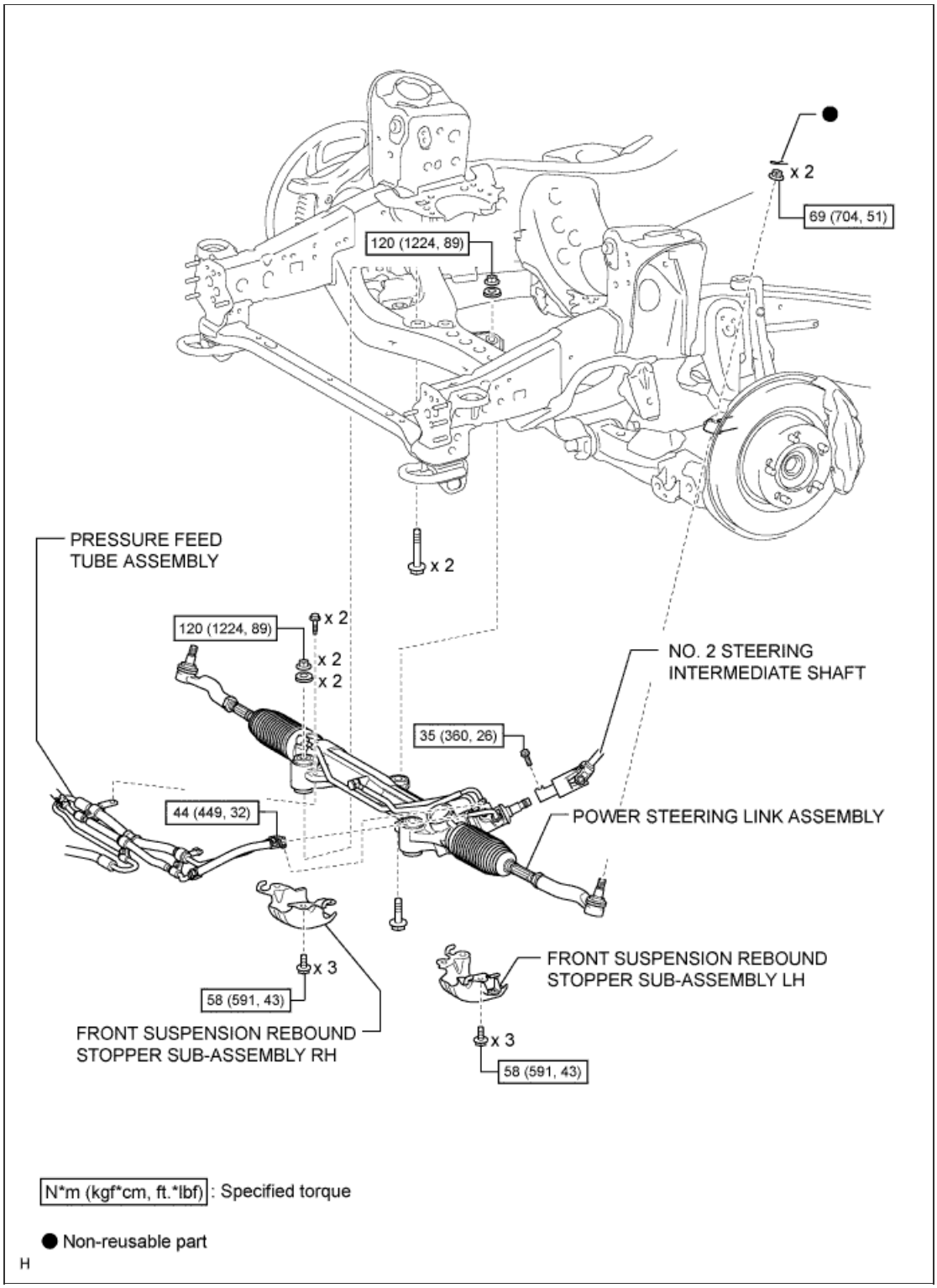
N*m (kgf*cm, ft.*lbf): Specified torque

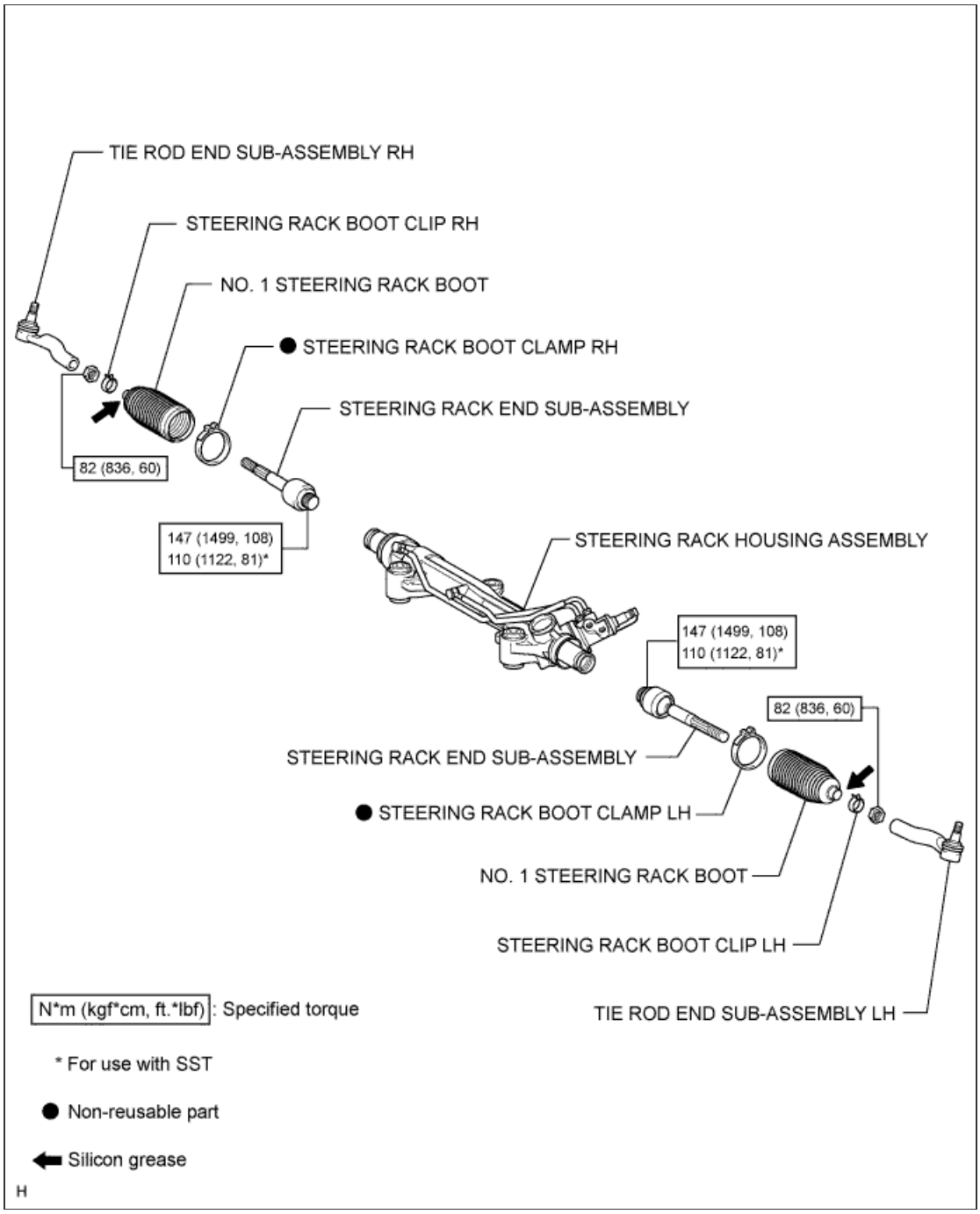
P

w/ KDSS:



N*m (kgf*cm, ft.*lbf) : Specified torque


x 2
69 (704, 51)
120 (1224, 89)
x 2
PRESSURE FEED
TUBE ASSEMBLY
120 (1224, 89)
x 2
x 2
x 2
NO. 2 STEERING
INTERMEDIATE SHAFT
35 (360, 26)
44 (449, 32)
POWER STEERING LINK ASSEMBLY
x 3
58 (591, 43)
FRONT SUSPENSION REBOUND
STOPPER SUB-ASSEMBLY RH
FRONT SUSPENSION REBOUND
STOPPER SUB-ASSEMBLY LH
x 3
58 (591, 43)
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
H


TIE ROD END SUB-ASSEMBLY RH
STEERING RACK BOOT CLIP RH
NO. 1 STEERING RACK BOOT
● STEERING RACK BOOT CLAMP RH
STEERING RACK END SUB-ASSEMBLY
82 (836, 60)
147 (1499, 108)
110 (1122, 81)*
STEERING RACK HOUSING ASSEMBLY
147 (1499, 108)
110 (1122, 81)*
82 (836, 60)
STEERING RACK END SUB-ASSEMBLY
● STEERING RACK BOOT CLAMP LH
NO. 1 STEERING RACK BOOT
STEERING RACK BOOT CLIP LH
TIE ROD END SUB-ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
* For use with SST
● Non-reusable part
Silicon grease
H

for Preparation Click here

CAUTION:

Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing the steering column (Click here).

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

2. REMOVE ENGINE ASSEMBLY

a. for 1UR-FE:
Remove the engine (Click here).

b. for 1GR-FE:
Remove the engine (Click here).

c. for 1VD-FTV:
Remove the engine (Click here).

d. for 3UR-FE:
Remove the engine (Click here).

3. REMOVE FRONT WHEELS

4. LOOSEN NO. 1 FRONT STABILIZER BRACKET LH

a. w/ KDSS:
Loosen the bracket (Click here).

b. w/o KDSS:
Loosen the bracket (Click here).

5. LOOSEN NO. 1 FRONT STABILIZER BRACKET RH

HINT:

Use the same procedures described for the LH side.

6. REMOVE FRONT STABILIZER LINK ASSEMBLY LH

a. w/ KDSS:
Remove the front stabilizer link (Click here).

b. w/o KDSS:
Remove the front stabilizer link (Click here).

7. REMOVE FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

8. REMOVE FRONT NO. 1 STABILIZER BRACKET LH

a. w/ KDSS:
Remove the stabilizer bracket (Click here).

b. w/o KDSS:
Remove the front bracket (Click here).

9. REMOVE FRONT NO. 1 STABILIZER BRACKET RH

HINT:

Use the same procedures described for the LH side.

10. REMOVE FRONT STABILIZER BAR

a. w/ KDSS:
Remove the stabilizer bar (Click here).

b. w/o KDSS:
Remove the stabilizer bar (Click here).

11. DISCONNECT NO. 2 STEERING INTERMEDIATE SHAFT

a. for Manual Tilt and Telescopic:
Disconnect the No. 2 steering intermediate shaft (Click here).

b. for Power Tilt and Power Telescopic:
Disconnect the No. 2 steering intermediate shaft (Click here).

12. DISCONNECT TIE ROD END SUB-ASSEMBLY LH

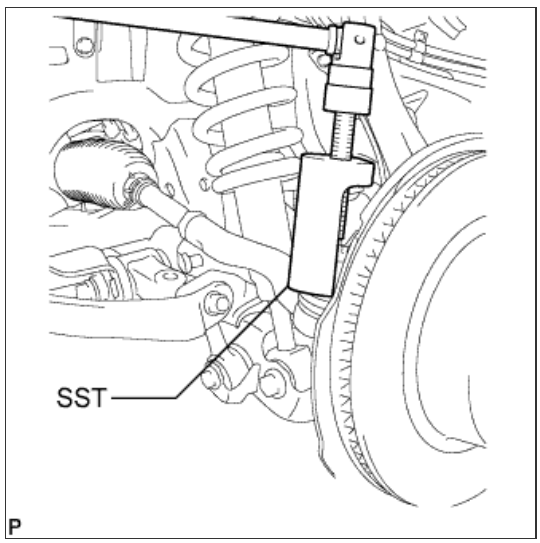
a. Remove the cotter pin and nut.

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.**



13. DISCONNECT TIE ROD END SUB-ASSEMBLY RH

HINT:

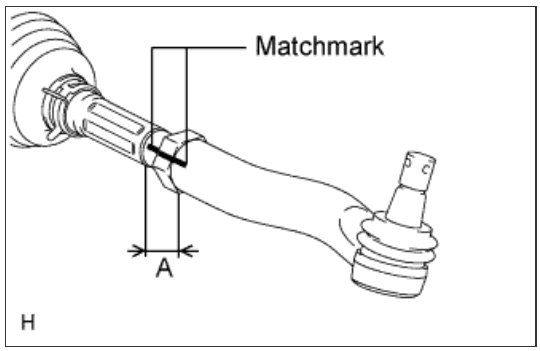
Use the same procedures described for the LH side.

14. REMOVE TIE ROD END SUB-ASSEMBLY LH

a. Put matchmarks on the tie rod end LH and steering rack end.

b. Measure length A and record the measurement.

c. Remove the tie rod end LH.



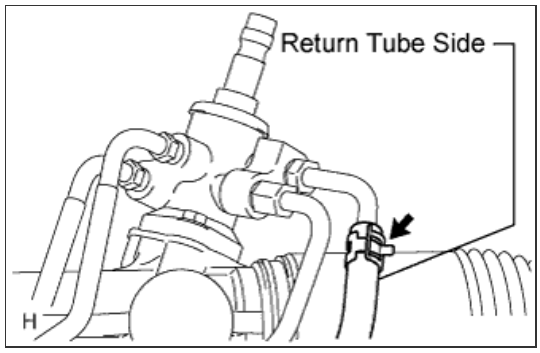
15. REMOVE TIE ROD END SUB-ASSEMBLY RH

HINT:

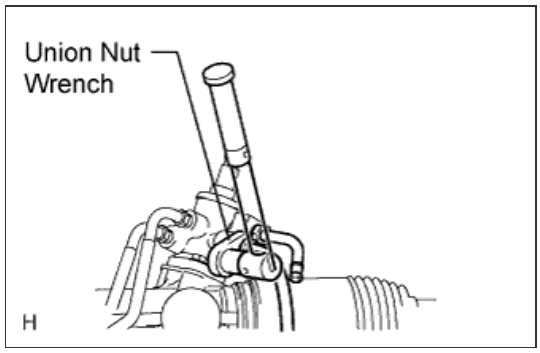
Use the same procedures described for the LH side.

16. DISCONNECT PRESSURE FEED TUBE ASSEMBLY

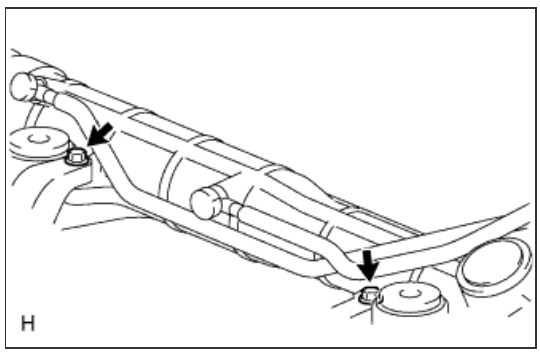
a. Remove the clamp and disconnect the pressure feed tube (return tube side) from the power steering link.



b. Using a union nut wrench, disconnect the pressure feed tube (pressure feed tube side) from the power steering link.

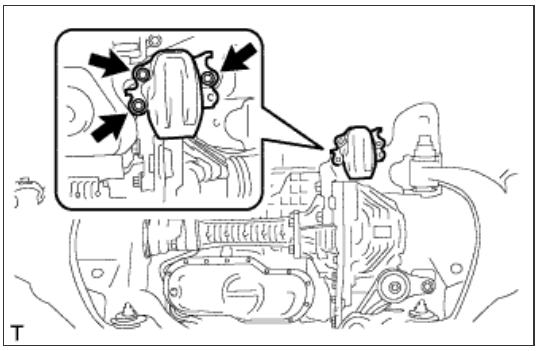


c. Remove the 2 bolts and disconnect the pressure feed tube clamp.



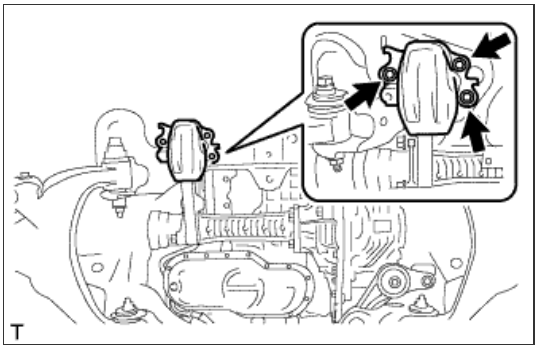
17. REMOVE FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY LH

a. Remove the 3 bolts and suspension rebound stopper LH.



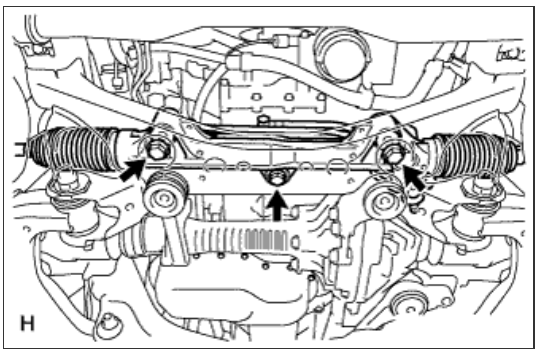
18. REMOVE FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY RH

a. Remove the 3 bolts and suspension rebound stopper RH.



19. REMOVE POWER STEERING LINK ASSEMBLY

a. Remove the 3 bolts, 3 nuts and power steering link.



for Preparation Click here

1. FIX POWER STEERING LINK ASSEMBLY

a. Using SST, fix the power steering link in a vise.

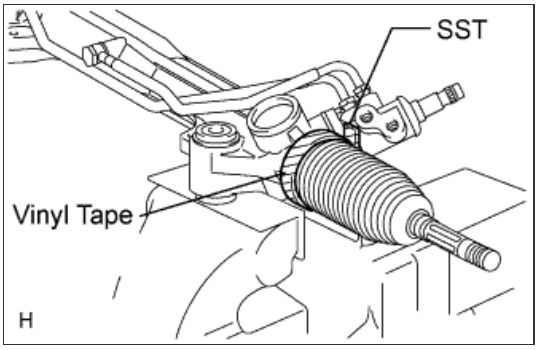
SST
09612-00012

HINT:

Tape SST before use.

NOTICE:

When using a vise, do not overtighten it.



2. REMOVE STEERING RACK BOOT CLIP LH

a. Using pliers, remove the steering rack boot clip.

3. REMOVE STEERING RACK BOOT CLIP RH

HINT:

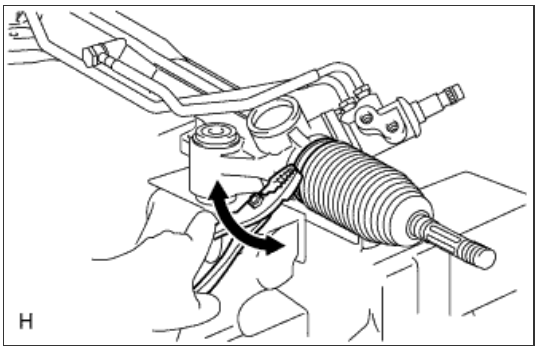
Use the same procedures described for the LH side.

4. REMOVE STEERING RACK BOOT CLAMP LH

a. Using pliers, remove the boot clamp as shown in the illustration.

NOTICE:

Be careful not to damage the steering rack boot.



5. REMOVE STEERING RACK BOOT CLAMP RH

HINT:

Use the same procedures described for the LH side.

6. REMOVE NO. 1 STEERING RACK BOOT

a. Remove the steering rack boot LH and RH.

7. REMOVE STEERING RACK END SUB-ASSEMBLY

a. Using a wrench, hold the steering rack (LH side).

b. Using SST, remove the steering rack end (LH side) from the power steering rack.

SST
09922-10010

HINT:

Rotate SST in the direction shown in the illustration.

c. Using SST, remove the steering rack end (RH side) from the power steering rack.

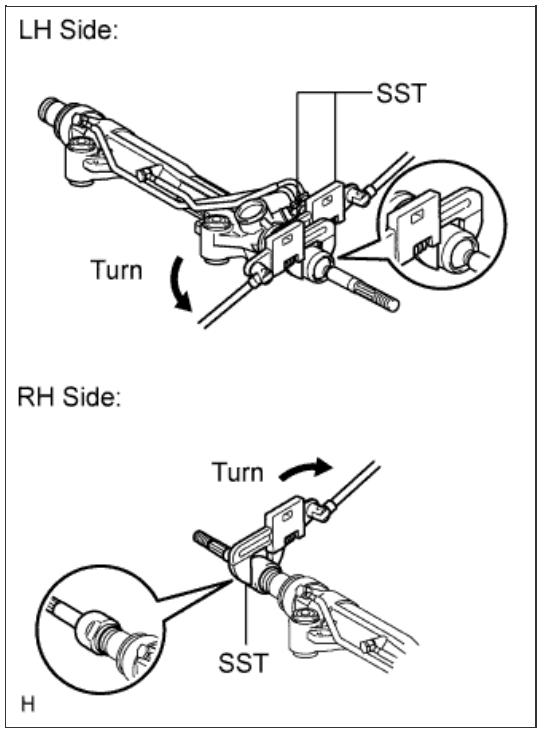
SST
09922-10010

HINT:

Rotate SST in the direction show in the illustration.

NOTICE:

- **Do not mistake the direction of SST.**
- **Make sure to keep the power steering rack fixed in place with SST.**



for Preparation Click here

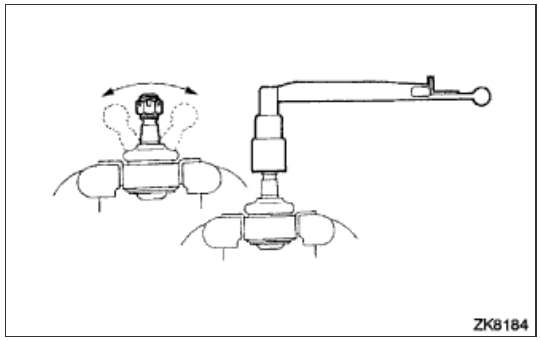
1. INSPECT TIE ROD END SUB-ASSEMBLY LH

a. Install the nut.

b. Flip the ball joint stud back and forth 5 times as shown in the illustration.

c. Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and check the torque reading on the 5th turn.

Torque:
0.98 to 3.92 N*m (10.0 to 35.0 kgf*cm, 8.67 to 30.36 in.*lbf)



2. INSPECT TOTAL PRELOAD

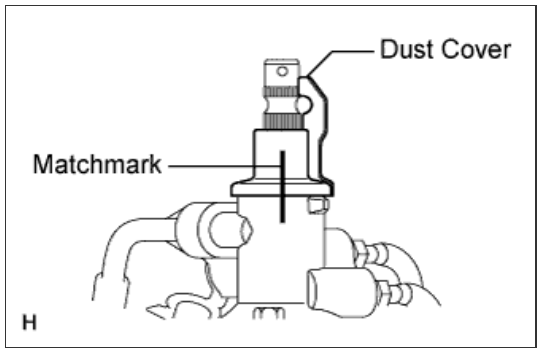
a. Put matchmarks on the dust cover and steering link.

b. Remove the dust cover.

c. Temporarily install the 2 steering rack ends to the power steering rack.

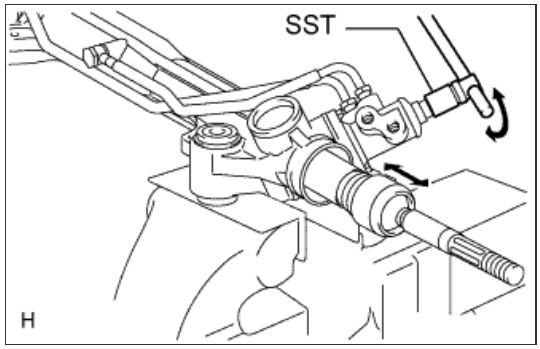
NOTICE:

Do not fully turn the power steering rack without the steering rack ends as it may damage the oil seal in the rack housing.



d. Using SST, fully turn the power steering rack right and left 10 times to settle it.

SST
09616-00011



e. Using SST, turn the control valve and measure the preload.

SST
09616-00011

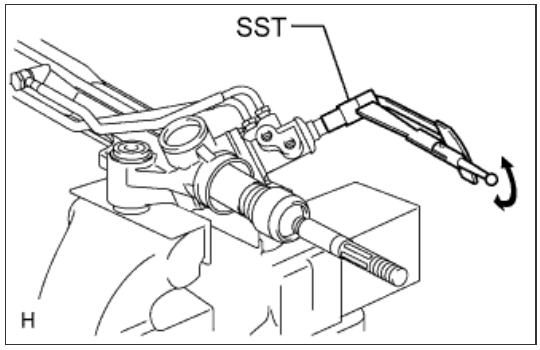
Standard preload (turning):
2.4 N*m (24 kgf*cm, 21 in.*lbf)

If the turning torque is not as specified, replace the power steering link.

NOTICE:

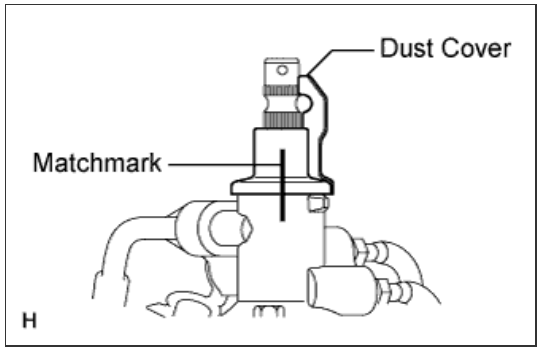
After setting the steering rack to the neutral point, align the dust cover rib with the power steering protrusion.

HINT:



- **Measure the standard preload at the steering rack neutral point.**
- **The steering control valve is fully turned when turned 3.14 times. Half of the distance from the fully turned position is the neutral point.**

f. After inspecting the preload, align the matchmarks and install the dust cover.



for Preparation Click here

1. INSTALL STEERING RACK END SUB-ASSEMBLY

a. Temporarily install the 2 steering rack ends to the power steering rack.

b. Fill up the ball joint of the steering rack ends with MP grease.

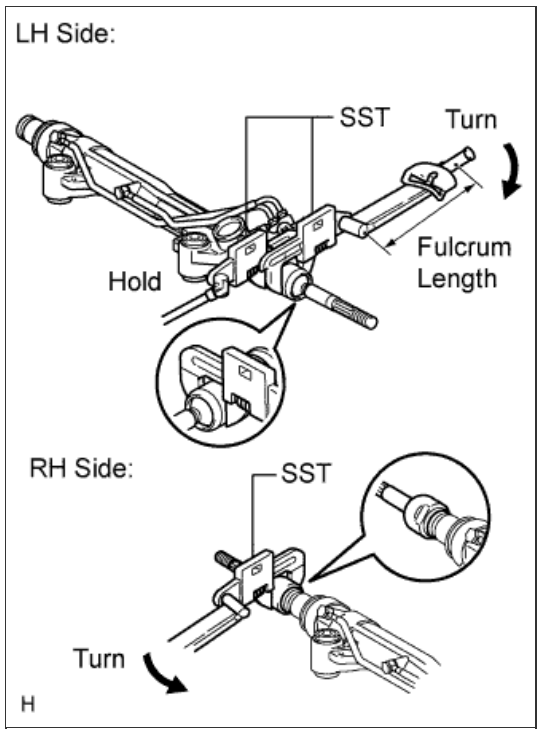
c. Using SST, install the power steering rack end (RH side) to the power steering rack.

SST
09922-10010

Torque:
without SST:
147 N*m{ 1499 kgf*cm , 108 ft.*lbf }
with SST:
110 N*m{ 1122 kgf*cm , 81 ft.*lbf }

HINT:

- **Rotate SST in the direction shown in the illustration.**
- **Use a torque wrench with a fulcrum length of 380 mm (14.97 in.).**



d. Using SST and a wrench, install the power steering rack end (LH side) to the power steering rack.

SST
09922-10010

Torque:
without SST:
147 N*m{ 1499 kgf*cm , 108 ft.*lbf }
with SST:
110 N*m{ 1122 kgf*cm , 81 ft.*lbf }

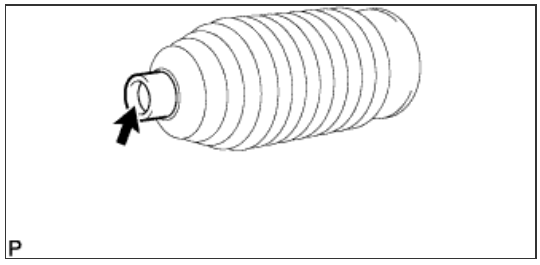
HINT:

- **Rotate SST in the direction shown in the illustration.**
- **Use a torque wrench with a fulcrum length of 380 mm (14.97 in.).**

2. INSTALL NO. 1 STEERING RACK BOOT

a. Apply silicon grease to the inside of the small opening of the boot.

b. Install the 2 boots to the groove on the rack housing.



3. INSTALL STEERING RACK BOOT CLAMP RH

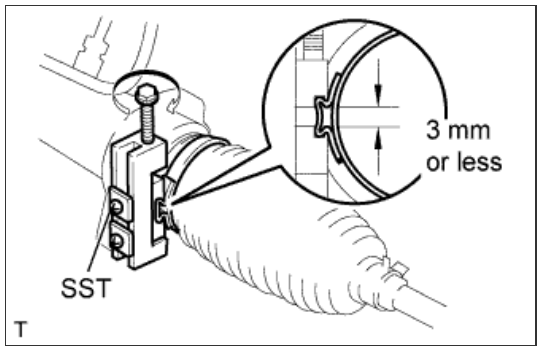
a. Using SST, install a new boot clamp as shown in the illustration.

SST
09521-24010

Standard clearance:
3.0 mm (0.119 in.) or less

NOTICE:

Be careful not to damage the boot.



4. INSTALL STEERING RACK BOOT CLAMP LH

HINT:

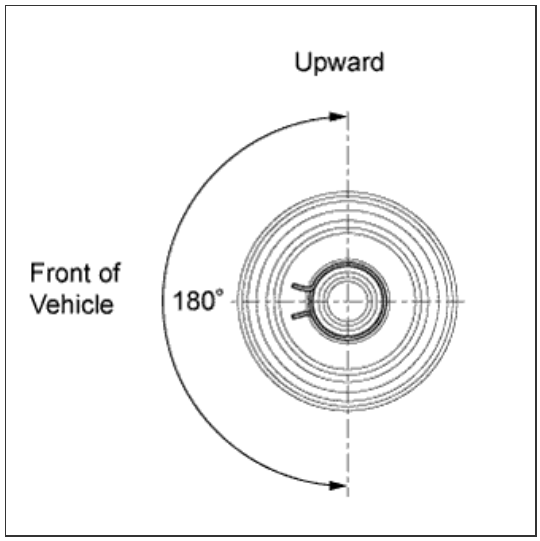
Use the same procedures described for the RH side.

5. INSTALL STEERING RACK BOOT CLIP RH

a. Using pliers, install the boot clip.

NOTICE:

Make sure that the claws of each clip are positioned within the area shown in the illustration.



6. INSTALL STEERING RACK BOOT CLIP LH

HINT:

Use the same procedures described for the RH side.

for Preparation Click here

1. INSTALL POWER STEERING LINK ASSEMBLY

a. Install the power steering link with the 3 bolts and 3 nuts.

Torque:
120 N*m{ 1224 kgf*cm , 89 ft.*lbf }

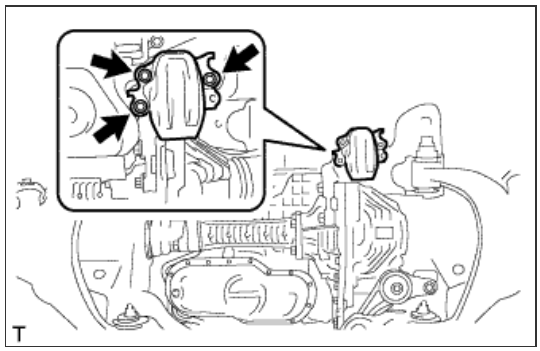
HINT:

Hold the bolts and tighten the nuts to install the power steering link.

2. INSTALL FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY LH

a. Install the suspension rebound stopper LH with the 3 bolts.

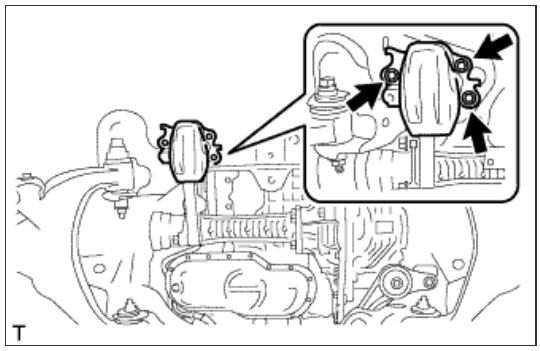
Torque:
58 N*m{ 591 kgf*cm , 43 ft.*lbf }



3. INSTALL FRONT SUSPENSION REBOUND STOPPER SUB-ASSEMBLY RH

a. Install the suspension rebound stopper RH with the 3 bolts.

Torque:
58 N*m{ 591 kgf*cm , 43 ft.*lbf }



4. CONNECT PRESSURE FEED TUBE ASSEMBLY

a. Install the pressure feed tube clamp with the 2 bolts.

Torque:
8.8 N*m{ 90 kgf*cm , 78 in.*lbf }

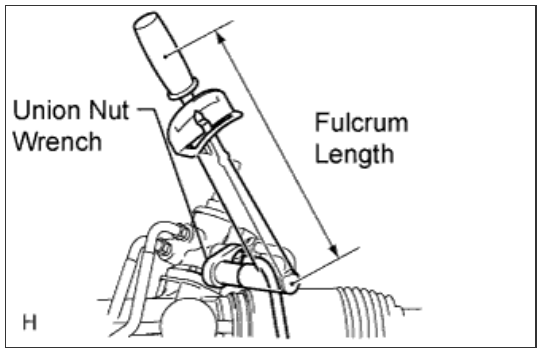
b. Connect the pressure feed tube (return tube side) to the power steering link with the clamp.

c. Using a union nut wrench, connect the pressure feed tube (pressure feed tube side) to the power steering link.

Torque:
44 N*m{ 449 kgf*cm , 32 ft.*lbf }

NOTICE:

Use the formula to calculate special torque values for situations where a union nut wrench is combined with a torque wrench (Click here).



5. INSTALL TIE ROD END SUB-ASSEMBLY LH

a. Align the matchmarks of the tie rod and rack end, and temporarily install the tie rod with the lock nut.

HINT:

After adjusting toe-in, tighten the lock nut.

Torque:
82 N*m{ 836 kgf*cm , 60 ft.*lbf }

b. Check that length A is the same as the length measured previously.

6. INSTALL TIE ROD END SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the RH side.

7. 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°.

8. CONNECT TIE ROD END SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

9. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT

a. for Manual Tilt and Telescopic:
Connect the No. 2 steering intermediate shaft (Click here).

b. for Power Tilt and Power Telescopic:
Connect the No. 2 steering intermediate shaft (Click here).

10. TEMPORARILY INSTALL FRONT STABILIZER BAR

a. w/ KDSS:
Temporarily install the stabilizer bar (Click here).

b. w/o KDSS:
Temporarily install the stabilizer bar (Click here).

11. TEMPORARILY INSTALL FRONT STABILIZER LINK ASSEMBLY LH

a. w/ KDSS:
Temporarily install the stabilizer link (Click here).

b. w/o KDSS:
Temporarily install the stabilizer link (Click here).

12. TEMPORARILY INSTALL FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

13. INSTALL ENGINE ASSEMBLY

a. for 1UR-FE:
Install the engine (Click here).

b. for 1GR-FE:
Install the engine (Click here).

c. for 1VD-FTV:
Install the engine (Click here).

d. for 3UR-FE:
Install the engine (Click here).

14. TIGHTEN FRONT NO. 1 STABILIZER BRACKET LH

a. w/ KDSS:
Tighten the stabilizer bracket (Click here).

b. w/o KDSS:
Tighten the stabilizer bracket (Click here).

15. TIGHTEN FRONT NO. 1 STABILIZER BRACKET RH

HINT:

Use the same procedures described for the LH side.

16. STABILIZE SUSPENSION

a. Install the front wheels.

Torque:
for aluminum wheel:
131 N*m{ 1336 kgf*cm , 97 ft.*lbf }
for steel wheel:
209 N*m{ 2131 kgf*cm , 154 ft.*lbf }

b. Lower the vehicle.

c. Press down on the vehicle several times to stabilize the suspension.

17. TIGHTEN FRONT STABILIZER LINK ASSEMBLY LH

a. w/ KDSS:
Tighten the stabilizer link (Click here).

b. w/o KDSS:
Tighten the stabilizer link (Click here).

18. TIGHTEN FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

19. TIGHTEN FRONT STABILIZER BAR

a. w/ KDSS:
Tighten the front stabilizer bar (Click here).

b. w/o KDSS:
Tighten the front stabilizer bar (Click here).

20. BLEED POWER STEERING FLUID

a. Check the fluid level.

b. Jack up the front of the vehicle and support it with stands.

c. Turn the steering wheel.

i. With the engine stopped, turn the wheel slowly from lock to lock several times.

d. Lower the vehicle.

e. Start the engine.

f. Idle the engine for a few minutes.

g. Turn the steering wheel.

i. With the engine idling, turn the wheel left or right to the full lock position and keep it there for 2 to 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 to 3 seconds. *1

ii. Repeat *1 several times.

NOTICE:

For vehicles with VGRS, if the steering wheel is turned from lock to lock repeatedly, the system may stop operating and the amount of rotation before the steering wheel locks may increase due to operation of the overheating prevention function. When the system temperature drops, the system operation automatically returns to normal.

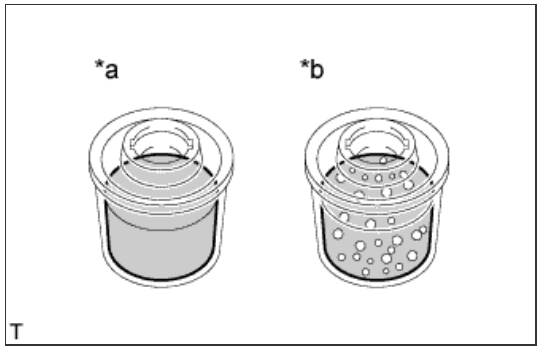
h. Stop the engine.

i. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

If the system has to be bled twice because of foaming or emulsification, check for fluid leaks in the system.



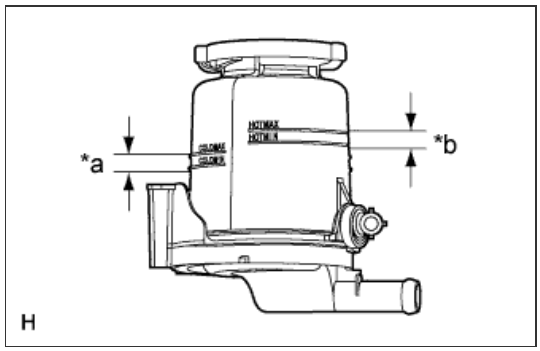
j. Check the fluid level.

21. CHECK POWER STEERING FLUID LEVEL

a. Keep the vehicle horizontal.

Text in Illustration

*a	COLD Range
*b	HOT Range



b. With the engine stopped, check the fluid level in the reservoir.
If necessary, add fluid.

Fluid:
ATF DEXRON II or III, or equivalent

HINT:

If the fluid is hot, check that the fluid level is within the HOT range. If the fluid is cold, check that the fluid level is within the COLD range.

c. Start the engine and idle it.

d. Turn the steering wheel from lock to lock several times to raise the fluid temperature.

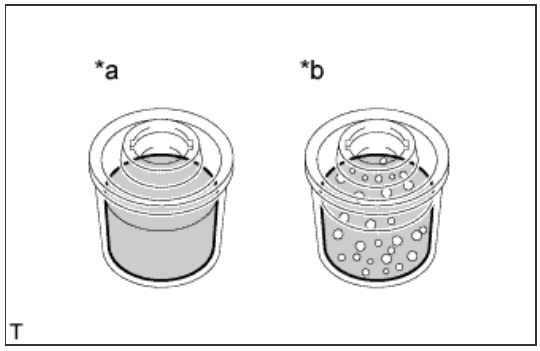
Fluid temperature:
80°C (176°F)

e. Check for foaming or emulsification.

Text in Illustration

*a	Correct
*b	Incorrect

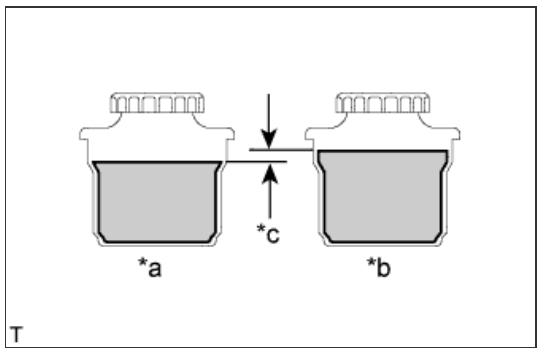
If foaming or emulsification is identified, bleed the power steering system.



f. With the engine idling, measure the fluid level in the reservoir.

Text in Illustration

*a	Engine idling
*b	Engine stopped
*c	5.0 mm (0.197 in.) or less



g. Stop the engine.

h. Wait a few minutes and remeasure the fluid level in the reservoir.

Maximum fluid level rise:
5.0 mm (0.197 in.)

If the fluid level rise is more than the maximum, bleed the power steering system.

i. Check the fluid level.

22. CHECK FOR POWER STEERING FLUID LEAK

23. INSTALL FRONT WHEELS

24. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

HINT:

Perform this procedure with the front of the vehicle jacked up.

25. ADJUST FRONT WHEEL ALIGNMENT

a. Adjust the front wheel alignment (Click here).

26. ADJUST HEADLIGHT ASSEMBLY

a. for Standard Headlight:
Adjust the headlight (Click here).

b. for HID Headlight:
Adjust the headlight (Click here).

27. CLOSE STABILIZER CONTROL WITH ACCUMULATOR HOUSING SHUTTER VALVE

NOTICE:

- **Perform the inspection on a level surface.**
- **Ensure that the wheels are on the ground and facing straight ahead.**
- **Perform the inspection with the vehicle load completely on the suspension.**

HINT:

- **Perform this step with the fuel tank full.**
- **If there are any parts installed to the vehicle which place any unbalanced load on the left or right side of the vehicle, remove them.**

a. Using a 5 mm hexagon socket wrench, tighten the lower and upper chamber shutter valves of the stabilizer control with accumulator housing.

Torque:
14 N*m{ 143 kgf*cm , 10 ft.*lbf }