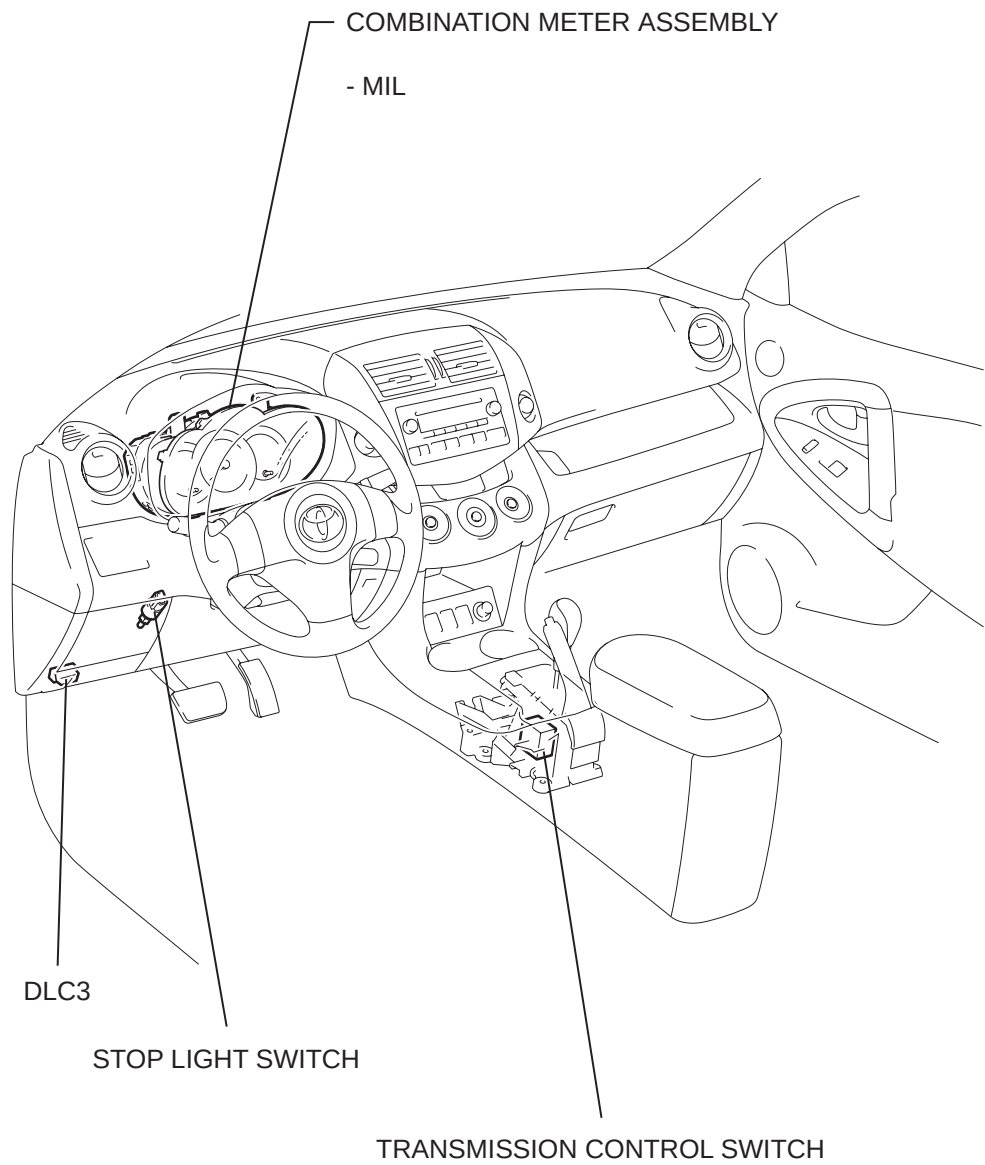
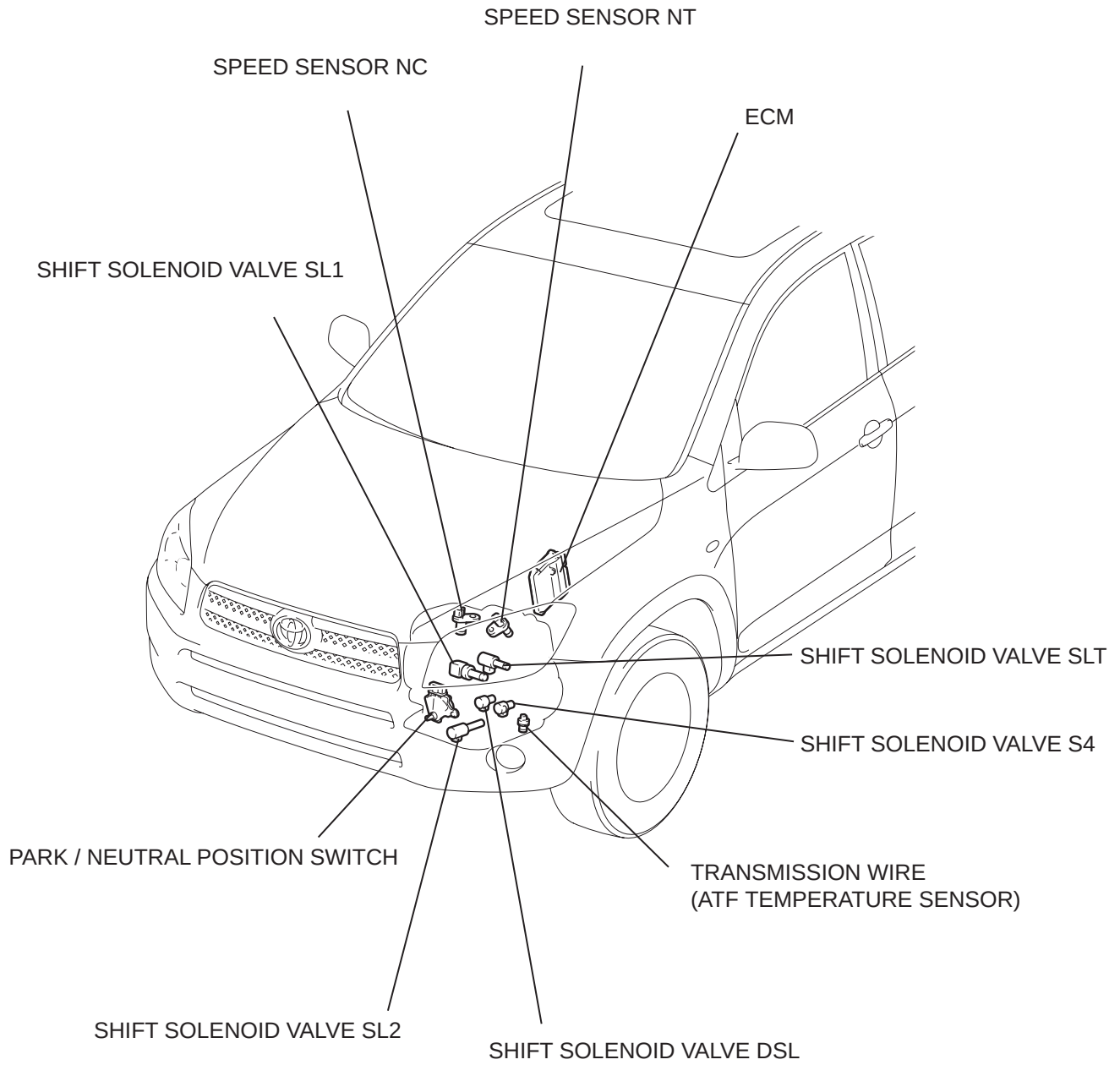


DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored.
Required sensor/Components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects malfunction only 1 time during a single driving cycle. "Continuous" means that the ECM detects a malfunction every time the enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediate" means that the ECM illuminates the MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates the MIL if the same malfunction is detected again in the 2nd driving cycle.
Component operating range	Normal operation range of sensors and solenoids under normal driving conditions. Use these ranges as a reference. They cannot be used to judge if a sensor or solenoid is defective or not.

PARTS LOCATION





REMOVAL

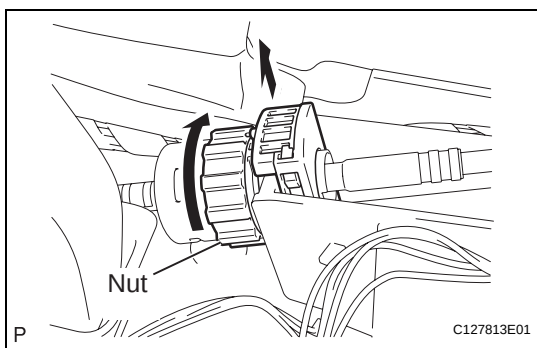
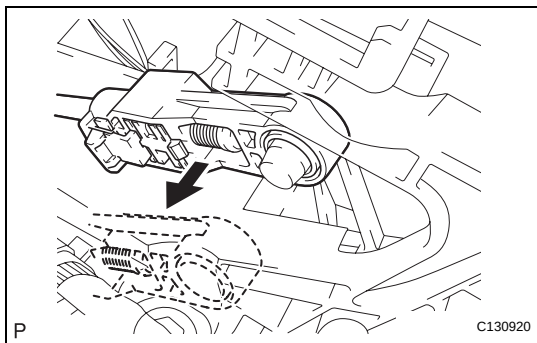
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

CAUTION:

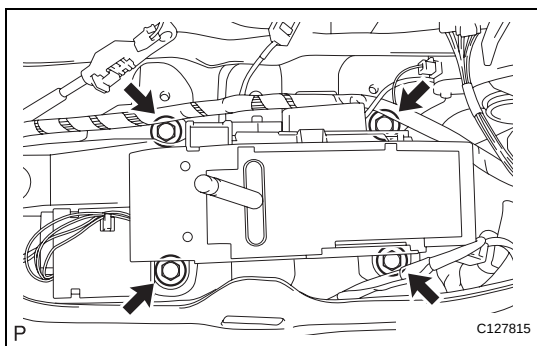
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
3. **REMOVE REAR CONSOLE BOX SUB-ASSEMBLY**
(a) Remove the console box (see page [IP-20](#)).
4. **DISCONNECT TRANSAXLE CONTROL CABLE ASSEMBLY**

(a) Disconnect the control cable from the shift lever.

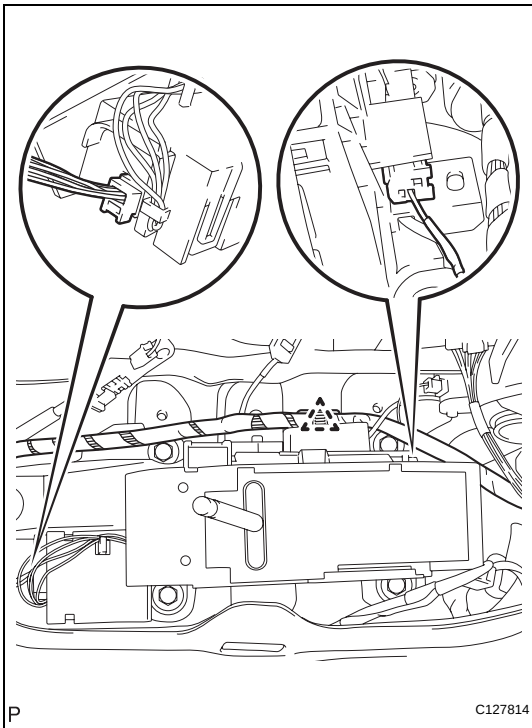


(b) Turn the nut and disconnect the control cable from the shift lever retainer.



5. **REMOVE FLOOR SHIFT ASSEMBLY**
(a) Remove the 4 bolts and floor shift.

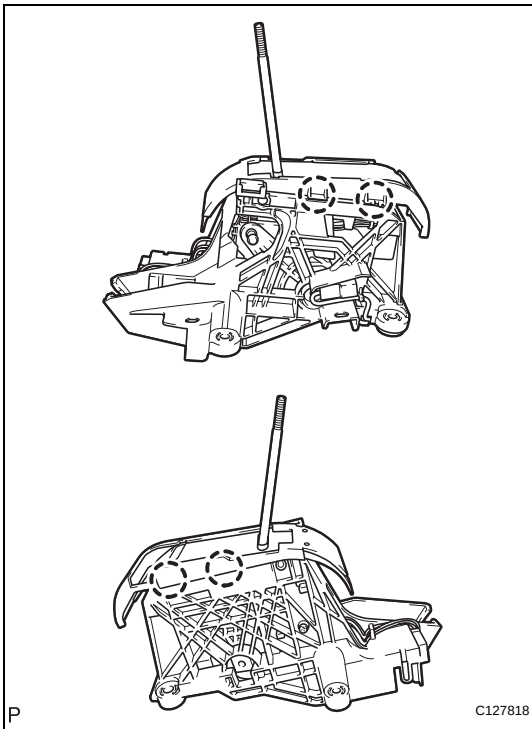
- (b) Disconnect the 2 connectors and detach the clamp.



DISASSEMBLY

1. REMOVE LOWER POSITION INDICATOR HOUSING

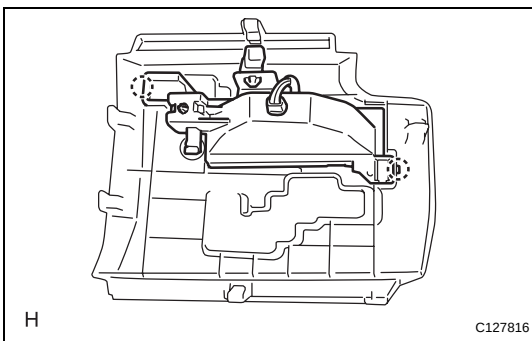
- (a) Detach the 4 claws and remove the housing.
- (b) Remove the position indicator slide cover with slide No. 2 cover.

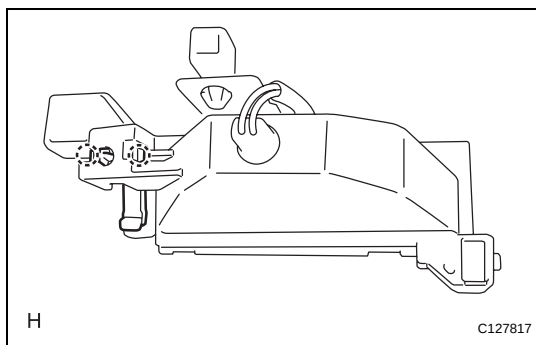


2. REMOVE POSITION INDICATOR LIGHT HOUSING

- (a) Detach the 2 claws and remove the indicator light housing from the floor shift position indicator housing.

3. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY



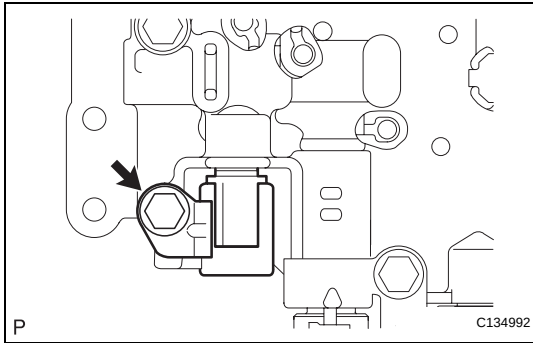
**4. REMOVE SHIFT LOCK RELEASE BUTTON**

- (a) Detach the 2 claws and remove the button and spring from the position indicator light housing.

REASSEMBLY

1. INSTALL MANUAL VALVE

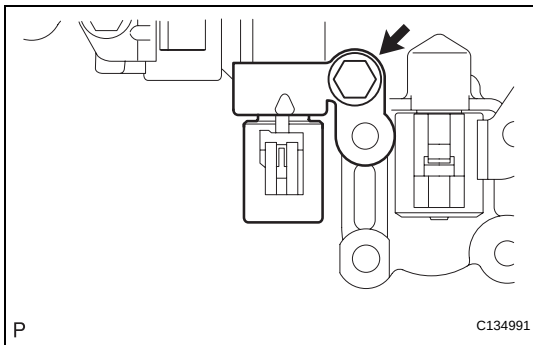
- (a) Install the manual valve to the valve body.



2. INSTALL SHIFT SOLENOID VALVE S4

- (a) Install the shift solenoid valve S4 to the valve body with the bolt.

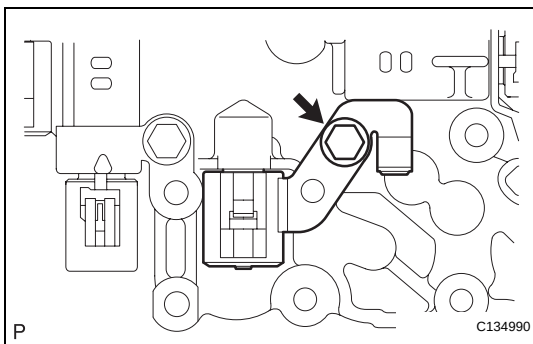
Torque: 11 N*m (112 kgf*cm, 9 ft.*lbf)



3. INSTALL SHIFT SOLENOID VALVE SL2

- (a) Install the shift solenoid valve SL2 to the valve body with the bolt and plate.

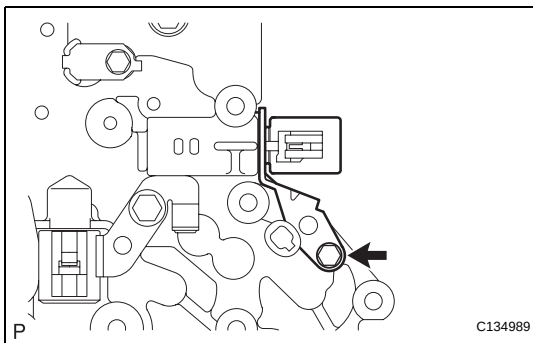
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



4. INSTALL SHIFT SOLENOID VALVE DSL

- (a) Install the shift solenoid valve DSL to the valve body with the bolt.

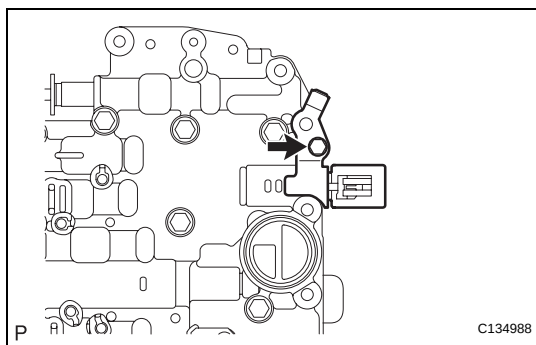
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



5. INSTALL SHIFT SOLENOID VALVE SL1

- (a) Install the shift solenoid valve SL1 to the valve body with the bolt and plate.

Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)

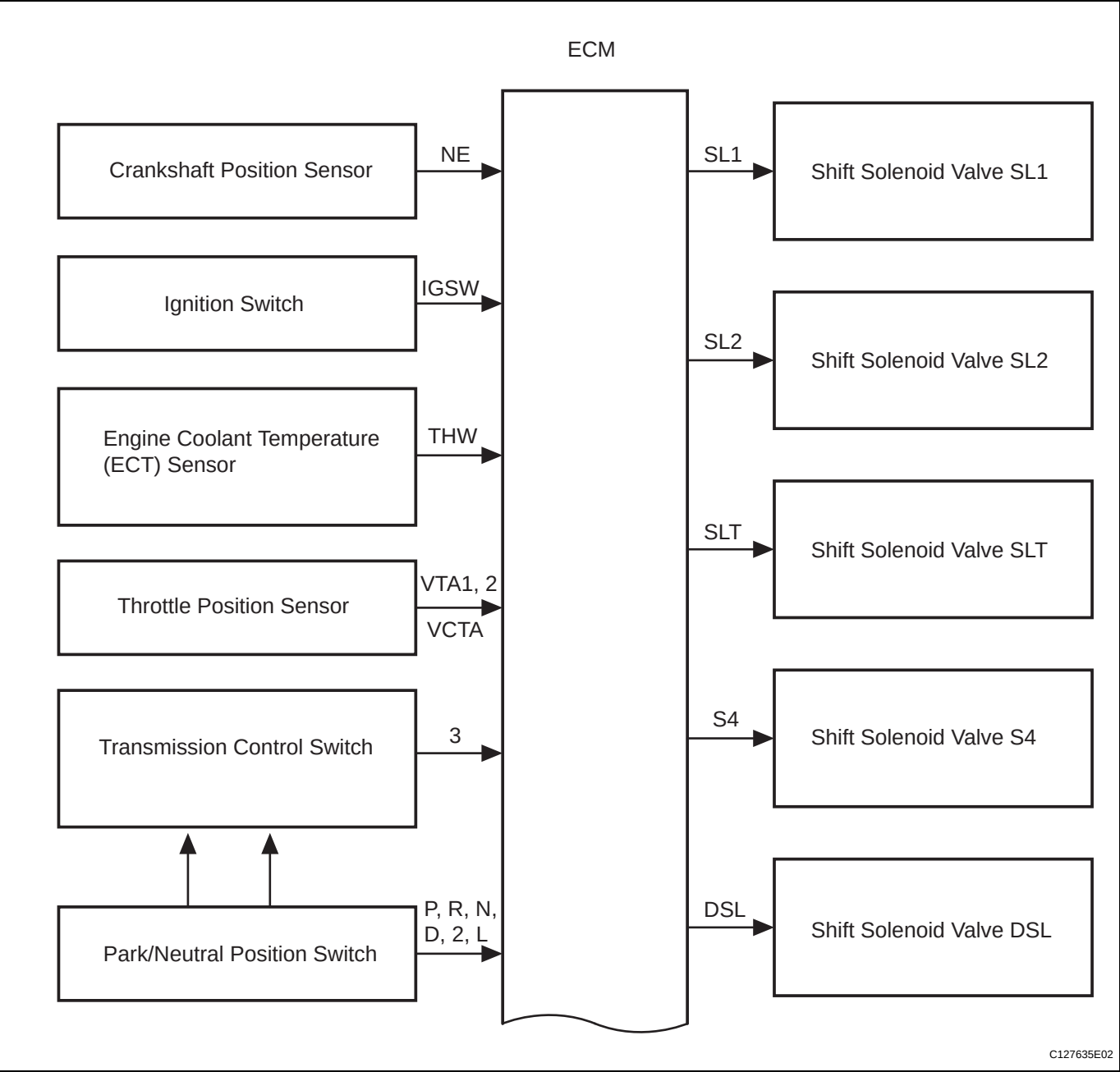
**6. INSTALL SHIFT SOLENOID VALVE SLT**

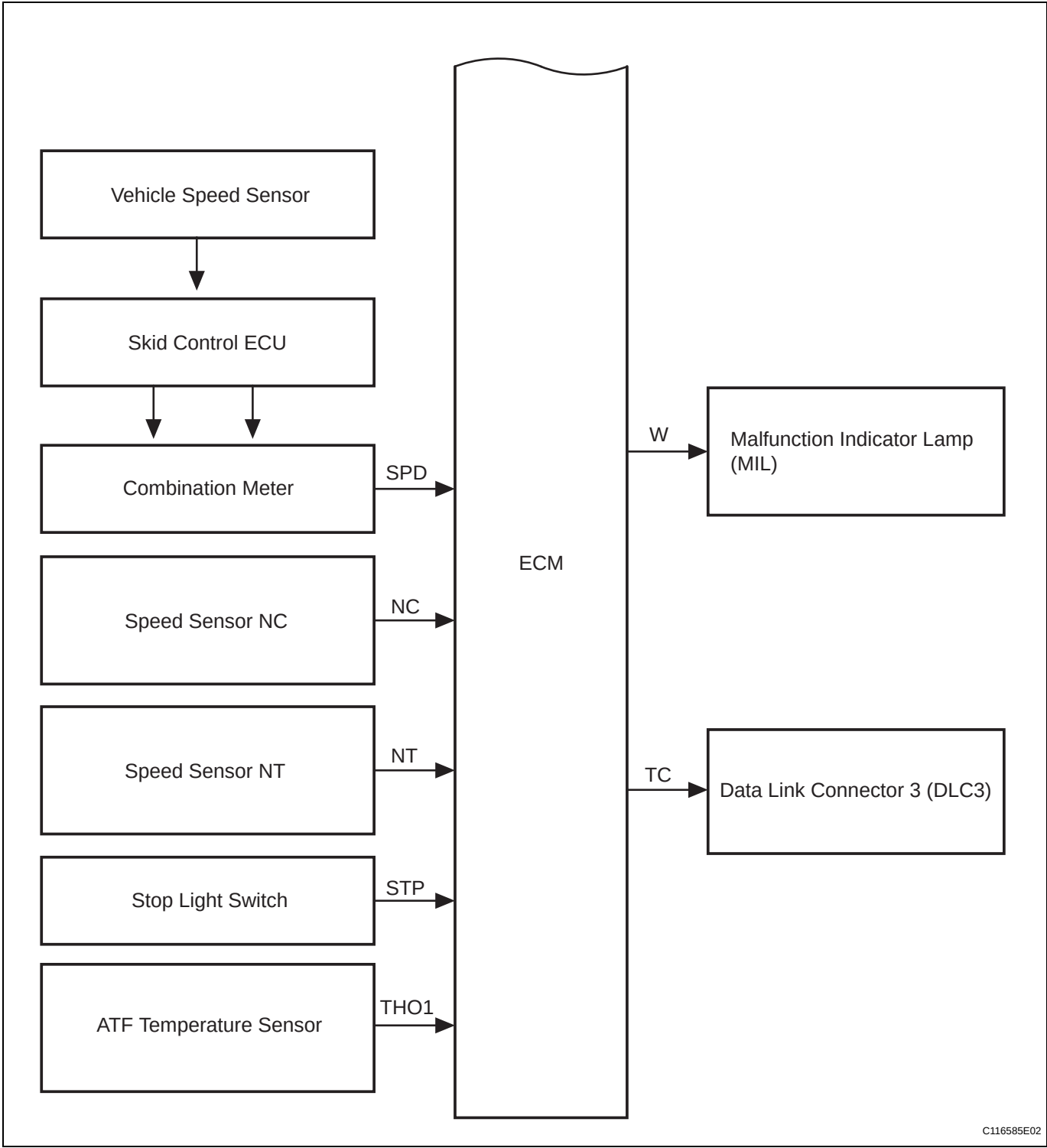
- (a) Install the shift solenoid valve SLT to the valve body with the bolt and plate.

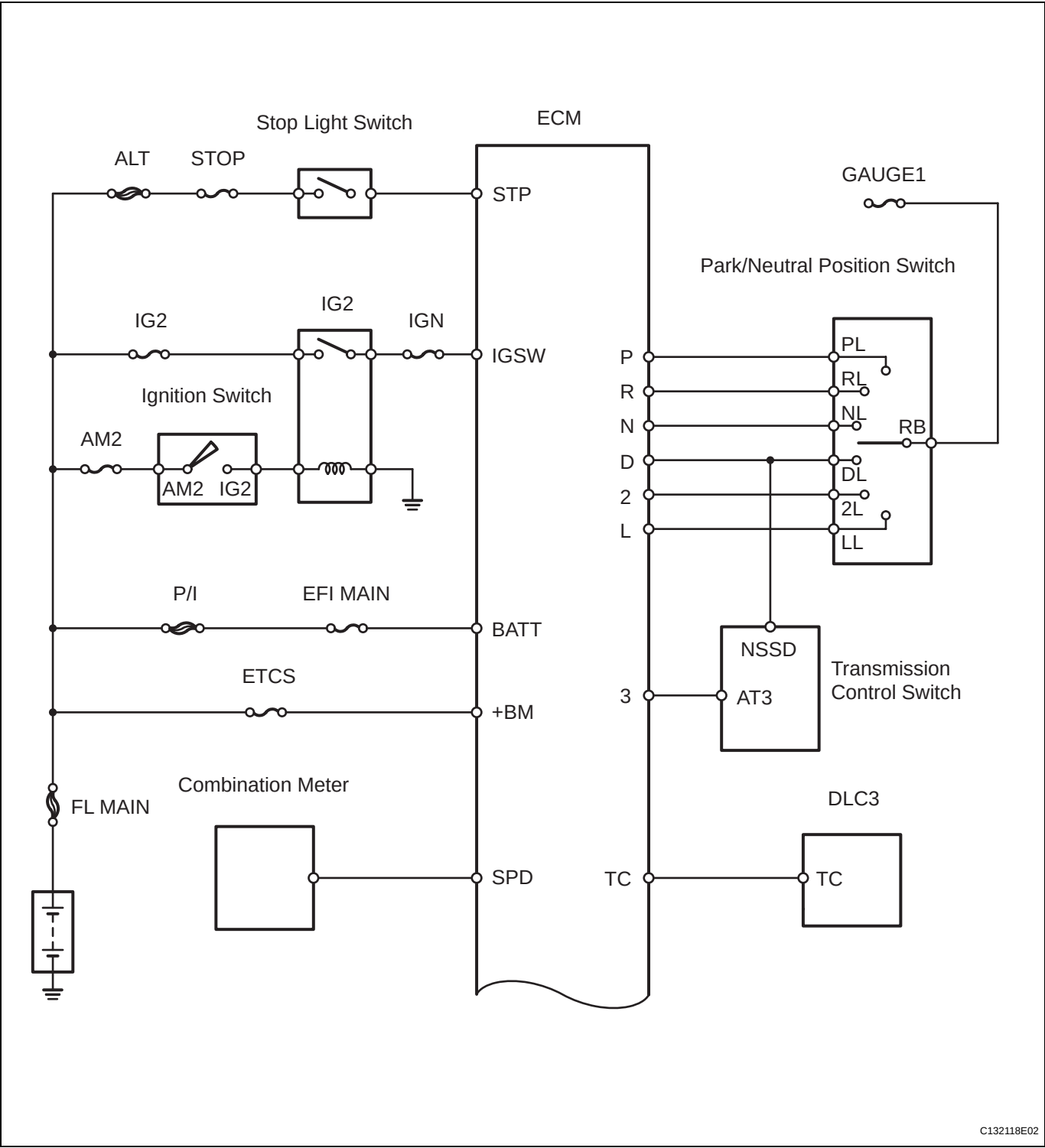
Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)

SYSTEM DIAGRAM

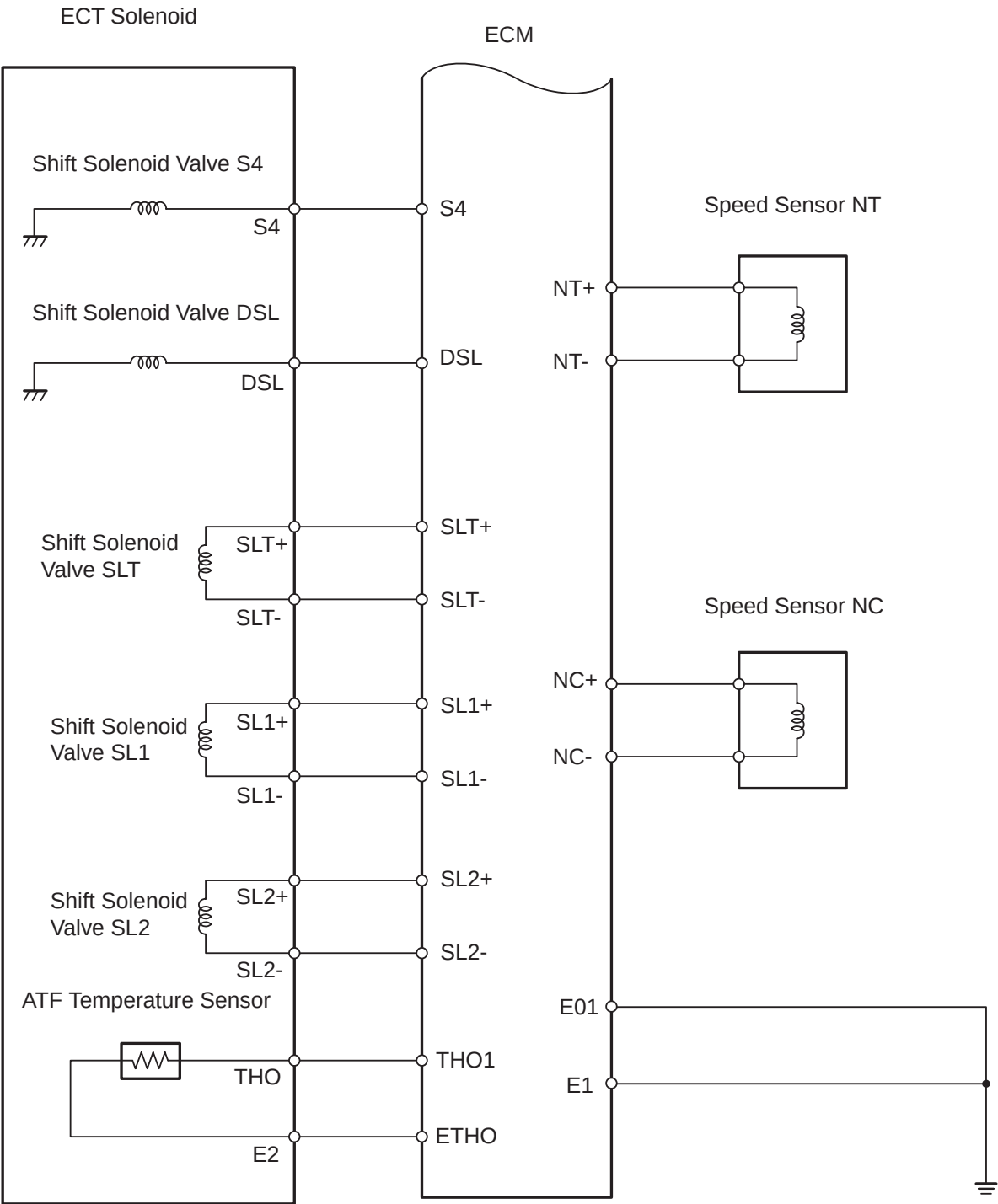
The configuration of the electronic control system in the U140F automatic transaxle is as shown in the following chart.







C132118E02



C132119E01

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

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

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The ECM of this system is connected to the CAN and multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN and multiplex communication systems.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS

NEXT

3 INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

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

NEXT

4 CONNECT INTELLIGENT TESTER TO DLC3*

NEXT

5 CHECK AND CLEAR DTCS AND FREEZE FRAME DATA*

(a) Refer to the DTC CHECK / CLEAR (see page [AX-29](#)).

NEXT

6 VISUAL INSPECTION

NEXT

7 SETTING CHECK MODE DIAGNOSIS*

(a) Refer to the CHECK MODE PROCEDURE (see page [AX-30](#)).

NEXT

8 PROBLEM SYMPTOM CONFIRMATION(a) Refer to the ROAD TEST (see page [AX-12](#)).**Result**

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B**GO TO STEP 10****A****9 SYMPTOM SIMULATION**(a) Refer to the ELECTRONIC CIRCUIT INSPECTION PROCEDURE (see page [IN-37](#)).

NEXT

10 DTC CHECK*(a) Refer to the DTC CHECK / CLEAR (see page [AX-29](#)).**Result**

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

B**GO TO STEP 18****A****11 BASIC INSPECTION**

- (a) Refer to the AUTOMATIC TRANSMISSION FLUID (see page [AX-102](#)).
- (b) Refer to the PARK/NEUTRAL POSITION SWITCH (see page [AX-108](#)).
- (c) Refer to the FLOOR SHIFT ASSEMBLY (see page [AX-136](#)).

NG**GO TO STEP 21**

OK

AX**12 MECHANICAL SYSTEM TESTS**(a) Refer to the MECHANICAL SYSTEM TESTS (see page [AX-15](#)).

NG

GO TO STEP 17

OK

13 HYDRAULIC TEST(a) Refer to the HYDRAULIC TEST (see page [AX-16](#)).

NG

GO TO STEP 17

OK

14 MANUAL SHIFTING TEST(a) Refer to the MANUAL SHIFTING TEST (see page [AX-17](#)).

NG

GO TO STEP 16

OK

15 PROBLEM SYMPTOMS TABLE CHAPTER 1(a) Refer to the PROBLEM SYMPTOMS TABLE (see page [AX-21](#)).

NG

GO TO STEP 19

OK

16 PROBLEM SYMPTOMS TABLE CHAPTER 2(a) Refer to the PROBLEM SYMPTOMS TABLE (see page [AX-21](#)).

NEXT

17 PART INSPECTION

NG

GO TO STEP 21

OK

18 DTC CHART(a) Refer to the DIAGNOSTIC TROUBLE CODE CHART (see page [AX-35](#)).

NEXT

19	CIRCUIT INSPECTION
----	--------------------

NEXT

20	IDENTIFICATION OF PROBLEM
----	---------------------------

NEXT

21	REPAIR OR REPLACE
----	-------------------

NEXT

22	CONFIRMATION TEST
----	-------------------

NEXT

END

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

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

2. ROAD TEST

NOTICE:

Perform the test at the normal operating ATF temperature of 50 to 80°C (122 to 176°F).

- (a) D position test

Move the shift lever to D and fully depress the accelerator pedal. Check the following:

- (1) Check up-shift operation.

Check that the 1 → 2, 2 → 3 and 3 → O/D up-shifts take place at the shift point shown in the automatic shift schedule (see page [SS-55](#)).

HINT:

O/D Gear Up-shift Prohibition Control

- Engine coolant temperature is 55°C (131°F) or less and vehicle speed is at 70 km/h (43 mph) or less.
- ATF temperature is 5°C (41°F) or less.

O/D Gear Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Engine coolant temperature is 60°C (140°F) or less.

- (2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up-shifts.

- (3) Check for abnormal noise and vibration.

Check for abnormal noise and vibration when up-shifting from 1 → 2, 2 → 3 and 3 → O/D while driving with the shift lever on D, and check while driving in the lock-up condition.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

- (4) Check kick-down operation.

While driving the vehicle in the 2nd, 3rd and O/D gears with the shift lever on D, check that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick-downs conform to those indicated in the automatic shift schedule (see page [SS-55](#)).

- (5) Check for abnormal shock and slip at kick-down.

(6) Check the lock-up mechanism.

- Drive the vehicle in the O/D gear with the shift lever on D. Maintain a steady speed (lock-up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

- There is no lock-up function in the 1st and 2nd gear.
- If there is a sudden increase in engine speed, there is no lock-up.

(b) 3 position test

Move the shift lever to 3 and fully depress the accelerator pedal. Check the following:

(1) Check up-shift operation.

Check that the 1 → 2 and 2 → 3 up-shifts take place and that the shift point conforms to the automatic shift schedule (see page [SS-55](#)).

(2) Check engine braking.

While driving the vehicle in the 3rd gear with the shift lever on 3, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(c) 2 position test

Move the shift lever to 2 and fully depress the accelerator pedal. Check the following:

(1) Check up-shift operation.

Check that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (see page [SS-55](#)).

HINT:

There is no O/D up-shift and lock-up when the shift lever is on 2.

(2) Check engine braking.

While driving the vehicle in the 2nd gear with the shift lever on 2, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(d) L position test

Move the shift lever to L and fully depress the accelerator pedal. Check the following:

(1) Check that there is no up-shift.

While driving the vehicle with the shift lever on L, check that there is no up-shift to 2nd gear.

HINT:

There is no lock-up in L.

- (2) Check engine braking.
While driving the vehicle with the shift lever on L, release the accelerator pedal and check the engine braking effect.
- (3) Check for abnormal noises during acceleration and deceleration.
- (e) R position test
Move the shift lever to R and lightly depress the accelerator pedal. Check that the vehicle moves backward without any abnormal noise or vibration.
CAUTION:
Before conducting this test, ensure that no people or obstacles are in the test area.
- (f) P position test
Stop the vehicle on an incline (more than 5°). Then move the shift lever to P and release the parking brake. Check that the parking lock pawl holds the vehicle in place.

MECHANICAL SYSTEM TESTS

1. STALL SPEED TEST

HINT:

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

NOTICE:

- **Do not perform the stall speed test longer than 5 seconds.**
 - **To ensure safety, perform this test in an open and level area that provides good traction.**
 - **The stall speed test should always be performed with at least 2 people. One person should observe the condition of the wheels and wheel chocks while the other is performing the test.**
- (a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
 - (b) Run the vehicle until the transmission fluid temperature has reached 50 to 80°C (122 to 176°F).
 - (c) Allow the engine to idle with the air conditioning OFF.
 - (d) Chock all 4 wheels.
 - (e) Set the parking brake and keep the brake pedal depressed firmly with your left foot.
 - (f) Move the shift lever to the D position.
 - (g) Depress the accelerator pedal as much as possible with your right foot.
 - (h) Read the engine rpm (stall speed) and release the accelerator pedal immediately.

Standard value:

2,150 to 2,450 rpm

Evaluation:

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

NOTICE:

Perform the test at the normal operating ATF temperature of 50 to 80°C (122 to 176°F).

2. SHIFT TIME LAG TEST

HINT:

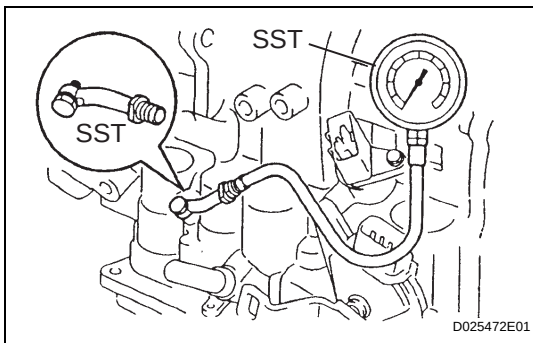
This test is to check the condition of the direct clutch, forward clutch, 1st brake and reverse brake.

- (a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (b) Run the vehicle until the transmission fluid temperature has reached 50 to 80°C (122 to 176°F).
- (c) Allow the engine to idle with the air conditioning OFF.

- (d) Set the parking brake and keep the brake pedal depressed firmly.
- (e) Check the D range time lag.
 - (1) Move the shift lever to N and wait for 1 minute.
 - (2) Move the shift lever to D and measure the time until the shock is felt.
 - (3) Repeat the 2 procedures above 3 times, and calculate the average time of the 3 tests.
- (f) Check the R range time lag.
 - (1) Move the shift lever to N and wait for 1 minute.
 - (2) Move the shift lever to R and measure the time until the shock is felt.
 - (3) Repeat the 2 procedures above 3 times, and calculate the average time of the 3 tests.

Standard value:**D range time lag is less than 1.2 seconds****R range time lag is less than 1.5 seconds****Evaluation:**

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

**HYDRAULIC TEST****1. MEASURE LINE PRESSURE****NOTICE:**

- Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).
 - The line pressure test should always be performed with at least 2 people. One person should observe the condition of the wheels or wheel chocks while the other is performing the test.
 - Be careful to prevent SST's hose from interfering with the exhaust pipe.
 - This test must be performed after checking and adjusting the engine.
 - Perform the test with the A/C OFF.
 - When conducting the stall test, do not continue for more than 10 seconds.
- (a) Warm up the ATF.
 - (b) Remove the test plug on the transaxle case center right side and connect SST.
SST 09992-00095 (09992-00231, 09992-00271)
 - (c) Fully apply the parking brake and chock the 4 wheels.
 - (d) Start the engine and check the idling speed.
 - (e) Keep your left foot firmly on the brake pedal and move the shift lever to D.
 - (f) Measure the line pressure when the engine is idling.

- (g) Depress the accelerator pedal as much as possible with your right foot. Quickly read the highest line pressure reading when the engine speed reaches stall speed.
- (h) Perform the measure line pressure test again with the shift lever on R.

Specified line pressure:

Condition	Shift Lever on D	Shift Lever on R
Idling	372 to 412 kPa (3.8 to 4.2 kgf/cm ² , 54 to 60 psi)	672 to 742 kPa (6.9 to 7.6 kgf/cm ² , 97 to 108 psi)
Stall	931 to 1,031 kPa (9.5 to 10.5 kgf/cm ² , 135 to 150 psi)	1,768 to 1,968 kPa (18.0 to 20.0 kgf/cm ² , 256 to 285 psi)

Evaluation:

Problem	Possible Cause
Measured values at all positions are higher than specified	- Shift solenoid valve SLT defective - Regulator valve defective
Measured values at all positions are lower than specified	- Shift solenoid valve SLT defective - Regulator valve defective - Oil pump defective - U/D (underdrive) direct clutch defective
Pressure is low when shift lever is on D only	- D position circuit fluid leak - Forward clutch defective
Pressure is low when shift lever is on R only	- R position circuit fluid leak - Direct clutch defective 1st and reverse brake defective

MANUAL SHIFTING TEST

1. MANUAL SHIFTING TEST

HINT:

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

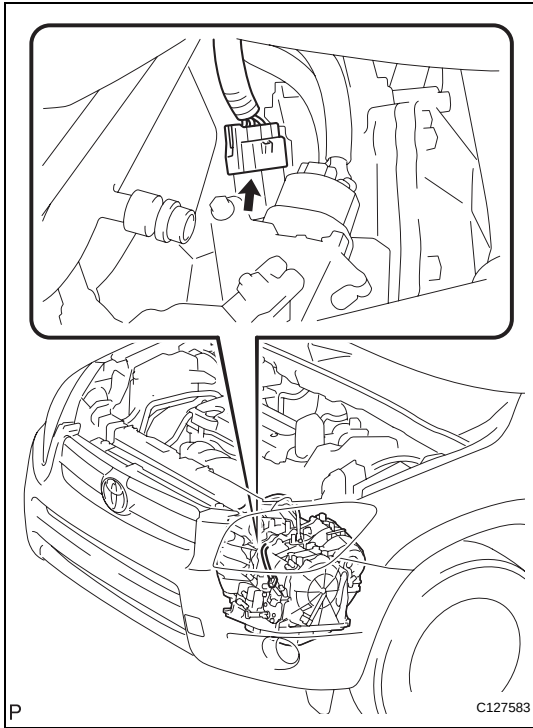
- (a) Disconnect the connector of the transmission wire.
HINT:

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

- (b) Drive with the transmission wire disconnected.
Move the shift lever to each position to check whether the gear position changes as shown in the table below.

Shift Lever Position	Gear Position
D	3rd
2	3rd
L	3rd
R	R
P	P

- (c) Connect the connector of the transmission wire.
(d) Clear the DTC (see page [AX-29](#)).



INITIALIZATION

1. RESET MEMORY

NOTICE:

- Perform the RESET MEMORY procedures (A/T initialization) when replacing the automatic transaxle assembly, engine assembly or ECM.
- RESET MEMORY can be performed only with the intelligent tester.

HINT:

The ECM memorizes the vehicle conditions when the ECT controls the automatic transaxle assembly and engine assembly. Therefore, when the automatic transaxle assembly, engine assembly, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

The reset procedures are as follows.

- (a) Turn the ignition switch OFF.
- (b) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (c) Turn the ignition switch ON and turn the tester ON.
- (d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II.
- (e) Perform the reset memory procedures from the Engine menu.

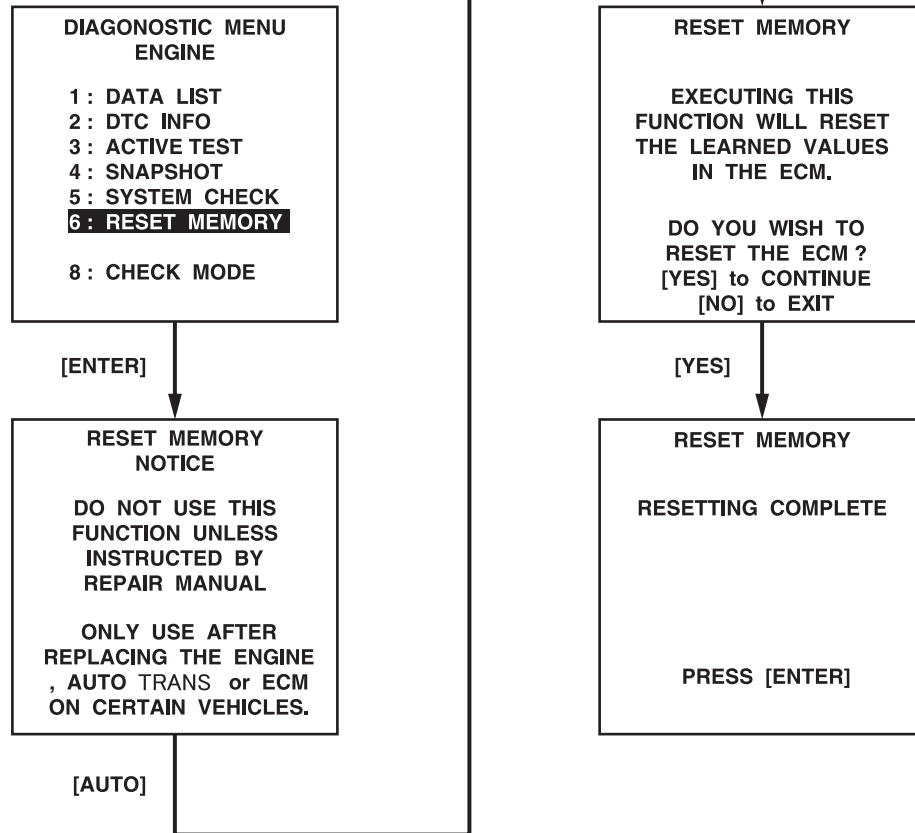
CAUTION:

After performing the RESET MEMORY procedures, be sure to perform the ROAD TEST (see page [AX-12](#)) as described earlier.

HINT:

The ECM learns through the ROAD TEST.

Tester Menu Flow:



MONITOR DRIVE PATTERN

1. TEST MONITOR DRIVE PATTERN FOR ECT

CAUTION:

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

HINT:

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

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

(a) Preparation for driving

- (1) Warm up the engine sufficiently (engine coolant temperature is 60°C (140°F) or higher).
- (2) Drive the vehicle when the atmospheric temperature is -10°C (14°F) or higher.
Malfunction is not detected when the atmospheric temperature is less than -10°C (14°F).

(b) Drive pattern

- (1) Drive the vehicle through all the gears.
Stop → 1st → 2nd → 3rd → O/D → O/D (lock-up ON).
- (2) Repeat the above drive pattern 3 times or more.

NOTICE:

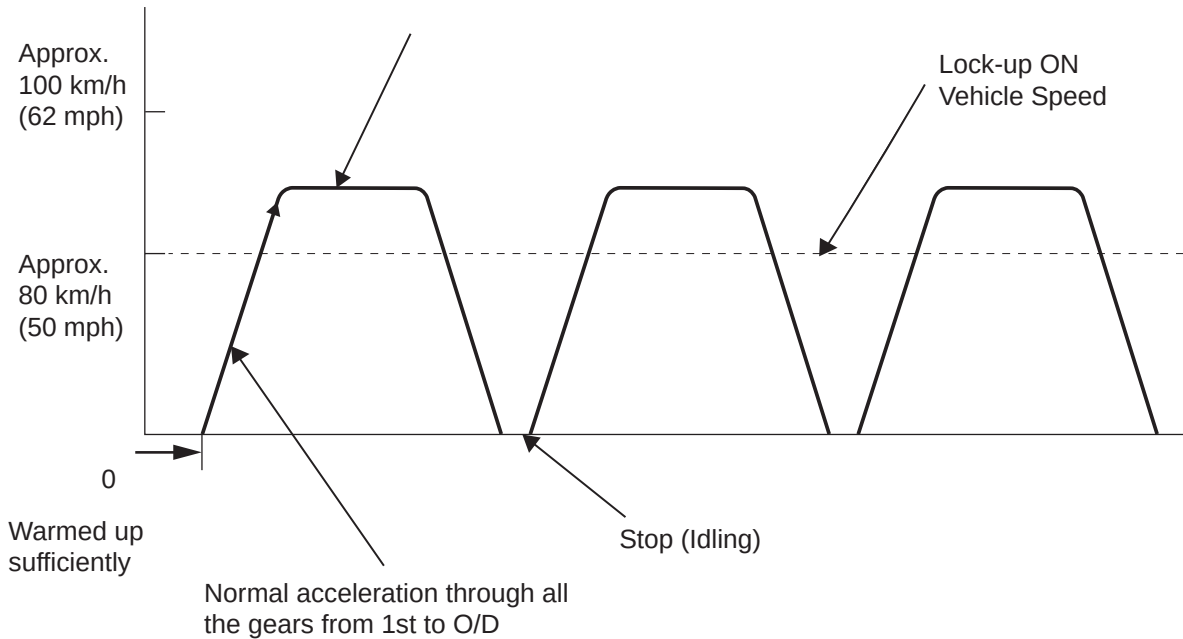
- **When using the intelligent tester, the monitor status can be found in "ENHANCED OBD II / DATA LIST" or under "CARB OBD II".**
- **In the event that the drive pattern must be interrupted (due to traffic conditions or other factors), the drive pattern can be resumed and, in most cases, the monitor can be completed.**

CAUTION:

Perform this drive pattern on a level road as much as possible and strictly observe the posted speed limits and traffic laws while driving.

Vehicle Speed

Maintain a constant speed or gradual acceleration (with the throttle valve open) for 3 minutes or more.*



P

C115866E05

HINT:

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

NOTICE:

It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (Transmission fluid temperature sensor "A" performance).

PROBLEM SYMPTOMS TABLE

HINT:

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

CHAPTER 1: ELECTRICAL CIRCUIT MATRIX CHART

Symptom	Suspected area	See page
No up-shift (1st -> 2nd)	ECM	IN-37
No up-shift (2nd -> 3rd)	ECM	IN-37
No up-shift (3rd -> O/D)	1. Park/Neutral position switch circuit*	AX-39
	2. ECM	IN-37
No down-shift (O/D -> 3rd)	ECM	IN-37
No down-shift (3rd -> 2nd)	ECM	IN-37
No down-shift (2nd -> 1st)	ECM	IN-37
No lock-up or no lock-up off	ECM	IN-37
Shift point too high or too low	ECM	IN-37
Up-shift to O/D from 3rd while shift lever is on 3	1. Park/Neutral position switch circuit*	AX-39
	2. ECM	IN-37
Up-shift to O/D from 3rd while engine is cold	1. Engine coolant temp. sensor circuit*	ES-51
	2. ECM	IN-37
Harsh engagement (N -> D)	ECM	IN-37
Harsh engagement (lock-up)	ECM	IN-37
Harsh engagement (any driving position)	ECM	IN-37
Poor acceleration	ECM	IN-37
Engine stalls when starting off or stopping	ECM	IN-37
Malfunction in shifting	1. Park/Neutral position switch circuit*	AX-39
	2. ECM	IN-37

HINT:

*: When the circuit is defective, a DTC may be output.

CHAPTER 2: ON-VEHICLE REPAIR AND OFF-VEHICLE REPAIR

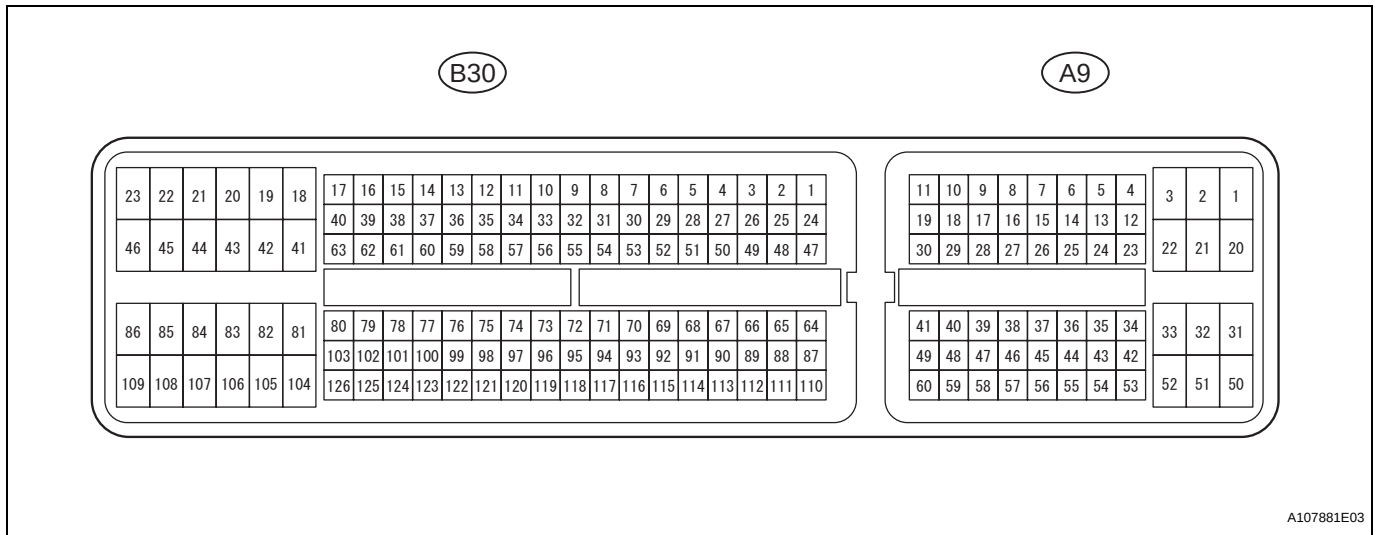
Symptom	Suspected area	See page
Vehicle does not move in all positions other than P and N	1. Manual valve	AX-155
	2. Primary regulator valve	AX-155
	3. Front and rear planetary gear	AX-155
	4. U/D planetary gear	AX-155
	5. F2 U/D one-way clutch	AX-155
	6. C1 forward clutch	AX-155
	7. B3 U/D brake	AX-155

Symptom	Suspected area	See page
Vehicle does not move with shift lever on R	1. Front and rear planetary gear	AX-155
	2. U/D planetary gear	AX-155
	3. C2 direct clutch	AX-155
	4. C3 U/D brake	AX-155
	5. B2 1st and reverse brake	AX-155
No up-shift (1st -> 2nd)	1. Valve body assembly	AX-118
	2. F1 No. 1 one-way clutch	AX-155
	3. B1 2nd brake	AX-155
No up-shift (2nd -> 3rd)	1. Valve body assembly	AX-118
	2. C2 direct clutch	AX-155
No up-shift (3rd -> O/D)	1. 3-4 shift valve	AX-155
	2. C3 U/D clutch	AX-155
No down-shift (O/D -> 3rd)	3-4 shift valve	AX-155
No down-shift (3rd -> 2nd)	Valve body assembly	AX-118
No down-shift (2nd -> 1st)	Valve body assembly	AX-118
No lock-up or no lock-up off	1. Lock-up relay valve	AX-155
	2. Torque converter clutch	AX-153
Harsh engagement (N -> D)	1. C1 accumulator	AX-155
	2. Valve body assembly	AX-118
	3. C1 forward clutch	AX-155
	4. F2 U/D one-way clutch	AX-155
	5. F1 No. 1 one-way clutch	AX-155
Harsh engagement (N -> R)	1. Valve body assembly	AX-118
	2. C2 direct clutch	AX-155
	3. B2 1st and reverse brake	AX-155
Harsh engagement (Lock-up)	1. Lock-up relay valve	AX-155
	2. Torque converter clutch	AX-153
Harsh engagement (2nd -> 3rd)	Valve body assembly	AX-118
Harsh engagement (3rd -> O/D)	Valve body assembly	AX-118
Harsh engagement (O/D -> 3rd)	Valve body assembly	AX-118
Slip or shudder (forward position, after warm-up)	1. Oil strainer	AX-118
	2. Torque converter clutch	AX-153
	3. C1 forward clutch	AX-155
	4. C2 direct clutch	AX-155
	5. C3 U/D brake	AX-155
	6. F1 No. 1 one-way clutch	AX-155
	7. F2 U/D one-way clutch	AX-155
Slip or shudder (shift lever on R)	1. Oil strainer	AX-118
	2. C2 direct clutch	AX-155
	3. B2 1st and reverse brake	AX-155
Slip or shudder (1st)	F1 No. 1 one-way clutch	AX-155
Slip or shudder (2nd)	1. F2 U/D one-way clutch	AX-155
	2. B1 2nd brake	AX-155
Slip or shudder (3rd)	C2 direct clutch	AX-155
Slip or shudder (O/D)	C3 U/D clutch	AX-155
No engine braking (1st to 3rd/shift lever on D)	B3 U/D brake	AX-155
No engine braking (1st/shift lever on L)	B2 1st and reverse brake	AX-155
No engine braking (2nd/shift lever on 2)	B1 2nd brake	AX-155

Symptom	Suspected area	See page
Poor acceleration (all positions)	1. Torque converter clutch	AX-153
	2. U/D planetary gear	AX-155
Poor acceleration (O/D)	1. C3 U/D clutch	AX-155
	2. U/D planetary gear	AX-155
Large shift shock or engine stalls when starting off or stopping	Torque converter clutch	AX-153
No kick-down	Valve body assembly	AX-118

TERMINALS OF ECM

1. CHECK ECM



(a) Measure the voltage of the ECM connector.

HINT:

Each ECM terminal's standard voltage is shown in the table below.

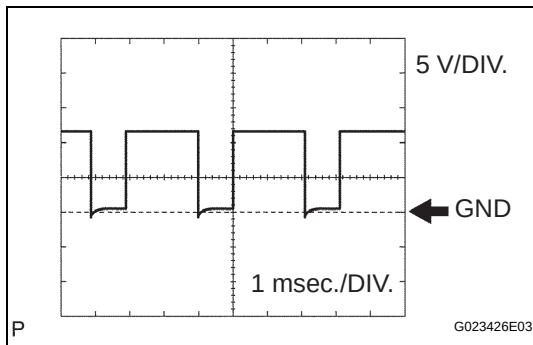
In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".

Use the illustration above as a reference for the ECM terminals.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
STAR (B30-52) - E1 (B30-104)	W - BR	Park/Neutral position switch signal	Ignition switch ON and shift lever on P or N	Below 2 V
STAR (B30-52) - E1 (B30-104)	W - BR	Park/Neutral position switch signal	Ignition switch ON and shift lever not on P or N	10 to 14 V
P (B30-73) - E1 (B30-104)	L - BR	P shift position switch signal	Ignition switch ON and transfer shift lever on P	10 to 14 V
P (B30-73) - E1 (B30-104)	L - BR	P shift position switch signal	Ignition switch ON and transfer shift lever not on P	Below 1 V
R (B30-53) - E1 (B30-104)	R - BR	R shift position switch signal	Ignition switch ON and transfer shift lever on R	10 to 14 V
R (B30-53) - E1 (B30-104)	R - BR	R shift position switch signal	Ignition switch ON and transfer shift lever not on R	Below 1 V
N (B30-54) - E1 (B30-104)	Y - BR	N shift position switch signal	Ignition switch ON and transfer shift lever on N	10 to 14 V
N (B30-54) - E1 (B30-104)	Y - BR	N shift position switch signal	Ignition switch ON and transfer shift lever not on N	Below 1 V
D (B30-56) - E1 (B30-104)	B - BR	D shift position switch signal	Ignition switch ON and transfer shift lever on D or 3	10 to 14 V
D (B30-56) - E1 (B30-104)	B - BR	D shift position switch signal	Ignition switch ON and transfer shift lever not on D or 3	Below 1 V

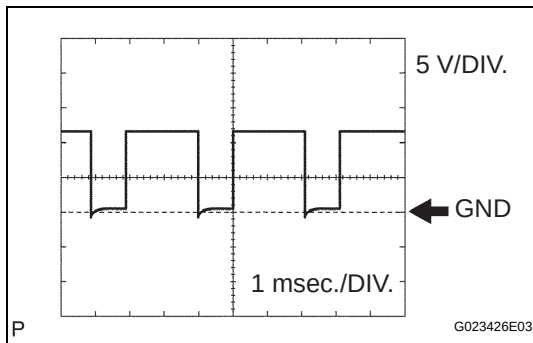
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
3 (A9-26) - E1 (B30-104)	P - BR	3 shift position switch signal	Ignition switch ON and transfer shift lever on 3	10 to 14 V
3 (A9-26) - E1 (B30-104)	P - BR	3 shift position switch signal	Ignition switch ON and transfer shift lever not on 3	Below 1 V
2 (B30-55) - E1 (B30-104)	P - BR	2 shift position switch signal	Ignition switch ON and transfer shift lever on 2 and L	10 to 14 V
2 (B30-55) - E1 (B30-104)	P - BR	2 shift position switch signal	Ignition switch ON and transfer shift lever not on 2 and L	Below 1 V
L (B30-74) - E1 (B30-104)	LG - BR	L shift position switch signal	Ignition switch ON and transfer shift lever on L	10 to 14 V
L (B30-74) - E1 (B30-104)	LG - BR	L shift position switch signal	Ignition switch ON and transfer shift lever not on L	Below 1 V
STP (A9-36) - E1 (B30-104)	L - BR	Stop light switch signal	Brake pedal is depressed	Between 10 V and 14 V
STP (A9-36) - E1 (B30-104)	L - BR	Stop light switch signal	Brake pedal is released	Below 1 V
SL1+ (B30-57) - SL1- (B30-77)	V - P	SL1 solenoid signal	Engine idle speed	Pulse generation (see waveform 1)
SL1+ (B30-57) - SL1- (B30-77)	V - P	SL1 solenoid signal	Ignition switch ON	Pulse generation (see waveform 1)
SL1+ (B30-57) - SL1- (B30-77)	V - P	SL1 solenoid signal	1st gear	Pulse generation (see waveform 1)
SL1+ (B30-57) - SL1- (B30-77)	V - P	SL1 solenoid signal	Not on 1st gear	Below 1 V
SL2+ (B30-58) - SL2- (B30-59)	Y - L	SL2 solenoid signal	Engine idle speed	Pulse generation (see waveform 2)
SL2+ (B30-58) - SL2- (B30-59)	Y - L	SL2 solenoid signal	Ignition switch ON	Pulse generation (see waveform 2)
SL2+ (B30-58) - SL2- (B30-59)	Y - L	SL2 solenoid signal	1st or 2nd gear	Pulse generation (see waveform 2)
SL2+ (B30-58) - SL2- (B30-59)	Y - L	SL2 solenoid signal	3rd or O/D gear	Below 1 V
DSL (B30-79) - E01 (B30-45)	G - BR	DSL solenoid signal	Vehicle speed 65 km/h (40 mph), lock-up (ON to OFF)	Below 1 V
DSL (B30-79) - E01 (B30-45)	G - BR	DSL solenoid signal	Vehicle driving under lock-up position	Pulse generation (see waveform 3)
SLT+ (B30-76) - SLT- (B30-75)	R - GR	SLT solenoid signal	Engine idle speed	Pulse generation (see waveform 4)
S4 (B30-78) - E01 (B30-45)	W - BR	S4 solenoid signal	Ignition switch ON	Below 1 V
S4 (B30-78) - E01 (B30-45)	W - BR	S4 solenoid signal	O/D gear	10 to 14 V
S4 (B30-78) - E01 (B30-45)	W - BR	S4 solenoid signal	Not on O/D gear	Below 1 V
THO1 (B30-72) - ETHO (B30-95)	LG- BR	ATF temperature sensor signal	ATF temperature: 115°C (239°F) or more	Below 1.5 V
NT+ (B30-125) - NT- (B30-124)	W - R	Speed sensor (NT) signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (see waveform 5)
NC+ (B30-101) - NC- (B30-102)	R - W	Speed sensor (NC) signal	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm	Pulse generation (see waveform 6)

(b) Using an oscilloscope, check the waveform 1.

Waveform 1 (Reference)

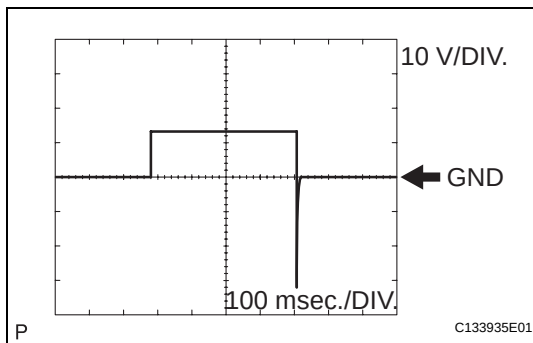
Item	Content
Symbols (Terminal No.)	SL1+ (B30-57) - SL1- (B30-77)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Engine idle speed

(c) Using an oscilloscope, check the waveform 2.

Waveform 2 (Reference)

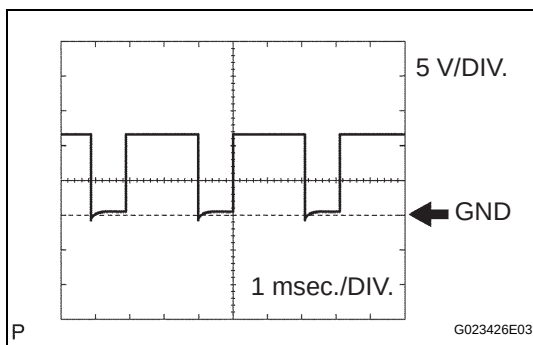
Item	Content
Symbols (Terminal No.)	SL2+ (B30-58) - SL2- (B30-59)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Engine idle speed

(d) Using an oscilloscope, check the waveform 3.

Waveform 3 (Reference)

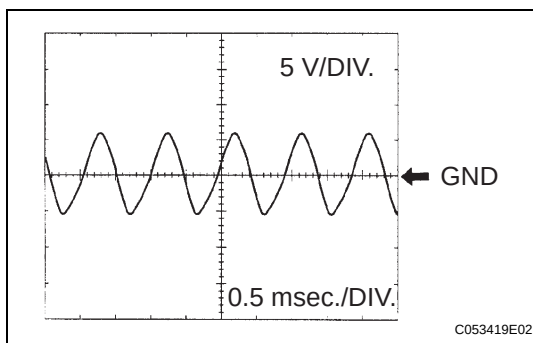
Item	Content
Symbols (Terminal No.)	DSL (B30-79) - E01 (B30-45)
Tool Setting	10 V/DIV., 100 msec./DIV.
Condition	Vehicle speed 65 km/h (40 mph), lock-up (ON to OFF)

(e) Using an oscilloscope, check the waveform 4.

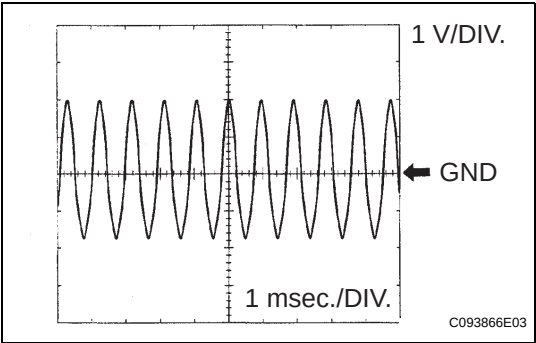
Waveform 4 (Reference)

Item	Content
Symbols (Terminal No.)	SLT+ (B30-76) - SLT- (B30-75)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Engine idle speed

(f) Using an oscilloscope, check the waveform 5.

Waveform 5 (Reference)

Item	Content
Symbols (Terminal No.)	NT+ (B30-125) - NT- (B30-124)
Tool Setting	5 V/DIV., 0.5 msec./DIV.
Condition	Vehicle speed 20 km/h (12 mph)



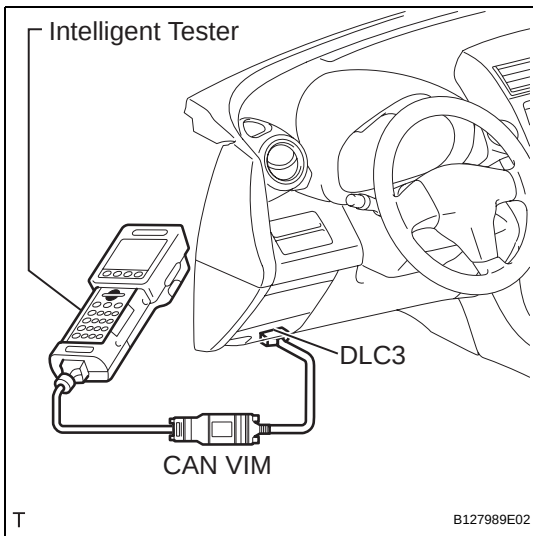
(g) Using an oscilloscope, check the waveform 6.
Waveform 6 (Reference)

Item	Content
Symbols (Terminal No.)	NC+ (B30-101) - NC- (B30-102)
Tool Setting	1 V/DIV., 1 msec./DIV.
Condition	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm

DIAGNOSIS SYSTEM

1. DESCRIPTION

- (a) When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle's ECM can then be read.
- (b) OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:
- (1) The emission control system/components
 - (2) The powertrain control components (which affect vehicle emissions)
 - (3) The computer
- In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory.
- When the malfunction does not reoccur, the MIL stays illuminated until the ignition switch is turned OFF, and the MIL turns OFF when the engine is started. However, the DTCs remain recorded in the ECM memory.
- (c) To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The tester displays DTCs, the freeze frame data and a variety of the engine data.
- The DTCs and freeze frame data can be erased with the tester (see page [AX-29](#)).



2. NORMAL MODE AND CHECK MODE

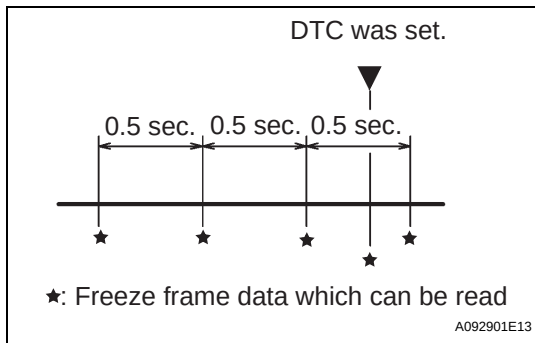
- (a) The diagnosis system operates in "normal mode" during normal vehicle use. In normal mode, "2 trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available to technicians as an option. In check mode, "1 trip detection logic" is used for simulating malfunction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

3. 2 TRIP DETECTION LOGIC

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

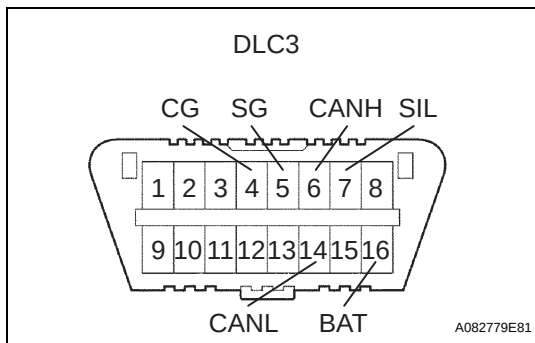
4. FREEZE FRAME DATA

- (a) Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- (b) The intelligent tester records freeze frame data in 5 different instances: 1) 3 times before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. These data can be used to simulate the vehicle's condition around the time when the malfunction occurred. The data may help find the cause of the malfunction, or judge if the DTC is being caused by a temporary malfunction or not.



5. DATA LINK CONNECTOR 3 (DLC3)

- (a) The vehicle's ECM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	9 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch OFF	54 to 69 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Ignition switch OFF	1 M Ω or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF	200 Ω or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Ignition switch OFF	1 M Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF	200 Ω or higher

HINT:

*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, other switches or doors.

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch ON and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle. If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

6. CHECK MIL

- (a) Check that the MIL illuminates when turning the ignition switch ON.
If the MIL does not illuminate, there is a problem in the MIL circuit (see page [ES-386](#)).
- (b) When the engine is started, the MIL should turn off.

7. ALL READINESS

- (a) For this vehicle, using the intelligent tester allows readiness codes corresponding to all DTCs to be read. When the diagnosis (normal or malfunctioning) has been completed, readiness codes are set. Enter the following menus:
ENHANCED OBD II / MONITOR STATUS.

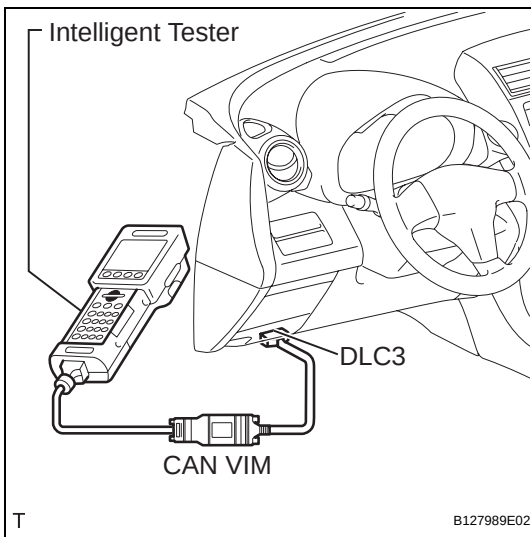
DTC CHECK / CLEAR

1. CHECK DTC

- (a) DTCs which are stored in the ECM can be displayed with the intelligent tester.
The intelligent tester can display pending DTCs and current DTCs. Some DTCs are not stored unless a malfunction is detected in consecutive driving cycles. When a malfunction is detected in only one driving cycle, it is stored as a pending DTC.
 - (1) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
 - (2) Turn the ignition switch ON and turn the tester ON.
 - (3) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES (or PENDING CODE).
 - (4) Confirm the DTCs and freeze frame data and then write them down.
 - (5) Confirm the details of the DTCs (see page [AX-35](#)).

NOTICE:

When simulating a symptom with the scan tool to check for DTCs, use normal mode. For codes on the **DIAGNOSTIC TROUBLE CODE CHART** subject to "2 trip detection logic", perform the following actions. Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the symptom has been simulated twice, the MIL illuminates and the DTCs are recorded in the ECM.



2. CLEAR DTC

(a) When using the intelligent tester:

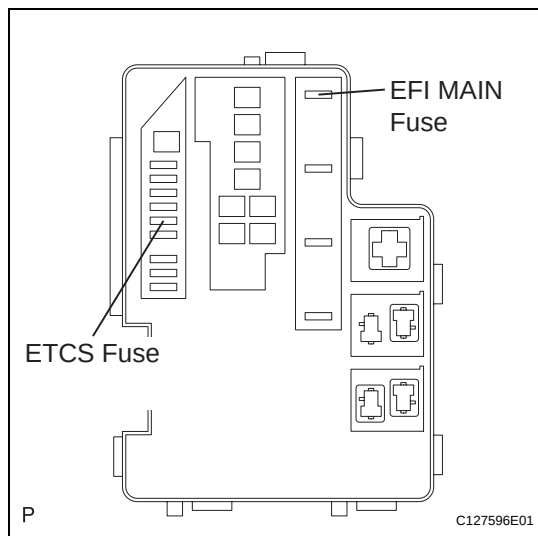
- (1) Connect the intelligent tester to the CAN VIM.
Then connect the CAN VIM to the DLC3.
- (2) Turn the ignition switch ON and turn the tester ON.
- (3) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES. Then and press YES.

HINT:

When operating the tester to erase the codes, the DTCs and freeze frame data will be erased.

(b) When not using the intelligent tester:

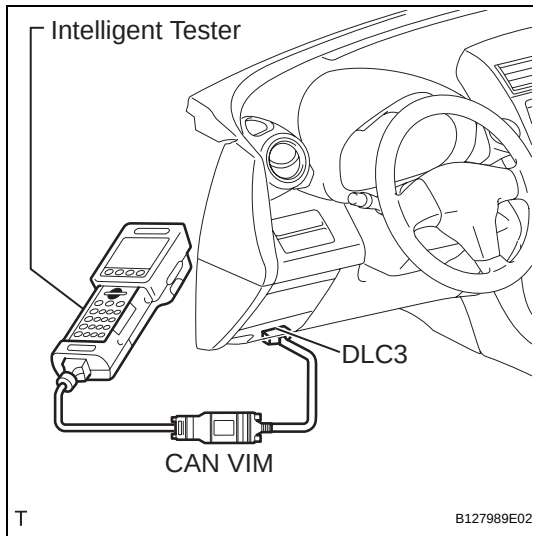
- (1) Disconnect the battery terminal or remove the EFI MAIN and ETCS fuses from the engine room No. 1 relay block and engine room No. 1 junction block for 60 seconds or more. However, if you disconnect the battery terminal, perform the "INITIALIZATION" procedure (see page [AX-18](#)).



CHECK MODE PROCEDURE

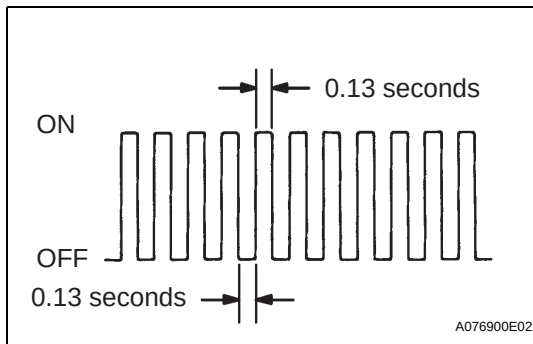
1. DESCRIPTION

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



2. CHECK MODE PROCEDURE

- (a) Make sure that the following conditions below are met:
- (1) Battery positive voltage 11 V or more
 - (2) Throttle valve fully closed
 - (3) Transaxle in the P or N position
 - (4) A/C OFF
- (b) Turn the ignition switch OFF.
- (c) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (d) Turn the ignition switch ON and turn the tester ON.
- (e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.



- (f) Change the ECM to check mode. Make sure the MIL flashes as shown in the illustration.

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the intelligent tester is used to change the ECM from normal mode to check mode or vice versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

Before check mode, make notes of the DTCs and freeze frame data.

- (g) Start the engine. The MIL should turn off after the engine starts.
- (h) Perform "MONITOR DRIVE PATTERN" for the ECT test (see page [AX-19](#)).
(Or, simulate the conditions of the malfunction described by the customer.)
- (i) After simulating the malfunction conditions, use the tester to check the DTC and freeze frame data.

ADJUSTMENT

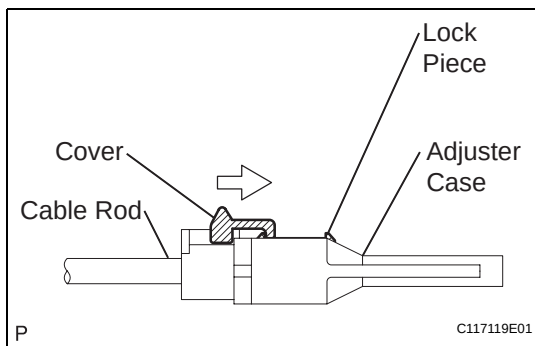
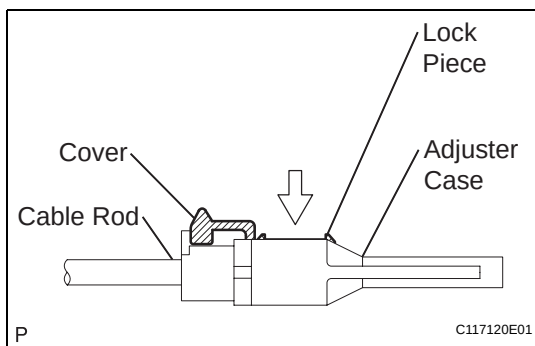
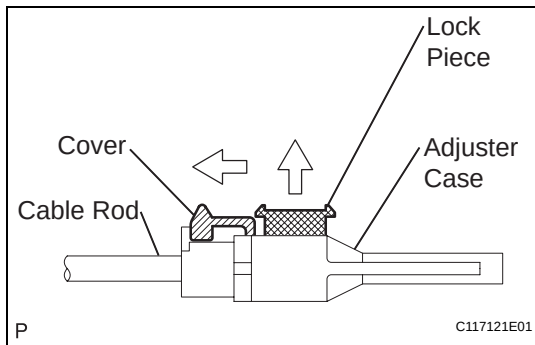
1. INSPECT SHIFT LEVER POSITION

- (a) When shifting the lever from P to the R position with the ignition switch ON and the brake pedal depressed, make sure that the shift lever moves smoothly and moves correctly into position.
- (b) Start the engine and make sure that the vehicle moves forward when shifting the lever from N to the D position and moves rearward when shifting the lever to the R position.

If the operation cannot be performed as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

2. ADJUST SHIFT LEVER POSITION

- (a) Shift the shift lever to the N position.
- (b) Slide the adjuster case cover in the direction shown in the illustration and pull out the lock piece.
- (c) Gently pull the cable rod toward the rear of the vehicle by hand to pull the cable taut.



- (d) Press the lock piece into the adjuster case and lock it.

- (e) Slide the cover in the direction shown in the illustration.

NOTICE:

Slide the cover past the protrusion of the lock piece.

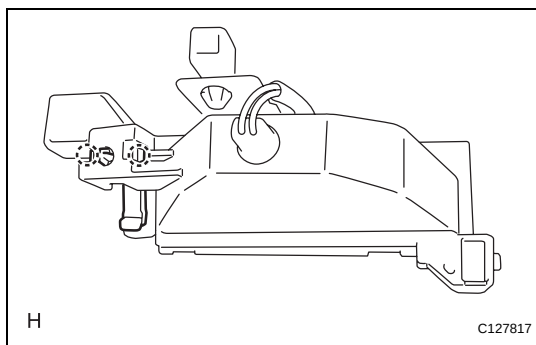
- (f) Inspect the operation after the adjustment.

REASSEMBLY

1. INSTALL SHIFT LOCK RELEASE BUTTON

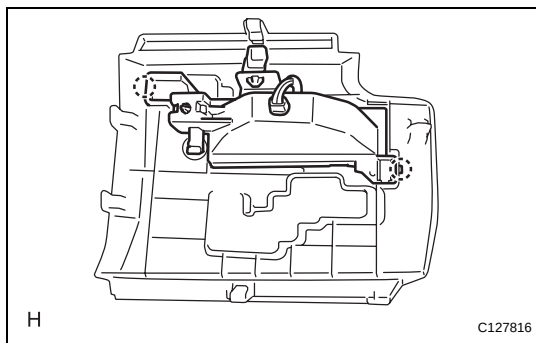
- (a) Install the spring and button and attach the claws to the position indicator light housing.

2. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY



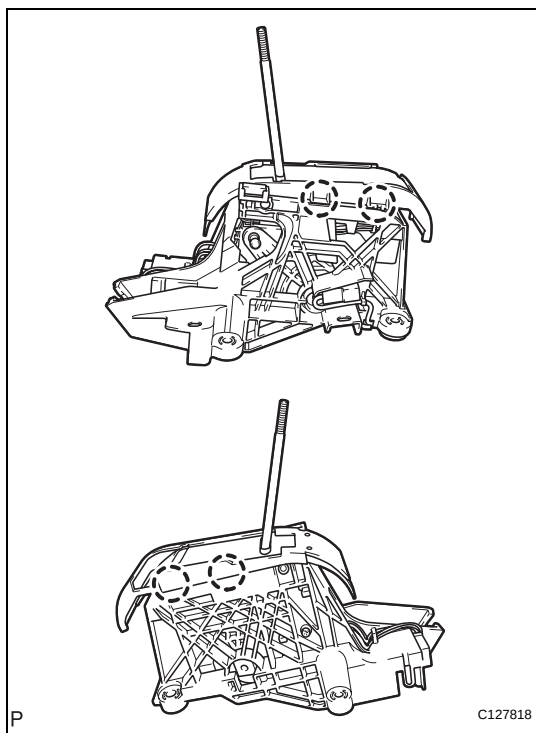
3. INSTALL POSITION INDICATOR LIGHT HOUSING

- (a) Attach the indicator light housing to the shift position indicator housing with the 2 claws.



4. INSTALL LOWER POSITION INDICATOR HOUSING

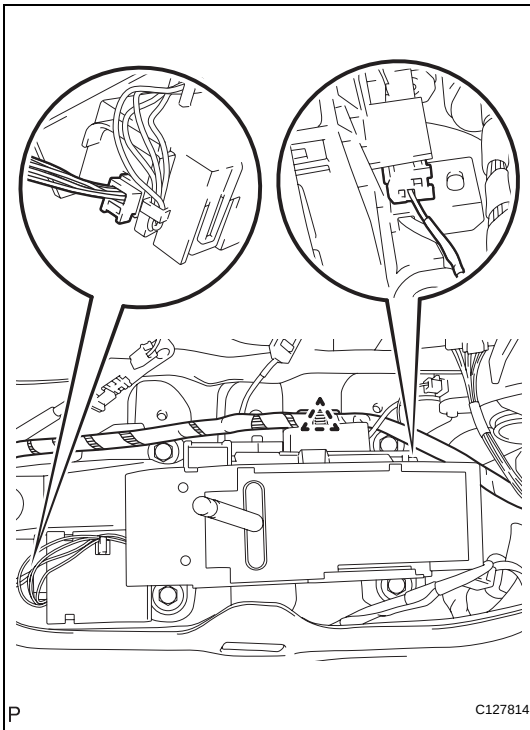
- (a) Install the position indicator slide cover with slide cover No. 2 to the indicator housing.
- (b) Attach the housing to the floor shift assembly with the 4 claws.



INSTALLATION

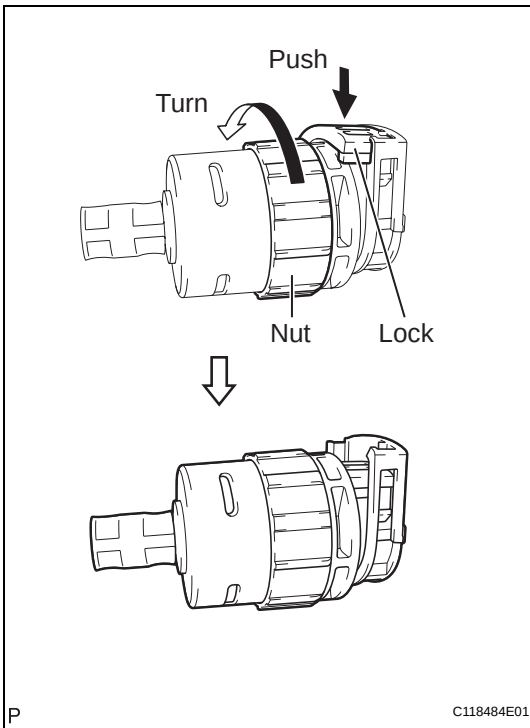
1. INSTALL FLOOR SHIFT ASSEMBLY

- (a) Connect the 2 connectors and attach the clamp.
- (b) Install the floor shift with the 4 bolts.



2. CONNECT TRANSAXLE CONTROL CABLE ASSEMBLY

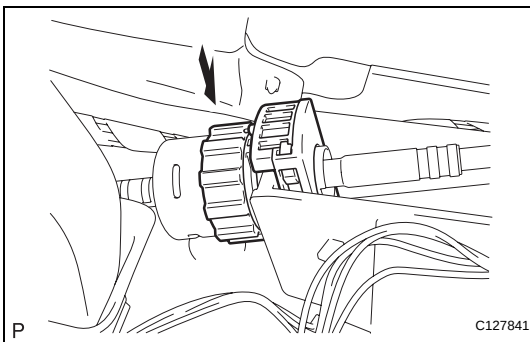
- (a) Turn the nut of the control cable and push in the lock.

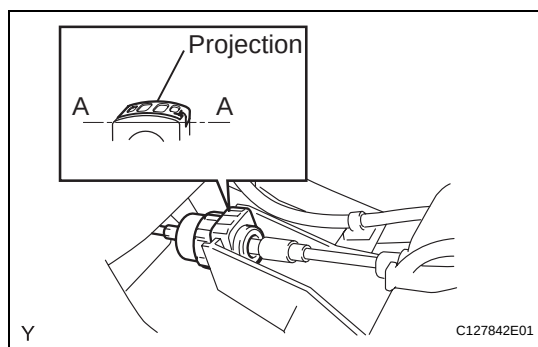


- (b) Install the control cable onto the shift lever retainer.

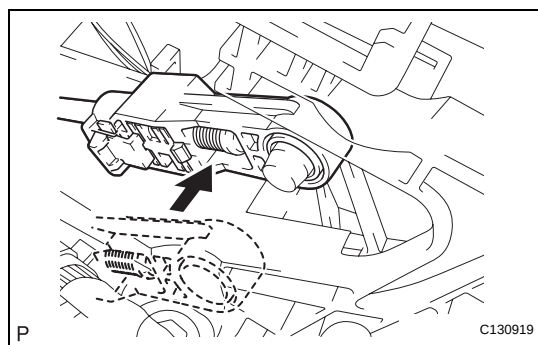
NOTICE:

- Install the cable with the protruding portion of the cable outer facing upward.





- After installing, check that the lock of the cable outer is protruding beyond portion A-A, as shown in the illustration.



- (c) Connect the control cable to the shift lever.

NOTICE:

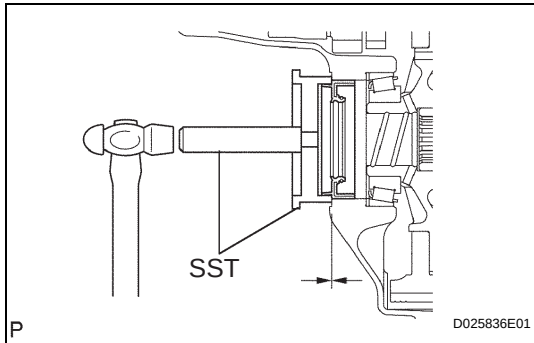
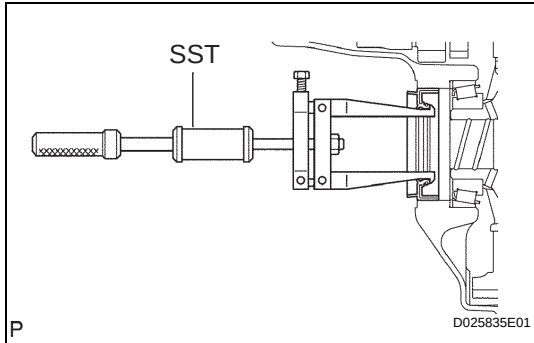
Connect the control cable so that the adjusting mechanism lock of the control cable is installed on the driver side of the vehicle.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
4. INSPECT SHIFT LEVER POSITION (See page [AX-138](#))
5. ADJUST SHIFT LEVER POSITION (See page [AX-138](#))
6. INSTALL REAR CONSOLE BOX SUB-ASSEMBLY
 - (a) Install the rear console box (see page [IP-26](#)).
7. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY

REPLACEMENT

1. REPLACE TRANSAXLE HOUSING OIL SEAL LH

- (a) Drain the automatic transaxle fluid.
 - (1) Remove the drain plug and gasket, and drain ATF.
 - (2) Install a new gasket and drain plug.
Torque: 47 N*m (479 kgf*cm, 35 ft.*lbf)
- (b) Remove the front drive shaft LH (see page [DS-41](#)).
- (c) Remove the transaxle housing oil seal LH.
 - (1) Using SST, tap out the oil seal.
SST 09308-00010



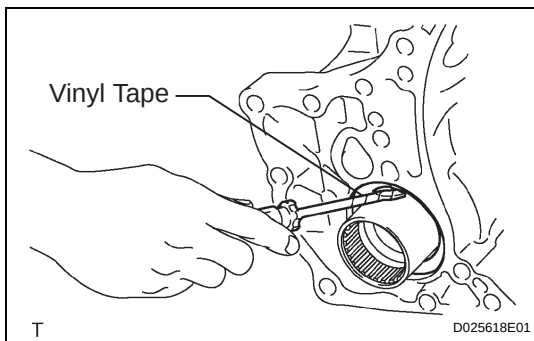
- (d) Install a new transaxle housing oil seal LH.
 - (1) Coat the lip of a new oil seal with MP grease.
 - (2) Using SST and a hammer, tap in the oil seal.
SST 09726-27012 (09726-02041), 09950-70010 (09951-07200, 09951-07200)
Standard depth:
0 +/-0.5 mm (0 +/-0.020 in.)
- (e) Install the front drive shaft LH (see page [DS-65](#)).
- (f) Add automatic transaxle fluid.
Fluid type:
Toyota Genuine ATF WS
- (g) Inspect the transaxle fluid level (see page [AX-102](#)).

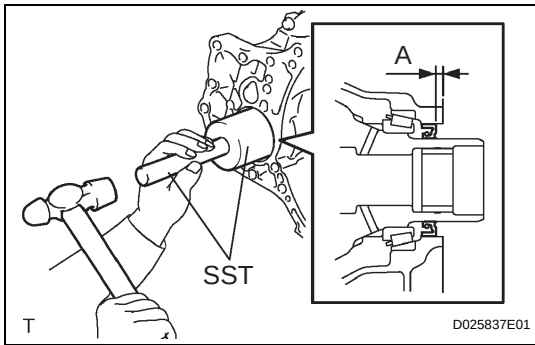
2. REPLACE TRANSAXLE HOUSING OIL SEAL RH

- (a) Remove the engine with transaxle (see page [EM-98](#)).
- (b) Drain the automatic transaxle fluid.
 - (1) Remove the drain plug and gasket, and drain ATF.
 - (2) Install a new gasket and the drain plug.
Torque: 47 N*m (479 kgf*cm, 35 ft.*lbf)
- (c) Remove the 3 bolts and drive shaft bearing bracket.
- (d) Remove the 3 bolts and engine mount bracket RR.
- (e) Remove the transfer assembly (see page [TF-59](#)).
- (f) Remove the transaxle housing oil seal RH.
 - (1) Using a screwdriver with vinyl tape wound around its tip, remove the oil seal.

NOTICE:

Be careful not to damage the housing.





- (g) Install a new transaxle housing oil seal RH.
- (1) Coat the lip of a new oil seal with MP grease.
 - (2) Using SST and a hammer, tap in the oil seal.
SST 09309-37010
Standard depth:
6.0 +0.5 mm (0.236 +0.020 in.)
- (h) Install the transfer assembly (see page [TF-75](#)).
- (i) Install the engine mount bracket RR with the 3 bolts.
Torque: 64 N*m (652 kgf*cm, 47 ft.*lbf)
- (j) Install the drive shaft bearing bracket with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)
- (k) Install the engine with transaxle (see page [EM-105](#)).
- (l) Add automatic transaxle fluid.
Fluid type:
Toyota Genuine ATF WS
- (m) Inspect the fluid level (see page [AX-102](#)).

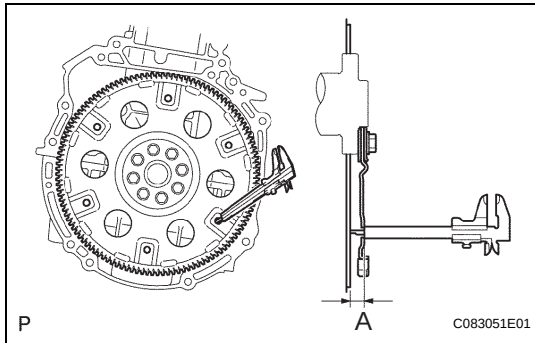
INSTALLATION

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

- (a) Inspect the torque converter (see page [AX-153](#)).

2. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

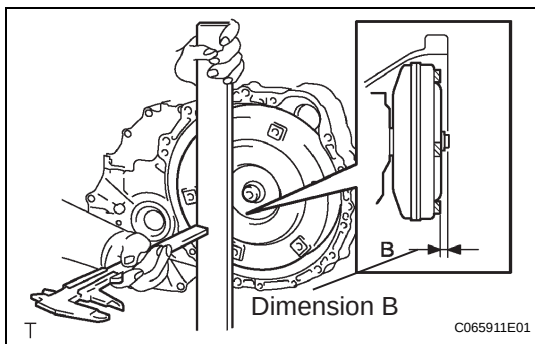
- (a) Install the torque converter clutch to the automatic transaxle.
- (b) Using a vernier caliper, measure dimension A between the transaxle and the end surface of the drive plate.



- (c) Using a vernier caliper and straightedge, measure the dimension B shown in the illustration and check that B is greater than A.

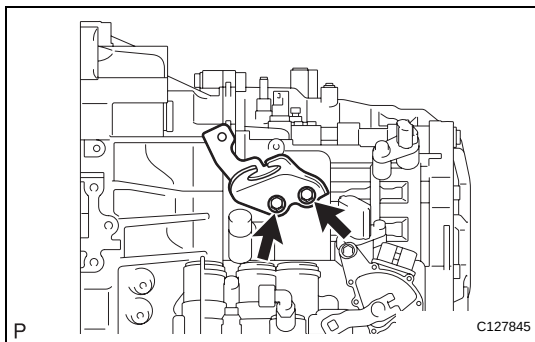
Standard dimension:

A + 1.0 mm (0.039 in.) or more



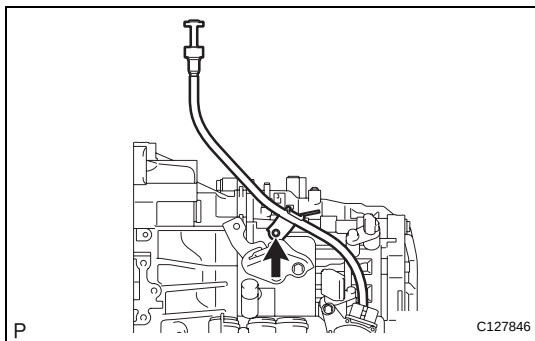
3. INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET

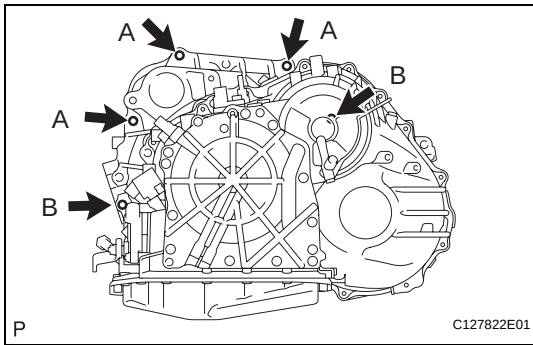
- (a) Install the cable bracket with the 2 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



4. INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

- (a) Install the filler tube with the bolt.
- (b) Install the filler tube with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
- (c) Install the ATF dipstick.

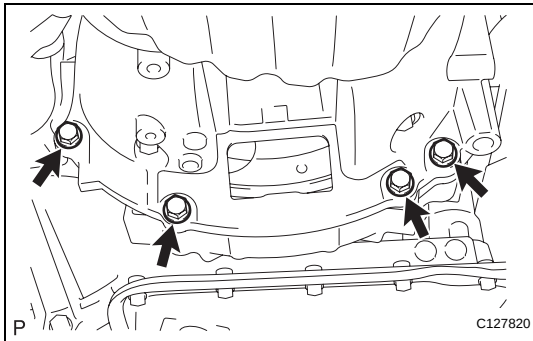




5. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

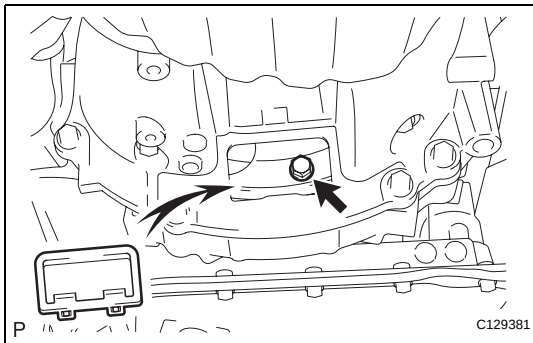
- (a) Install the automatic transaxle with the 5 upper side mounting bolts to the engine.

Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf) for bolt A
46 N*m (469 kgf*cm, 34 ft.*lbf) for bolt B



- (b) Install the 4 lower side mounting bolts.

Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)



- (c) Install the 6 torque converter clutch mounting bolts.

Torque: 41 N*m (418 kgf*cm, 30 ft.*lbf)

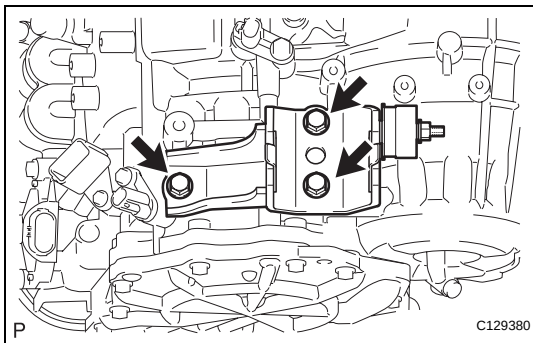
HINT:

First install the green colored bolt and then the 5 bolts.

- (d) Install the flywheel housing under cover.

6. INSTALL TRANSFER ASSEMBLY

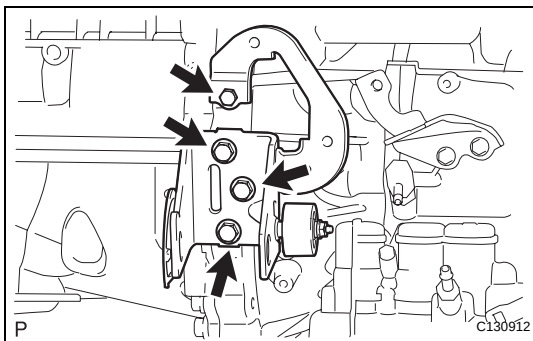
- (a) Install the transfer (see page [TF-75](#)).



7. INSTALL ENGINE MOUNTING BRACKET LH

- (a) Install the mounting bracket with the 3 bolts.

Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

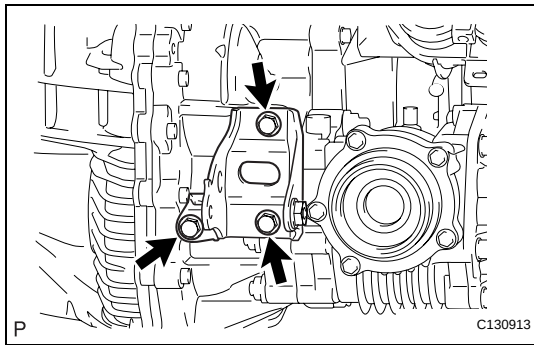


8. INSTALL ENGINE MOUNTING BRACKET FR

- (a) Install the mounting bracket with the 4 bolts.

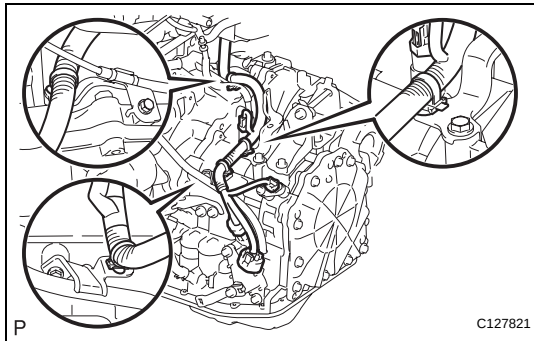
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf) for 14 mm head bolt

Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf) for 12 mm head bolt

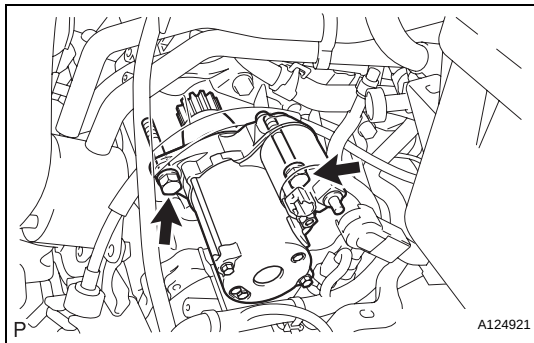


- 9. INSTALL ENGINE MOUNTING BRACKET RR**
 (a) Install the mounting bracket with the 3 bolts.
Torque: 45 N*m (459 kgf*cm, 33 ft.*lbf)

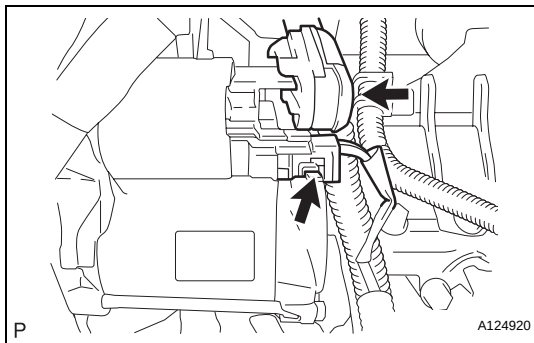
- 10. INSTALL TRANSMISSION OIL COOLER**
 (a) Install the oil cooler (see page [AX-127](#)).



- 11. CONNECT WIRE HARNESS**
 (a) Connect the wire harness clamps.
 (b) Connect the 2 speed sensor connectors.
 (c) Connect the transaxle wire connector.
 (d) Connect the park/neutral position switch connector.



- 12. INSTALL STARTER ASSEMBLY**
 (a) Install the starter with the 2 bolts.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)



- (b) Connect the starter wire with the nut.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
 (c) Connect the starter connector.
 (d) Install the terminal nut and cover the nut with the cap.
Torque: 9.8 N*m (100 kgf*cm, 7 in.*lbf)

- 13. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**
 (a) Install the engine with transaxle. (see page [EM-105](#)).

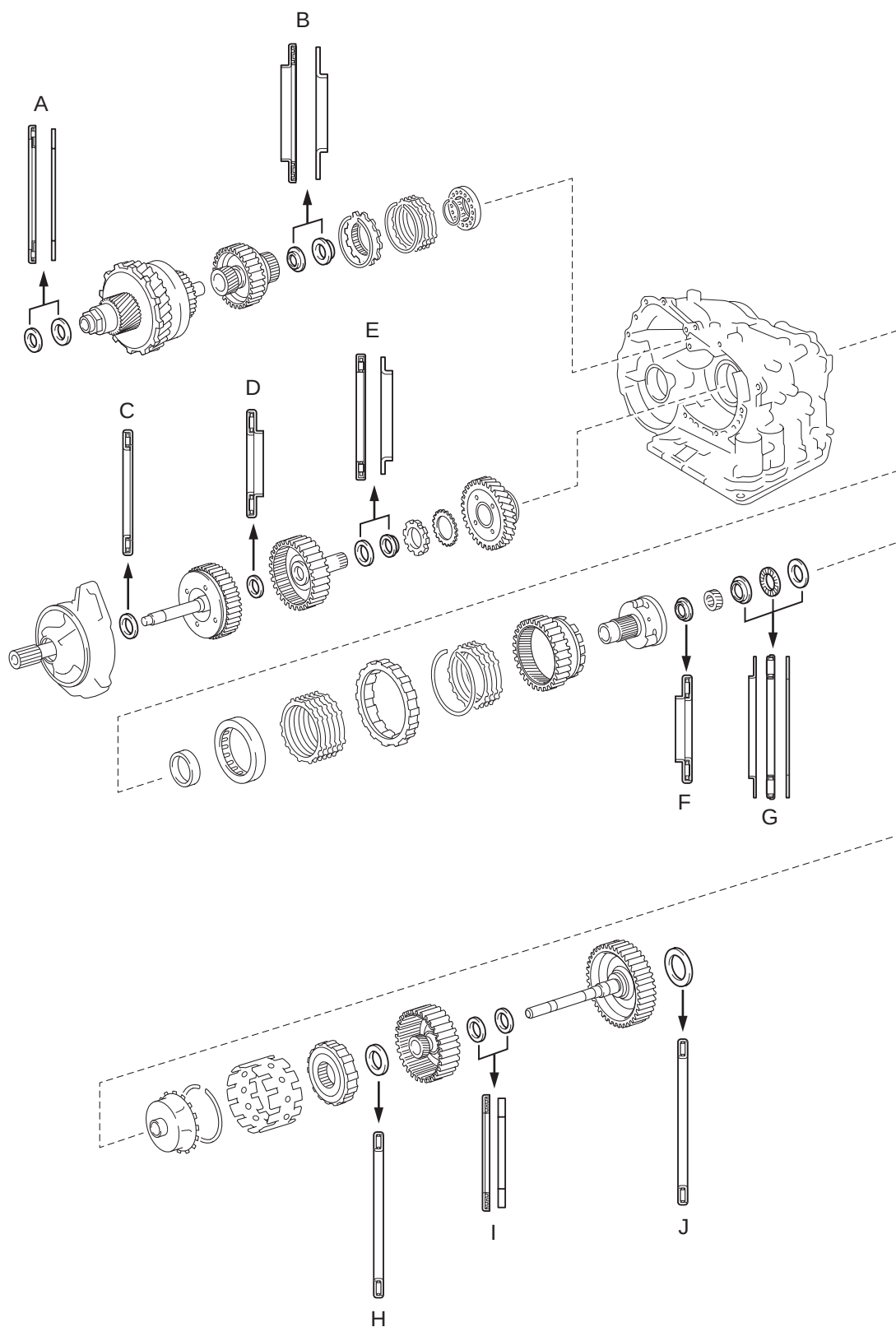
- 14. ADD AUTOMATIC TRANSAXLE FLUID**
Fluid type:
Toyota Genuine ATF WS

- 15. INSPECT AUTOMATIC TRANSAXLE FLUID**
 (a) Inspect the automatic transaxle fluid (see page [AX-102](#)).

- 16. PERFORM RESET MEMORY**
 (a) Perform the RESET MEMORY procedures (A/T initialization) (see page [AX-18](#)).

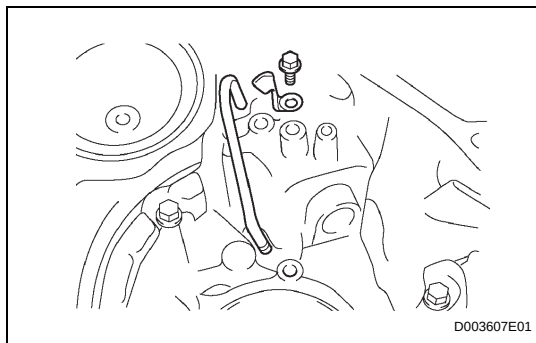
REASSEMBLY

1. BEARING POSITION



Standard bearing position

Mark	Front Race Diameter Inside / Outside	Thrust Bearing Diameter Inside / Outside	Rear Race Diameter Inside / Outside
A	-	57.2 mm (2.252 in.) / 84.96 mm (3.3449 in.)	56.4 mm (2.220 in.) / 83.0 mm (3.268 in.)
B	-	37.73 mm (1.4854 in.) / 58.0 mm (2.283 in.)	29.9 mm (1.177 in.) / 55.5 mm (2.185 in.)
C	-	33.85 mm (1.3327 in.) / 52.2 mm (2.055 in.)	-
D	-	23.5 mm (0.925 in.) / 44.0 mm (1.732 in.)	-
E	-	36.3 mm (1.429 in.) / 52.2 mm (2.055 in.)	34.5 mm (1.358 in.) / 48.5 mm (1.909 in.)
F	-	34.6 mm (1.362 in.) / 52.2 mm (2.055 in.)	-
G	40.3 mm (1.587 in.) / 58.0 mm (2.283 in.)	38.6 mm (1.520 in.) / 60.0 mm (2.362 in.)	38.6 mm (1.520 in.) / 58.0 mm (2.283 in.)
H	-	53.6 mm (2.110 in.) / 69.6 mm (2.740 in.)	-
I	-	33.8 mm (1.331 in.) / 48.2 mm (1.898 in.)	30.3 mm (1.193 in.) / 46.0 mm (1.811 in.)
J	-	53.6 mm (2.110 in.) / 70.18 mm (2.763 in.) or 69.6 mm (2.740 in.)	-

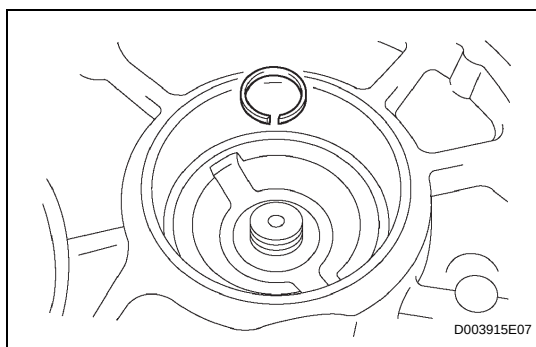
**2. INSTALL DIFFERENTIAL GEAR LUBE APPLY TUBE**

- (a) Install the apply tube and clamp to the transaxle housing with the bolt.

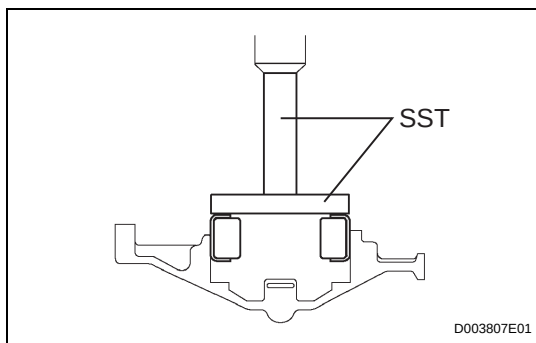
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

NOTICE:

Make sure to insert the pipe to the stopper.

**3. INSTALL UNDERDRIVE OUTPUT SHAFT OIL SEAL RING**

- (a) Install a new oil seal ring to the transaxle housing.

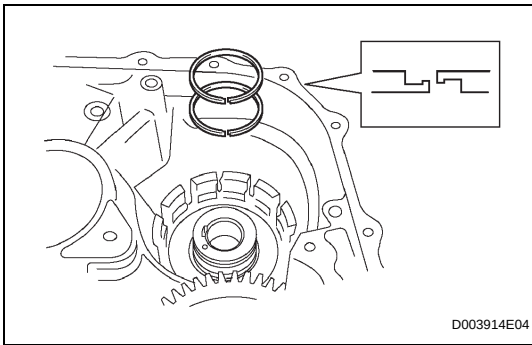
**4. INSTALL UNDERDRIVE CYLINDRICAL ROLLER BEARING**

- (a) Using SST and a press, press in the underdrive cylindrical roller bearing.

SST 09950-60020 (09951-00810), 09950-70010 (09951-07100)

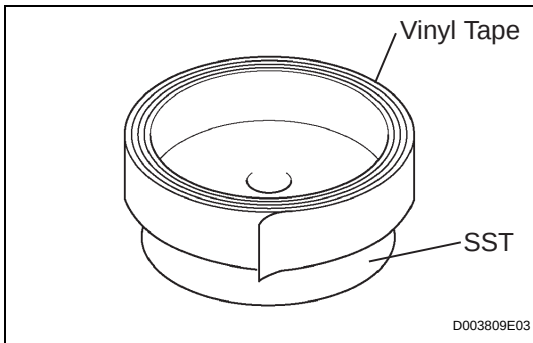
NOTICE:

Do not apply excessive pressure.



5. INSTALL UNDERDRIVE CLUTCH DRUM OIL SEAL RING

- (a) Install 2 new oil seal rings to the transaxle.



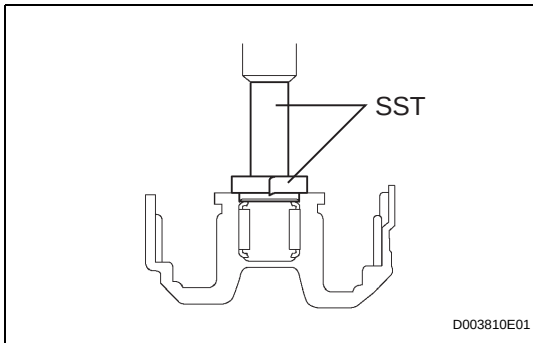
6. INSTALL UNDERDRIVE BRAKE PISTON

- (a) Wind a vinyl tape around SST at the place 4.0 mm (0.157 in.) above from the bottom end until the thickness of the wound tape is about 5.0 mm (0.197 in.)

SST 09950-60010 (09951-00320)

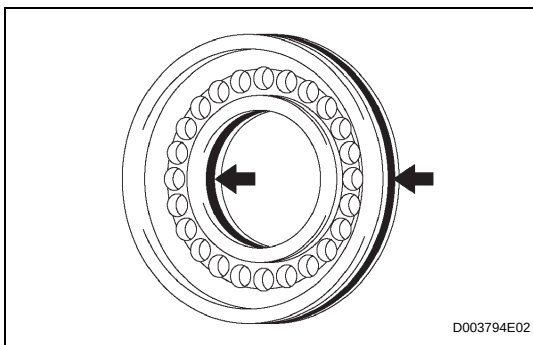
NOTICE:

Clean SST to remove deposited oil before winding a vinyl tape.

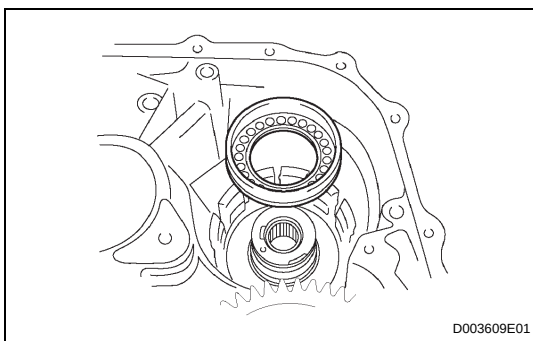


- (b) Using SST and a press, press in the needle-roller bearing to the transaxle until the wound vinyl tape contacts the transaxle case.

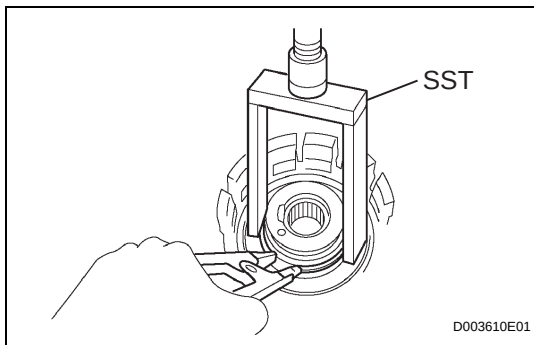
SST 09950-60010 (09951-00320), 09950-70010 (09951-07100)



- (c) Coat 2 new O-rings with ATF, and install them to the underdrive brake piston.



- (d) Install the underdrive brake piston to the transaxle.



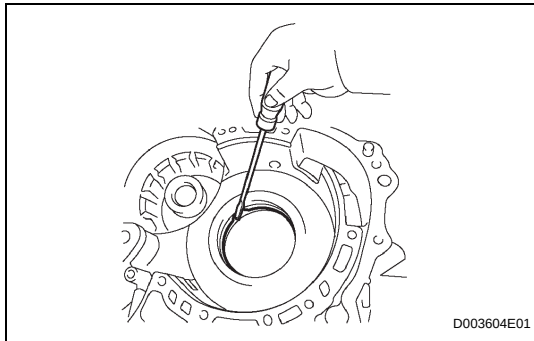
- (e) Using SST, a snap ring expander and press, press in the piston return spring and snap ring to the transaxle.

SST 09387-00020

NOTICE:

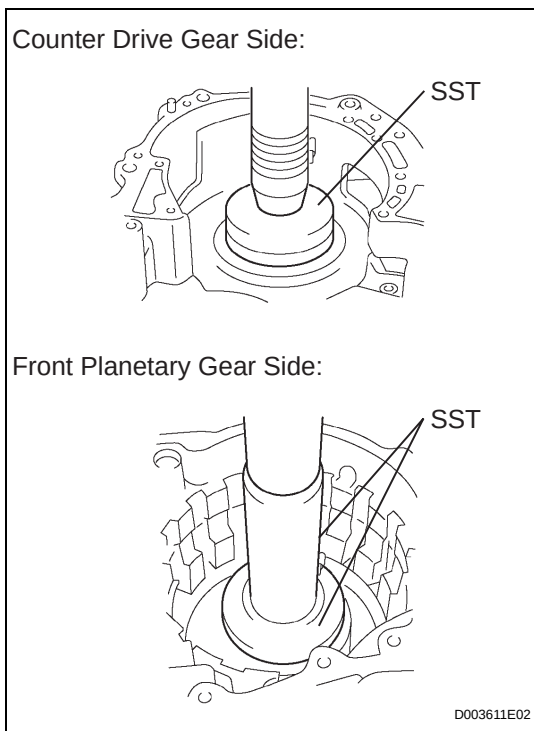
Do not apply excessive pressure.

7. INSTALL NO. 2 BREATHER PLUG



8. INSTALL COUNTER DRIVE GEAR HOLE SNAP RING

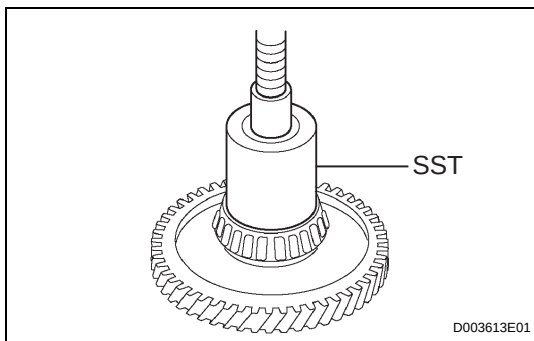
- (a) Using a screwdriver, press in the snap ring to the transaxle.



9. INSTALL COUNTER DRIVE GEAR

- (a) Using SST and a press, press in the 2 bearings outer races to the transaxle.

SST 09950-60020 (09951-00890), 09950-70010 (09951-07150)

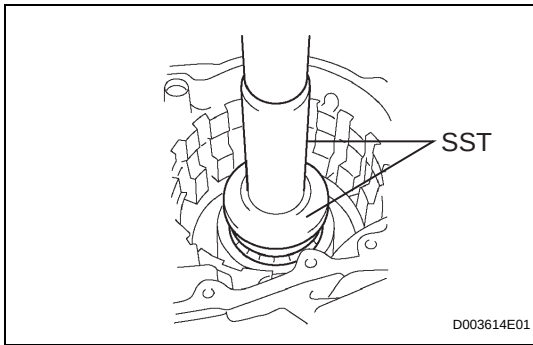


- (b) Using SST and a press, press in the tapered roller bearing to the counter drive gear until the bearing race contacts with the snap ring.

NOTICE:

Do not apply excessive pressure.

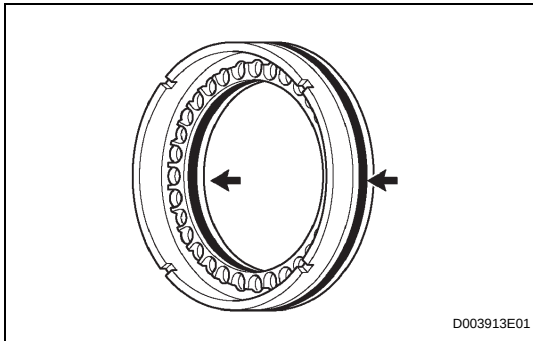
SST 09649-17010



- (c) Using SST and a press, install the counter drive gear and bearing to the transaxle.
SST 09950-70010 (09951-07150), 09950-60020 (09951-00750)

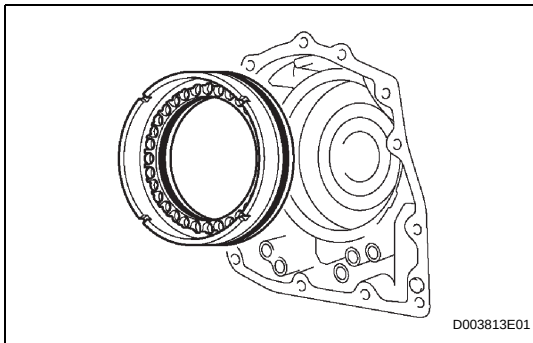
NOTICE:

Do not apply excessive pressure.

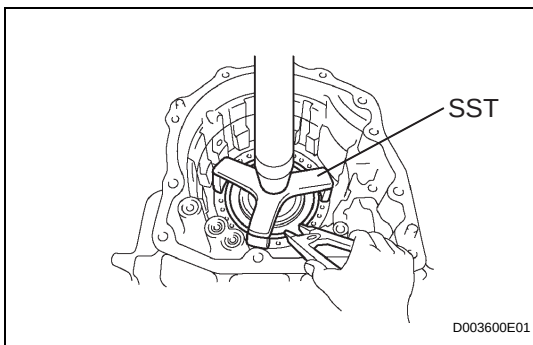


10. INSTALL 1ST AND REVERSE BRAKE PISTON

- (a) Coat 2 new O-rings with ATF.
(b) Install the 2 O-ring to the 1st and reverse brake piston.



- (c) Coat the 1st and reverse brake piston with ATF, and install it to the transaxle.



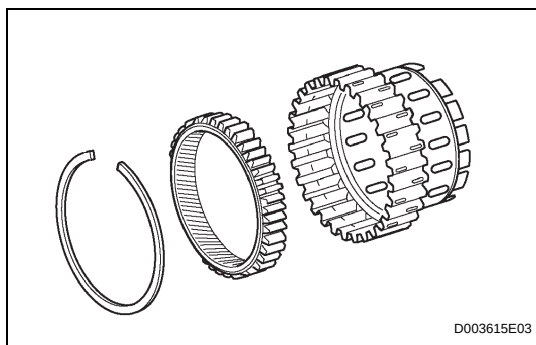
11. INSTALL 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

- (a) Using SST, a press and snap ring expander, press the piston return spring and snap ring to the transaxle.

SST 09387-00070

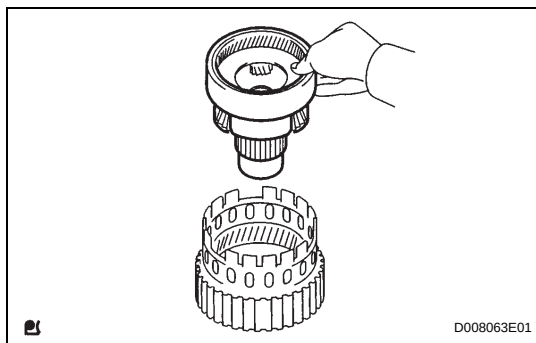
NOTICE:

- Stop the press when the spring sheet is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, preventing the spring sheet from being deform.
- Do not expand the snap ring excessively.



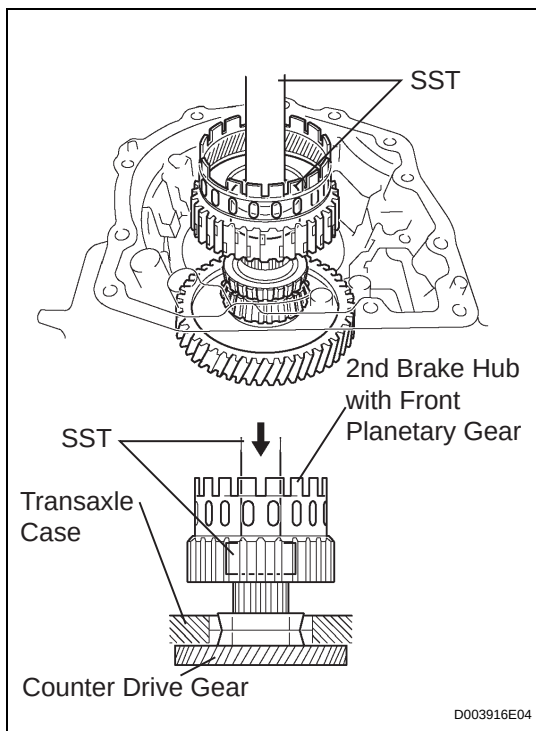
12. INSTALL FRONT PLANETARY RING GEAR

- (a) Using a screwdriver, install the front planetary ring gear and snap ring to the brake hub.



13. INSTALL FRONT PLANETARY GEAR ASSEMBLY

- (a) Install the front planetary gear assembly to the brake hub.

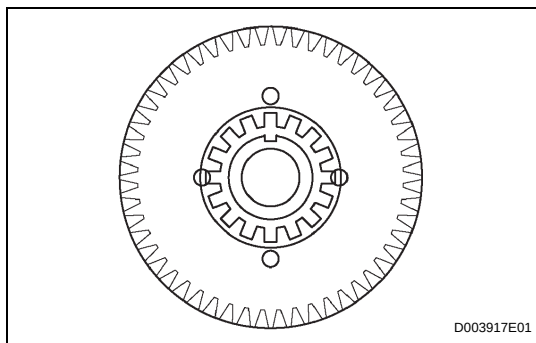


- (b) Using SST and a press, press-fit the front planetary gear.

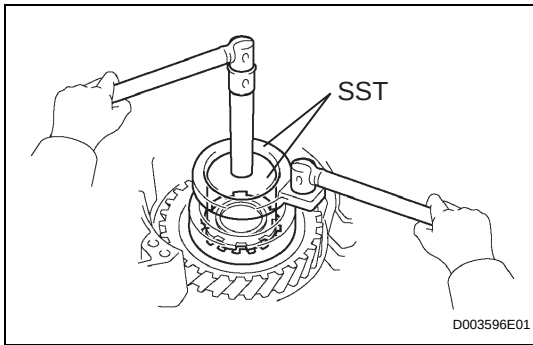
SST 09950-60010 (09951-00500), 09950-70010 (09951-07100)

NOTICE:

Do not apply excessive pressure.



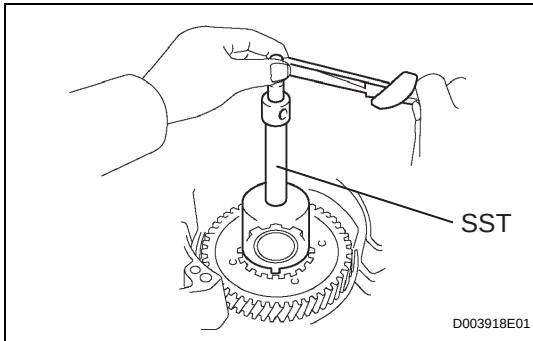
- (c) Install the washer, as shown in the illustration.



- (d) Using SST, install the nut.

SST 09387-00030, 09387-00080

Torque: 280 N*m (2,855 kgf*cm, 206 ft.*lbf)



- (e) Using SST and a torque wrench, measure the turning torque of the bearing while rotating SST at 60 rpm. When the measured value is not within the specified value, gradually tighten the nut until it reaches the specified value.

SST 09387-00080

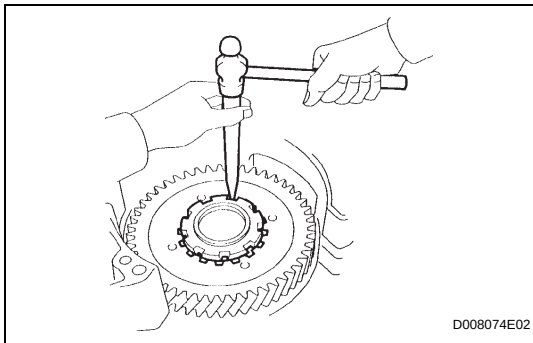
Torque: Turning torque at 60 rpm

0.51 to 1.02 N*m (5.1 to 10.0 kgf*cm, 4.4 to 8.7 in.*lbf) for new

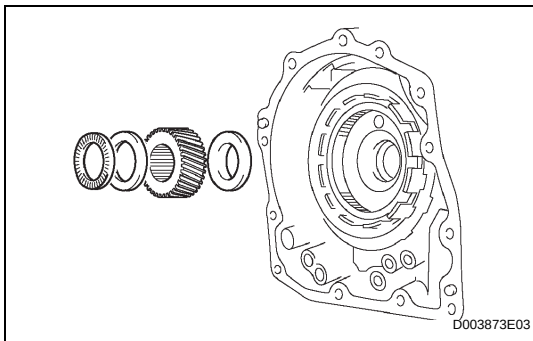
0.3 to 0.5 N*m (3.1 to 5.1 kgf*cm, 27 to 4.4 in.*lbf) for used

HINT:

Use a torque wrench with a fulcrum length of 160 mm (6.3 in.).



- (f) Using a chisel and hammer, stake the front planetary gear washer.

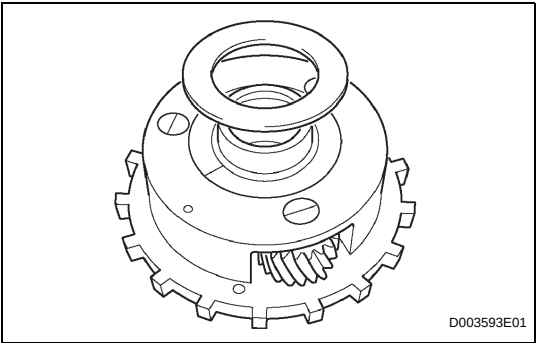


14. INSTALL INPUT SUN GEAR

- (a) Install the 2 thrust bearings, bearing race and front planetary sun gear to the front planetary gear.

Standard bearing and race diameter

Item	Inside	Outside
Bearing	34.6 mm (1.362 in.)	52.2 mm (2.055 in.)
Race	40.3 mm (1.587 in.)	58.0 mm (2.283 in.)
Bearing	38.6 mm (1.52 in.)	60.0 mm (2.362 in.)

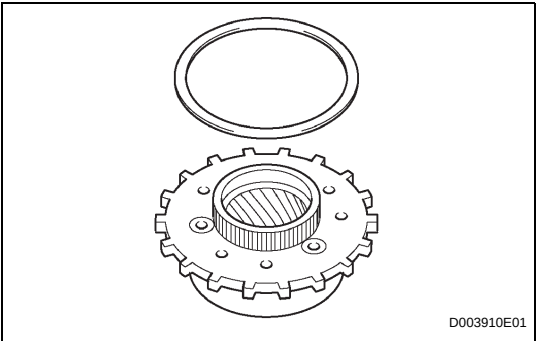


15. INSTALL REAR PLANETARY GEAR ASSEMBLY

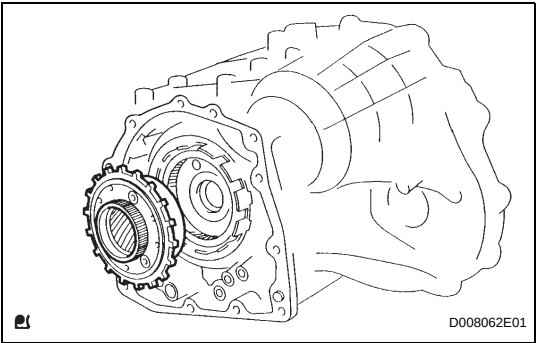
- (a) Coat the bearing race with ATF, and install it to the rear planetary gear assembly.

Standard bearing race diameter

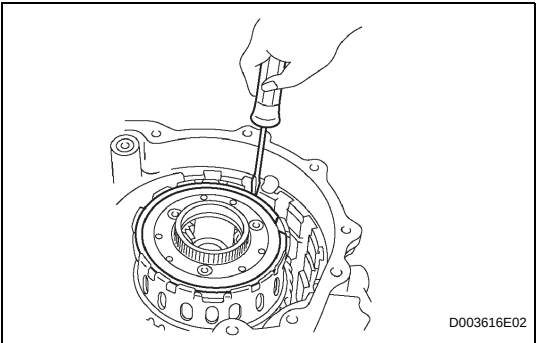
Item	Inside	Outside
Race	38.6 mm (1.520 in.)	58.0 mm (2.83 in.)



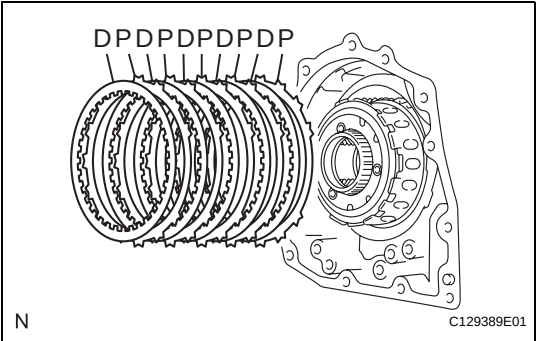
- (b) Install the No. 2 thrust washer.



- (c) Install the rear planetary gear to the rear planetary ring gear.



- (d) Using a screwdriver, install the snap ring.



16. INSTALL 1ST AND REVERSE BRAKE CLUTCH DISC

- (a) Install the 5 plates and 5 discs.

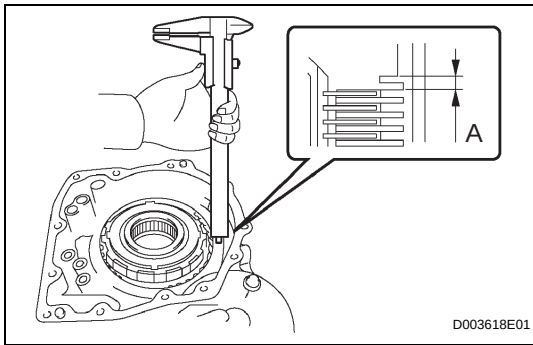
Install in order:

P - D - P - D - P - D - P - D - P - D

HINT:

P = Plate

D = Disc



- (b) Using a vernier caliper, measure the distance between the disc surface and the contact surface of the 2nd brake cylinder and transaxle (Dimension A).
- (c) Select an appropriate flange so that the pack clearance will meet the specified value.
0.745 to 1.21 mm (0.0293 to 0.0476 in.)

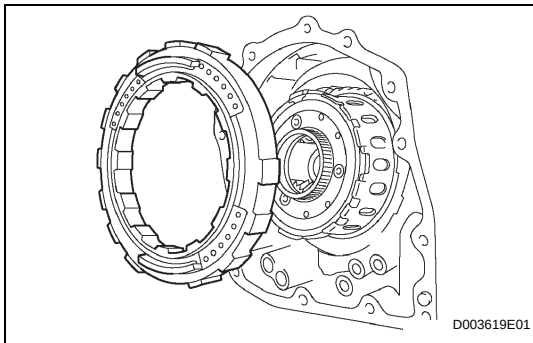
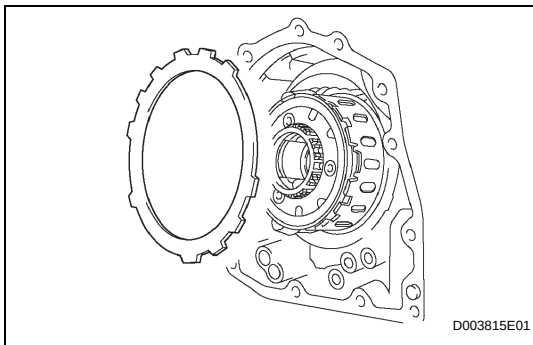
HINT:

Piston stroke = Dimension A - Flange thickness

Standard flange thickness

Mark	Thickness	Mark	Thickness
1	1.8 mm (0.071 in.)	5	2.2 mm (0.087 in.)
2	1.9 mm (0.075 in.)	6	2.3 mm (0.091 in.)
3	2.0 mm (0.079 in.)	7	2.4 mm (0.094 in.)
4	2.1 mm (0.083 in.)	8	2.5 mm (0.098 in.)

- (d) Install the flange.



17. INSTALL 2ND BRAKE PISTON ASSEMBLY

- (a) Install the 2nd brake piston to the transaxle.
- (b) Install the snap ring and measure the inside diameter.

Standard inside diameter:

More than 167 mm (6.57 in.)

NOTICE:

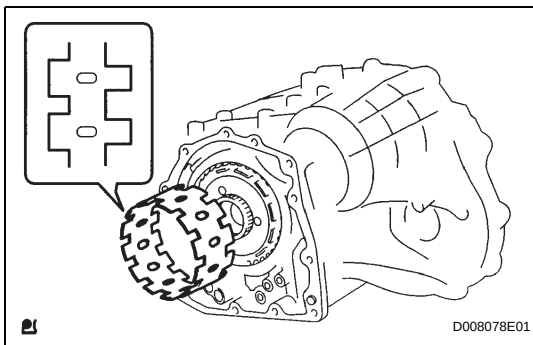
- Because the taper snap ring has the positioning direction, check it when installing.
- When the diameter does not satisfy the specified value, replace the snap ring with a new one.

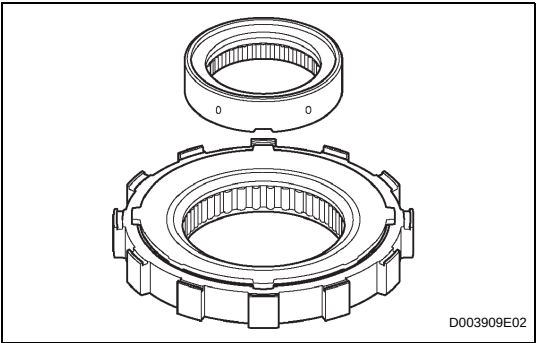
18. INSTALL 1-WAY CLUTCH SLEEVE OUTER

- (a) Install the 1-way clutch outer sleeve to the 2nd brake cylinder.

NOTICE:

Check the positioning direction of the outer sleeve.

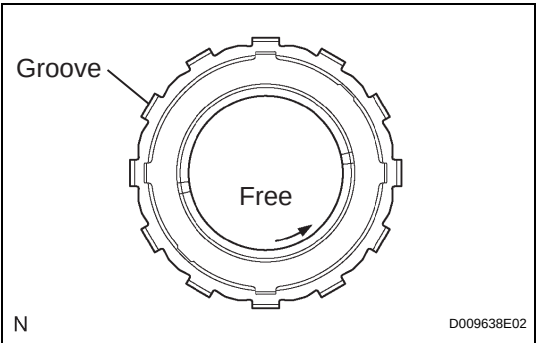




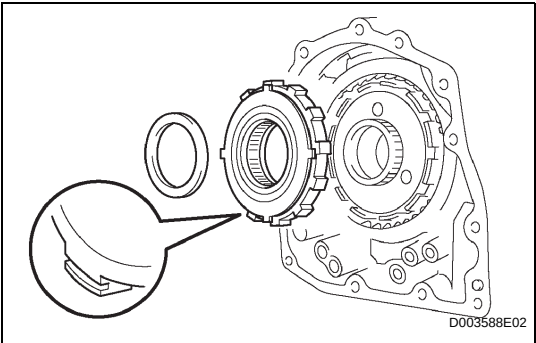
19. INSTALL 1-WAY CLUTCH ASSEMBLY

- (a) Install the inner race to the 1-way clutch.

NOTICE:
Check the direction of the inner race.



- (b) Check the rotating direction of the 1-way clutch for the lock or free operation, as shown in illustration.

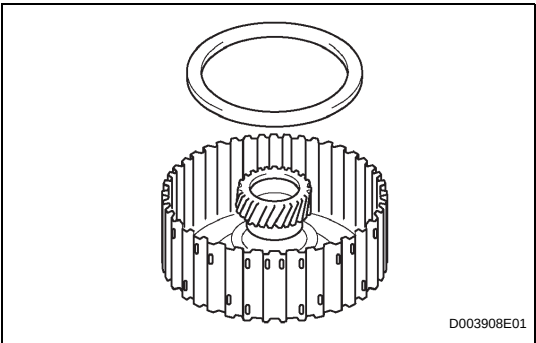


- (c) Install the 1-way clutch and bearing to the 1-way clutch sleeve outer.

Standard bearing diameter

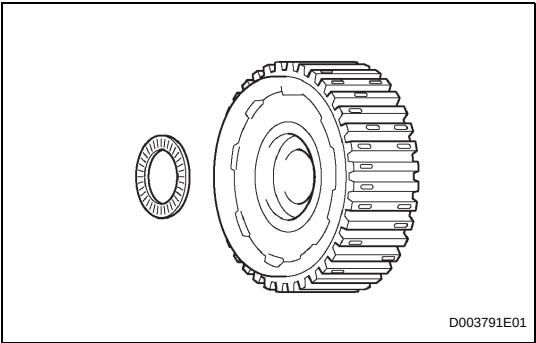
Item	Inside	Outside
Bearing	53.6 mm (2.110 in.)	69.6 mm (2.740 in.)

NOTICE:
Install the thrust bearing properly so that no-colored race will be visible.



20. INSTALL REAR PLANETARY SUN GEAR ASSEMBLY

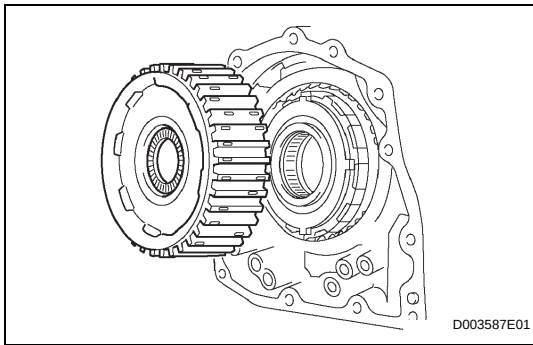
- (a) Coat the No. 1 thrust washer with petroleum jelly, and install it onto the rear planetary sun gear.



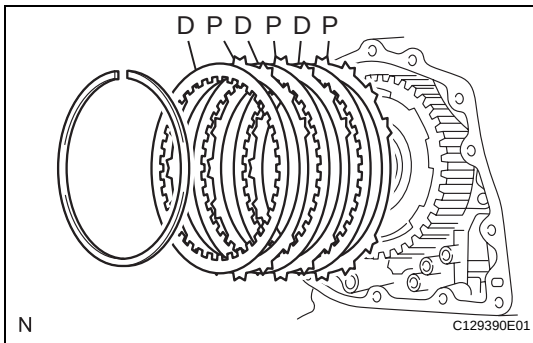
- (b) Coat the bearing with petroleum jelly, and install it onto the rear planetary sun gear.

Standard bearing diameter

Item	Inside	Outside
Bearing	33.8 mm (1.331 in)	48.2 mm (1.898 in.)



- (c) Install the rear planetary sun gear to the rear planetary gear.



21. INSTALL 2ND BRAKE CLUTCH DISC

- (a) Install the 3 discs and 3 plates to the transaxle.

Standard install in order:

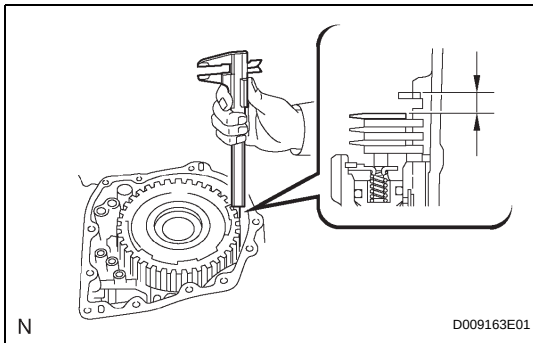
P - D - P - D - P - D

HINT:

P = Plate

D = Disc

- (b) Temporarily install the snap ring.



- (c) Using a vernier caliper, measure the distance between the disc surface and snap ring surface.
- (d) Select an appropriate flange so that the pack clearance will meet the specified value.

Standard pack clearance:

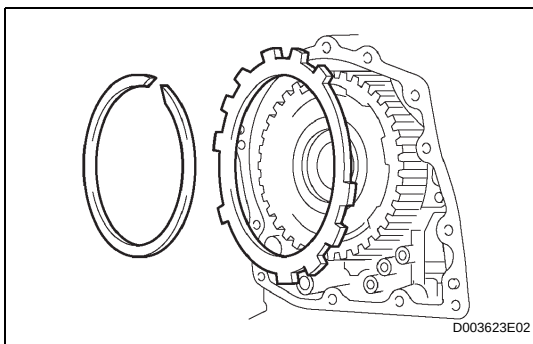
0.50 to 0.91 mm (0.0197 to 0.0358 in.)

HINT:

Piston stroke = Clearance - Flange thickness - Snap ring thickness 1.6 mm (0.063 in.)

Standard flange thickness

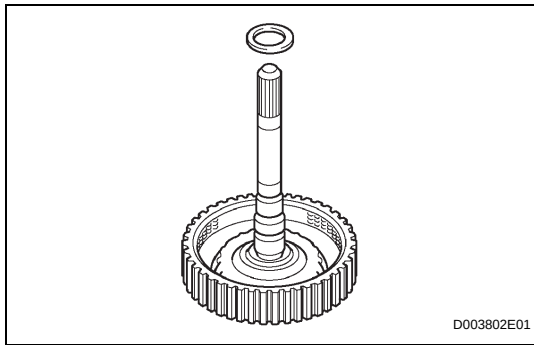
Mark	Thickness	Mark	Thickness
1	3.0 mm (0.118 in.)	5	3.4 mm (0.134 in.)
2	3.1 mm (0.122 in.)	6	3.5 mm (0.138 in.)
3	3.2 mm (0.126 in.)	7	3.6 mm (0.142 in.)
4	3.3 mm (0.130 in.)	8	-



- (e) Temporarily remove the snap ring, attach the selected flange and restore the snap ring.

NOTICE:

Secure the snap ring so that its gap is visible through the groove of the transaxle case.

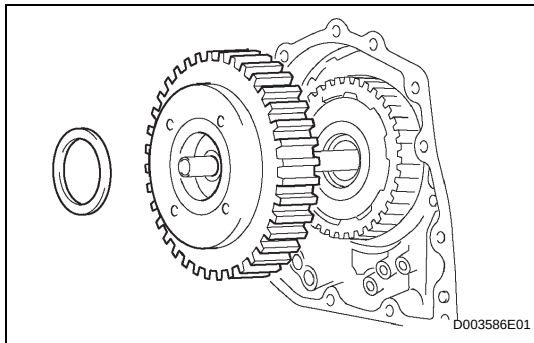


22. INSTALL DIRECT CLUTCH

- (a) Install the bearing race to the direct clutch.

Standard bearing race diameter

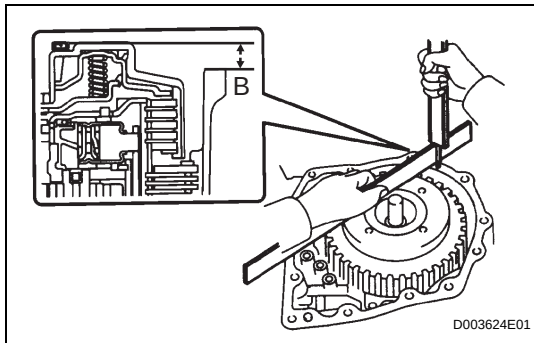
Item	Inside	Outside
Bearing race	30.3 mm (1.193 in.)	46.0 mm (1.811 in.)



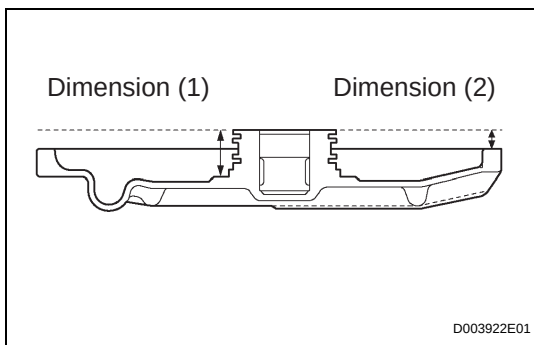
- (b) Install the direct clutch and thrust bearing to the rear planetary sun gear.

NOTICE:

The disc in the direct clutch should completely mate with the hub attached outside the rear planetary sun gear. Otherwise, the rear cover cannot be installed.



- (c) Clean the connector part of the transaxle case and rear cover.
- (d) As shown in the illustration, place a straightedge on the direct clutch drum and measure the distance between the transaxle case and the straightedge using a vernier caliper (Dimension B).



- (e) Measure the 2 places of the rear cover as shown in the illustration. Calculate a dimension C using the following formula.

HINT:

Dimension C = Dimension (1) - Dimension (2)

- (f) Calculate the end play value using the following formula. Select a thrust bearing which satisfies the end play value and install it.

End play:

0.198 to 0.936 mm (0.00780 to 0.03685 in.)

NOTICE:

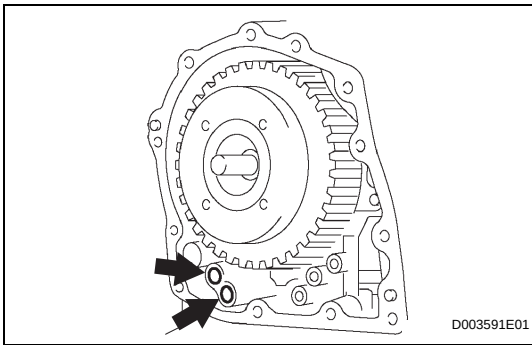
Make sure that the colored race side is facing the direct clutch assembly.

HINT:

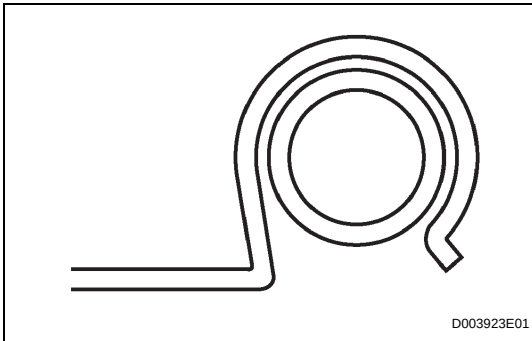
End play = Dimension C - Dimension B

Standard bearing thickness and diameter

Thickness	Inside	Outside
3.58 mm (0.1409 in.)	53.6 mm (2.110 in.)	69.6 mm (2.740 in.)
3.88 mm (0.1528 in.)	53.6 mm (2.110 in.)	70.18 mm (2.768 in.)

**23. INSTALL NO. 1 GOVERNOR APPLY GASKET**

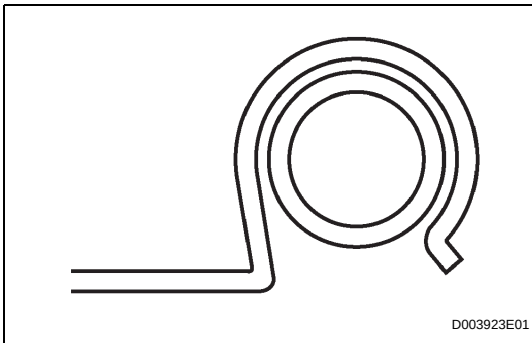
- (a) Install 2 new governor apply gaskets.

**24. INSTALL FRONT CLUTCH APPLY TUBE**

- (a) Install the clamp to the front clutch apply tube.

NOTICE:

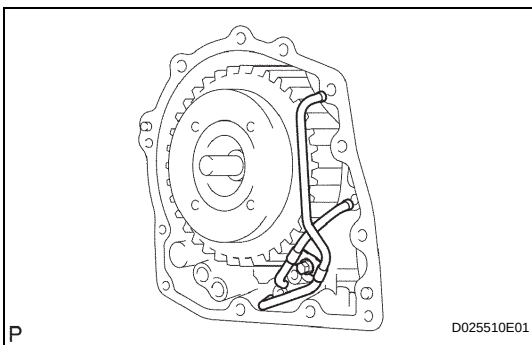
Make sure to install the clamp to the apply pipe before installing the apply pipe to the transaxle case. This prevents the apply pipe from being deformed or damaged.

**25. INSTALL BRAKE APPLY TUBE**

- (a) Install the clamp to the brake apply tube.

NOTICE:

Make sure to install the clamp to the apply pipe before installing the apply pipe to the transaxle case. This prevents the apply pipe from being deformed or damaged.

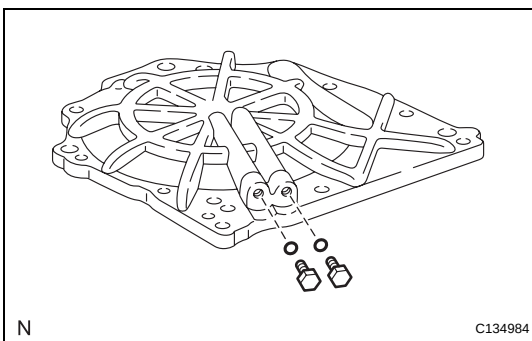


- (b) Install the 2 apply tubes and to the transaxle with the bolt.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

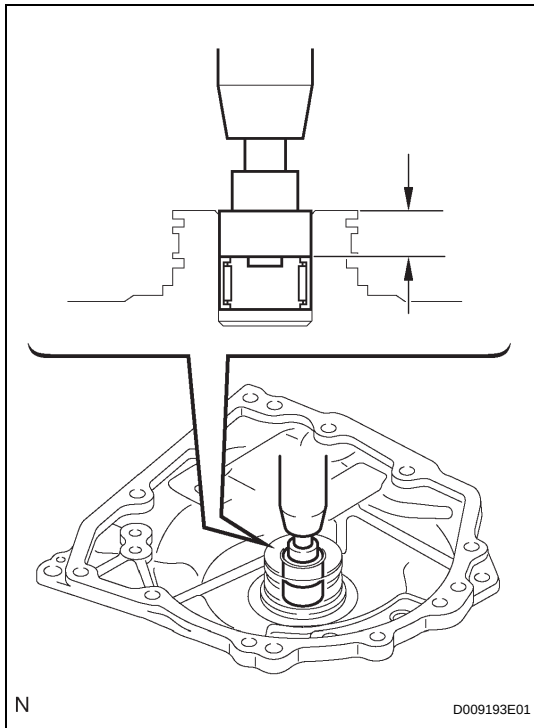
NOTICE:

Each pipe should be securely inserted until it reaches the stopper.

**26. INSTALL NO. 1 TRANSAXLE CASE PLUG**

- (a) Install 2 new O-rings to the 2 plugs.
(b) Install the 2 plugs to the transaxle rear cover.

Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



27. INSTALL TRANSAXLE REAR COVER SUB-ASSEMBLY

- (a) Using SST and a press, press in the bearing.
SST 09950-60010 (09951-00230, 09952-06010)
Standard depth:

12.05 to 12.75 mm (0.4744 to 0.5020 in.)

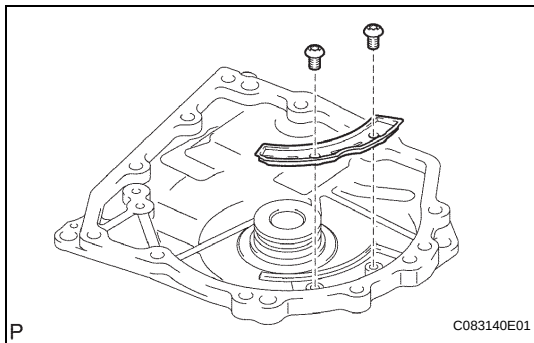
NOTICE:

- Face the inscribed mark side of the bearing race up.
- Repeat the press-fit until the specified value is obtained.

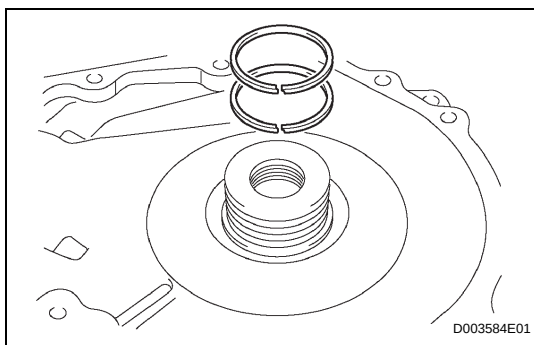
- (b) Apply adhesive to the 2 screws.

Adhesive:

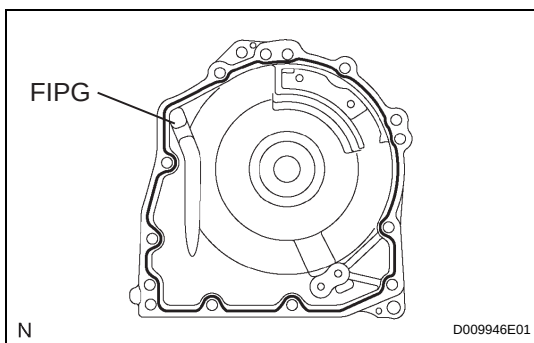
**Toyota Genuine Adhesive 1344,
 Three Bond 1344 or Equivalent**



- (c) Using a T30 "torx" socket wrench, install the transaxle rear cover plate with the 2 screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)



- (d) Coat 2 new oil seal rings with ATF, and install them to the transaxle rear cover.

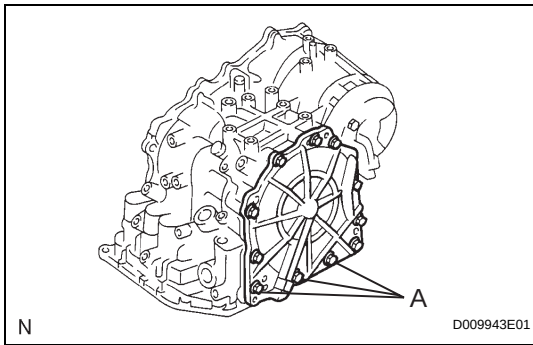


- (e) Remove any packing material and be careful not to get oil on the contacting surfaces of the transaxle rear cover or the transaxle.
 (f) Apply FIPG to the cover.

Seal packing:

**Toyota Genuine Seal Packing 1281,
 Three Bond 1281 or Equivalent**

- (g) Coat the needle roller bearing with ATF.



- (h) Apply adhesive to the threads of the bolts labeled A.

Adhesive:

Toyota Genuine Adhesive 1344,

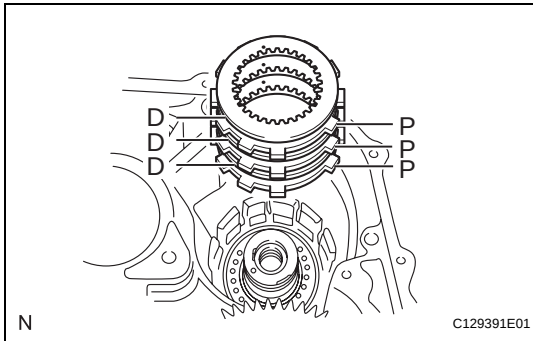
Three Bond 1344 or Equivalent

- (i) Install the 11 bolts.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf) for bolt A.

25 N*m (255 kgf*cm, 18 ft.*lbf) for other bolt

SST 09950-60010 (09951-00230, 09952-06010)



28. INSTALL NO. 2 UNDERDRIVE CLUTCH DISC

- (a) Install the 3 discs and 3 plates to the transaxle.

Install in order:

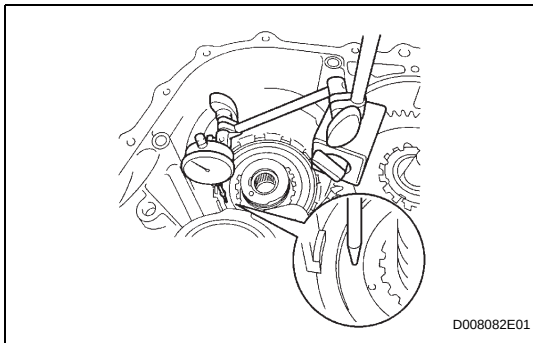
P - D - P - D - P - D

HINT:

D = Disc

P = Plate

- (b) Using a screwdriver, install the snap ring.



- (c) Using a dial indicator, measure the underdrive brake pack clearance while applying and releasing compressed air (392kPa, 4.0 kgf/cm², 57 psi).

Standard pack clearance:

1.59 to 2.20 mm (0.0626 to 0.0866 in.)

HINT:

Select an appropriate flange from the table below so that it will meet the specified value.

Standard flange thickness

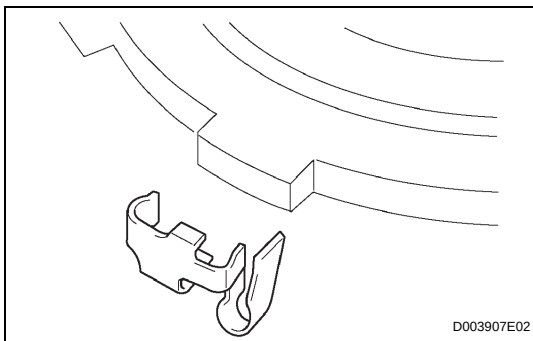
Mark	Thickness	Mark	Thickness
1	3.0 mm (0.118 in.)	3	3.4 mm (0.134 in.)
2	3.2 (0.126 in.)	-	-

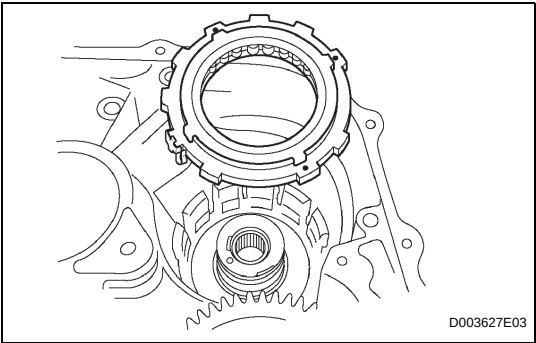
- (d) Temporarily remove the snap ring and attach the flange. Restore the snap ring.

29. INSPECT UNDERDRIVE 1-WAY CLUTCH ASSEMBLY (See page [AX-186](#))

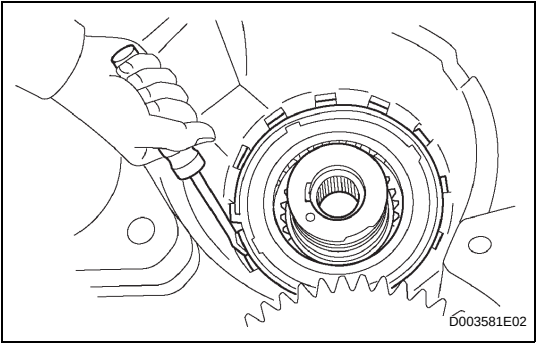
30. INSTALL UNDERDRIVE 1 WAY CLUTCH ASSEMBLY

- (a) Install the outer race retainer to the 1-way clutch.

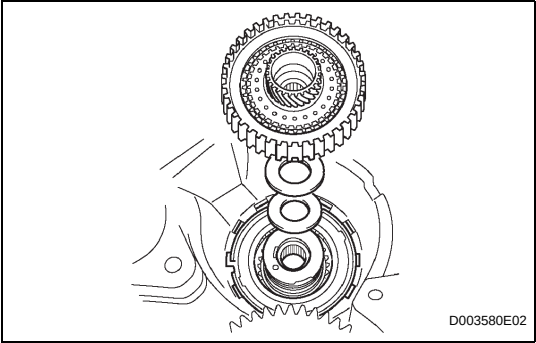




- (b) Install the 1-way clutch to the transaxle.
NOTICE:
Make sure that the mark on the 1-way clutch outer race is visible.



- (c) Using a screwdriver, install the snap ring to the transaxle.

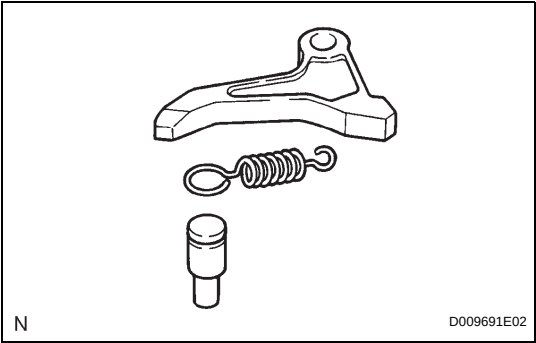


31. INSTALL UNDERDRIVE CLUTCH ASSEMBLY

- (a) Coat the bearing and bearing race with petroleum jelly, and install them onto the underdrive clutch.
Standard race diameter

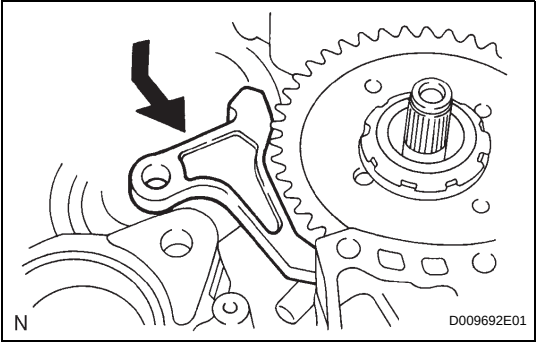
Item	Inside	Outside
Bearing	37.73 mm (1.4854 in.)	58.0 mm (2.283 in.)
Race	29.9 mm (1.177 in.)	55.5 mm (2.185 in.)

- (b) Install the underdrive clutch to the transaxle.

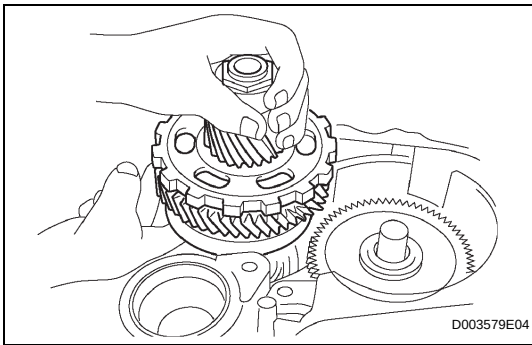


32. INSTALL UNDERDRIVE PLANETARY GEAR

- (a) Install the pawl pin and spring to the parking lock pawl.



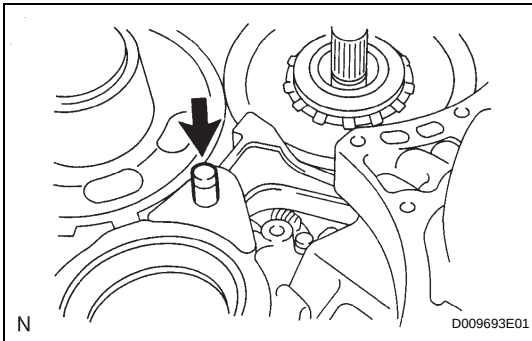
- (b) Temporarily install the parking lock pawl, shaft and spring to the transaxle case as shown in the illustration.



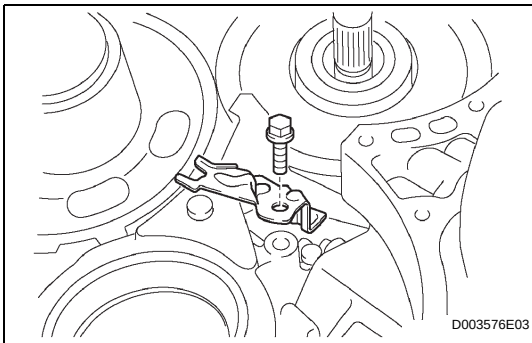
- (c) Install the underdrive planetary gear to the transaxle.

NOTICE:

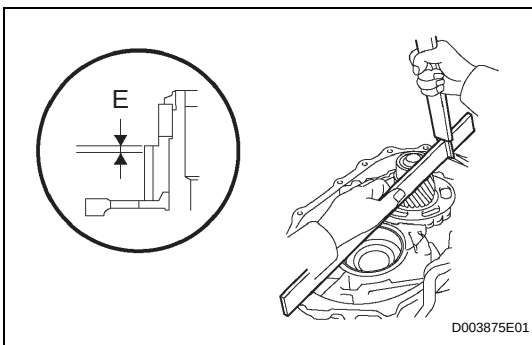
Engage all the discs of underdrive clutch and the hub splines of the underdrive planetary gear firmly and assemble them securely.



- (d) Install the parking lock pawl shaft.



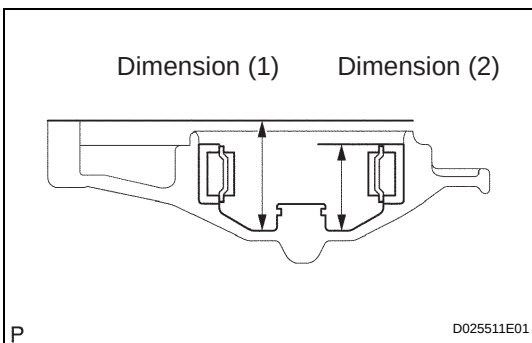
- (e) Install the pawl shaft clamp with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



- (f) Using a straightedge and vernier calipers as shown in the illustration, measure the gap between the top of the differential drive pinion in the underdrive planetary gear and contact surface of the transaxle and housing (Dimension D).

NOTICE:

Make a note of dimension D as it is necessary for the following process.



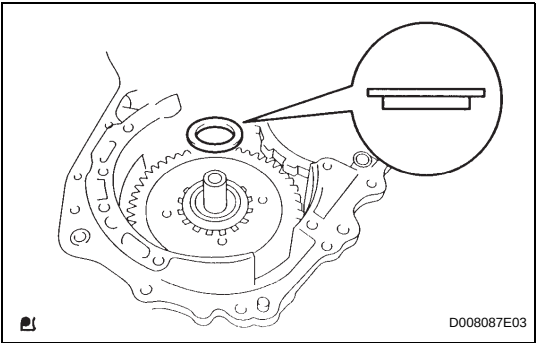
- (g) As shown in the illustration, measure the 2 places of the transaxle housing. Calculate the dimension E using the formula.

NOTICE:

Make a note of dimension E as it is necessary for the following process.

HINT:

Dimension E = Dimension (1) - Dimension (2)

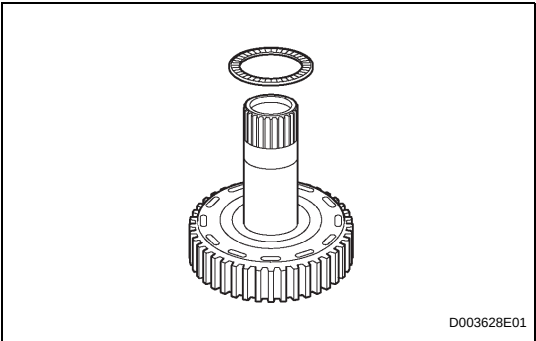


33. INSTALL MULTIPLE DISC CLUTCH HUB

- (a) Install the bearing race to the transaxle while checking its direction.

Standard bearing race diameter

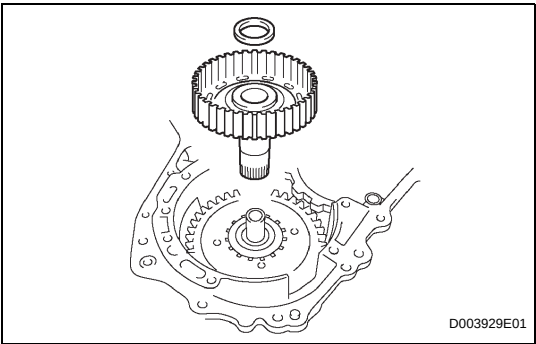
Item	Inside	Outside
Bearing race	34.5 mm (1.358 in.)	48.5 mm (1.909 in.)



- (b) Coat the thrust bearing and race with petroleum jelly, and install them onto the multiple disc clutch hub.

Standard thrust bearing and race diameter

Item	Inside	Outside
Bearing	36.3 mm (1.429 in.)	52.2 mm (2.055 in.)

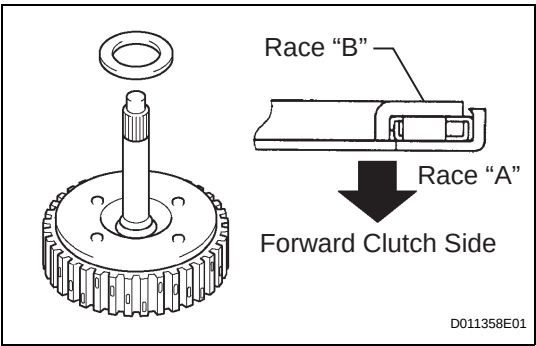


- (c) Install the bearing to the multiple clutch hub.

Standard bearing diameter

Item	Inside	Outside
Bearing	23.5 mm (0.925 in.)	44.0 mm (1.732 in.)

- (d) Install the forward clutch hub to the transaxle.



34. INSTALL FORWARD CLUTCH ASSEMBLY

- (a) Install the thrust bearing to the forward clutch.

Standard bearing diameter

Item	Inside	Outside
Bearing	33.85 mm (1.3327 in.)	52.2 mm (2.055 in.)

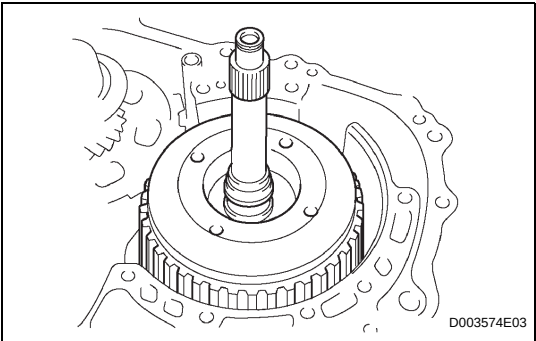
NOTICE:

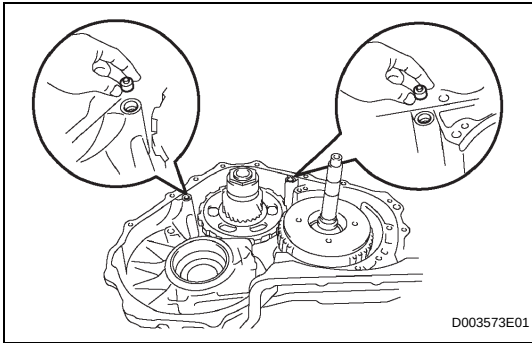
Install the thrust bearing properly so that the race "B" will be visible.

- (b) Install the forward clutch to the multiple clutch hub.

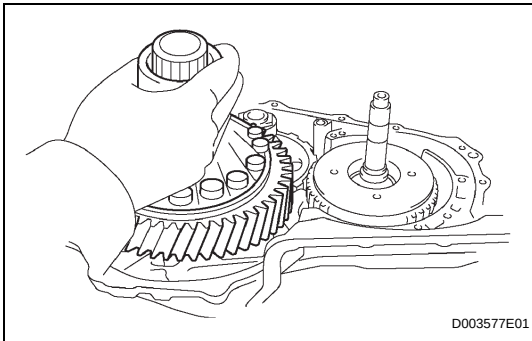
NOTICE:

Align the splines of all discs in the forward clutch with those of multiple clutch hub to assemble them securely.

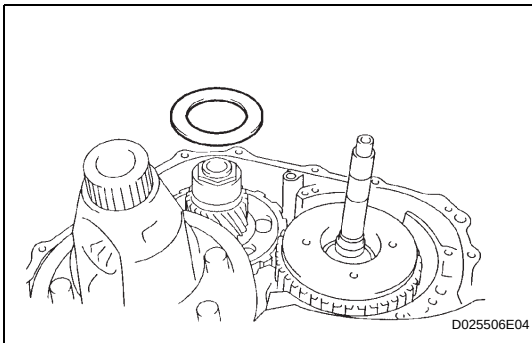


**35. INSTALL OVERDRIVE BRAKE GASKET**

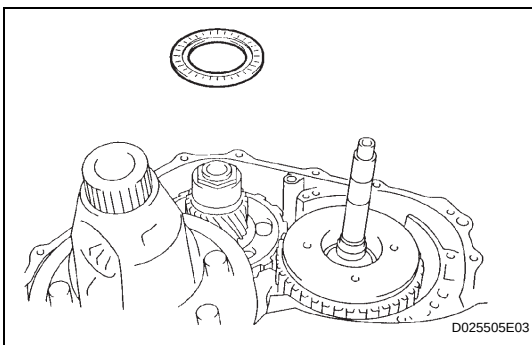
- (a) Install 2 new overdrive brake gaskets.

**36. INSTALL DIFFERENTIAL GEAR ASSEMBLY**

- (a) Install the differential gear to the transaxle.

**37. INSTALL NO. 2 THRUST BEARING UNDERDRIVE RACE**

- (a) Install the thrust bearing race to the underdrive planetary gear.

**38. INSTALL THRUST NEEDLE ROLLER BEARING**

- (a) Calculate the end play value using the following formula and values of Dimensions D and E that were measured when installing cylindrical roller bearing and underdrive planetary gear. Select an appropriate underdrive planetary gear thrust bearing race No. 2 which satisfies the specified end play value, and instal it.

End play:

0.498 to 0.993 mm (0.0196 to 0.0390 in.)

HINT:

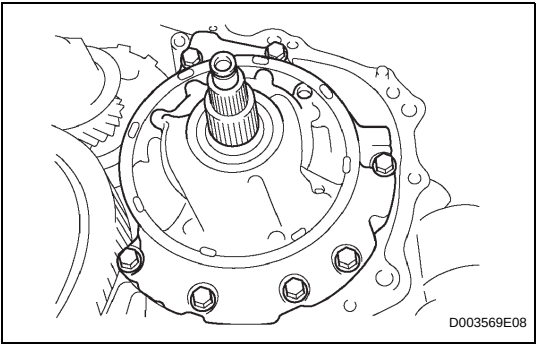
End play = Dimension E - Dimension D - thrust bearing thickness 3.28mm (0.1291 in.) - underdrive thrust bearing race thickness.

Standard race thickness

E - D	Thickness
Less than 7.64 mm (0.3008 in.)	3.5 mm (0.138 in.)
7.64 mm (0.3008 in.)	3.8 mm (0.150 in.)

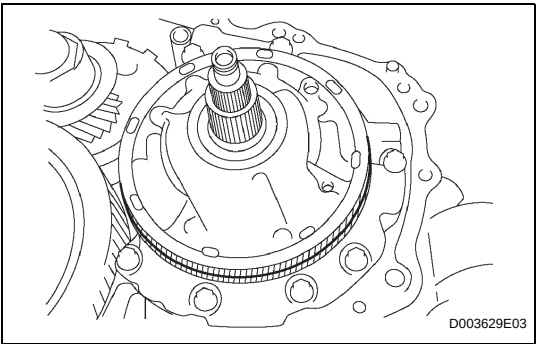
Standard bearing and bearing race diameter

Item	Inside	Outside
Bearing	57.2 mm (2.252 in.)	84.96 mm (3.3449 in.)
Bearing race	56.4 mm (2.220 in.)	83.0mm (3.268 in.)

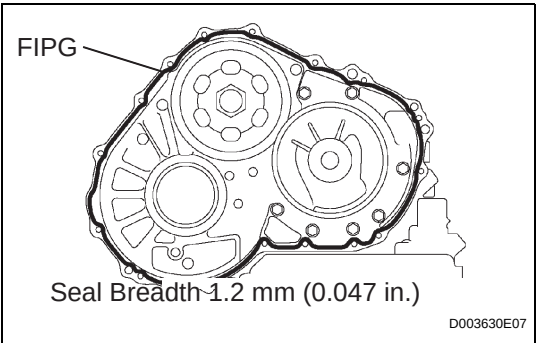


39. INSTALL OIL PUMP ASSEMBLY

- (a) Install the oil pump to the transaxle with the 7 bolts.
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)



- (b) Coat the O-ring of the oil pump with ATF.

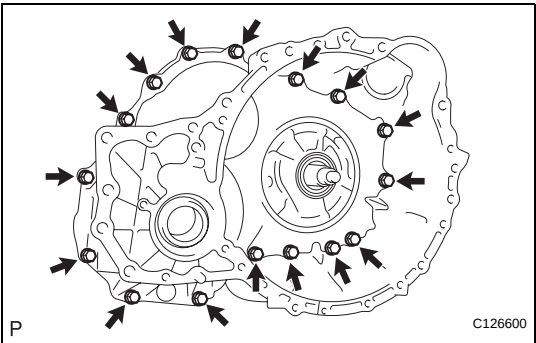


40. INSTALL TRANSAXLE HOUSING

- (a) Remove any packing material and be careful not to get oil on the contacting surface of the transaxle housing.

- (b) Apply FIPG to the transaxle.

Seal packing:
Toyota Genuine Seal Packing 1281,
Three Bond 1281 or Equivalent



- (c) Install the transaxle housing to the transaxle with the 16 bolts.

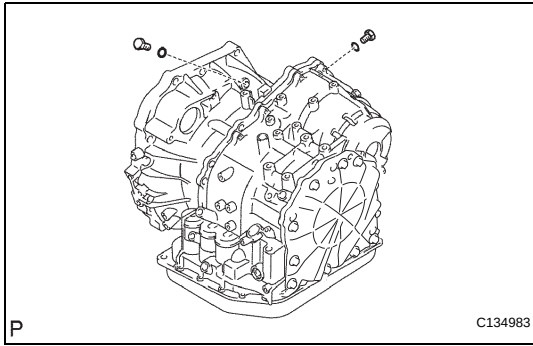
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf) for bolt A
29 N*m (296 kgf*cm, 21 ft.*lbf) for bolt B
and C

HINT:
Each bolt length is indicated below.

Bolt length:
50 mm (1.969 in.) for bolt A
50 mm (1.969 in.) for bolt B
42 mm (1.654 in.) for bolt C

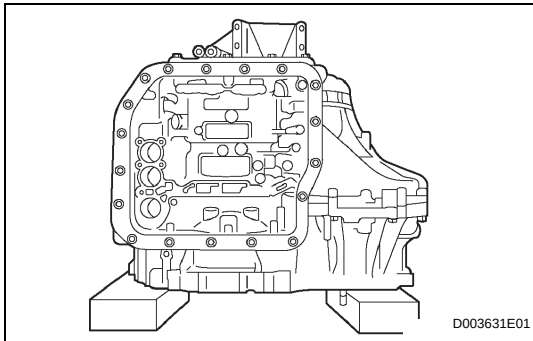
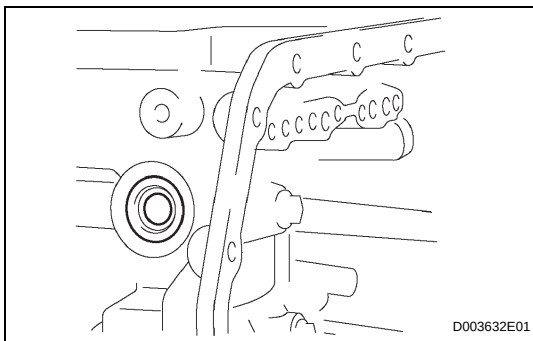
NOTICE:
Because the bolt labeled A are seal bolts, apply seal packing to new bolts and tighten them within 10 minutes after application.

Seal packing:
Toyota Genuine Seal Packing 1281,

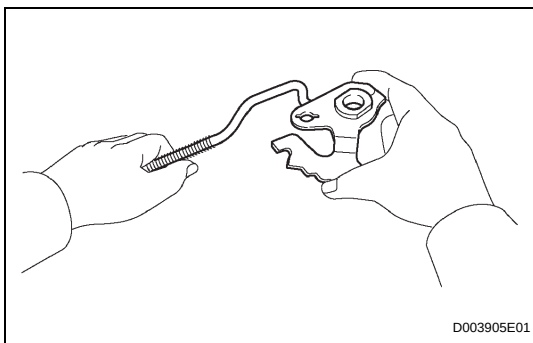
Three Bond 1281 or Equivalent**41. INSTALL NO. 1 TRANSAXLE CASE PLUG**

- (a) Install 2 new O-rings to the 2 plugs.
- (b) Install the 2 plugs to the transaxle housing.

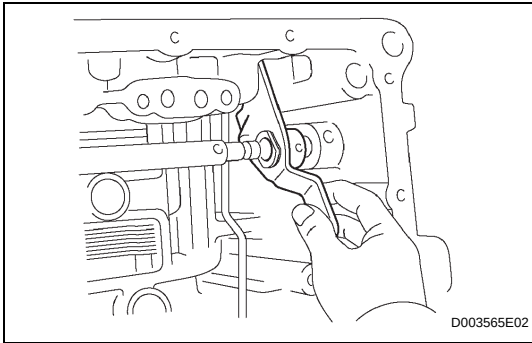
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)

42. INSPECT INPUT SHAFT END PLAY (See page [AX-184](#))**43. FIX AUTOMATIC TRANSAXLE ASSEMBLY****44. INSTALL MANUAL VALVE LEVER SHAFT OIL SEAL**

- (a) Coat a new oil seal with ATF.
- (b) Install the oil seal to the transaxle.

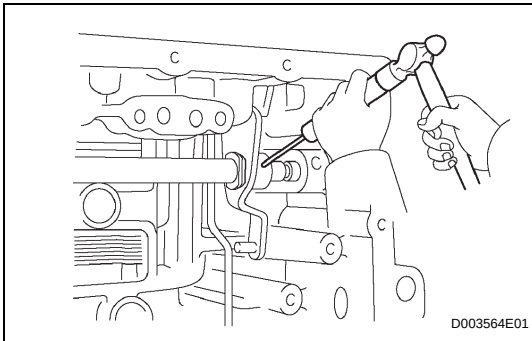
**45. INSTALL PARKING LOCK ROD SUB-ASSEMBLY**

- (a) Install the parking lock rod to the manual valve lever.

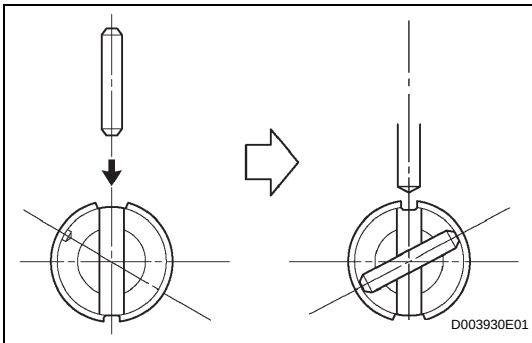


46. INSTALL MANUAL VALVE LEVER SUB-ASSEMBLY

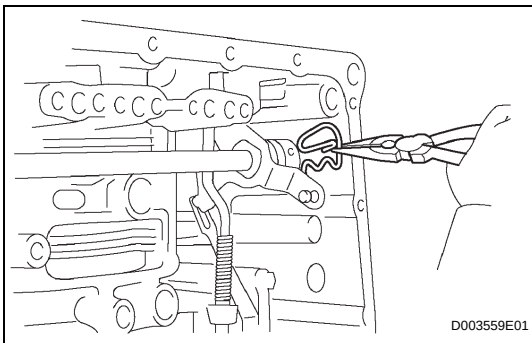
- (a) Install a new spacer and manual valve lever shaft to the transaxle.



- (b) Using a pin punch and hammer, tap in a new pin.

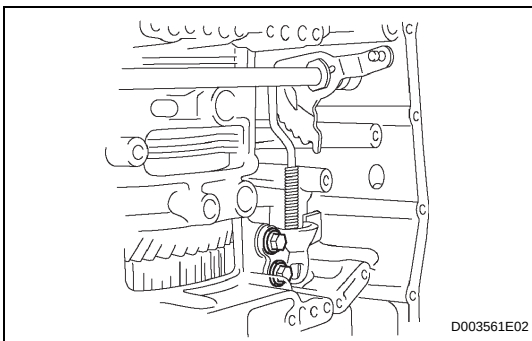


- (c) Turn the spacer and lever shaft to align the small hole for locating the staking position mark on the lever shaft.
 (d) Using a pin punch, stake the spacer through the small hole.
 (e) Check that the spacer does not turn.



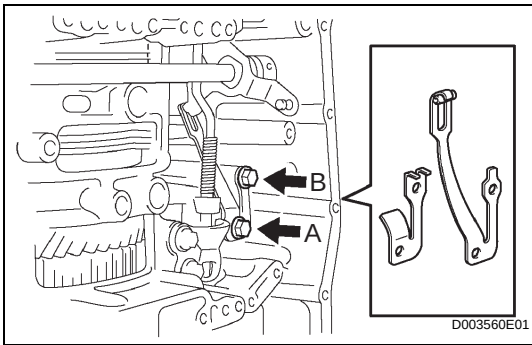
47. INSTALL MANUAL VALVE LEVER SHAFT RETAINER SPRING

- (a) Using needle-nose pliers, install the retainer spring.



48. INSTALL PARKING LOCK PAWL BRACKET

- (a) Install the parking lock pawl bracket with the 2 bolts.
Torque: 20 N*m (205 kgf*cm, 15 ft.*lbf)
Bolt length:
25 mm (0.984 in.)



49. INSTALL MANUAL DETENT SPRING SUB-ASSEMBLY

- (a) Install the manual detent spring with the 2 bolts.

NOTICE:

Make sure to install the manual detent spring and cover in this order.

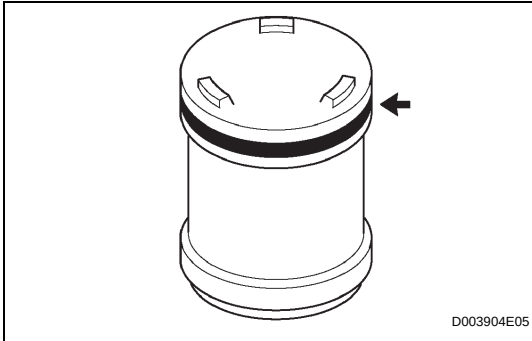
**Torque: 20 N*m (204 kgf*cm, 16 ft.*lbf) for bolt A
12 N*m (122 kgf*cm, 9 ft.*lbf) for bolt B**

HINT:

Each bolt length is indicated below.

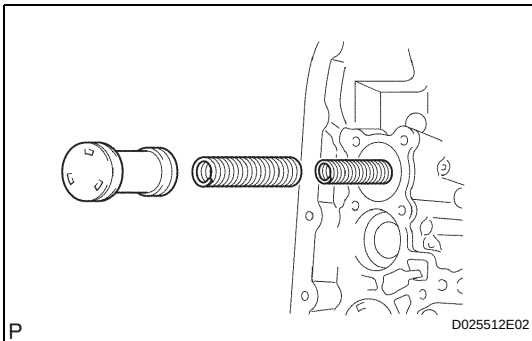
27 mm (1.063 in.) for bolt A

16 mm (0.630 in.) for bolt B



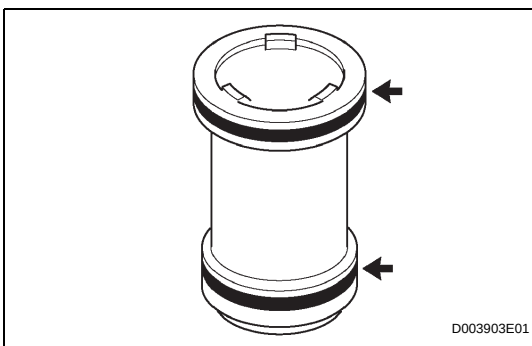
50. INSTALL B-3 ACCUMULATOR PISTON

- (a) Coat a new O-ring with ATF, and install it to the B-3 accumulator piston.



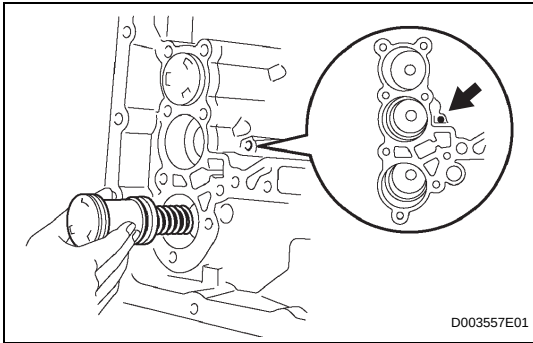
- (b) Coat the piston with ATF, install it to the transaxle.
Standard accumulator spring

Spring	Free length Outer diameter	Color
B-3 Inner	60.24 mm (2.3716 in.) 15.9 (0.626 in.)	Yellowish green
B-3 Outer	74.61 mm (2.9374 in.) 21.7 mm (0.854 in.)	Blue



51. INSTALL C-1 ACCUMULATOR PISTON

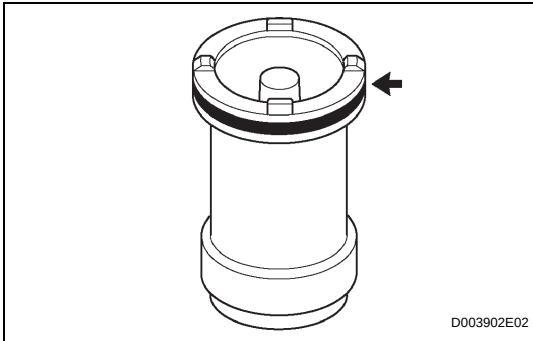
- (a) Coat 2 new O-rings with ATF, and install them to the C-1 accumulator piston.



- (b) Coat the piston with ATF, and install it to the transaxle.

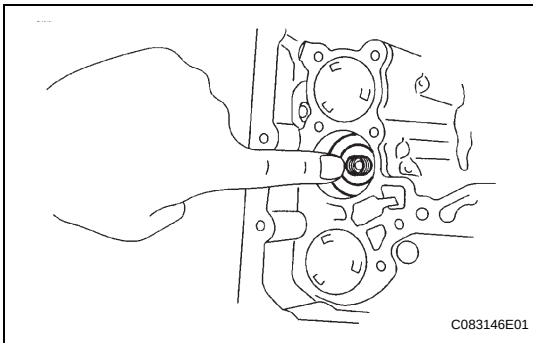
Standard accumulator spring

Spring	Free length Outer diameter	Color
C-1	81.53 mm (3.2098 in.) 18.5 mm (0.728 in.)	Pink



52. INSTALL C-3 ACCUMULATOR PISTON

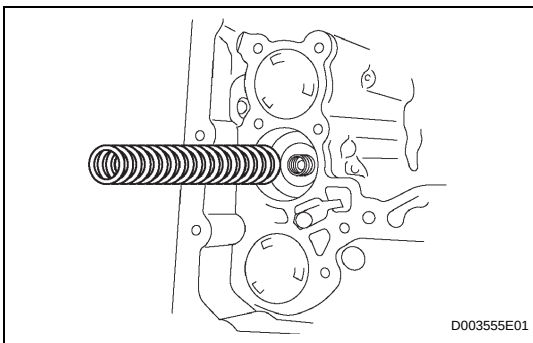
- (a) Coat a new O-ring with ATF, and install it to the C-3 accumulator piston.



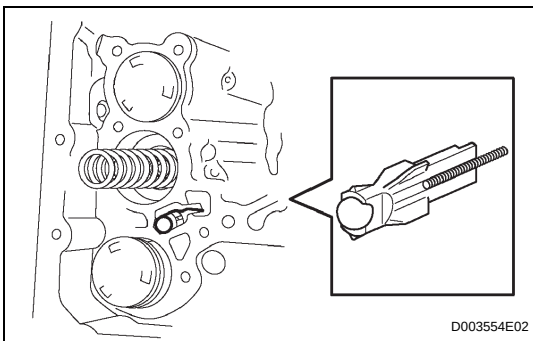
- (b) Coat the piston with ATF, install it to the transaxle case.

Standard accumulator spring

Spring	Free length Outer diameter	Color
C - 3	90.49 mm (3.5626 in.) 19.2 mm (0.756 in.)	White

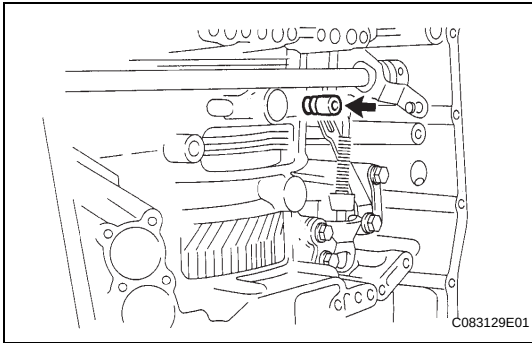


- (c) Install the spring from the C-3 accumulator piston.

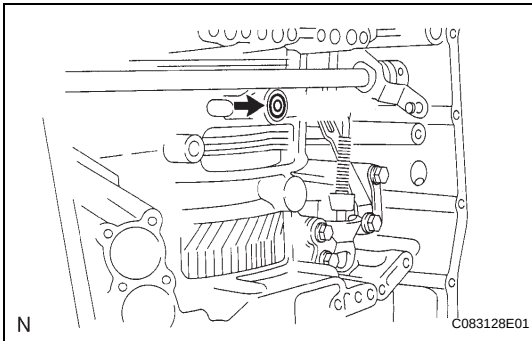


53. INSTALL CHECK BALL BODY

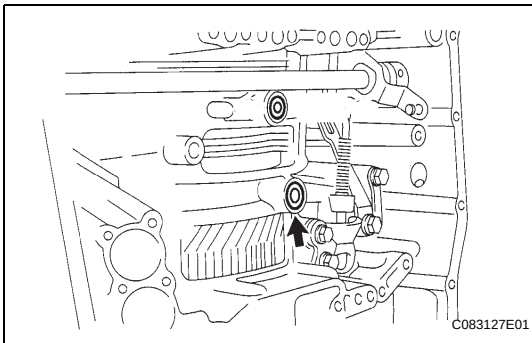
- (a) Install the check ball body and spring.

**54. INSTALL BRAKE DRUM GASKET**

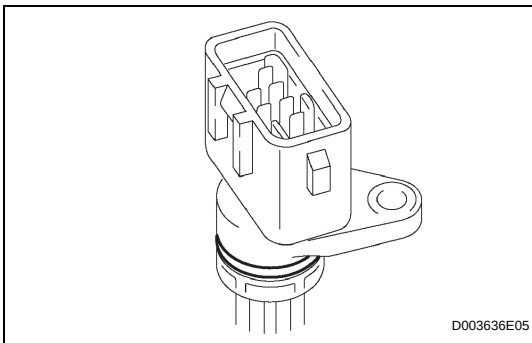
- (a) Coat a new brake drum gasket with ATF, and install it to the transaxle.

**55. INSTALL TRANSAXLE CASE 2ND BRAKE GASKET**

- (a) Coat a new transaxle case 2nd brake gasket with ATF, and install it to the transaxle.

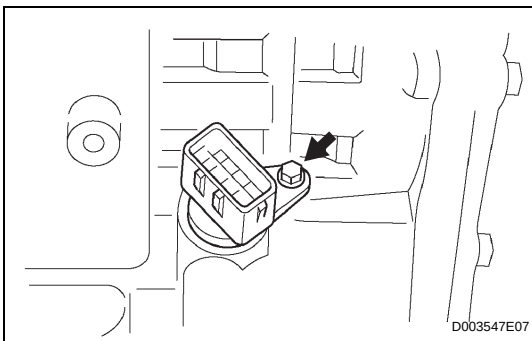
**56. INSTALL NO. 1 GOVERNOR APPLY GASKET**

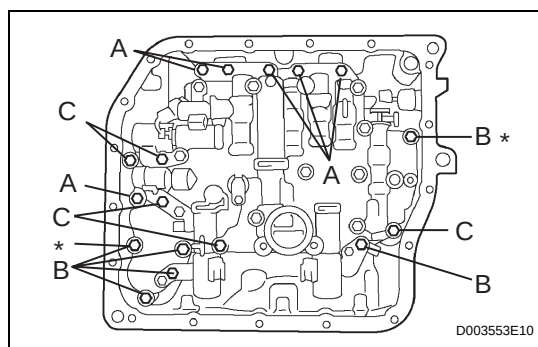
- (a) Coat a new governor apply gasket No. 1 with ATF, and install it to the transaxle.

**57. INSTALL TRANSMISSION WIRE**

- (a) Coat a new O-ring with ATF, and install it to the transaxle solenoid wire.

- (b) Install the solenoid wire retaining bolt
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)





58. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Align the groove of the manual valve with the pin of lever.

(b) Install the 17 bolts.

Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

NOTICE:

- Push the valve body against the accumulator piston spring and the check ball body to install it.
- Tighten the bolts marked by * in the illustration first temporarily because they are positioning bolts.

HINT:

Each bolt length is indicated below.

Bolt length:

25 mm (0.984 in.) for bolt A

41 mm (1.614 in.) for bolt B

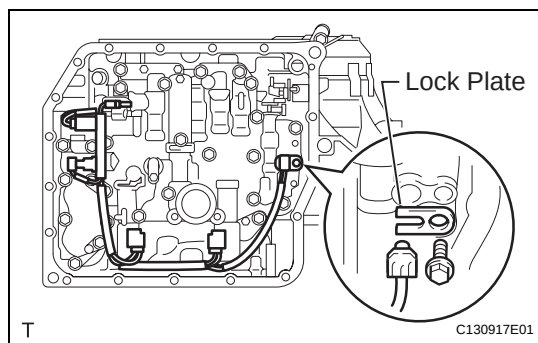
45 mm (1.771 in.) for bolt C

(c) Connect the 5 solenoid connectors.

(d) Coat the O-ring of the temperature sensor with ATF.

(e) Install the ATF temperature sensor with the lock plate and bolt.

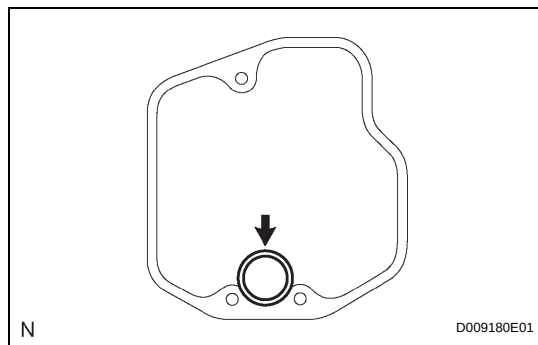
Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)



59. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

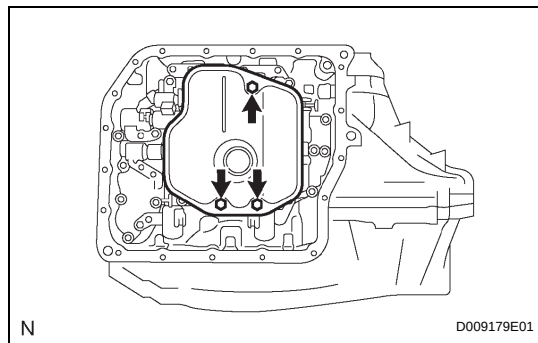
(a) Coat a new O-ring with ATF.

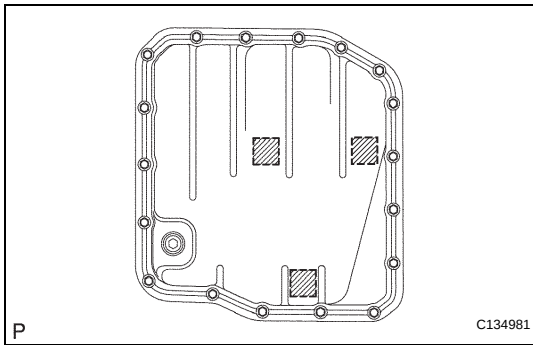
(b) Install the O-ring to the oil strainer.



(c) Install the oil strainer with the 3 bolts.

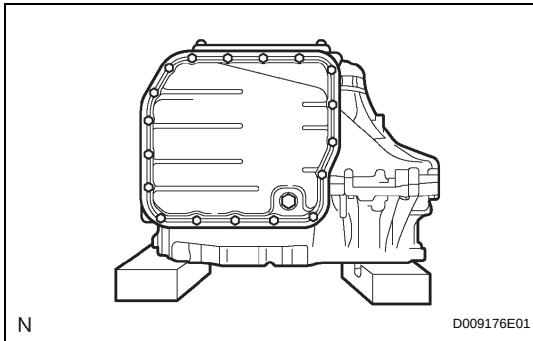
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)





60. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

- Install the 3 magnets in the oil pan.
- Install a new oil pan gasket to the oil pan.

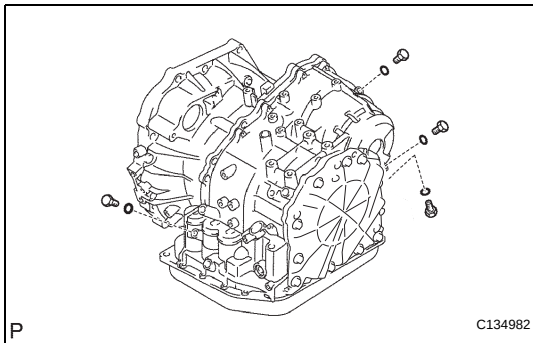


- Install the oil pan to the transaxle with the 18 bolts.

Torque: 7.6 N*m (77 kgf*cm, 67 in.*lbf)

NOTICE:

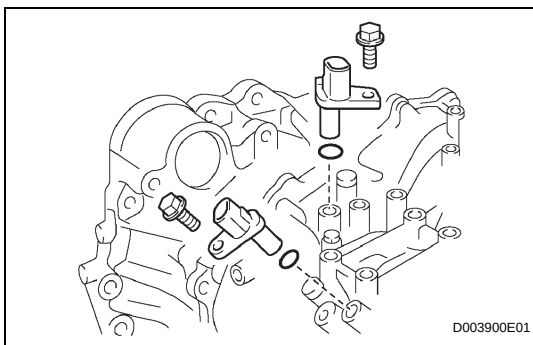
Because the bolts are seal bolts, apply seal packing to new bolts and tighten them within 10 minutes after application.



61. INSTALL NO. 1 TRANSAXLE CASE PLUG

- Coat 4 new O-rings with ATF, and install them to the 4 plugs.
- Install the 4 plugs to the transaxle case.

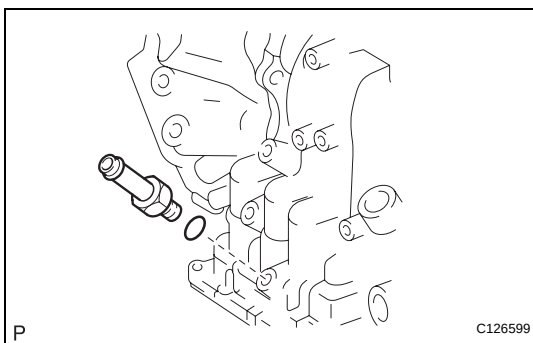
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



62. INSTALL SPEED SENSOR

- Coat 2 new O-rings with ATF, and install them to the 2 sensors.
- Install the 2 sensors with the 2 bolts.

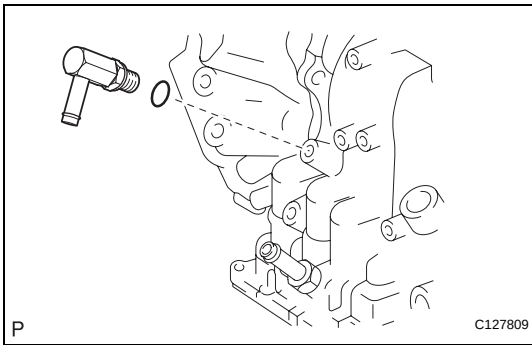
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



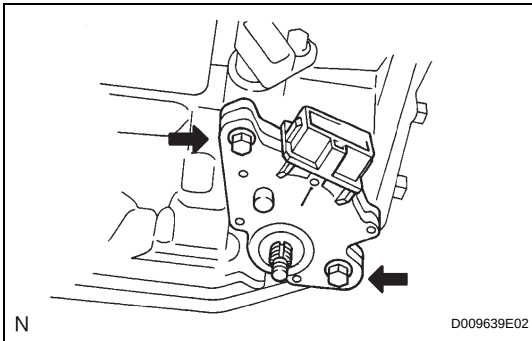
63. INSTALL OIL COOLER INLET TUBE UNION

- Coat a new O-ring with ATF, and install it to the union.
- Install the union to the transaxle.

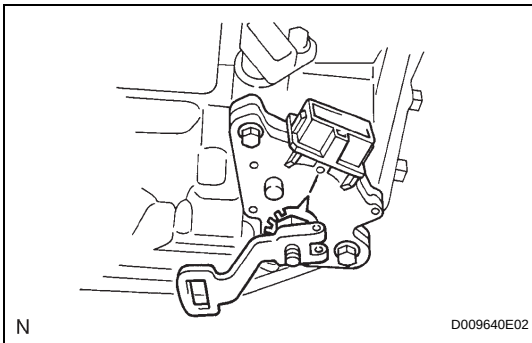
Torque: 27 N*m (276 kgf*cm, 20 ft.*lbf)

**64. INSTALL OIL COOLER OUTLET TUBE UNION**

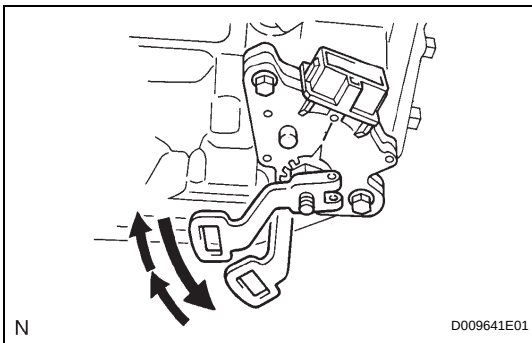
- (a) Coat a new O-ring with ATF, and install it to the union.
 - (b) Install the union to the transaxle.
- Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)**

65. INSTALL BREATHER PLUG HOSE**66. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY**

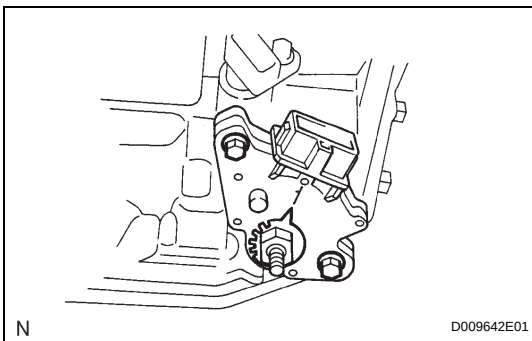
- (a) Install the park/neutral position switch to the manual valve shaft.
 - (b) Temporarily install the 2 bolts.
 - (c) Install a new lock plate and tighten the manual valve shaft nut.
- Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)**



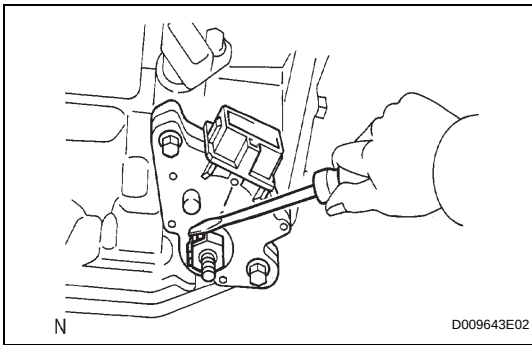
- (d) Temporarily install the control shaft lever.



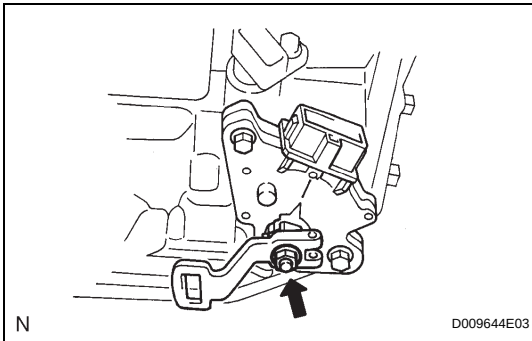
- (e) Turn the lever counterclockwise until it stops, and then turn it clockwise 2 notches.
- (f) Remove the control shaft lever.



- (g) Align the groove with neutral basic line.
 - (h) Hold the switch in this position and tighten the 2 bolts.
- Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)**



- (i) Using a screwdriver, stake the nut with the lock plate.



- (j) Install the control shaft lever with the washer and nut.

Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

REASSEMBLY

1. INSTALL FRONT OIL PUMP OIL SEAL

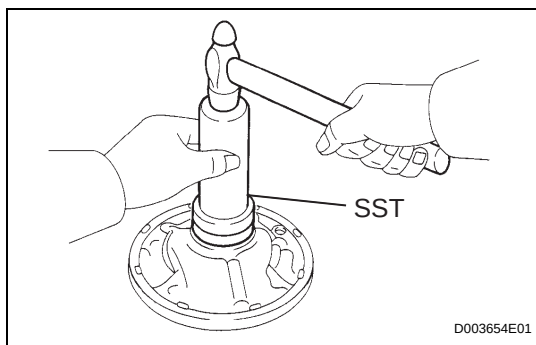
- (a) Using SST and a hammer, install a new oil seal to the pump.

SST 09350-32014 (09351-32140)

HINT:

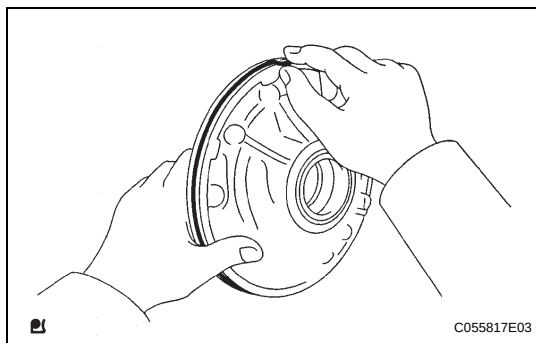
The seal end should be flat with the outer edge of the oil pump.

- (b) Coat the lip of the oil seal with petroleum jelly.



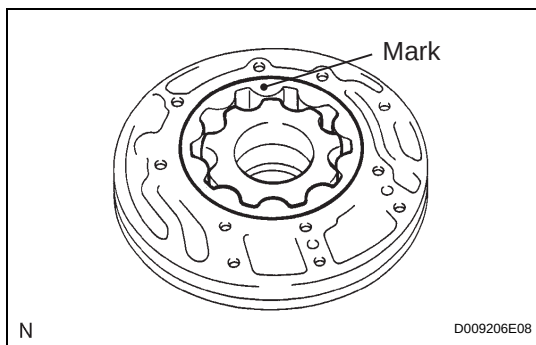
2. INSTALL FRONT OIL PUMP BODY O-RING

- (a) Coat the new O-ring with ATF, and install it to the oil pump body.



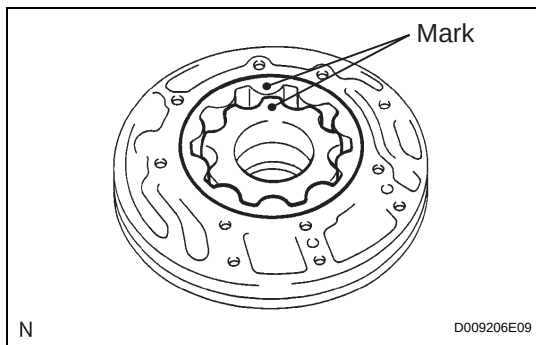
3. INSTALL FRONT OIL PUMP DRIVEN GEAR

- (a) Coat the front oil pump driven gear with ATF, and install it to the oil pump body with the marked side facing up.



4. INSTALL FRONT OIL PUMP DRIVE GEAR

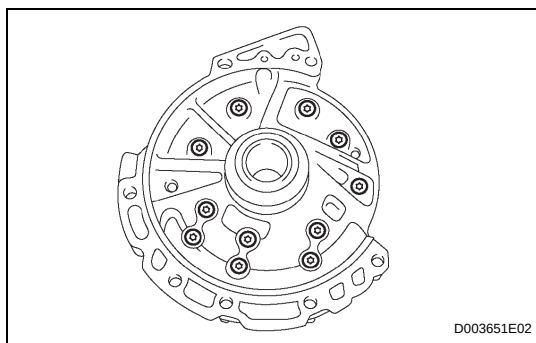
- (a) Coat the front oil pump drive gear with ATF, and install it to the oil pump body with the marked side facing up.

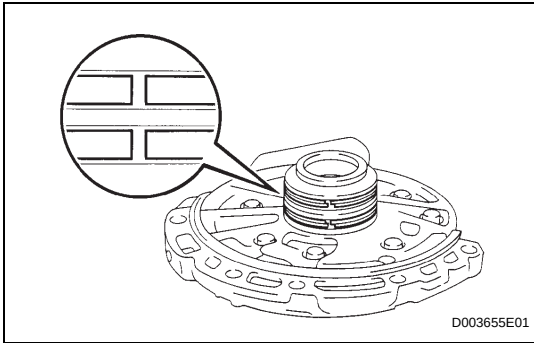


5. INSTALL STATOR SHAFT ASSEMBLY

- (a) Set the stator shaft by aligning each bolt hole.
- (b) Using a T30 "trox" socket, install the 11 bolts.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



**6. INSTALL CLUTCH DRUM OIL SEAL RING**

- (a) Install the 2 clutch drum oil seal rings.

NOTICE:

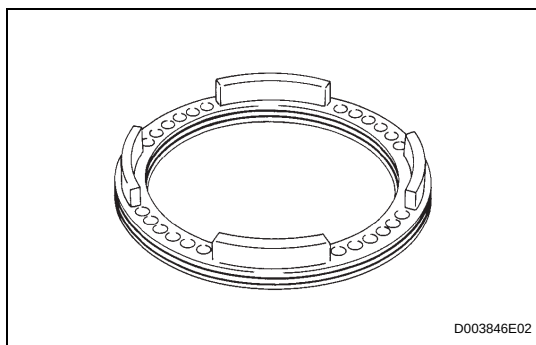
Do not expand the ring ends excessively.

7. INSPECT OIL PUMP ASSEMBLY (See page [AX-218](#))

REASSEMBLY

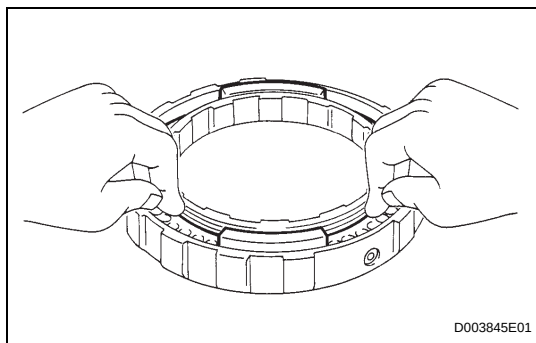
1. INSTALL 2ND BRAKE PISTON O-RING

- (a) Coat the 2 new O-rings with ATF, and install them into the 2nd brake piston.



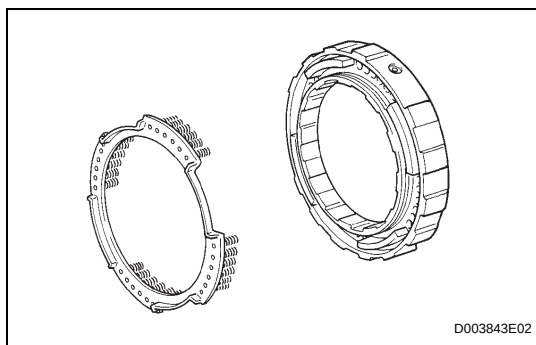
2. INSTALL 2ND BRAKE PISTON

- (a) Press in the 2nd brake piston into the 2nd brake cylinder with your hands.



3. INSTALL 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

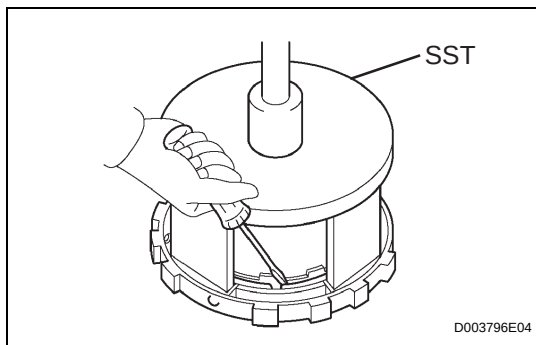
- (a) Install the piston return spring.

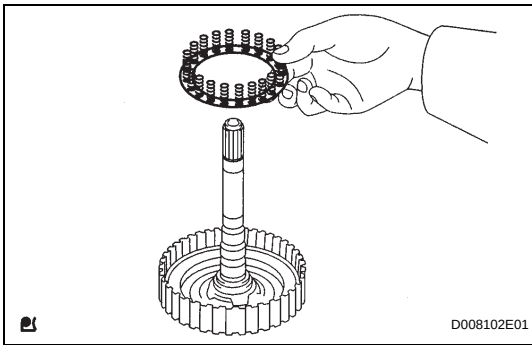


- (b) Place SST on the piston return spring, and compress the piston return spring with a press.
SST 09387-00060
- (c) Using a screwdriver, install the snap ring.

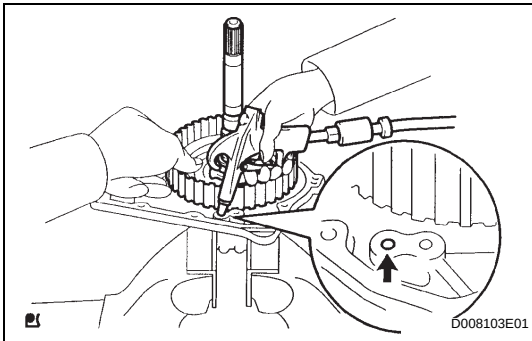
NOTICE:

Be sure the end gap of the snap ring is not aligned with the piston return spring claw.

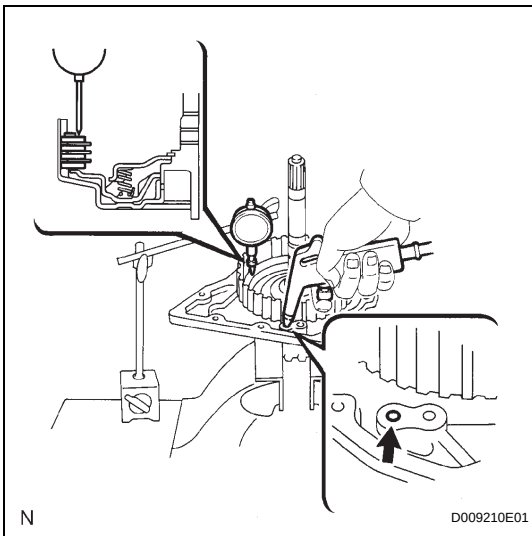




- (d) Remove the piston return spring from the direct clutch drum.



- (e) Install the direct clutch drum on the transaxle rear cover.
 (f) Holding the direct clutch piston with your hand, apply compressed air (392 kPa, 4.0 kgf/cm², 57 psi) to the transaxle rear cover to remove the direct clutch piston.



INSPECTION

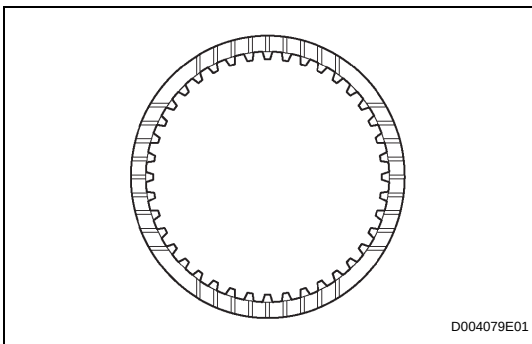
1. INSPECT PACK CLEARANCE OF DIRECT CLUTCH

- (a) Install the direct clutch and needle roller bearing on the transaxle rear cover.
 (b) Using a dial indicator, measure the forward clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm², 57 psi)

Standard pack clearance:

0.515 to 0.825 mm (0.0203 to 0.0324 in.)

If the pack clearance is not as specified, inspect the discs, plates and flange.

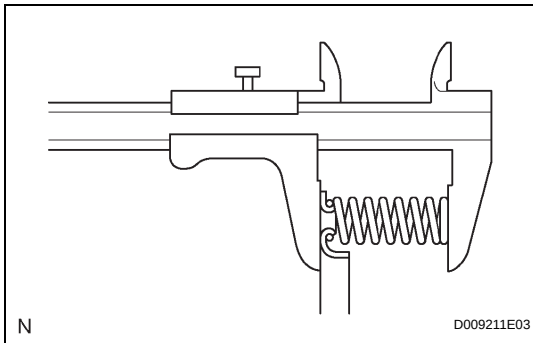


2. INSPECT DIRECT MULTIPLE DISC CLUTCH DISC

- (a) Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



3. INSPECT DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

- (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:

22.58 mm (0.8898 in.)

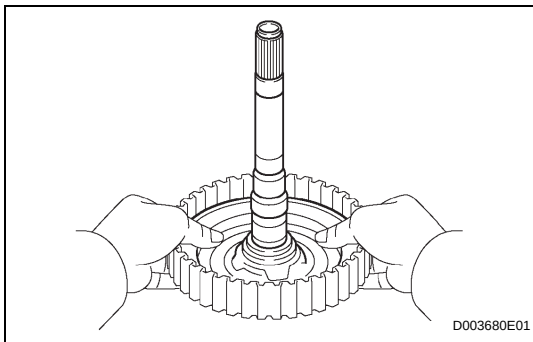
REASSEMBLY

1. INSTALL DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

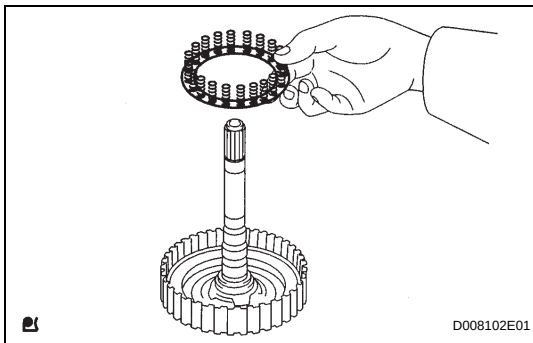
- (a) Coat the direct clutch piston with ATF, and install it to the direct clutch drum.

NOTICE:

Be careful not to damage the lip seal of the direct clutch piston.



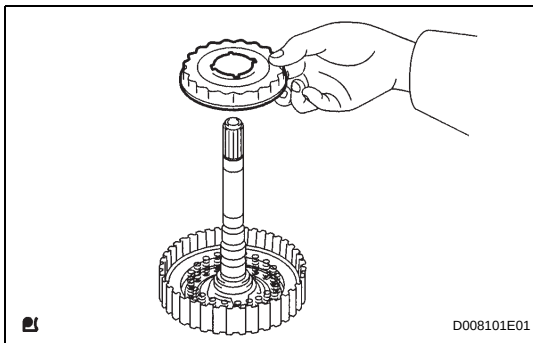
- (b) Install the piston return spring to the direct clutch drum.



- (c) Install the clutch balancer to the direct clutch drum.

NOTICE:

Be careful not to damage the lip seal of the direct clutch balancer.



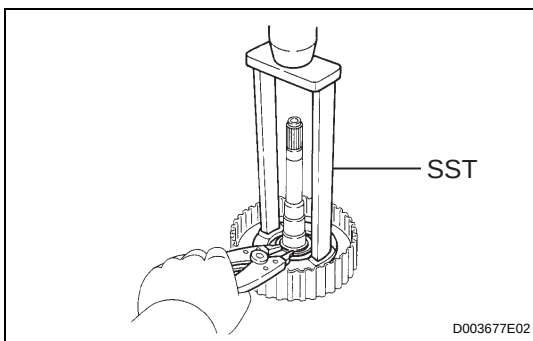
- (d) Place SST on the clutch balancer and compress the piston return spring with a press.

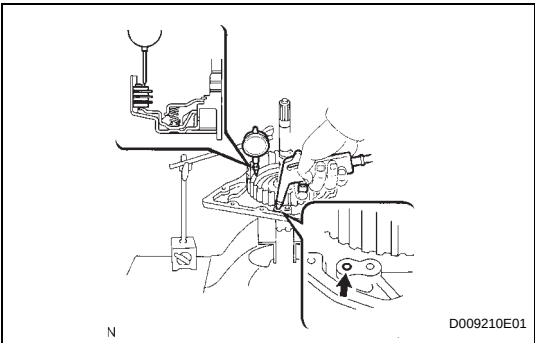
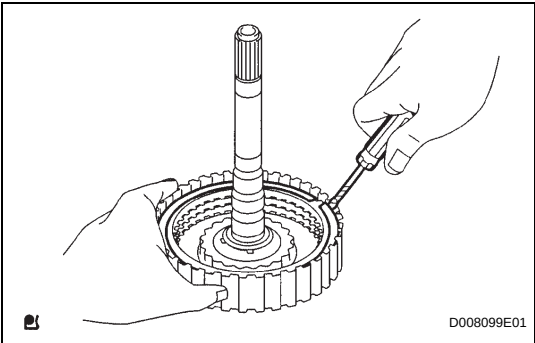
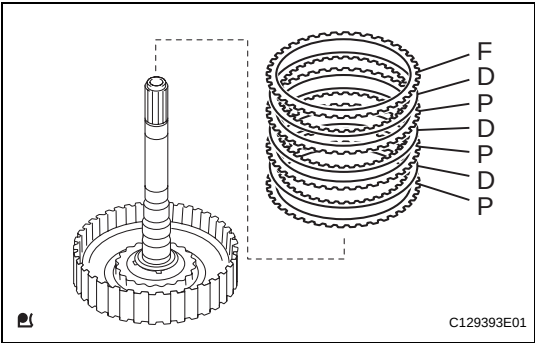
SST 09387-00020

- (e) Using a snap ring expander, install the snap ring to the direct clutch drum.

NOTICE:

- Be sure the end gap of the snap ring is not aligned with the clutch balancer claw.
- Stop the press when the spring sheet is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove.





- This prevents the spring sheet from being deformed.
- Do not expand the snap ring excessively.

2. INSTALL DIRECT MULTIPLE DISC CLUTCH DISC

- (a) Install the 3 plates, 3 discs and flange to the direct clutch drum.

Install in order:

P - D - P - D - P - D - F

HINT:

P = Plate

D = Disc

F = Flange

- (b) Using a screwdriver, install the snap ring.
(c) Check that the end gap of the snap ring is not aligned with one of the cutouts.

3. INSPECT PACK CLEARANCE OF DIRECT CLUTCH

- (a) Install the direct clutch on the transaxle rear cover.
(b) Using a dial indicator, measure the direct clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm², 57 psi).

Standard pack clearance:

0.515 to 0.825 mm (0.0203 to 0.0324 in.)

If the pack clearance is less than the minimum, parts may have been assembled incorrectly, so check and reassemble again.

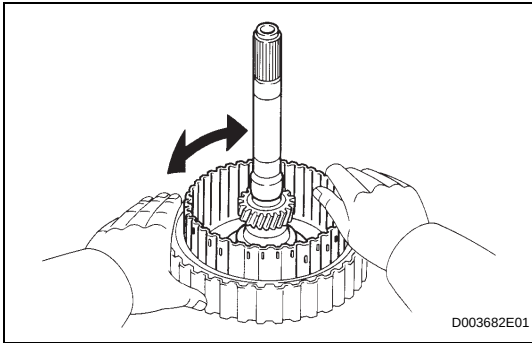
If the stroke is not as specified, select another flange.

HINT:

There are 6 flanges in different thickness.

Standard flanges in different thickness

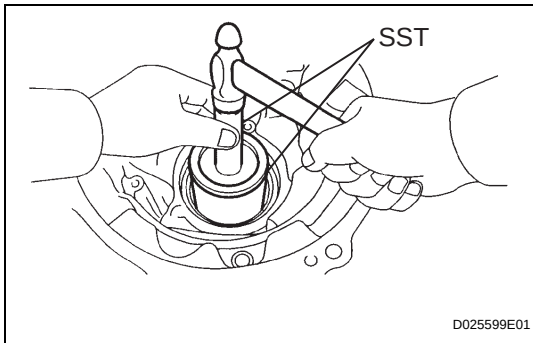
No.	Thickness	No.	Thickness
1	3.0 mm (.118 in.)	4	3.3 mm (0.130 in.)
2	3.1 mm (0.122 in.)	5	3.4 mm (0.134 in.)
3	3.2 mm (0.126 in.)	6	3.5 mm (0.138 in.)



4. **INSPECT DIRECT MULTIPLE DISC CLUTCH DISC**
- (a) Check that the disc rotates when rotating the disc after inserting the rear planetary sun gear.

NOTICE:

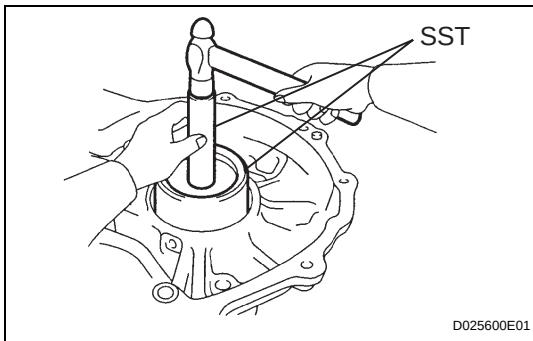
Do not place the rear planetary sun gear in a vise.



7. REMOVE TRANSAXLE HOUSING OIL SEAL

- (a) Using SST and hammer, tap out the oil seal.

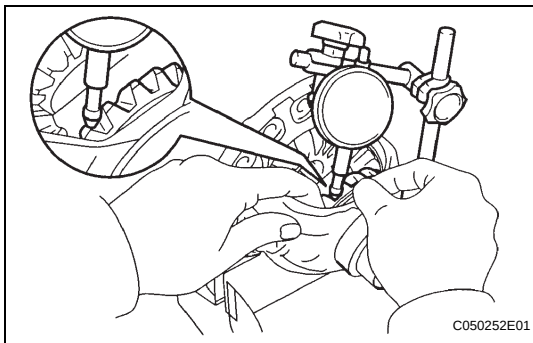
SST 09950-70010 (09951-07100), 09215-00013 (09215-00471)



8. REMOVE DIFFERENTIAL SIDE BEARING RETAINER OIL SEAL

- (a) Using SST and hammer, tap out the oil seal.

SST 09950-70010 (09951-07100), 09608-10010



INSPECTION

1. INSPECT DIFFERENTIAL SIDE GEAR BACKLASH

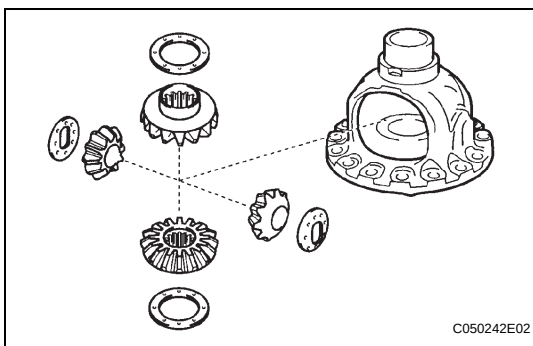
- (a) Using a dial indicator, measure the backlash of the side gear.

Standard backlash:

0.05 to 0.20 mm (0.0020 to 0.0070 in.)

Standard thrust washer thickness

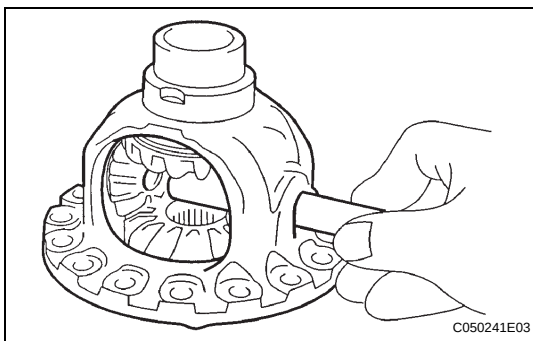
Thickness	Thickness
1.625 mm (0.0640 in.)	1.825 mm (0.0719 in.)
1.725 mm (0.0679 in.)	-



REASSEMBLY

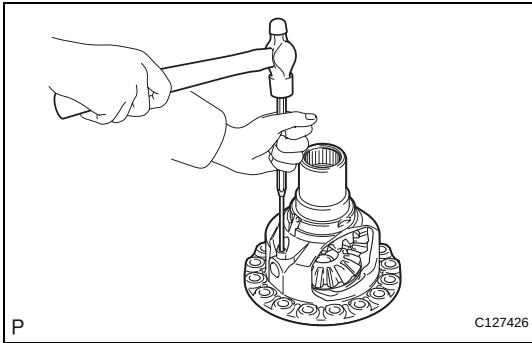
1. INSTALL FRONT DIFFERENTIAL SIDE GEAR

- (a) Coat the 2 front differential side gears, 2 side gear thrust washers, 2 front differential pinions and 2 pinion thrust washers with ATF and install them to the differential case.



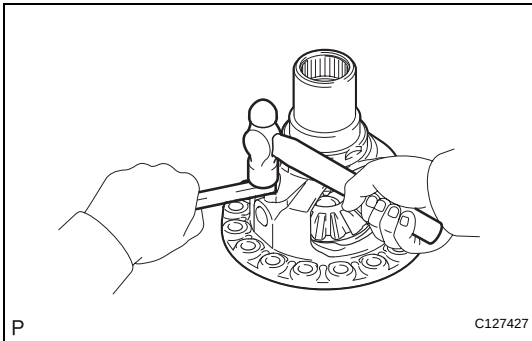
2. INSTALL NO. 1 FRONT DIFFERENTIAL PINION SHAFT

- (a) Coat the No. 1 front differential pinion shaft with ATF, and install it to the differential case.



3. INSTALL TRANSAXLE CASE STRAIGHT PIN

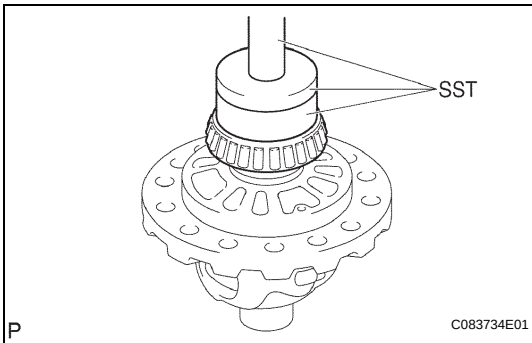
- (a) Using a pin punch and a hammer, tap in the pinion shaft straight pin.



- (b) Using a chisel and a hammer, stake the differential case.

NOTICE:

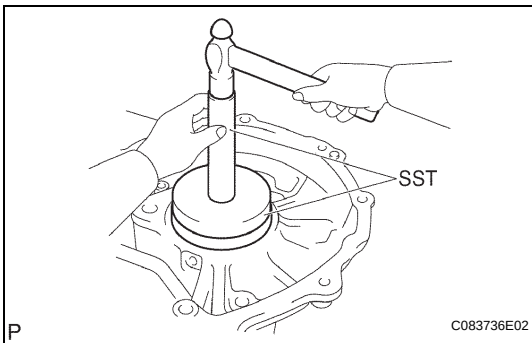
Stake it after adjusting the backlash.



4. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

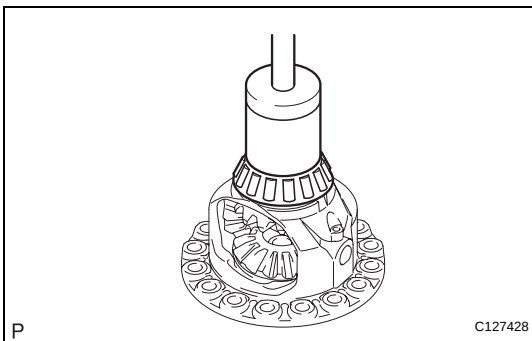
- (a) Using SST and a press, press in the front differential case rear tapered roller bearing to the differential case.

SST 09550-60010, 09950-60020 (09951-00680), 09950-70010 (09951-07100)



- (b) Using SST and a hammer, tap in the front differential case tapered roller bearing front outer race to the transaxle housing.

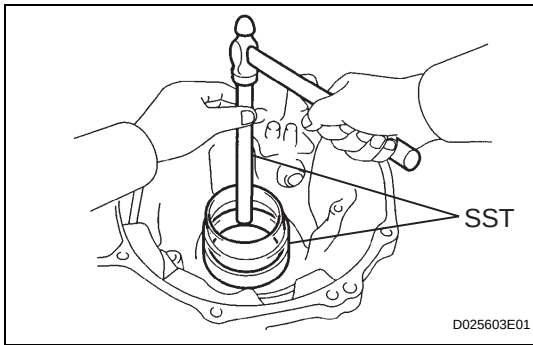
SST 09550-60010, 09950-60020 (09951-00680), 09950-70010 (09951-07100, 09951-00890)



5. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

- (a) Using SST and a press, press in the front differential case front tapered roller bearing to the differential case.

SST 09550-60010, 09950-60020 (09951-00680), 09950-70010 (09951-07100, 09951-00890)

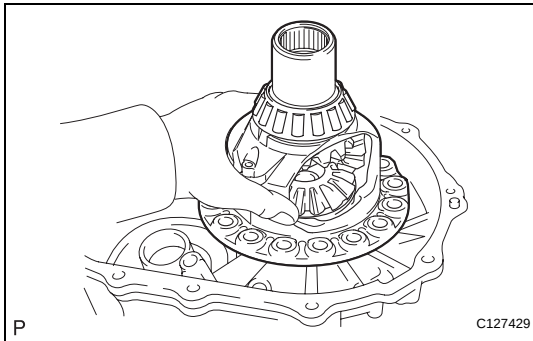


- (b) Using SST and a hammer, tap in the front differential case tapered roller bearing front outer race to the transaxle housing.

SST 09550-60010, 09950-60020 (09951-00680),
09950-70010 (09951-07100, 09951-00890)

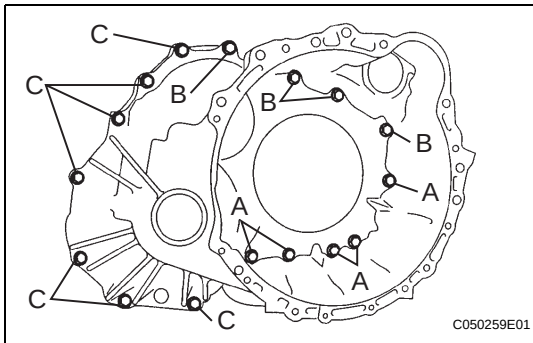
NOTICE:

Clearance is not allowed between the bearing and transaxle housing.



6. ADJUST DIFFERENTIAL SIDE BEARING PRELOAD

- (a) Install the differential assembly to the transaxle case.



- (b) Clean the matching surfaces of the transaxle case and transaxle housing.
(c) Install the transaxle housing to the transaxle case and tighten them with the 16 bolts

Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf) for bolt A
29 N*m (296 kgf*cm, 21 ft.*lbf) for bolts B and C

HINT:

Each bolt length is indicated below.

Bolt length:

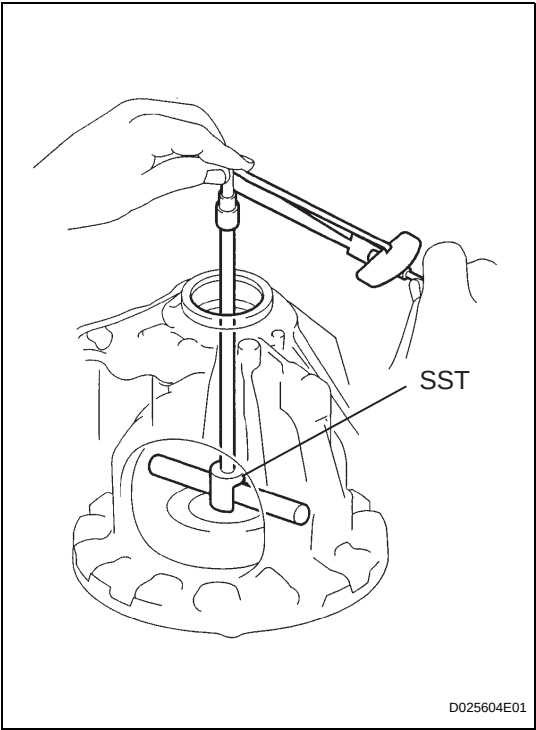
50 mm (1.969 in.) for bolt A

50 m (1.969 in.) for bolt B

42 mm (1.654 in.) for bolt C

NOTICE:

Usually, bolt A is non-reusable bolt. In this case, however, it can be used after cleaning it.



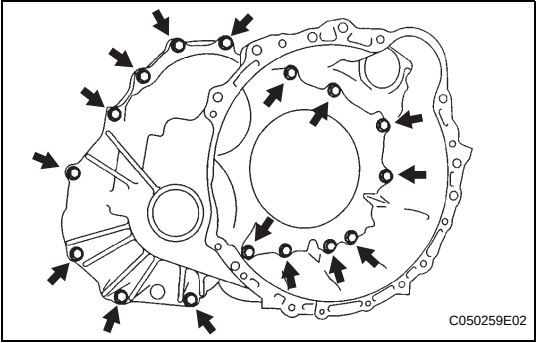
- (d) Using SST, return the differential assembly right and left 2 or 3 times to allow the bearing settle.
SST 09564-32011
- (e) Using SST and torque wrench, measure the turning torque of the differential.
SST 09564-32011
Torque: Standard turning torque at 60 rpm
0.20 to 0.69 N*m (2.0 to 7.0 kgf*cm, 1.8 to 6.1 in.*lbf)

HINT:
If the turning torque is not within the specified value, refer to the table below and select a thrust washer which turning torque is within the specified value.

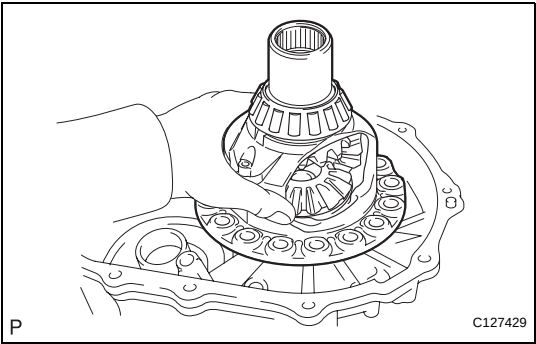
Standard flange thickness

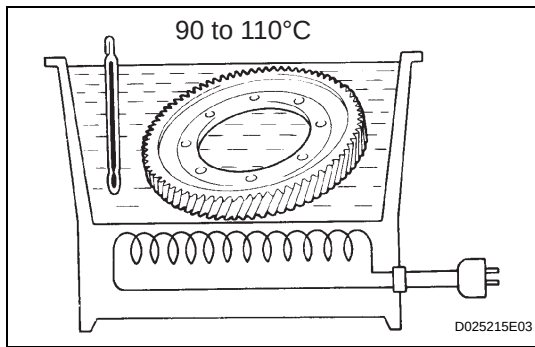
Mark	Thickness	Mark	Thickness
0	2.00 mm (0.0787 in.)	9	2.45 mm (0.0965 in.)
1	2.05 mm (0.0807 in.)	A	2.50 mm (0.0984 in.)
2	2.10 mm (0.0827 in.)	B	2.55 mm (0.1004 in.)
3	2.15 mm (0.0846 in.)	C	2.60 mm (0.1024 in.)
4	2.20 mm (0.0866 in.)	D	2.65 mm (1.1043 in.)
5	2.25 mm (0.0886 in.)	E	2.70 mm (0.1063 in.)
6	2.30 mm (0.0906 in.)	F	2.75 mm (0.1083 in.)
7	2.35 mm (0.0925 in.)	G	2.80 mm (0.1102 in.)
8	2.40 mm (0.0945 in.)	H	2.85 mm (0.1122 in.)

- (f) Remove the 16 bolts and the transaxle housing.



- (g) Remove the differential assembly.





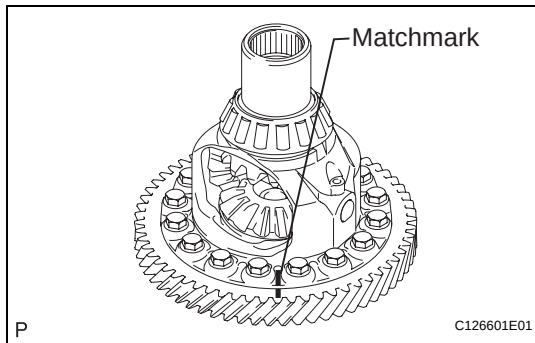
7. INSTALL FRONT DIFFERENTIAL RING GEAR

- (a) Using ATF and a heater, heat the front differential ring gear to 90 to 110 °C (194.0 to 230.0 °F)

NOTICE:

Do not overheat the ring gear to 110°C (230.0°F) or more.

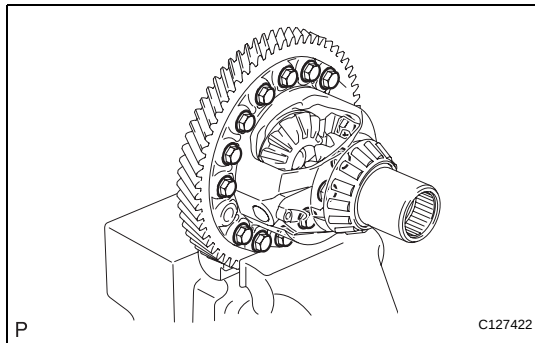
- (b) Clean the contact surface of the front differential case.



- (c) Align the matchmarks, and install the front differential ring gear case quickly.

NOTICE:

Do not install the bolts while the ring gear is hot.

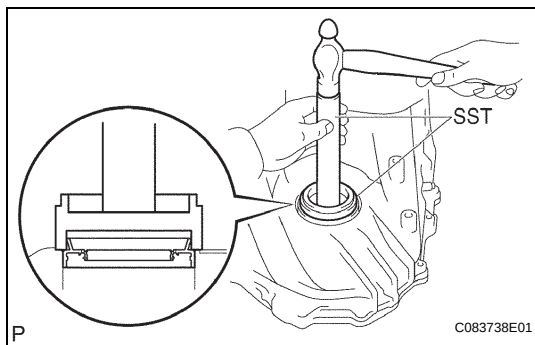


- (d) Tighten the 14 bolts.

Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)

NOTICE:

Tighten the bolts a little at a time in diagonal order.

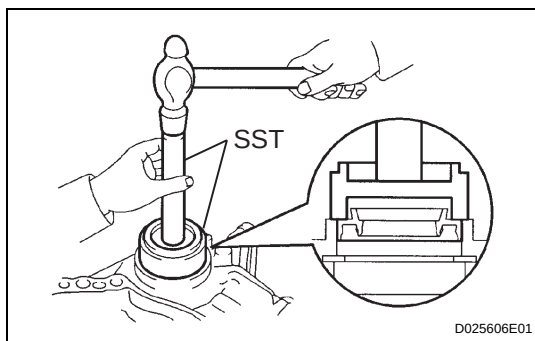


8. INSTALL DIFFERENTIAL SIDE BEARING RETAINER OIL SEAL

- (a) Coat the lip of a new oil seal with a little amount of MP grease.

- (b) Using SST and a hammer, tap in the oil seal.

SST 09223-15020, 09950-70010 (09951-07100)



9. REMOVE TRANSAXLE HOUSING OIL SEAL

- (a) Coat the lip of a new oil seal with a little amount of MP grease.

- (b) Using SST and a hammer, tap in the oil seal.

SST 09710-30050, 09950-70010 (09951-07100)

FAIL-SAFE CHART

1. FAIL-SAFE CHART

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

- (a) Automatic Transmission Fluid (ATF) temperature sensor:

When the ATF temperature sensor has a malfunction, O/D up-shift is prohibited.

- (b) Counter gear speed sensor NC (Speed sensor NC):
When the counter gear speed sensor has a malfunction, O/D up-shift is prohibited.

- (c) Shift solenoid valve DSL:
When the solenoid valve DSL has a malfunction, the current to the solenoid valve is stopped.
This stops lock-up control, then fuel economy decreases.

- (d) Shift solenoid valve SL1, SL2 and S4:
If any of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid "ON" and "OFF" in order to shift into the gear positions shown in the table below.

Manual shifting as shown in the following table must be done. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid. Even if starting the engine in the fail-safe mode, the gear position remains in the same position.

Normal				Shift Solenoid Valve SL1				Shift Solenoid Valve SL2				Shift Solenoid Valve S4			
Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve		
	SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4
1st	ON	ON	OFF	2nd	X	ON	OFF	3rd	ON ↓ OFF	X	OFF	1st	ON	ON	X
2nd	OFF	ON	OFF	2nd	X	ON	OFF	3rd	OFF	X	OFF	2nd	OFF	ON	X
3rd	OFF	OFF	OFF	3rd	X	OFF ↓ ON	OFF ↓ ON	3rd	OFF	X	OFF	3rd	OFF	OFF	X
O/D	OFF	OFF	ON	3rd	X	OFF ↓ ON	ON	O/D	OFF	X	ON	3rd	OFF	OFF	X

Shift Solenoid Valve SL1 and SL2				Shift Solenoid Valve SL1 and S4				Shift Solenoid Valve SL2 and S4				Shift Solenoid Valve SL1, SL2 and S4			
Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve		
	SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4
3rd	X	X	OFF	2nd	X	ON	X	3rd	ON ↓ OFF	X	X	3rd	X	X	X
3rd	X	X	OFF	2nd	X	ON	X	3rd	OFF	X	X	3rd	X	X	X
3rd	X	X	OFF	2nd	X	OFF ↓ ON	X	3rd	OFF	X	X	3rd	X	X	X
O/D	X	X	ON	2nd	X	OFF ↓ ON	X	3rd	OFF	X	X	3rd	X	X	X

HINT:

- ↓: Condition in the normal operation is shown above the "↓".
- ↓: Condition in the fail-safe mode is shown beneath the "↓".
- E/B: Engine brake.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator, and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

NOTICE:

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

- (a) Warm up the engine.
- (b) Turn the ignition switch OFF.
- (c) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (d) Turn the ignition switch ON and turn the tester ON.
- (e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
- (f) Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
SPD (NC)	Counter gear speed/ Min.: 0 rpm Max.: 12,750 rpm	4th (O/D) when shift lever is on D (after warming up the engine); Intermediate shaft speed (NC) becomes close to the engine speed	Data is displayed in increments of 50 rpm
SPD (NT)	Input turbine speed/ Min.: 0 rpm Max.: 12,750 rpm	- Lock-up ON (after warming up engine): Input turbine speed (NT) equal to engine speed. - Lock-up OFF (idling with shift lever on N): Input turbine speed (NT) is nearly equal to engine speed.	Data is displayed in increments of 50 rpm
PNP SW (NSW)	PNP switch status/ ON or OFF	Shift lever is: On P or N: ON Not on P or N: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-39
STOP LIGHT SW	Stop light switch status/ ON or OFF	- Brake pedal is depressed: ON - Brake pedal is released: OFF	-
SHIFT	ECM gear shift command/ 1st, 2nd, 3rd or 4th	Shift lever position is: - On L: 1st - On 2: 1st or 2nd - On 3: 1st, 2nd or 3rd - On D: 1st, 2nd, 3rd or 4th	-

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
REVERSE	PNP switch status/ ON or OFF	Shift lever is: On R: ON Not on R: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-39
PARKING	PNP switch status/ ON or OFF	Shift lever is: On P: ON Not on P: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-39
NEUTRAL	PNP switch status/ ON or OFF	Shift lever is: On N: ON Not on N: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-39
DRIVE	PNP switch status/ ON or OFF	Shift lever is: On D: ON Not on D: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-39
3RD	PNP switch status/ ON or OFF	Shift lever is: On 3: ON Not on 3: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-39
2ND	PNP switch status/ ON or OFF	Shift lever is: On 2: ON Not on 2: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-39
LOW	PNP switch status/ ON or OFF	Shift lever is: On L: ON Not on L: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-39

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
A/T OIL TEMP1	ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	- After stall test: Approximately 80°C (176°F) - Equal to ambient temperature while engine is cold	If value is -40°C (-40°F) or "150°C (302°F) or more", ATF temperature sensor circuit is open or short circuited
LOCK UP SOL	Lock-up solenoid status/ ON or OFF	- Lock-up: ON - Not on lock-up: OFF	-
SOLENOID (SLT)	Shift solenoid SLT status/ ON or OFF	- Accelerator pedal is depressed: OFF - Accelerator pedal is released: ON	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

- Warm up the engine.
- Turn the ignition switch OFF.
- Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- Turn the ignition switch ON and turn the tester ON.
- Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
- Perform the ACTIVE TEST.

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate shift solenoid valve and set each shift lever position by yourself [Vehicle Condition] - IDL: ON 50 km/h (31 mph) or less [Other information] - Press "→" button: Shift up - Press "←" button: Shift down	Possible to check operation of shift solenoid valves
SOLENOID (S4)	[Test Details] Operate the shift solenoid S4 [Vehicle Condition] - Vehicle stopped - Shift lever P or N position	-
SOLENOID (SL1)	[Test Details] Operate the shift solenoid SL1 [Vehicle Condition] - Vehicle stopped - Shift lever P or N position	-
SOLENOID (SL2)	[Test Details] Operate the shift solenoid SL2 [Vehicle Condition] - Vehicle stopped - Shift lever P or N position	-
LOCK UP	[Test Details] Control shift solenoid DSL to set automatic transaxle to the lock-up condition [Vehicle Condition] - Throttle valve opening angle: Less than 35% - Vehicle speed: 60 km/h (36 mph) or more	Possible to check shift solenoid valve DSL operation

Item	Test Details	Diagnostic Note
SOLENOID (DSL)	[Test Details] Operate the shift solenoid DSL [Vehicle Condition] • Vehicle stopped • Shift lever P or N position	-
SOLENOID (SLT)*	[Test Details] Operate shift solenoid SLT and raise line pressure [Vehicle Condition] • Vehicle stopped • IDL: ON HINT: OFF: Line pressure up (when Active Test "SOLENOID (SLT)" is performed, ECM commands SLT solenoid to turn OFF) ON: No action (normal operation)	-

HINT:

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check the line pressure changes by connecting SST to the automatic transaxle, which is used in the HYDRAULIC TEST (see page [AX-16](#)) as well. Please note that the pressure values in the ACTIVE TEST and HYDRAULIC TEST are different.

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit listed in the table below and proceed to the page given.

HINT:

- *1: "Comes on" means the Malfunction Indicator Lamp (MIL) illuminates.
- *2: "DTC stored" means the ECM memorizes the malfunction code if the ECM detects the DTC detection condition.
- These DTCs may be output when the clutch, brake, gear components, etc., inside the automatic transaxle are damaged.

DTC No.	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	- Open or short in park/neutral position switch circuit - Park/Neutral position switch - ECM	Comes on	DTC stored	AX-39
P0710	Transmission Fluid Temperature Sensor "A" Circuit	- Open or short in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-46
P0711	Transmission Fluid Temperature Sensor "A" Performance	- Open or short in No. 1 ATF temperature sensor circuit - No. 1 ATF temperature sensor - ECM	Comes on	DTC stored	AX-50
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	- Short in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-46
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	- Open in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-46
P0717	Input Speed Sensor Circuit No Signal	- Open or short in speed sensor NT circuit - Speed sensor NT - ECM	Comes on	DTC stored	AX-53
P0724	Brake Switch "B" Circuit High	- Short in stop light switch circuit - Stop light switch - ECM	Comes on	DTC stored	AX-57

DTC No.	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve DSL)	- Shift solenoid valve DSL remains open or closed - Valve body is blocked - Shift solenoid valve DSL - Torque converter clutch - Automatic transaxle (clutch, brake, gear, etc.) - Line pressure is too low - ECM	Comes on	DTC stored	AX-60
P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)	- Shift solenoid valve SL1 remains open or closed - Valve body is blocked - Shift solenoid valve SL1 - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-66
P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	- Open or short in shift solenoid valve SL1 circuit - Shift solenoid valve SL1 - ECM	Comes on	DTC stored	AX-70
P0766	Shift Solenoid "D" Performance (Shift Solenoid Valve S4)	- Shift solenoid valve S4 remains open or closed - Valve body is blocked - Shift solenoid valve S4 - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-73
P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	- Shift solenoid valve SL2 remains open or closed - Valve body is blocked - Shift solenoid valve SL2 - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-77
P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	- Open or short in shift solenoid valve SL2 circuit - Shift solenoid valve SL2 - ECM	Comes on	DTC stored	AX-81
P0793	Intermediate Shaft Speed Sensor "A"	- Open or short in speed sensor NC circuit - Speed sensor NC - ECM	Comes on	DTC stored	AX-84

DTC No.	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0982	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	- Short in shift solenoid valve S4 circuit - Shift solenoid valve S4 - ECM	Comes on	DTC stored	AX-88
P0983	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)	- Open in shift solenoid valve S4 circuit - Shift solenoid valve S4 - ECM	Comes on	DTC stored	AX-88
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	- Shift solenoid valve SLT remains open or closed - Valve body is blocked - Torque converter clutch - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-91
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	- Open or short in shift solenoid valve SLT circuit - Shift solenoid valve SLT - ECM	Comes on	DTC stored	AX-96
P2769	Torque Converter Clutch Solenoid Circuit Low (Shift Solenoid Valve DSL)	- Short in shift solenoid valve DSL circuit - Shift solenoid valve DSL - ECM	Comes on	DTC stored	AX-99
P2770	Torque Converter Clutch Solenoid Circuit High (Shift Solenoid Valve DSL)	- Open in shift solenoid valve DSL circuit - Shift solenoid valve DSL - ECM	Comes on	DTC stored	AX-99

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)
------------	--------------	--

DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P0705	When one of following conditions is met: (A) Any 2 or more of the following signals are ON simultaneously (2 trip detection logic) • P input signal is ON • N input signal is ON • R input signal is ON • D input signal is ON • 2 input signal is ON • L input signal is ON (B) Any 2 or more of the following signals are ON simultaneously (2 trip detection logic) • NSW input signal is ON • R input signal is ON • D input signal is ON • 2 input signal is ON • L input signal is ON (C) All of the signals are OFF simultaneously (2 trip detection logic) • P input signal is OFF • N input signal is OFF • NSW input signal is OFF • R input signal is OFF • D input signal is OFF • 2 input signal is OFF • L input signal is OFF (D) Both 1 and 2 are met (2 trip detection logic) 1. Either of the following is met (a) NSW input signal is ON (b) P input signal is ON (c) N input signal is ON (d) R input signal is ON 2. Either of the following is met (a) 3 input signal is ON (b) L input signal is ON	• Open or short in park/neutral position switch circuit • Park/Neutral position switch • ECM

MONITOR DESCRIPTION

These DTCs indicate a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.

The park/neutral position switch detects the shift lever position and sends a signal to the ECM.

For security, the park/neutral position switch detects the shift lever position so that the engine can be started only when the shift lever is on P or N.

The park/neutral position switch sends a signal to the ECM according to the shift lever position (R, D, 3, 2 or L).

The ECM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The ECM will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705: Park/Neutral position switch/Verify switch input
Required sensors/Components	Park/Neutral position switch
Frequency of operation	Continuous
Duration	2 seconds or 60 seconds
MIL operation	2 driving cycles

Sequence of operation	None
-----------------------	------

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Ignition switch	ON
Battery voltage	10.5 V or more

TYPICAL MALFUNCTION THRESHOLDS

Condition (A)

Number of the following signal input at the same time	2 or more
P switch	ON
N switch	ON
R switch	ON
D switch	ON
2 switch	ON
L switch	ON

Condition (B)

Number of the following signal input at the same time	2 or more
NSW switch	ON
R switch	ON
D switch	ON
2 switch	ON
L switch	ON

Condition (C)

When all of the following conditions are met	-
P switch	OFF
N switch	OFF
NSW switch	OFF
R switch	OFF
D switch	OFF
2 switch	OFF
L switch	OFF

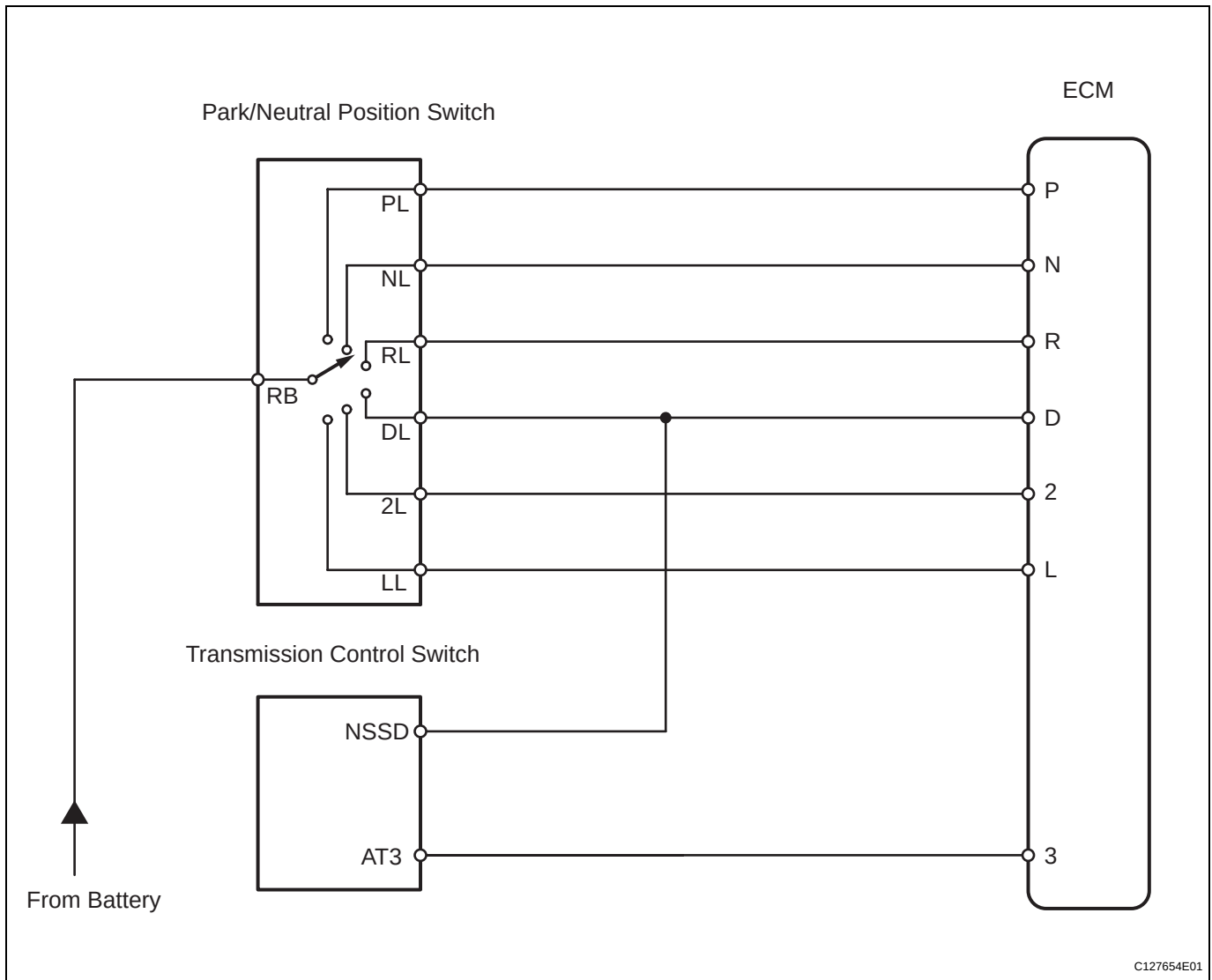
Condition (D)

When both conditions (a) and (b) are met	-
(a) When one of following condition is met	-
NSW switch	ON
P switch	ON
N switch	ON
R switch	ON
(b) When one of following condition is met	-
3 switch	ON
L switch	ON

COMPONENT OPERATING RANGE

Park/Neutral position switch	Park/Neutral position switch sends only one signal to ECM.
------------------------------	--

WIRING DIAGRAM



C127654E01

INSPECTION PROCEDURE

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save 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.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON and turn the tester ON.
5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
6. Follow the instructions on the tester and read the DATA LIST.

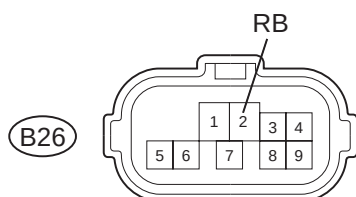
Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
PNP SW (NSW)	PNP switch status/ ON or OFF	Shift lever is: On P or N: ON Not on P or N: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
REVERSE	PNP switch status/ ON or OFF	Shift lever is: On R: ON Not on R: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect
PARKING	PNP switch status/ ON or OFF	Shift lever is: On P: ON Not on P: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect
NEUTRAL	PNP switch status/ ON or OFF	Shift lever is: On N: ON Not on N: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect
DRIVE	PNP switch status/ ON or OFF	Shift lever is: On D: ON Not on D: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect
3RD	PNP switch status/ ON or OFF	Shift lever is: On 3: ON Not on 3: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect
2ND	PNP switch status/ ON or OFF	Shift lever is: On 2: ON Not on 2: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect
LOW	PNP switch status/ ON or OFF	Shift lever is: On L: ON Not on L: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect

1

CHECK WIRE HARNESS (PARK/NEUTRAL POSITION SWITCH - BATTERY)

Wire Harness Side



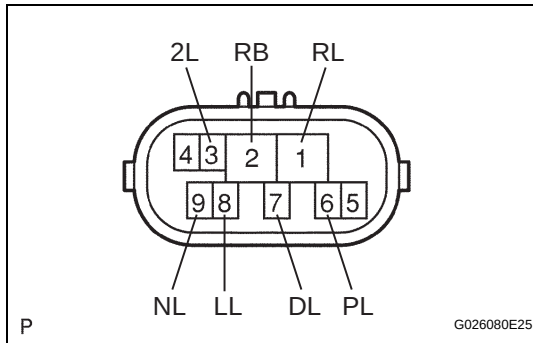
- Disconnect the B26 park/neutral position switch connector.
 - Turn the ignition switch ON.
 - Measure the voltage.
- Standard voltage**

Tester Connection	Specified Condition
2 (RB) - Body ground	10 to 14 V

NG

CHECK POWER SOURCE OF ECM

2 INSPECT PARK/NEUTRAL POSITION SWITCH



- Disconnect the B26 park/neutral position switch connector.
- Measure the resistance of the park/neutral position switch when the shift lever is moved to each position.

Standard resistance

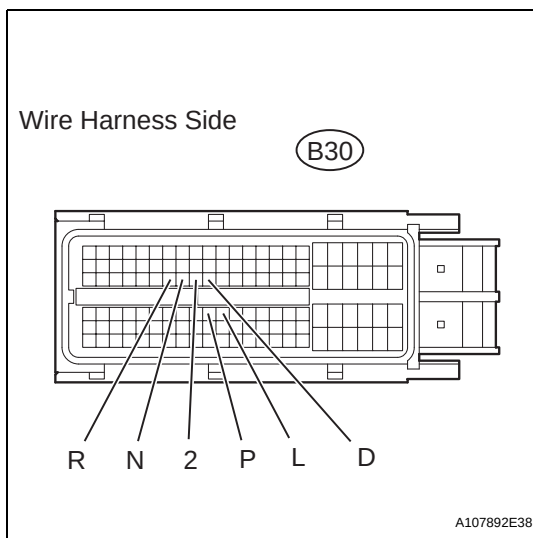
Tester Connection	Shift Lever Position	Specified Condition
6 (PL) - 2 (RB)	P	Below 1 Ω
6 (PL) - 2 (RB)	Not on P	10 k Ω or higher
1 (RL) - 2 (RB)	R	Below 1 Ω
1 (RL) - 2 (RB)	Not on R	10 k Ω or higher
9 (NL) - 2 (RB)	N	Below 1 Ω
9 (NL) - 2 (RB)	Not on N	10 k Ω or higher
7 (DL) - 2 (RB)	D	Below 1 Ω
7 (DL) - 2 (RB)	Not on D	10 k Ω or higher
3 (2L) - 2 (RB)	2	Below 1 Ω
3 (2L) - 2 (RB)	Not on 2	10 k Ω or higher
8 (LL) - 2 (RB)	L	Below 1 Ω
8 (LL) - 2 (RB)	Not on L	10 k Ω or higher

NG

REPLACE PARK/NEUTRAL POSITION SWITCH

OK

3 CHECK WIRE HARNESS (ECM - BATTERY AND BODY GROUND)



- Disconnect the B30 ECM connector.
- Turn the ignition switch ON.
- Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Shift Lever Position	Specified Condition
B30-73 (P) - Body ground	P	10 to 14 V
B30-73 (P) - Body ground	Not on P	Below 1 V
B30-53 (R) - Body ground	R	10 to 14 V*
B30-53 (R) - Body ground	Not on R	Below 1 V
B30-54 (N) - Body ground	N	10 to 14 V
B30-54 (N) - Body ground	Not on N	Below 1 V
B30-56 (D) - Body ground	D or 3	10 to 14 V
B30-56 (D) - Body ground	Not on D or 3	Below 1 V
B30-55 (2) - Body ground	2	10 to 14 V

Tester Connection	Shift Lever Position	Specified Condition
B30-55 (2) - Body ground	Not on 2	Below 1 V
B30-74 (L) - Body ground	L	10 to 14 V
B30-74 (L) - Body ground	Not on L	Below 1 V

HINT:

*: The voltage will drop slightly due to the illumination of the back-up light.

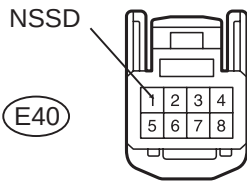
NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4 CHECK WIRE HARNESS (PARK/NEUTRAL POSITION SWITCH - TRANSMISSION CONTROL SWITCH)

Wire Harness Side



P

A107783E24

- Disconnect the E40 switch connector.
- Turn the ignition switch ON.
- Measure the voltage when the shift lever is moved to each position.

Standard voltage

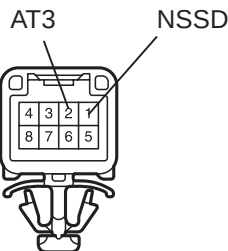
Tester Connection	Shift Lever Position	Specified Condition
1 (NSSD) - Body ground	D and 3	10 to 14 V
1 (NSSD) - Body ground	Not on D and 3	Below 1 V

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

5 INSPECT TRANSMISSION CONTROL SWITCH



P

A107779E04

- Disconnect the E40 switch connector.
- Measure the resistance of the switch when the shift lever is moved to each position.

Standard resistance

Tester Connection	Shift Lever Position	Specified Condition
1 (NSSD) - 2 (AT3)	D	10 kΩ or higher
1 (NSSD) - 2 (AT3)	3	Below 1 Ω

NG

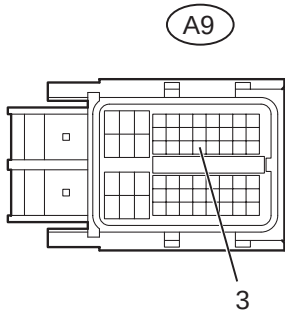
REPLACE TRANSMISSION CONTROL SWITCH

OK

6

CHECK WIRE HARNESS (TRANSMISSION CONTROL SWITCH - BATTERY AND BODY GROUND)

Wire Harness Side



A115671E20

- (a) Disconnect the A9 ECM connector.
- (b) Turn the ignition switch ON.
- (c) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Shift Lever Position	Specified Condition
A9-26 (3) - Body ground	3	10 to 14 V
A9-26 (3) - Body ground	Not on 3	Below 1 V

HINT:

*: The voltage will drop slightly due to the illumination of the back-up light.

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM

DTC	P0710	Transmission Fluid Temperature Sensor "A" Circuit
DTC	P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input
DTC	P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the ATF temperature into a resistance value which is input into the ECM.

The ECM applies a voltage to the temperature sensor through ECM terminal THO1.

The sensor resistance changes with the ATF temperature.

One terminal of the sensor is grounded so that the sensor resistance and voltage decrease as the temperature becomes higher.

The ECM calculates the ATF based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0710	ATF temperature sensor resistance changes from (a) to (b) or from (b) to (a) in less than 0.5 sec., and P0712 and P0713 are not detected (1 trip detection logic): (a) ATF temperature sensor resistance is less than 79 Ω (b) ATF temperature sensor resistance is more than 156 k Ω	• Open or short in ATF temperature sensor circuit • ATF temperature sensor • ECM
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more (1 trip detection logic)	• Short in ATF temperature sensor circuit • ATF temperature sensor • ECM
P0713	15 minutes or more after the engine start, ATF temperature sensor resistance is more than 156 k Ω for 0.5 sec. or more (1 trip detection logic)	• Open in ATF temperature sensor circuit • ATF temperature sensor • ECM

MONITOR DESCRIPTION

ATF temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω *1 or more than 156 k Ω *2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will illuminate the MIL and store the DTC.

HINT:

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

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Chattering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor
Frequency of operation	Continuous
Duration	0.5 sec.

MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0710, P0712: Range check (Chattering, Low resistance)

The monitor will run whenever the following DTCs are not present.	None
The typical enabling condition is not available.	-

P0713: Range check (High resistance)

The monitor will run whenever the following DTCs are not present.	None
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710: Range check (Chattering)

ATF temperature sensor resistance	Less than 79 Ω or more than 156 k Ω
-----------------------------------	---

P0712: Range check (Low resistance)

ATF temperature sensor resistance	Less than 79 Ω
-----------------------------------	-----------------------

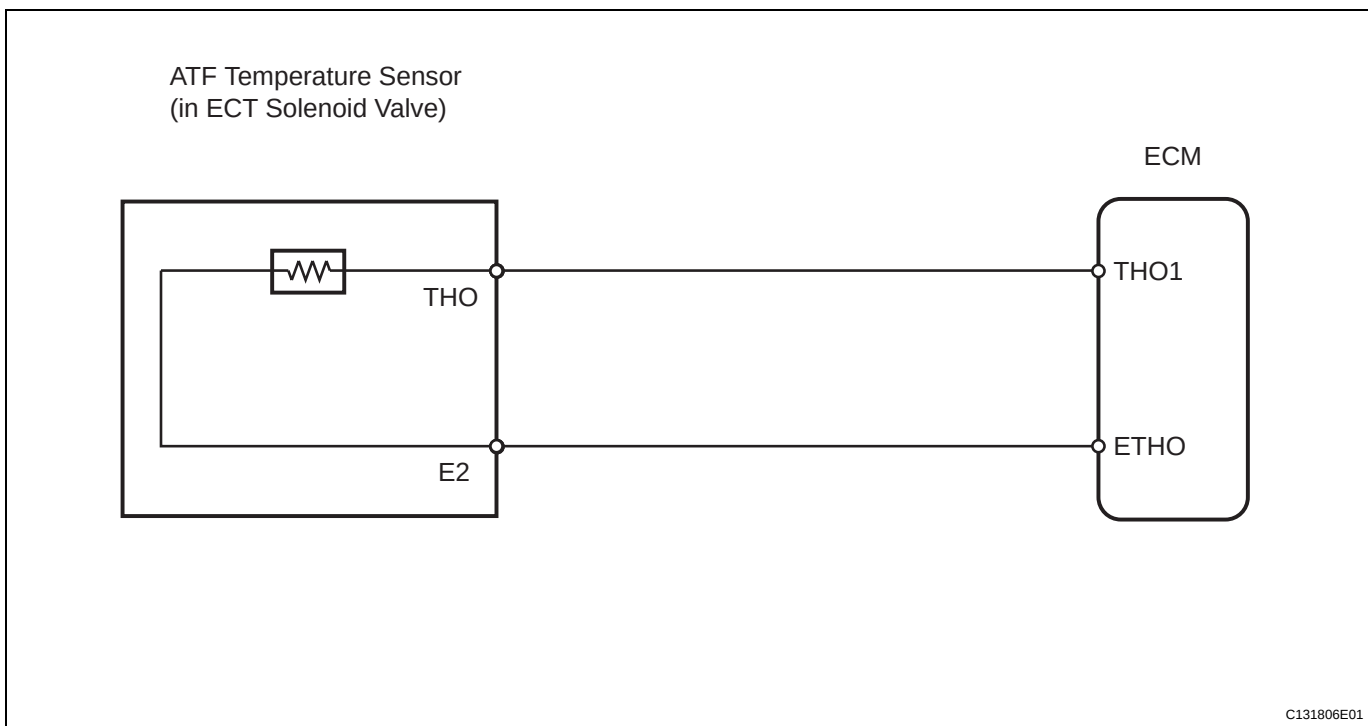
P0713: Range check (High resistance)

ATF temperature sensor resistance	More than 156 k Ω
-----------------------------------	--------------------------

COMPONENT OPERATING RANGE

ATF temperature sensor	79 Ω to 156 k Ω
------------------------	-------------------------------

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save 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.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON and turn the tester ON.
5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
6. Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
A/T OIL TEMP1	ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature while engine is cold	If value is -40°C (-40°F) or "150°C (302°F) or more", ATF temperature sensor circuit is open or short circuited

HINT:

- When DTC P0712 is output and the tester output is 150°C (302°F) or more, there is a short circuit.
- When DTC P0713 is output and the tester output is -40°C (-40°F), there is an open circuit.

Measure the resistance between terminal THO1 (THO) and the body ground.

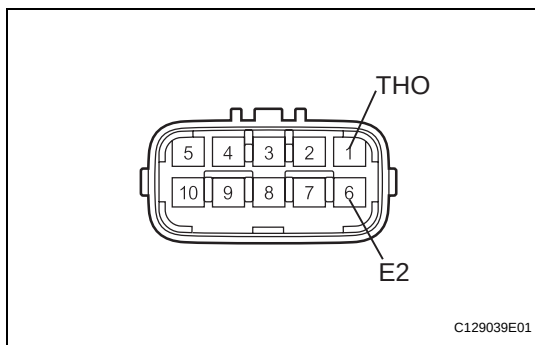
Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:

If a circuit related to the ATF temperature sensor becomes open, P0713 is set in approximately 0.5 seconds. It is not necessary to inspect the circuit when P0711 is set.

1

INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



- (a) Disconnect the B27 wire connector.
- (b) Measure the resistance of the transmission wire.

Standard resistance

Tester Connection	Specified Condition
1 (THO) - 6 (E2)	90 Ω to 156 kΩ
1 (THO) - Body ground	1 MΩ or higher
6 (E2) - Body ground	1 MΩ or higher

HINT:

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

Standard resistance

ATF Temperature	Specified Condition
10°C (68°F)	6.4 kΩ
110°C (230°F)	0.2 kΩ

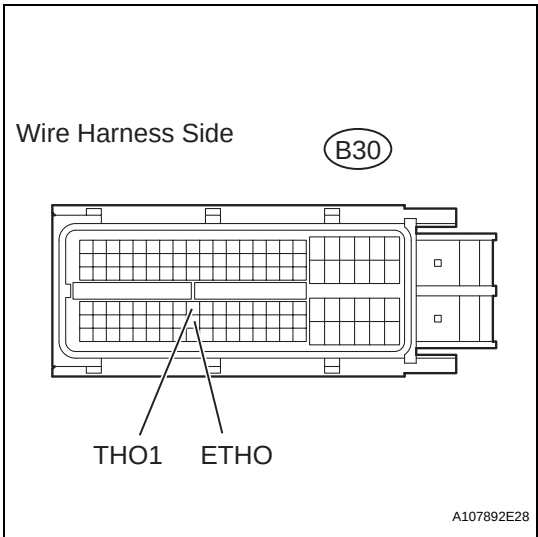
NG

REPAIR OR REPLACE TRANSMISSION WIRE

OK

2

CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



- (a) Disconnect the B30 ECM connector.
- (b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Specified Condition
B30-72 (THO1) - B30-95 (ETHO)	90 Ω to 156 kΩ
B30-72 (THO1) - Body ground	1 MΩ or higher
B30-95 (ETHO) - Body ground	1 MΩ or higher

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM

DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance
------------	--------------	--

DESCRIPTION

Refer to DTC P0710 (see page [AX-46](#)).

DTC No.	DTC Detection Condition	Trouble Area
P0711	Case 1 (2 trip detection logic): First, ECM checks for following conditions: (a) 17 minutes or more after engine is started and after 9 km (5.6 miles) or more of driving, ECT is -15°C (5°F) or more (b) After starting engine and certain period of time has elapsed, ECT and IAT are -10°C (14°F) or more If conditions are met, ECM then checks if ATF temperature is less than 20°C (68°F). If so, ECM interprets this as fault and illuminates MIL. Case 2 (2 trip detection logic): First, ECM checks for following conditions: (a) ECT is 60°C (140°F) or more (b) After starting engine and certain period of time has elapsed, ECT is less than 35°C (95°F) If conditions are met, ECM then checks if ATF temperature is 100°C (212°F) or more. If so, ECM interprets this as fault and illuminates MIL.	• Open or short in No. 1 ATF temperature sensor circuit • No. 1 ATF temperature sensor • ECM

MONITOR DESCRIPTION

This DTC indicates that there is a problem with output from the ATF temperature sensor and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, detects open or short circuits of the ATF temperature circuit, and detects faults in the ATF temperature sensor.

Case 1 (2 trip detection logic):

First, the ECM checks for the following conditions:

(a) 17 minutes or more after the engine is started and after 9 km (5.6 miles) or more of driving, the ECT is -15°C (5°F) or more.

(b) After starting the engine and a certain period of time has elapsed, the ECT and IAT are -10°C (14°F) or more.

If the conditions are met, the ECM then checks if the ATF temperature is less than 20°C (68°F). If so, the ECM interprets this as a fault and illuminates the MIL.

Case 2 (2 trip detection logic):

First, the ECM checks for the following conditions:

(a) ECT is 60°C (140°F) or more.

(b) After starting the engine and a certain period of time has elapsed, the ECT is less than 35°C (95°F).

If the conditions are met, the ECM then checks if the ATF temperature is 100°C (212°F) or more. If so, the ECM interprets this as a fault and illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor
Frequency of operation	Continuous
Duration	Condition 1: 3 seconds Condition 2: 10 seconds
MIL operation	2 driving cycles

Sequence of operation	None
-----------------------	------

TYPICAL ENABLING CONDITIONS

All

The monitor will run whenever this DTC is not present	None P0110-P0113: IAT sensor P0115-P0118: ECT sensor P0710-P0713: Trans fluid temperature sensor
---	---

Condition 1

Time after engine start	17 minutes or more
ECT	-15°C (5°F) or more
Driving distance after engine start	9 km (5.6 miles) or more
IAT (12 sec. after engine start)	-10°C (14°F) or more
ECT (12 sec. after engine start)	-10°C (14°F) or more

Condition 2

ECT	60°C (140°F) or more
ECT (12 sec. after engine start)	Less than 35°C (95°F)

TYPICAL MALFUNCTION THRESHOLDS

Condition 1

ATF temperature	Less than 20°C (68°F)
-----------------	-----------------------

Condition 2

ATF temperature	100°C (212°F) or more
-----------------	-----------------------

COMPONENT OPERATING RANGE

ATF temperature	Atmospheric temperature - approximately 130°C (266°F)
-----------------	---

WIRING DIAGRAM

Refer to DTC P0710 (see page [AX-47](#)).

INSPECTION PROCEDURE

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save 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.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON and turn the tester ON.
5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
6. Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
A/T OIL TEMP1	ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature while engine is cold	If value is -40°C (-40°F) or "150°C (302°F) or more", ATF temperature sensor circuit is open or short circuited

HINT:

- When DTC P0712 is output and the tester output is 150°C (302°F) or more, there is a short circuit.
 - When DTC P0713 is output and the tester output is -40°C (-40°F), there is an open circuit.
- Measure the resistance between terminal THO1 (THO) and the body ground.

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

HINT:

If a circuit related to the ATF temperature sensor becomes open, P0713 is set in approximately 0.5 seconds.

It is not necessary to inspect the circuit when P0711 is set.

1**CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0711)**

- Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- Turn the ignition switch ON and turn the tester ON.
- Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- Read the DTCs using the tester.

Result

Display (DTC output)	Proceed to
Only P0711 is output	A
P0711 and other DTCs are output	B

HINT:

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

B**GO TO DTC OUTPUT****A****2****CHECK TRANSAXLE FLUID LEVEL****OK:**

Automatic transaxle fluid level is correct.

NG**ADD FLUID****OK****REPAIR OR REPLACE TRANSMISSION WIRE**

DTC**P0717****Input Speed Sensor Circuit No Signal****DESCRIPTION**

This sensor detects the rotation speed of the turbine, which shows the input revolution of the transaxle. By comparing the input speed signal (NT) with the counter gear speed sensor signal (NC), the ECM detects the shift timing of the gears and controls the engine torque and hydraulic pressure according to various conditions. As a result, smooth gear shifting is achieved.

DTC No.	DTC Detection Condition	Trouble Area
P0717	ECM detects conditions (a), (b) and (c) continuously for 5 sec. or more (1 trip detection logic): (a) Vehicle speed: 50 km/h (31 mph) or more (b) Park/Neutral position switch (NSW, R and L) is OFF (c) Speed sensor NT: Less than 300 rpm	• Open or short in speed sensor NT circuit • Speed sensor NT • ECM

MONITOR DESCRIPTION

This DTC indicates that a pulse is not output from the speed sensor NT (input speed sensor) or is output only a little. The NT terminal of the ECM detects the revolving signal from the speed sensor (NT) (input RPM). The ECM outputs a gear shift signal comparing the input speed sensor (NT) with the output speed sensor (NC).

While the vehicle is operating in the 2nd, 3rd or O/D gear position with the shift lever on D, if the input shaft revolution is less than 300 rpm*1 and the output shaft revolution is 1,000 rpm or more*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

HINT:

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is approximately 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT)/Verify pulse input
Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present.	P0500: VSS P0748: Shift solenoid SL1 P0778: Shift solenoid SL2 P0982, P0983: Shift solenoid S4
Shift change	Shift change is completed before starting next shift change operation
ECM selected gear	2nd, 3rd or 4th
Output shaft rpm	1,000 rpm or more
NSW switch	OFF
R switch	OFF
L switch	OFF
Engine	Running
Ignition switch	ON
Starter	OFF

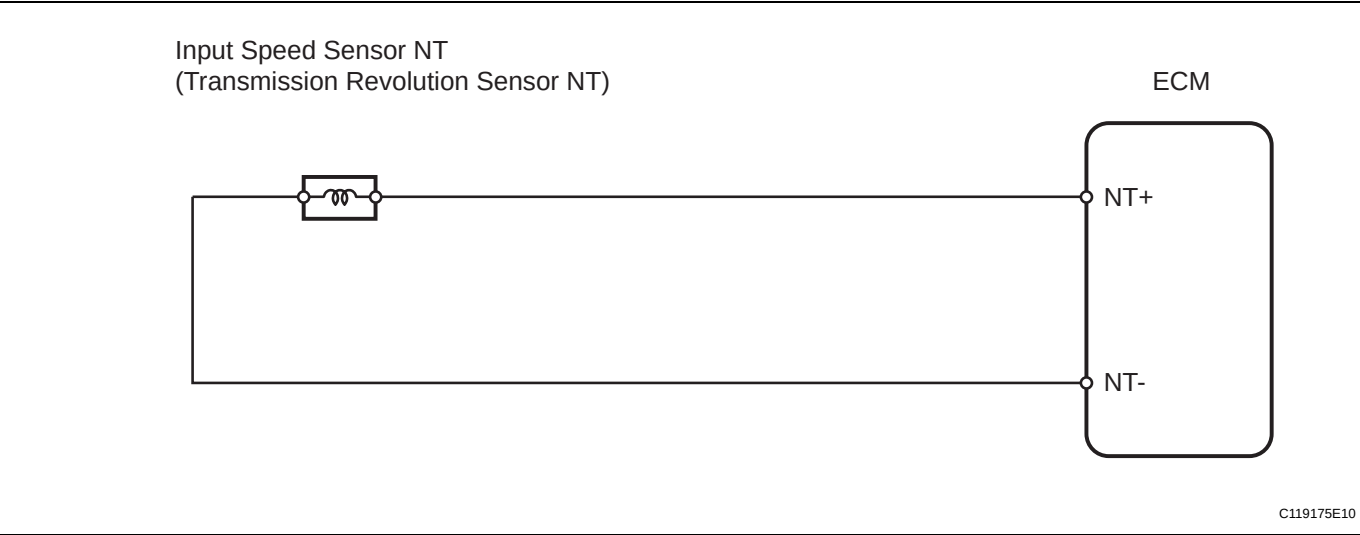
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm
-------------------	-------------------

COMPONENT OPERATING RANGE

Speed sensor (NT)	Input speed is equal to engine speed when lock-up ON.
-------------------	---

WIRING DIAGRAM



INSPECTION PROCEDURE

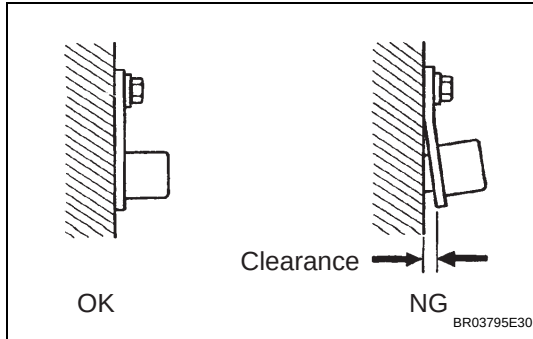
- HINT:
Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.
- NOTICE:**
In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.
1. Warm up the engine.
 2. Turn the ignition switch OFF.
 3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
 4. Turn the ignition switch ON and turn the tester ON.
 5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
 6. Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
SPD (NT)	Input turbine speed/ Min.: 0 rpm Max.: 12,750 rpm	• Lock-up ON (after warming up engine): Input turbine speed (NT) equal to engine speed. • Lock-up OFF (idling with shift lever on N): Input turbine speed (NT) is nearly equal to engine speed.	Data is displayed in increments of 50 rpm

- AX** HINT:
- SPD (NT) is always 0 rpm while driving:
Open or short in the sensor or circuit.

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

1 INSPECT SPEED SENSOR (INSTALLATION)



- (a) Check the speed sensor NT installation.

OK:

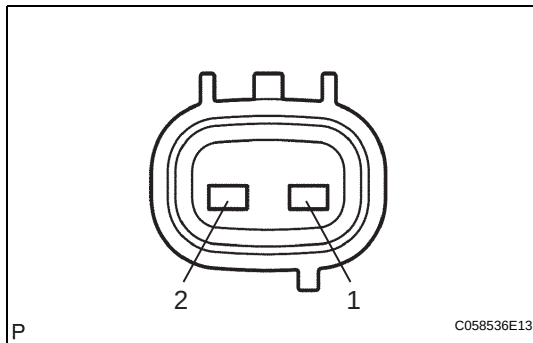
Installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG

SECURELY INSTALL SENSOR OR REPLACE SPEED SENSOR

OK

2 INSPECT SPEED SENSOR NT



- (a) Disconnect the B28 sensor connector from the transaxle.
(b) Measure the resistance of the sensor.

Standard resistance

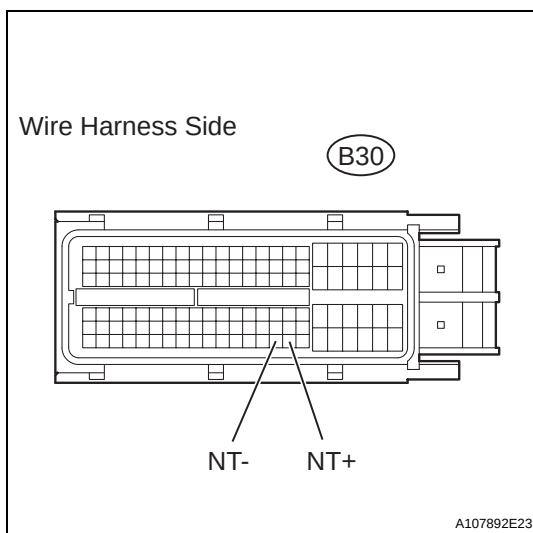
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

NG

REPLACE SPEED SENSOR NT

OK

3 CHECK WIRE HARNESS (SPEED SENSOR - ECM)



- (a) Disconnect the B30 ECM connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
B30-125 (NT+) - B30-124 (NT-)	20°C (68°F)	560 to 680 Ω
B30-125 (NT+) - Body ground	20°C (68°F)	10 k Ω or higher
B30-124 (NT-) - Body ground	20°C (68°F)	10 k Ω or higher

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

AX

OK

REPLACE ECM

DTC**P0724****Brake Switch "B" Circuit High****DESCRIPTION**

The purpose of this circuit is to prevent the engine from stalling while driving in the lock-up condition when the brakes are suddenly applied.

When the brake pedal is depressed, this switch sends a signal to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	Stop light switch remains ON even when vehicle is driven in GO (30 km/h (18.63 mph) or more) and STOP (less than 3 km/h (1.86 mph)) pattern 5 times (2 trip detection logic)	• Short in stop light switch signal circuit • Stop light switch • ECM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains ON. When the stop light switch remains ON during GO and STOP driving, the ECM interprets this as a fault in the stop light switch. Then the MIL illuminates and the ECM stores the DTC. The vehicle must GO (30 km/h (18.63 mph) or more) and STOP (less than 3 km/h (1.86 mph)) 5 times for 2 driving cycles in order for the DTC to be output.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Range check/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

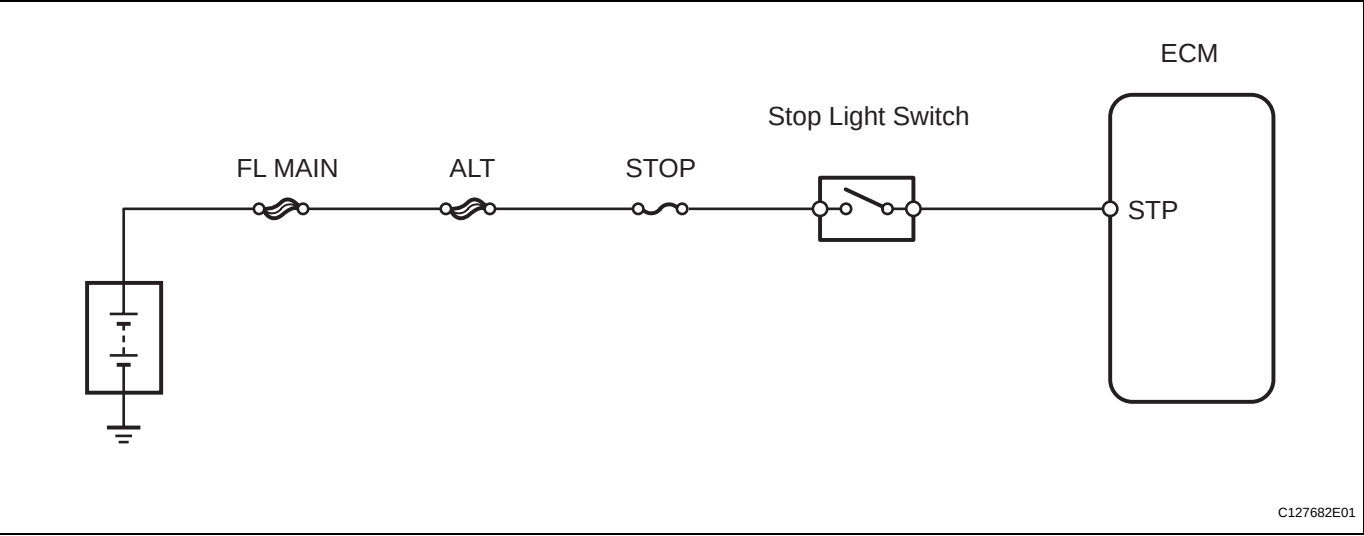
TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Battery voltage	8 V or more
Starter	OFF
Ignition switch	ON
GO (Vehicle speed is 30 km/h (18.63 mph) or more)	Once
STOP (Vehicle speed is less than 3 km/h (1.86 mph))	Once

TYPICAL MALFUNCTION THRESHOLDS

Brake switch	Stuck ON
--------------	----------

WIRING DIAGRAM



INSPECTION PROCEDURE

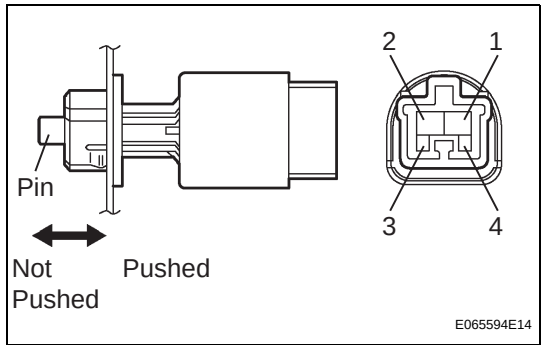
HINT:
Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

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.

- 1. Warm up the engine.
- 2. Turn the ignition switch OFF.
- 3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- 4. Turn the ignition switch ON and turn the tester ON.
- 5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
- 6. Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light switch status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF	-

1 INSPECT STOP LIGHT SWITCH



- (a) Remove the A3 stop light switch.
 - (b) Measure the resistance of the switch.
- Standard resistance**

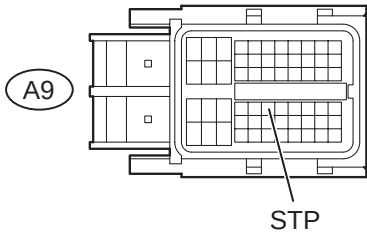
Tester Connection	Switch Condition	Specified Condition
1 - 2	Pin pushed (pedal released)	Below 1 Ω
1 - 2	Pin not pushed (pedal depressed)	10 k Ω or higher
3 - 4	Pin pushed (pedal released)	10 k Ω or higher
3 - 4	Pin not pushed (pedal depressed)	Below 1 Ω

NG REPLACE STOP LIGHT SWITCH

OK

2 CHECK WIRE HARNESS (ECM - BATTERY)

Wire Harness Side



A115671E17

(a) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A9-36 (STP) - Body ground	Brake pedal is depressed	10 to 14 V
A9-36 (STP) - Body ground	Brake pedal is released	Below 1 V

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM

DTC	P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve DSL)
------------	--------------	--

DESCRIPTION

The ECM uses the signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, intermediate (counter) shaft speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.

Then the ECM compares the engagement conditions of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical problems of the shift solenoid valve DSL, valve body and torque converter clutch.

DTC No.	DTC Detection Condition	Trouble Area
P0741	Lock-up does not occur when driving in lock-up range Lock-up remains ON in lock-up OFF range (2 trip detection logic)	- Shift solenoid valve DSL remains open or closed - Valve body is blocked - Shift solenoid valve DSL - Torque converter clutch - Automatic transaxle (clutch, brake, gear, etc.) - Line pressure is too low - ECM

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on the speed sensor (NT), speed sensor (NC), engine rpm, engine load, engine temperature, vehicle speed, transmission temperature and gear selection.

The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm control voltage to counter gear rpm (NC). When conditions are appropriate, the ECM requests "lock-up" by applying control voltage to the shift solenoid valve DSL. When the DSL is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.

If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in the shift solenoid valve DSL or lock-up system performance.

The ECM will illuminate the MIL and store the DTC.

Example:

When any of the following is met, the system judges it as a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up.
(Engine speed is at least 100 rpm greater than input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up OFF.
(The difference between engine speed and input turbine speed is less than 35 rpm.)

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve DSL/OFF malfunction Shift solenoid valve DSL/ON malfunction
Required sensors/Components	Shift solenoid valve DSL, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE), Throttle position sensor (VPA1), Mass air flow sensor (MAF), Transmission temperature sensor (THO1), Engine coolant temperature sensor (ECT)
Frequency of operation	Continuous

Duration	OFF malfunction 3.5 sec. ON malfunction 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All

The monitor will run when ever this DTC is no present	P0115-P0118: ECT sensor P0125: Insufficient ECT for Closed Loop P0500: VSS P0748-P0799: Trans solenoid (range)
Transmission range	"D"
ECT (Engine coolant temperature)	60°C (140°F) or higher
ATF temperature	-20°C (-4°F) or higher
ATF temperature sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction

ECM lock-up command	ON
ECM selected gear	3rd or 4th
Vehicle speed	25 km/h (15.5 mph) or more

ON malfunction

ECM lock-up command	OFF
ECM selected gear	3rd or 4th
Vehicle speed	25 to 60 km/h (15.5 to 37.2 mph)
Throttle valve opening angle	8% or more

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction or ON malfunction

OFF malfunction

Engine speed - input (turbine) speed	100 rpm or more
--------------------------------------	-----------------

ON malfunction

2 detections are necessary per driving cycle:

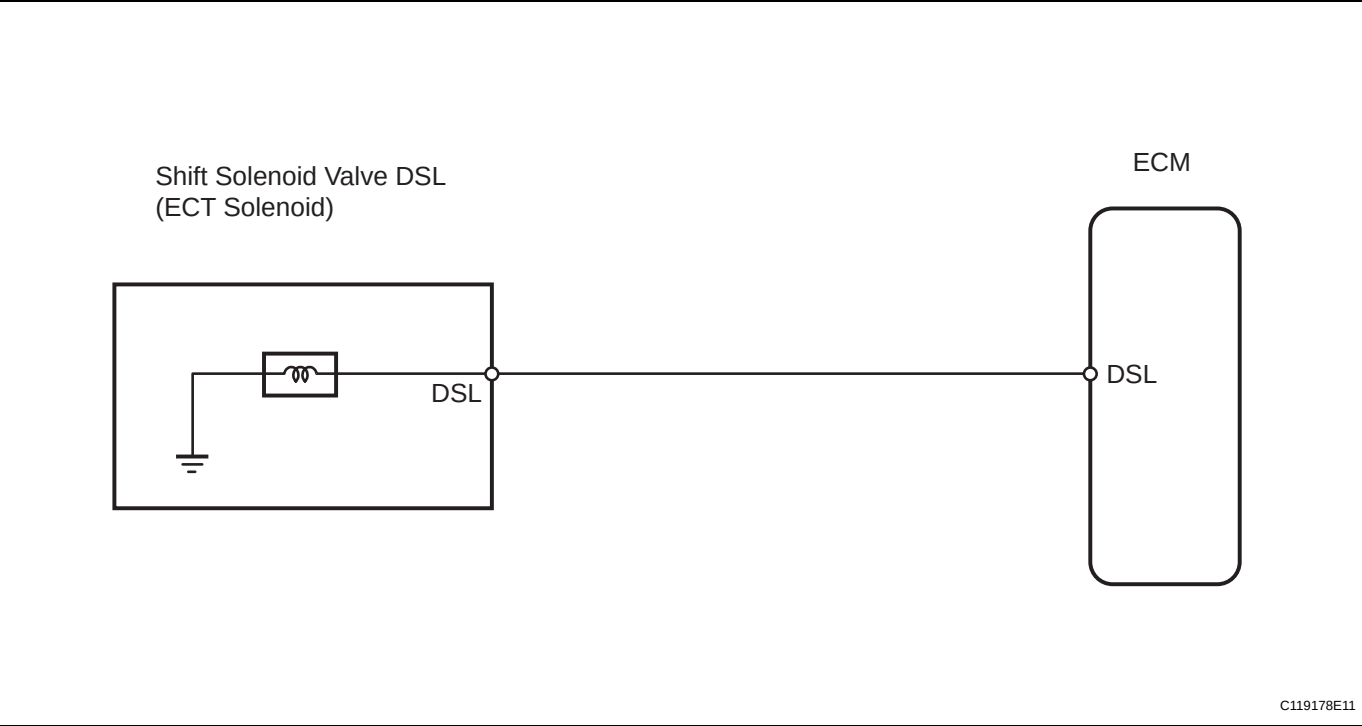
1st detection: temporary flag ON

2nd detection: pending fault code ON

Vehicle speed must be under 10 km/h (6.2 mph) once before 2nd detection

Difference between engine speed and input (turbine) speed	Less than 35 rpm
---	------------------

WIRING DIAGRAM

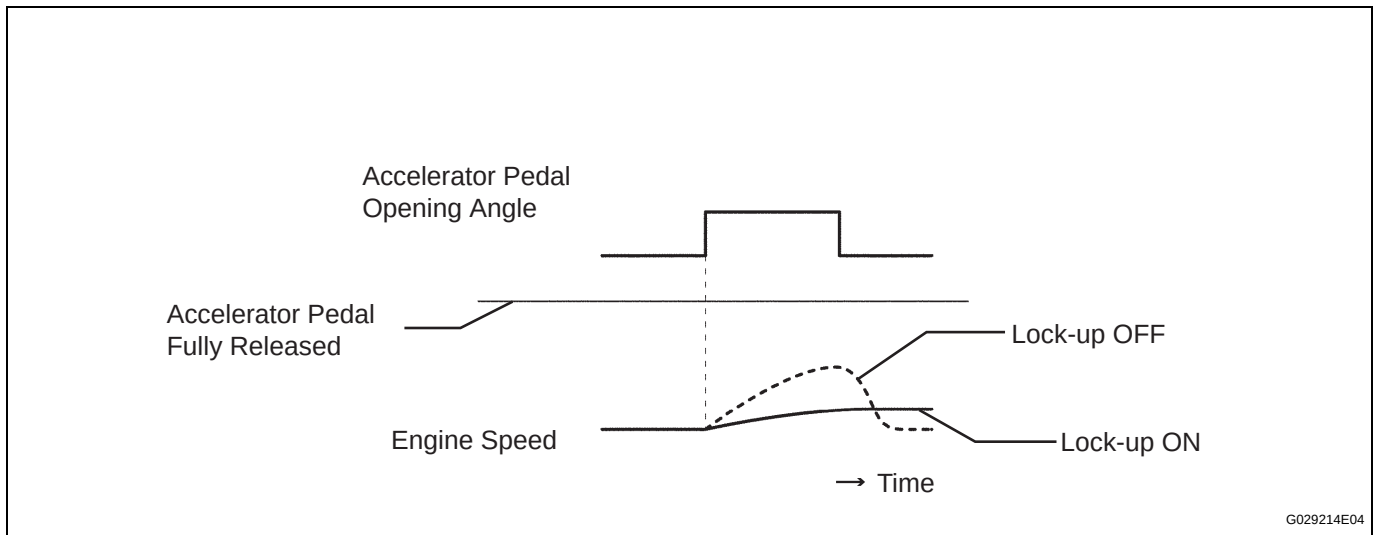


INSPECTION PROCEDURE

- HINT:
- Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time.
- The DATA LIST can be displayed during the ACTIVE TEST.
1. Warm up the engine.
 2. Turn the ignition switch OFF.
 3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
 4. Turn the ignition switch ON and turn the tester ON.
 5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
 6. Follow the instructions on the tester and read the ACTIVE TEST.

Item	Test Detail	Diagnostic Note
LOCK UP	[Test Details] Control shift solenoid DSL to set automatic transaxle to the lock-up condition [Vehicle Condition] • Throttle valve opening angle: Less than 35% • Vehicle speed: 60 km/h (36 mph) or more	Possible to check shift solenoid valve DSL operation

- HINT:
- This test can be conducted when the vehicle speed is 60 km/h (36 mph) or more.
 - This test can be conducted in the 3rd or O/D gear.
7. Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.
- HINT:
- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is ON.
 - Slowly release the accelerator pedal in order to decelerate. (Do not fully release the pedal as that will close the throttle valve and lock-up may be turned OFF.)

**1****CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0741)**

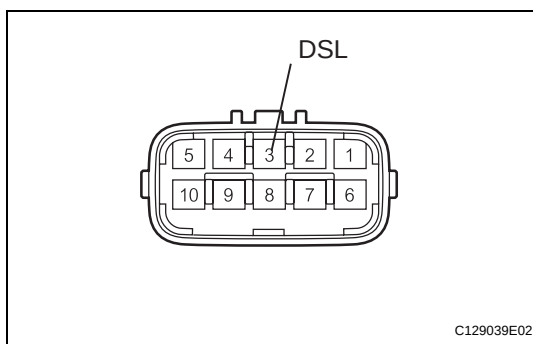
- Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- Turn the ignition switch ON and turn the tester ON.
- Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- Read the DTCs using the tester.

Result

Display (DTC output)	Proceed to
Only P0741 is output	A
P0741 and other DTCs are output	B

HINT:

If any other codes besides P0741 are output, perform troubleshooting for those DTCs first.

B**GO TO DTC CHART****A****2****INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE DSL)**

- Disconnect the B27 wire connector.
- Measure the resistance of the transmission wire.

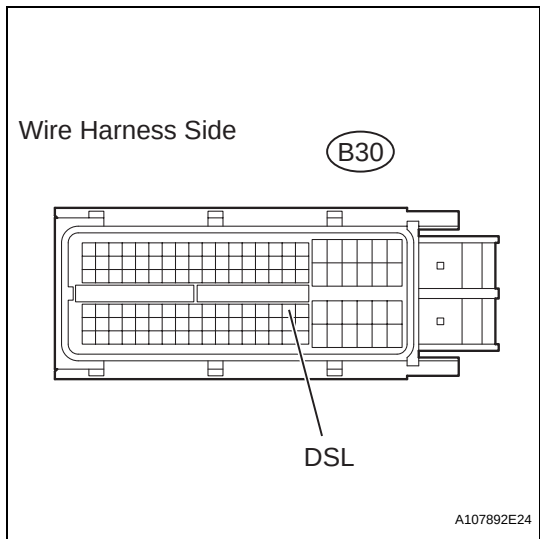
Standard resistance

Tester Connection	Condition	Specified Condition
3 (DSL) - Body ground	20°C (68°F)	11 to 13 Ω

NG**Go to step 4****OK**

3

CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



- (a) Disconnect the B30 ECM connector.
- (b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
B30-79 (DSL) - Body ground	20°C (68°F)	11 to 13 Ω

NG

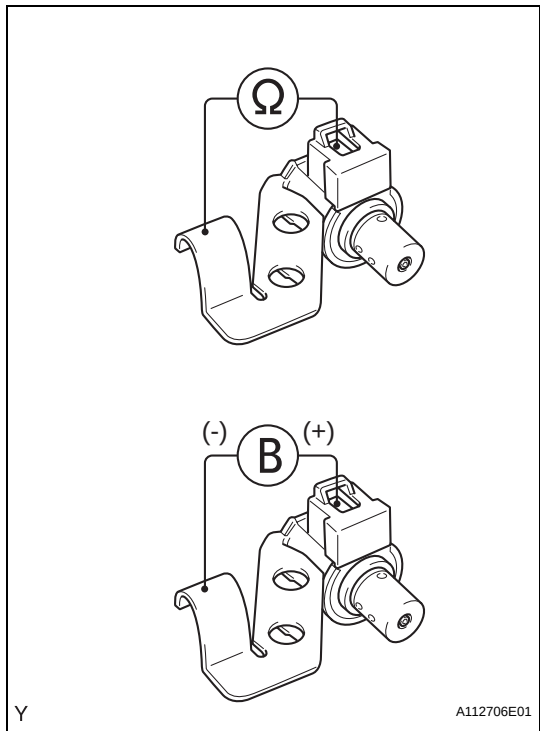
REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM

4

INSPECT SHIFT SOLENOID VALVE DSL



- (a) Remove the shift solenoid valve DSL.
- (b) Measure the resistance of the solenoid valve.
- (c) Connect the battery's positive (+) lead to the terminal of the solenoid valve connector, and the negative (-) lead to the solenoid body. Then check that the valve moves and makes an operating noise.

OK:
Valve moves and makes operating noise.

NG

REPLACE SHIFT SOLENOID VALVE DSL

OK

5 CHECK TRANSMISSION WIRE**OK:**

The connectors and pins are securely installed.
There is no open or short on the wire harness.

NG**REPAIR OR REPLACE TRANSMISSION
WIRE****OK****6 INSPECT TRANSMISSION VALVE BODY ASSEMBLY**

(a) Check the transmission valve body assembly.

OK:

There are no foreign objects on each valve.

NG**REPAIR OR REPLACE TRANSMISSION
VALVE BODY ASSEMBLY****OK****7 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY**

(a) Check the torque converter clutch assembly (see page [AX-153](#)).

OK:

The torque converter clutch operates normally.

NG**REPLACE TORQUE CONVERTER CLUTCH
ASSEMBLY****OK****REPAIR AUTOMATIC TRANSAXLE ASSEMBLY**

DTC	P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)
------------	--------------	---

DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).

Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transaxle (clutch, brake, gear, etc.).

DTC No.	DTC Detection Condition	Trouble Area
P0746	Gear required by the ECM does not match the actual gear when driving (2 trip detection logic)	- Shift solenoid valve SL1 remains open or closed - Valve body is blocked - Shift solenoid valve SL1 - Automatic transaxle (clutch, brake, gear, etc.) - ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd or O/D gear position). When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL.

Example:

When either condition (a) or (b) is met, the ECM detects a malfunction.

(a) The ECM commands the 1st gear, but the actual gear is 2nd.

(b) The ECM commands the 2nd gear, but the actual gear is 1st.

MONITOR STRATEGY

Related DTCs	P0746: Shift solenoid valve SL1/OFF malfunction Shift solenoid valve SL1/ON malfunction
Required sensors/Components	Shift solenoid valve SL1, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction, ON malfunction (A) 0.8 sec. ON malfunction (B) 1 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All

Transmission range	"D"
ECT (Engine coolant temperature)	60°C (140°F) or more
ATF temperature	-20°C (-4°F) or more
ATF temperature sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction

Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction

ECM selected gear	1st
Vehicle speed	10 to 40 km/h (6.2 to 24.9 mph)
Throttle valve opening angle	4.5% or more (varies with engine speed)

ON malfunction (A)

ECM selected gear	2nd
Vehicle speed	10 km/h (6.2 mph) or more
Throttle valve opening angle	4.5% or more (varies with engine speed)

ON malfunction (B)

ECM lock-up command	OFF
ECM selected gear	3rd or 4th

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction, or ON malfunction (A) and (B)

2 detections are necessary per driving cycle:

1st detection: temporary flag ON

2nd detection: pending fault code ON

OFF malfunction

Input (turbine) speed/Intermediated shaft speed	1.49 to 1.63
---	--------------

ON malfunction (A)

Input (turbine) speed/Intermediated shaft speed	2.72 to 2.86
---	--------------

ON malfunction (B)

Engine speed - Input (turbine) speed	250 rpm or more
--------------------------------------	-----------------

INSPECTION PROCEDURE**HINT:**

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time.

The DATA LIST can be displayed during the ACTIVE TEST.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON and turn the tester ON.
5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
6. Follow the instructions on the tester and read the ACTIVE TEST.

HINT:

While driving, the shift position can be forcibly changed with the tester. Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page [AX-31](#)).

Item	Test Detail	Diagnostic Note
SHIFT	[Test Details] Operate shift solenoid valve and set each shift lever position by yourself [Vehicle Condition] • IDL: ON • 50 km/h (31 mph) or less [Other information] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of shift solenoid valves

HINT:

- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or more.
- This shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the tester.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0746)
----------	--

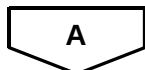
- (a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (b) Turn the ignition switch ON and turn the tester ON.
- (c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- (d) Read the DTCs using the tester.

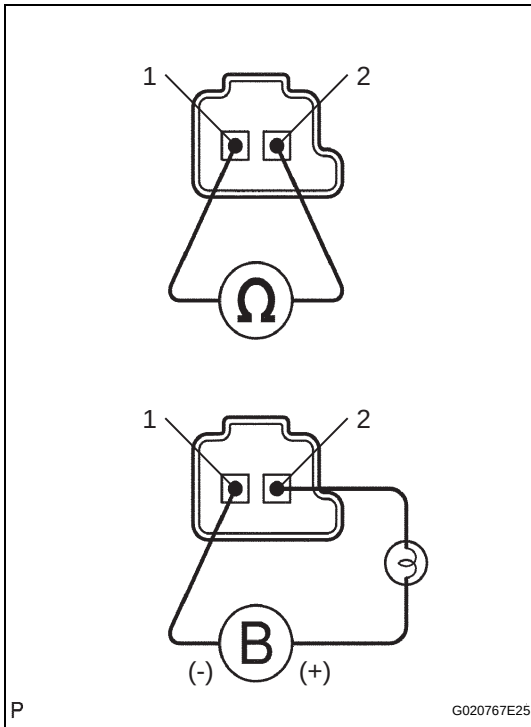
Result

Display (DTC output)	Proceed to
Only P0746 is output	A
P0746 and other DTCs are output	B

HINT:

If any other codes besides P0746 are output, perform the troubleshooting for those DTCs first.



2 INSPECT SHIFT SOLENOID VALVE SL1

- (a) Remove the shift solenoid valve SL1.
(b) Measure the resistance of the solenoid valve.

Standard resistance:

5.0 to 5.6 Ω at 20°C (68°F)

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

OK:

Valve moves and makes operating noise.

NG

REPLACE SHIFT SOLENOID VALVE SL1

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

- (a) Check the transmission valve body assembly.

OK:

There are no foreign objects on each valve.

NG

REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

4 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

- (a) Check the torque converter clutch assembly (see page [AX-153](#)).

OK:

The torque converter clutch operates normally.

NG

REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

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

DESCRIPTION

Shifting from 1st to O/D is performed in combination with the ON and OFF operation of the shift solenoid valves SL1 and SL2, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (see page [AX-31](#)).

DTC No.	DTC Detection Condition	Trouble Area
P0748	Duty cycle to shift solenoid valve SL1 is 100% (1 trip detection logic)	- Open or short in shift solenoid valve SL1 circuit - Shift solenoid valve SL1 - ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL1 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the circuit (see page [AX-31](#)).

MONITOR STRATEGY

Related DTCs	P0748: Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Battery voltage	11 V or more
Starter	OFF
Ignition switch	ON

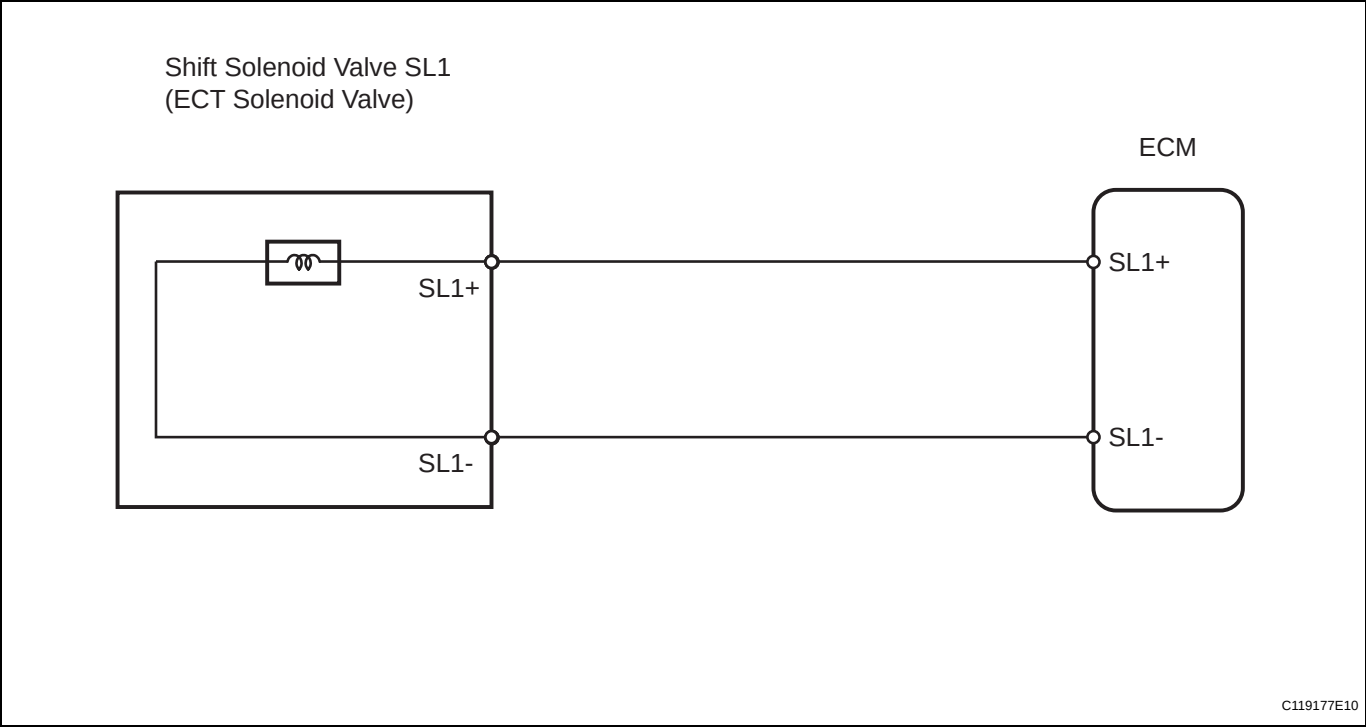
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status	Fail
-----------------	------

COMPONENT OPERATING RANGE

Output signal duty	Less than 100%
--------------------	----------------

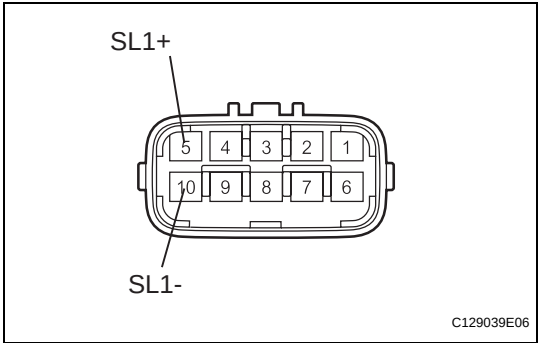
WIRING DIAGRAM



INSPECTION PROCEDURE

1

INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL1)



- (a) Disconnect the B27 wire connector.
 - (b) Measure the resistance of the transmission wire.
- Standard resistance**

Tester Connection	Condition	Specified Condition
5 (SL1+) - 10 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
5 (SL1+) - Body ground	20°C (68°F)	1 MΩ or higher
10 (SL1-) - Body ground	20°C (68°F)	1 MΩ or higher

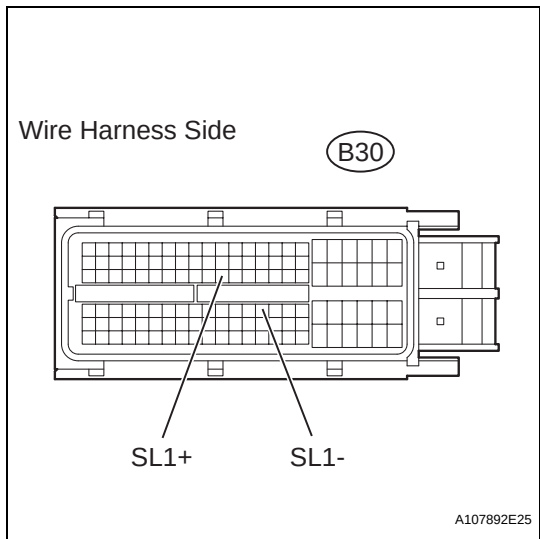
NG

Go to step 3

OK

2

CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



- (a) Disconnect the B30 ECM connector.
- (b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
B30-57 (SL1+) - B30-77 (SL1-)	20°C (68°F)	5.0 to 5.6 Ω
B30-57 (SL1+) - Body ground	20°C (68°F)	1 MΩ or higher
B30-77 (SL1-) - Body ground	20°C (68°F)	1 MΩ or higher

NG

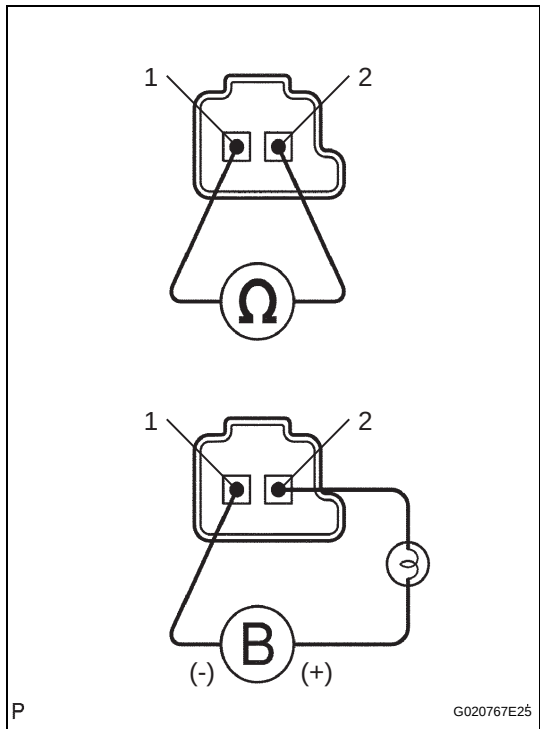
REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM

3

INSPECT SHIFT SOLENOID VALVE SL1



- (a) Remove the shift solenoid valve SL1.
- (b) Measure the resistance of the solenoid valve.
Standard resistance:
5.0 to 5.6 Ωat 20°C (68°F)
- (c) Connect the battery's positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector. Then check that the valve moves and makes an operating noise.

OK:
Valve moves and makes operating noise.

NG

REPLACE SHIFT SOLENOID VALVE SL1

OK

REPAIR OR REPLACE TRANSMISSION WIRE

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

SYSTEM DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).

Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transaxle (clutch, brake, gear, etc.).

DTC No.	DTC Detection Condition	Trouble Area
P0766	Gear required by the ECM does not match the actual gear when driving (2 trip detection logic)	- Shift solenoid valve S4 remains open or closed - Valve body is blocked - Shift solenoid valve S4 - Automatic transaxle (clutch, brake, gear, etc.) - ECM

MONITOR DESCRIPTION

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

MONITOR STRATEGY

Related DTCs	P0766: Shift solenoid valve S4/ON malfunction Shift solenoid valve S4/OFF malfunction
Required sensors/Components	Shift solenoid valve S4, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All

Transmission range	"D"
ECT (Engine coolant temperature)	60°C (140°F) or more
ATF temperature	-20°C (-4°F) or more
ATF temperature circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Electric throttle control system	Not circuit malfunction

OFF malfunction

ECM selected gear	4th
-------------------	-----

Vehicle speed	10 km/h (6.2 mph) or more
Throttle valve opening angle	5% or more

ON malfunction

ECM selected gear	3rd
Vehicle speed	10 km/h (6.2 mph) or more
Throttle valve opening angle	5% or more

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction or ON malfunction

2 detections are necessary per driving cycle:

1st detection: temporary flag ON

2nd detection: pending fault code ON

OFF malfunction

Intermediate shaft speed/Output speed	1.34 to 1.48
---------------------------------------	--------------

ON malfunction

Intermediate shaft speed/Output speed	0.95 to 1.09
---------------------------------------	--------------

INSPECTION PROCEDURE

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time.

The DATA LIST can be displayed during the ACTIVE TEST.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON and turn the tester ON.
5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
6. Follow the instructions on the tester and perform the ACTIVE TEST.

HINT:

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

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page [AX-31](#)).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift lever position by yourself [Vehicle Condition] • IDL: ON • 50 km/h (31 mph) or less [Other information] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves

HINT:

- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the tester.

1 CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0766)

- (a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (b) Turn the ignition switch ON and turn the tester ON.
- (c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- (d) Read the DTCs using the tester.

Result

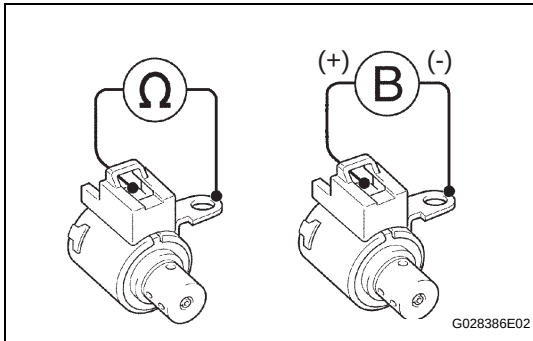
Display (DTC output)	Proceed to
Only P0766 is output	A
P0766 and other DTCs are output	B

HINT:

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

B **GO TO DTC CHART**

A

2 INSPECT SHIFT SOLENOID VALVE S4

- (a) Remove the shift solenoid valve S4.
- (b) Measure the resistance between the solenoid valve terminal and solenoid valve body.

Standard resistance:

11 to 15 Ω at 20°C (68°F)

- (c) Connect the battery's positive (+) lead to the terminal of the solenoid valve connector, and the negative (-) lead to the solenoid body. Then check that the valve moves and makes an operating noise.

OK:

Valve moves and makes operating noise.

NG **REPLACE SHIFT SOLENOID VALVE S4**

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

- (a) Check the transmission valve body assembly.

OK:

There are no foreign objects on each valve.

NG **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY
---	--

- (a) Check the torque converter clutch assembly (see page [AX-153](#)).

OK:

The torque converter clutch operates normally.

NG

REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

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

DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).

Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transaxle (clutch, brake, gear, etc.).

DTC No.	DTC Detection Condition	Trouble Area
P0776	Gear required by the ECM does not match the actual gear when driving (2 trip detection logic)	- Shift solenoid valve SL2 remains open - Valve body is blocked - Automatic transaxle (clutch, brake, gear, etc.) - ECM

MONITOR DESCRIPTION

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

MONITOR STRATEGY

Related DTCs	P0776: Shift solenoid valve SL2/ON malfunction Shift solenoid valve SL2/OFF malfunction
Required sensors/Components	Shift solenoid valve SL2, Speed sensor (NT), Speed sensor (NO), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS**All**

Transmission range	"D"
ECT (Engine coolant temperature)	60°C (140°F) or more
ATF temperature	-20°C (-4°F) or more
ATF temperature circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Electric throttle control system	Not circuit malfunction

OFF malfunction

ECM selected gear	1st
Vehicle speed	10 to 40 km/h (6.2 to 24.9 mph)
Throttle valve opening angle	4.5% or more (varies with engine speed)

ON malfunction

ECM selected gear	3rd or 4th
Vehicle speed	10 km/h (6.2 mph) or more
Throttle valve opening angle	4.5% or more (varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction or ON malfunction

2 detections are necessary per driving cycle:

1st detection: temporary flag ON

2nd detection: pending fault code ON

OFF malfunction

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07
--	--------------

ON malfunction

Input (turbine) speed/Intermediate shaft speed	1.49 to 1.63
--	--------------

INSPECTION PROCEDURE

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time.

The DATA LIST can be displayed during the ACTIVE TEST.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON and turn the tester ON.
5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
6. Follow the instructions on the tester and perform the ACTIVE TEST.

HINT:

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

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page [AX-31](#)).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift lever position by yourself [Vehicle Condition] • IDL: ON • 50 km/h (31 mph) or less [Other information] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves

HINT:

- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the tester.

1**CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0776)**

- (a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (b) Turn the ignition switch ON and turn the tester ON.

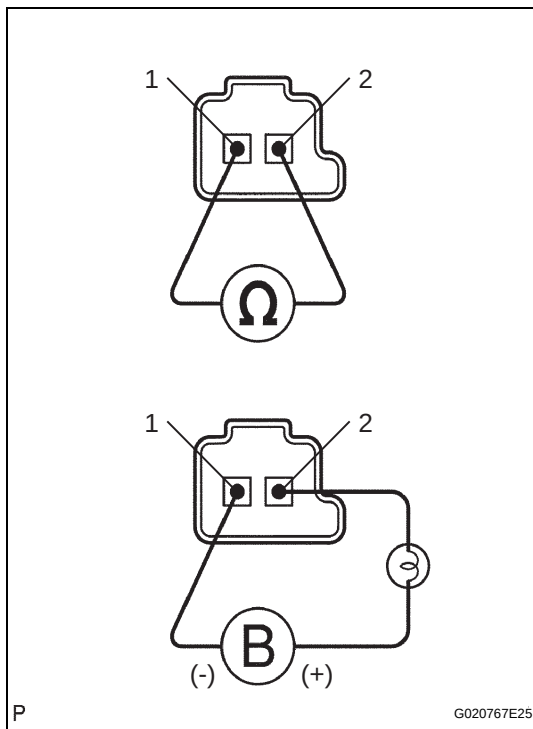
- (c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
 (d) Read the DTCs using the tester.

Result

Display (DTC output)	Proceed to
Only P0776 is output	A
P0776 and other DTCs are output	B

HINT:

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

B**GO TO DTC CHART****A****2****INSPECT SHIFT SOLENOID VALVE SL2**

- (a) Remove the shift solenoid valve SL2.
 (b) Measure the resistance of the solenoid valve.

Standard resistance:**5.0 to 5.6 Ω at 20°C (68°F)**

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

OK:**Valve moves and makes operating noise.****NG****REPLACE SHIFT SOLENOID VALVE SL2****OK****3****INSPECT TRANSMISSION VALVE BODY ASSEMBLY**

- (a) Check the transmission valve body assembly.

OK:**There are no foreign objects on each valve.****NG****REPAIR TRANSMISSION VALVE BODY ASSEMBLY****OK****AX**

4**INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY**

- (a) Check the torque converter clutch assembly (see page [AX-153](#)).

OK:

The torque converter clutch operates normally.

NG**REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY****OK****REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY**

DTC	P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)
------------	--------------	--

DESCRIPTION

Shifting from 1st to O/D is performed in combination with the ON and OFF operation of the shift solenoid valves SL1 and SL2, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (see page [AX-31](#)).

DTC No.	DTC Detection Condition	Trouble Area
P0778	Duty cycle to shift solenoid valve SL2 is 100% (1 trip detection logic)	- Open or short in shift solenoid valve SL2 circuit - Shift solenoid valve SL2 - ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL2 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the circuit (see page [AX-31](#)).

MONITOR STRATEGY

Related DTCs	P0778: Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Battery voltage	11 V or more
Starter	OFF
Ignition switch	ON

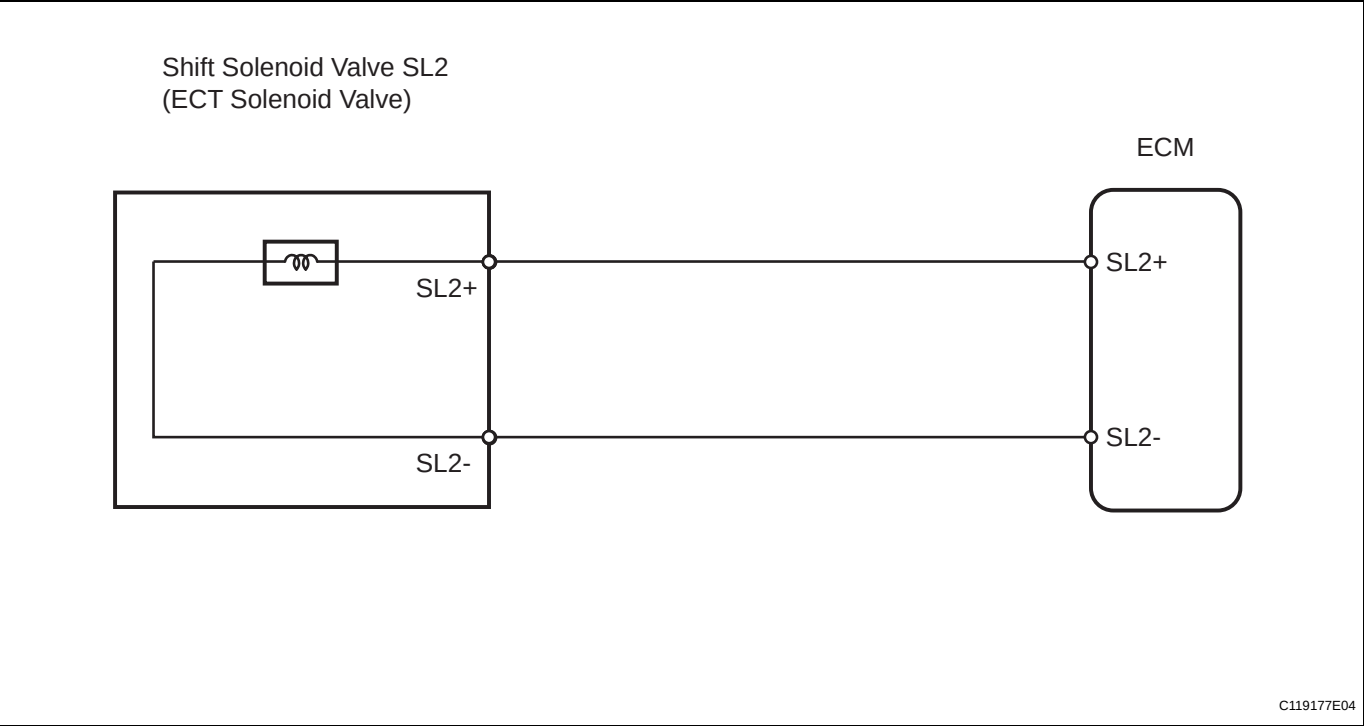
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status	Fail
-----------------	------

COMPONENT OPERATING RANGE

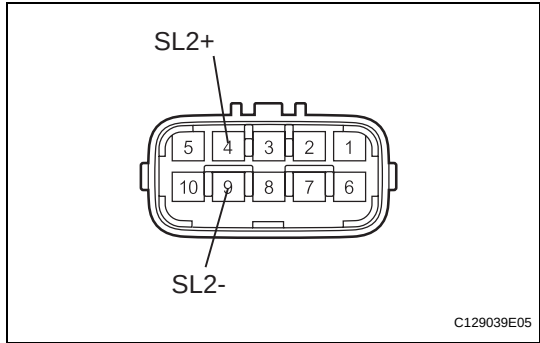
Output signal duty	Less than 100%
--------------------	----------------

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL2)



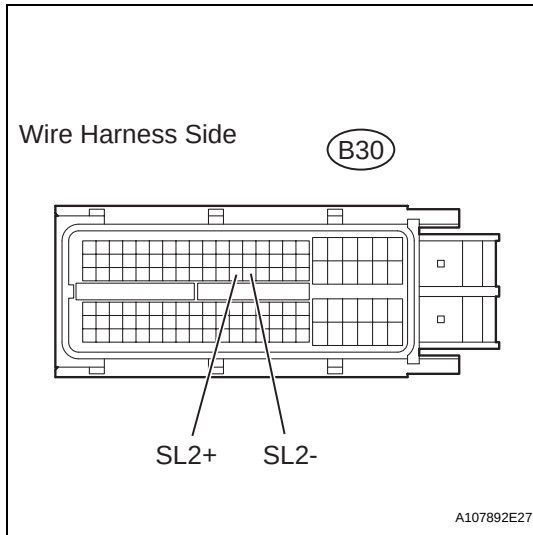
- (a) Disconnect the B27 wire connector.
 - (b) Measure the resistance of the transmission wire.
- Standard resistance**

Tester Connection	Condition	Specified Condition
4 (SL2+) - 9 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
4 (SL2+) - Body ground	20°C (68°F)	1 MΩ or higher
9 (SL2-) - Body ground	20°C (68°F)	1 MΩ or higher

OK

NG

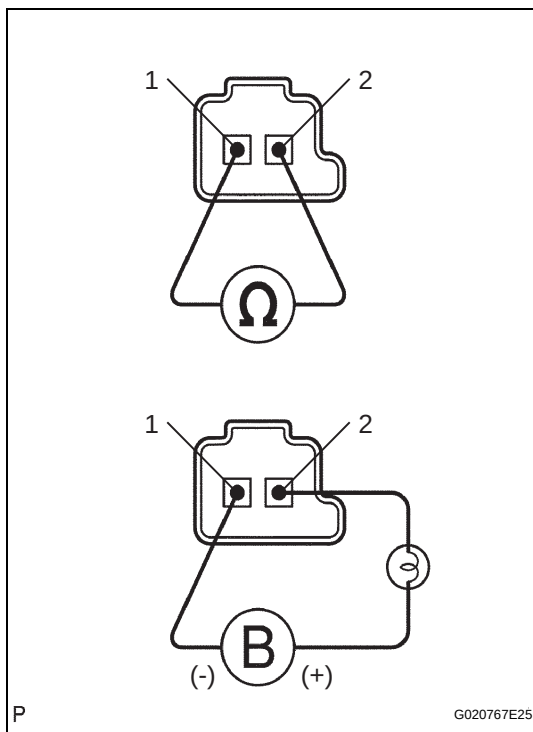
Go to step 3

2**CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)**

- (a) Disconnect the B30 ECM connector.
 (b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
B30-58 (SL2+) - B30-59 (SL2-)	20°C (68°F)	5.0 to 5.6 Ω
B30-58 (SL2+) - Body ground	20°C (68°F)	1 M Ω or higher
B30-59 (SL2-) - Body ground	20°C (68°F)	1 M Ω or higher

NG**REPAIR OR REPLACE HARNESS AND CONNECTOR****OK****REPLACE ECM****3****INSPECT SHIFT SOLENOID VALVE SL2**

- (a) Remove the shift solenoid valve SL2.
 (b) Measure the resistance of the solenoid valve.

Standard resistance:**5.0 to 5.6 Ω at 20°C (68°F)**

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

OK:**Valve moves and makes operating noise.****NG****REPLACE SHIFT SOLENOID VALVE SL2****OK****REPAIR OR REPLACE TRANSMISSION WIRE**

DTC**P0793****Intermediate Shaft Speed Sensor "A"****DESCRIPTION**

This sensor detects the rotation speed of the counter gear. By comparing the counter gear speed signal (NC) with the direct clutch speed sensor signal (NT), the ECM detects the shift timing of the gears and approximately controls the engine torque and hydraulic pressure according to various conditions. Thus smooth gear shifting is performed.

DTC No.	DTC Detection Condition	Trouble Area
P0793	ECM detects conditions (a) and (b) continuously for 5 sec. or more (1 trip detection logic): (a) Park/Neutral position switch (NSW) is OFF (b) Speed sensor NC: Less than 300 rpm	• Open or short in speed sensor NC circuit • Speed sensor NC • ECM

MONITOR DESCRIPTION

The NC terminal of the ECM detects revolution signals from speed sensor NC (counter gear rpm). The ECM calculates gear shifts by comparing speed sensor NT with speed sensor NC.

While the vehicle is operating in the 2nd, 3rd or O/D gear position with the shift lever on D, if the counter gear revolution is less than 300 rpm*1 and the output shaft revolution is more than 1,000 rpm*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0793: Speed sensor (NC)/Verify pulse input
Required sensors/Components	Speed sensor (NC), Speed sensor (NT), NSW switch
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present.	P0500: VSS P0748: Shift solenoid SL1 P0778: Shift solenoid SL2 P0982, P0983: Shift solenoid S4
Engine	Running
NSW switch	OFF
Output shaft rpm	1,000 rpm or more

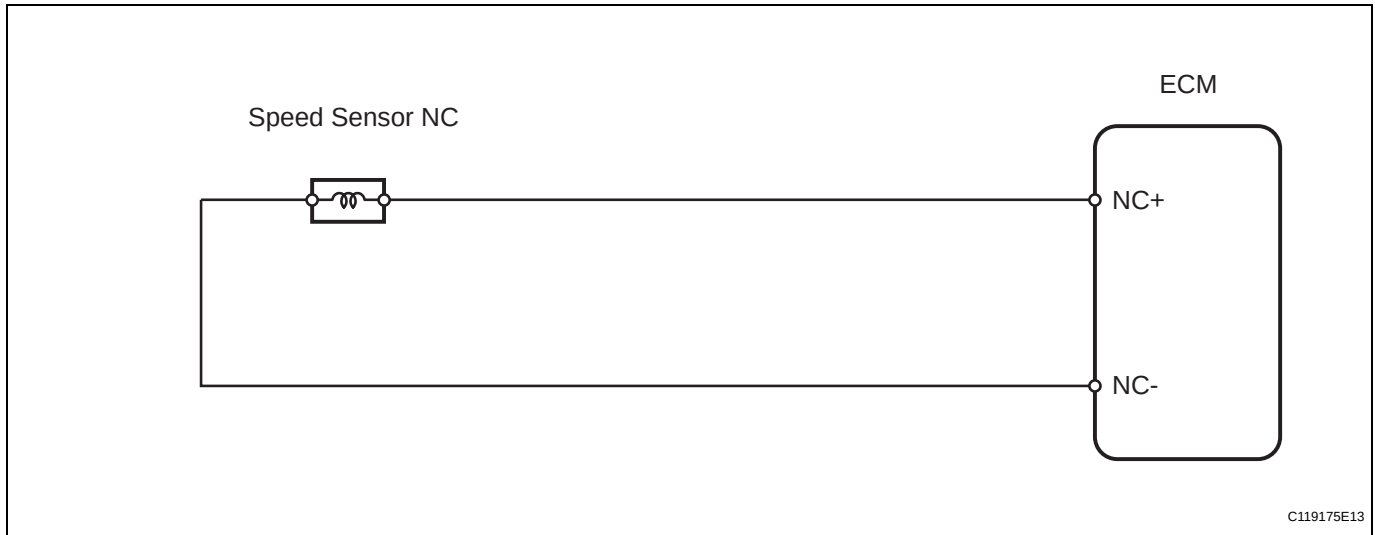
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm
-------------------	-------------------

COMPONENT OPERATING RANGE

Counter gear speed sensor (NC)	4th (O/D) when shift lever is on D (after warming up the engine); Intermediate shaft speed (NC) becomes close to the engine speed
--------------------------------	--

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

NOTICE:

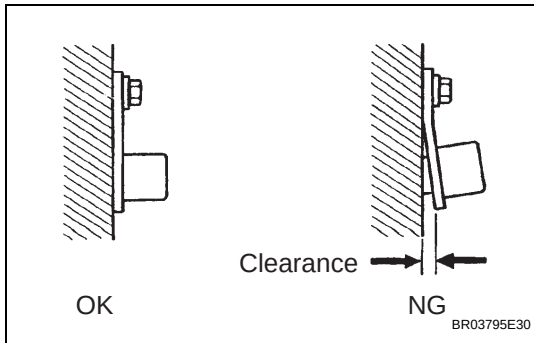
In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON and turn the tester ON.
5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
6. Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
SPD (NC)	Counter gear speed/ Min.: 0 rpm Max.: 12,750 rpm	4th (O/D) when shift lever is on D (after warming up the engine); Intermediate shaft speed (NC) becomes close to the engine speed	Data is displayed in increments of 50 rpm

HINT:

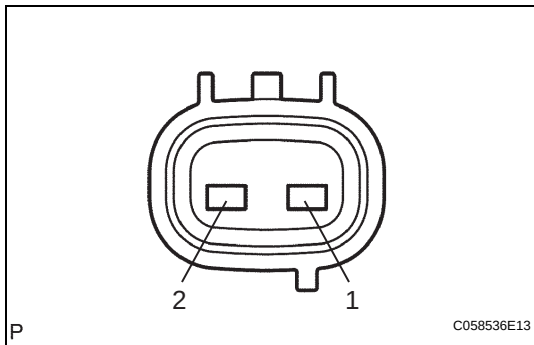
- SPD (NC) is always 0 rpm while driving:
Open or short in the sensor or circuit.
- SPD (NC) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:
Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1 INSPECT SPEED SENSOR (INSTALLATION)

- (a) Check the speed sensor NC installation.

OK:

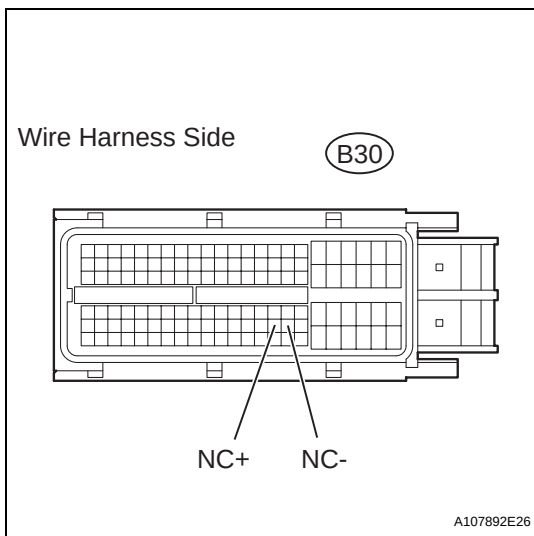
Installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG**REPLACE SPEED SENSOR NC****OK****2 INSPECT SPEED SENSOR NC**

- (a) Disconnect the B24 sensor connector from the transaxle.
 (b) Measure the resistance of the sensor.

Standard resistance

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

NG**REPLACE SPEED SENSOR NC****OK****3 CHECK WIRE HARNESS (SPEED SENSOR - ECM)**

- (a) Disconnect the B30 ECM connector.
 (b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Specified Condition
B30-101 (NC+) - B30-102 (NC-)	560 to 680 Ω
B30-101 (NC+) - Body ground	10 k Ω or higher
B30-102 (NC-) - Body ground	10 k Ω or higher

NG**REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

DTC	P0982	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)
DTC	P0983	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)

DESCRIPTION

Shifting from 1st to O/D is performed in combination with the ON and OFF operation of the shift solenoid valves SL1 and SL2, which are controlled by the ECM. If an open or short circuit occurs in any of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated safely (see page [AX-31](#)).

DTC No.	DTC Detection Condition	Trouble Area
P0982	ECM detects short in solenoid valve S4 circuit 2 times when solenoid valve S4 is operated (1 trip detection logic)	- Short in shift solenoid valve S4 circuit - Shift solenoid valve S4 - ECM
P0983	ECM detects open in solenoid valve S4 circuit 2 times when solenoid valve S4 is not operated (1 trip detection logic)	- Open in shift solenoid valve S4 circuit - Shift solenoid valve S4 - ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve S4 circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the circuit (see page [AX-31](#)).

MONITOR STRATEGY

Related DTCs	P0982: Shift solenoid valve S4/Range check (Low resistance) P0983: Shift solenoid valve S4/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S4
Frequency of operation	Continuous
Duration	0.128 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0982: Range check (Low resistance)

The monitor will run whenever this DTC is not present.	None
Shift solenoid valve S4	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0983: Range check (High resistance)

The monitor will run whenever this DTC is not present	None
Shift solenoid valve S4	OFF
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0982: Range check (Low resistance)

Shift solenoid valve S4 resistance	8 Ω or less
------------------------------------	-------------

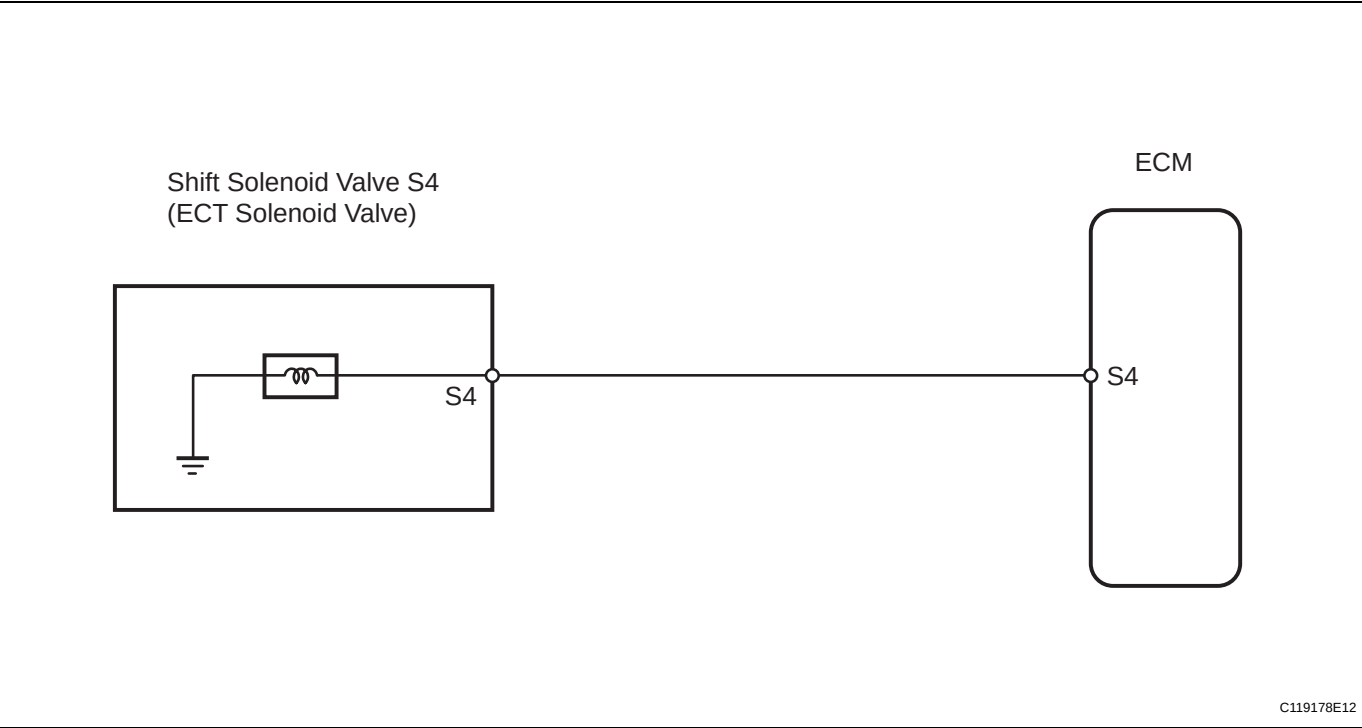
P0983: Range check (High resistance)

Shift solenoid valve S4 resistance	100 kΩ or more
------------------------------------	----------------

COMPONENT OPERATING RANGE

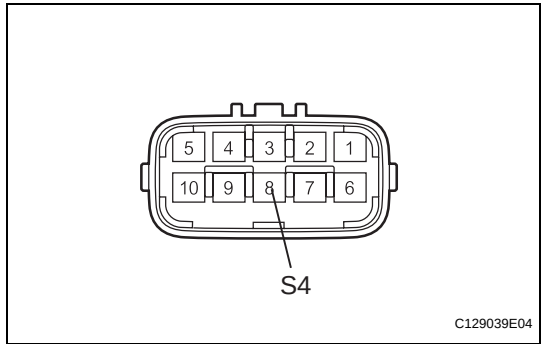
Shift solenoid valve S4	Resistance: 11 to 15 Ω at 20°C (68°F)
-------------------------	---------------------------------------

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE S4)
---	---



- (a) Disconnect the B27 wire connector.
 - (b) Measure the resistance of the transmission wire.
- Standard resistance**

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

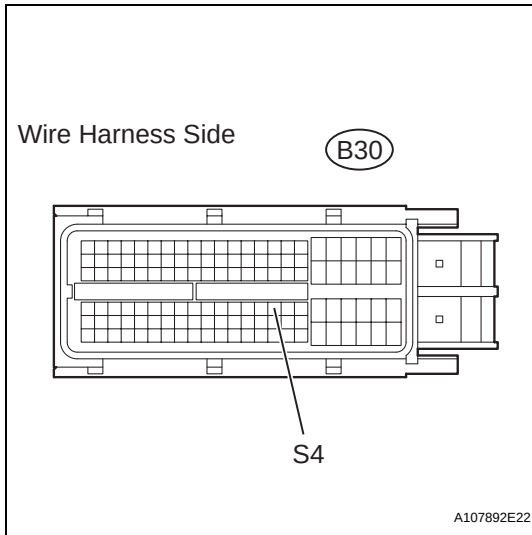
NG

Go to step 3

OK

2

CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



- Disconnect the B30 ECM connector.
- Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
B30-78 (S4) - Body ground	20°C (68°F)	11 to 15 Ω

NG

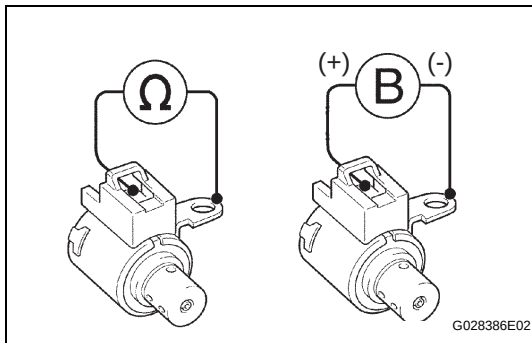
REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM

3

INSPECT SHIFT SOLENOID VALVE S4



- Remove the shift solenoid valve S4.
- Measure the resistance of the solenoid valve.

Standard resistance:**11 to 15 Ω at 20°C (68°F)**

- Connect the battery's positive (+) lead to the terminal of the solenoid valve connector, and the negative (-) lead to the solenoid body. Then check that the valve moves and makes an operating noise.

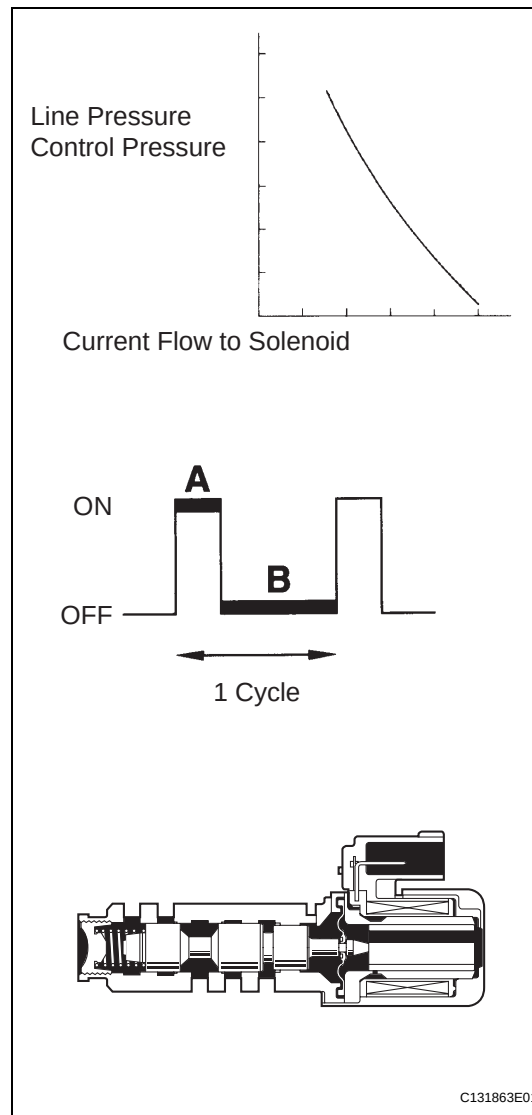
OK:**Valve moves and makes operating noise.**

NG

REPLACE SHIFT SOLENOID VALVE S4

OK

REPAIR OR REPLACE TRANSMISSION WIRE

DTC**P2714****Pressure Control Solenoid "D" Performance
(Shift Solenoid Valve SLT)****DESCRIPTION**

The throttle pressure that is applied to the primary regulator valve (which modulates the line pressure) causes the solenoid valve SLT, under electronic control, to precisely modulate and generate the line pressure according to the extent that the accelerator pedal is depressed or the output of engine power. This controls the line pressure and provides smooth shifting characteristics.

Upon receiving a signal of the throttle valve opening angle, the ECM controls the line pressure by sending a predetermined duty ratio* to the solenoid valve, modulating the line pressure and generating throttle pressure.

HINT:

*: The duty ratio is the ratio of the current ON time (A) to the total of the current ON and OFF time (A + B).
 Duty Ratio (%) = $A / (A + B) \times 100$

DTC No.	DTC Detection Condition	Trouble Area
P2714	ECM detects malfunction on SLT (ON side) according to difference in revolutions of turbine (input) and output shaft (2 trip detection logic)	- Shift solenoid valve SLT remains open or closed - Valve body is blocked - Torque converter clutch - Automatic transaxle (clutch, brake or gear etc.) - ECM

MONITOR DESCRIPTION

In any forward position, when the difference between the revolutions of the turbine and output shaft exceeds the specified value (varies with output speed) determined by the ECM, the ECM illuminates the MIL and outputs the DTC. When shift solenoid valve SLT remains on, the oil pressure goes down and the clutch engagement force decreases.

MONITOR STRATEGY

Related DTCs	P2714: Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Shift solenoid valve SLT, Speed sensor (NT), Speed sensor (SPD)
Frequency of operation	Continuous
Duration	1 second
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following conditions are common to ON malfunctions (a), (b), (c) and (d).

The monitor runs whenever the following DTCs are not present	None
Transmission shift position	D
Time after shifting N to D	4.5 seconds or more
ATF (Automatic Transmission Fluid) temperature	-10°C (14°F) or more
ATF temperature sensor (TFT sensor) circuit	No circuit malfunction
Electronic Throttle Control System (if applicable)	No circuit malfunction
Shift solenoid valve S1 circuit	No circuit malfunction
Shift solenoid valve S2 circuit	No circuit malfunction
Shift solenoid valve SLU circuit	No circuit malfunction
Shift solenoid valve SLT circuit	No circuit malfunction
Speed sensor (NT) circuit	No circuit malfunction
Speed sensor (SPD) circuit	No circuit malfunction

ON malfunction (a):

ECM gearshift command	1st
Input (turbine) speed	300 rpm or more
Output speed	300 rpm or more

ON malfunction (b):

ECM gearshift command	2nd
Input (turbine) speed	300 rpm or more
Output speed	300 rpm or more

ON malfunction (c):

ECM gearshift command	3rd
Input (turbine) speed	300 rpm or more
Output speed	300 rpm or more

ON malfunction (d):

ECM gearshift command	4th
Input (turbine) speed	300 rpm or more
Output speed	300 rpm or more

TYPICAL MALFUNCTION THRESHOLDS**[ON malfunction]**

Detection condition: Total accumulated time of ON malfunctions (a), (b), (c) and (d) is 1 second or more

ON malfunction (a):

NT - NC x 1st gear ratio (without counter gear and under drive gear) NT: Input (turbine) speed NC: Counter gear speed	More than 300 rpm at counter gear speed of 1,000 rpm (Conditions vary with counter gear speed)
Duration	0.85 seconds or more

ON malfunction (b):

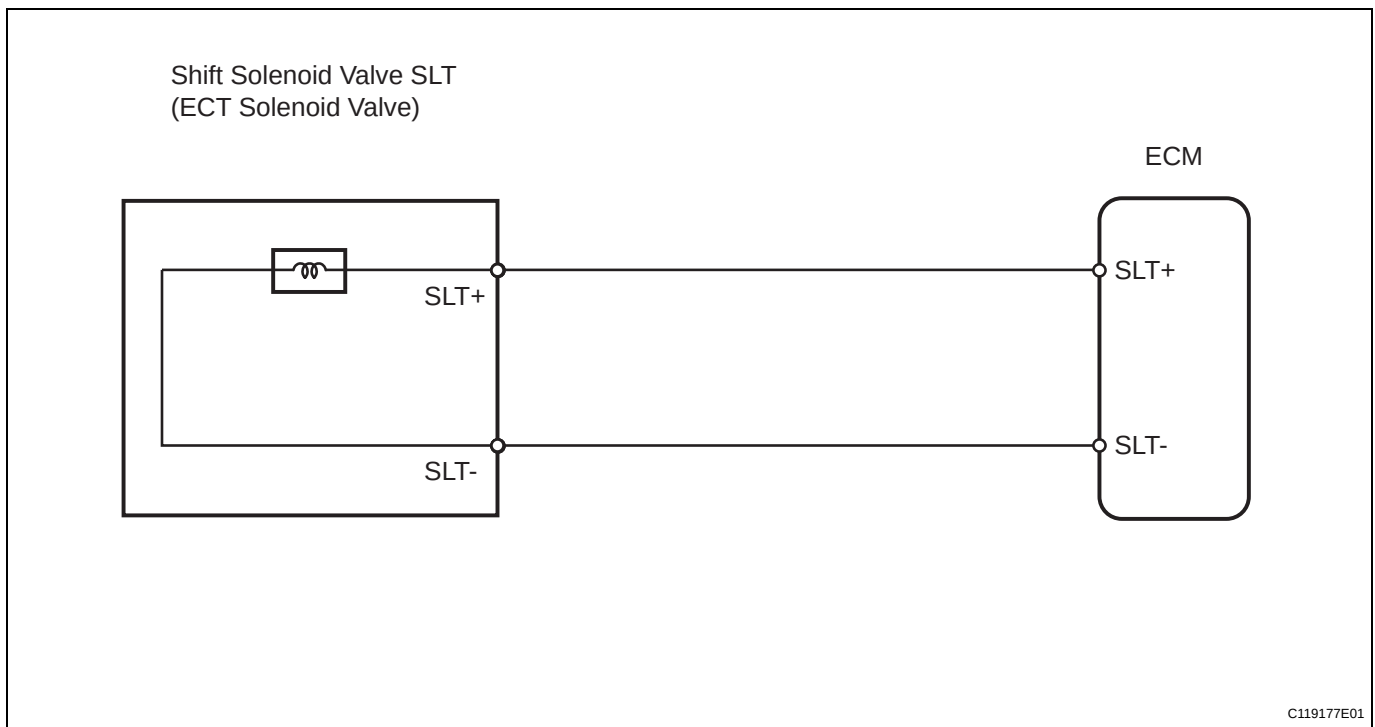
NT - NC x 2nd gear ratio (without counter gear and under drive gear)	More than 300 rpm at counter gear speed of 1,000 rpm (Conditions vary with counter gear speed)
Duration	0.85 seconds or more

ON malfunction (c):

NT - NC x 3rd gear ratio (without counter gear and under drive gear)	More than 300 rpm at counter gear speed of 1,000 rpm (Conditions vary with counter gear speed)
Duration	0.85 seconds or more

ON malfunction (d):

NC - NO x Counter gear ratio x under drive gear ratio (Low or High)	More than 300 rpm at output speed of 1,000 rpm (Conditions vary with output speed)
Duration	0.85 seconds or more

WIRING DIAGRAM

INSPECTION PROCEDURE

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time.

The DATA LIST can be displayed during the ACTIVE TEST.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON and turn the tester ON.
5. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
6. Perform the ACTIVE TEST.

Item	Test Details	Diagnostic Note
SOLENOID (SLT)*	[Test Details] Operate shift solenoid SLT and raise line pressure [Vehicle Condition] • Vehicle stopped • IDL: ON HINT: OFF: Line pressure up (when Active Test "SOLENOID (SLT)" is performed, ECM commands SLT solenoid to turn OFF) ON: No action (normal operation)	-

HINT:

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check the line pressure changes by connecting SST to the automatic transaxle, which is used in the HYDRAULIC TEST (see page [AX-16](#)) as well. Please note that the pressure values in the ACTIVE TEST and HYDRAULIC TEST are different.

1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2714)

- (a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (b) Turn the ignition switch ON and turn the tester ON.
- (c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- (d) Read the DTCs using the tester.

Result

Display (DTC output)	Proceed to
Only P2714 is output	A
P2714 and other DTCs are output	B

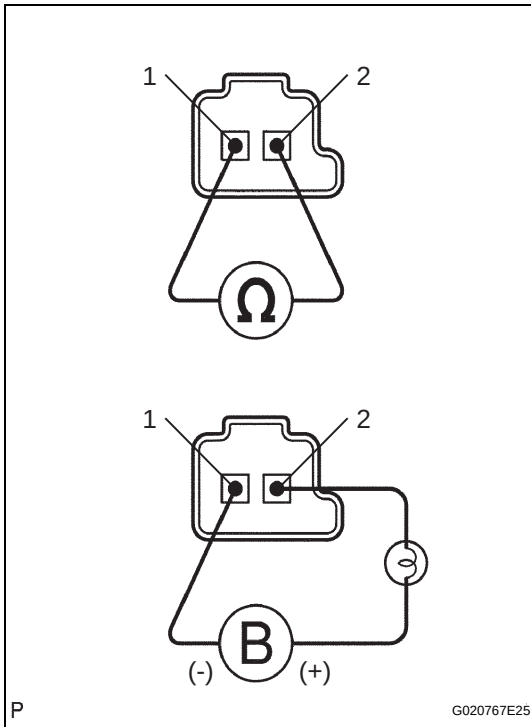
HINT:

If any other codes besides P2714 are output, perform troubleshooting for those DTCs first.

B

GO TO DTC CHART

A

2 INSPECT SHIFT SOLENOID VALVE SLT

- (a) Remove the shift solenoid valve SLT.
(b) Measure the resistance of the solenoid valve.

Standard resistance:

5.0 to 5.6 Ω at 20°C (68°F)

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

OK:

Valve moves and makes operating noise.

NG

REPLACE SHIFT SOLENOID VALVE SLT

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

- (a) Check the transmission valve body assembly.

OK:

There are no foreign objects on each valve.

NG

REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

4 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

- (a) Check the torque converter clutch assembly (see page [AX-153](#)).

OK:

The torque converter clutch operates normally.

NG

REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

AX

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)
------------	--------------	--

DESCRIPTION

Refer to DTC P2714 (see page [AX-91](#)).

DTC No.	DTC Detection Condition	Trouble Area
P2716	Condition (a) and (b) below is detected for 1 sec. or more (1 trip detection logic): (a) SLT - terminal: 0 V (b) SLT - terminal: 12 V	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM

MONITOR DESCRIPTION

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

MONITOR STRATEGY

Related DTCs	P2716: Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Battery voltage	11 V or more
Solenoid current cut status	Not cut
CPU command duty ratio to SLT	19% or more
Starter	OFF
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

Solenoid status from IC	Fail (open or short)
-------------------------	----------------------

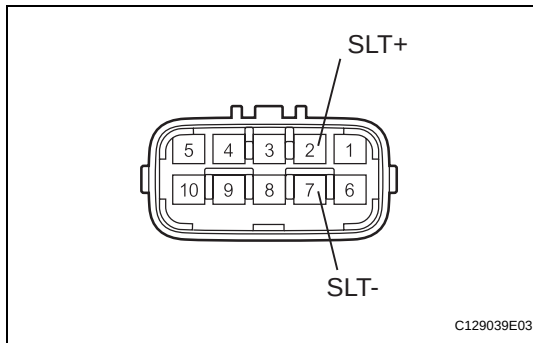
COMPONENT OPERATING RANGE

Shift solenoid valve SLT	Resistance: 5.0 to 5.6 Ω at 20°C (68°F)
--------------------------	--

WIRING DIAGRAM

Refer to DTC P2714 (see page [AX-91](#)).

INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLT)

- (a) Disconnect the B27 wire connector.
 (b) Measure the resistance of the transmission wire.

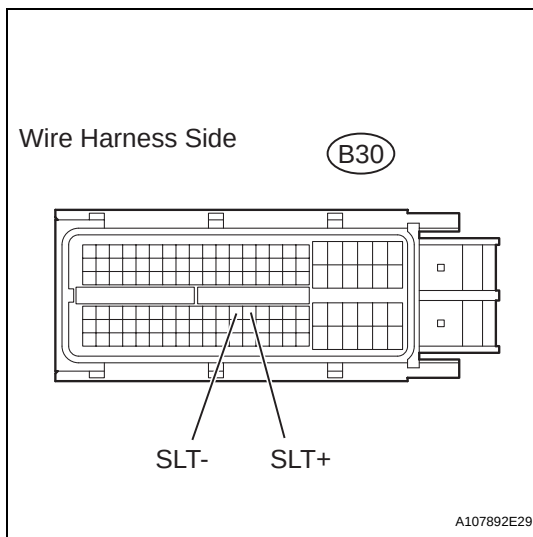
Standard resistance

Tester Connection	Condition	Specified Condition
2 (SLT+) - 7 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
2 (SLT+) - Body ground	20°C (68°F)	1 M Ω or higher
7 (SLT-) - Body ground	20°C (68°F)	1 M Ω or higher

NG

Go to step 3

OK

2 CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)

- (a) Disconnect the B30 ECM connector.
 (b) Measure the resistance of the wire harness side connector.

Standard resistance

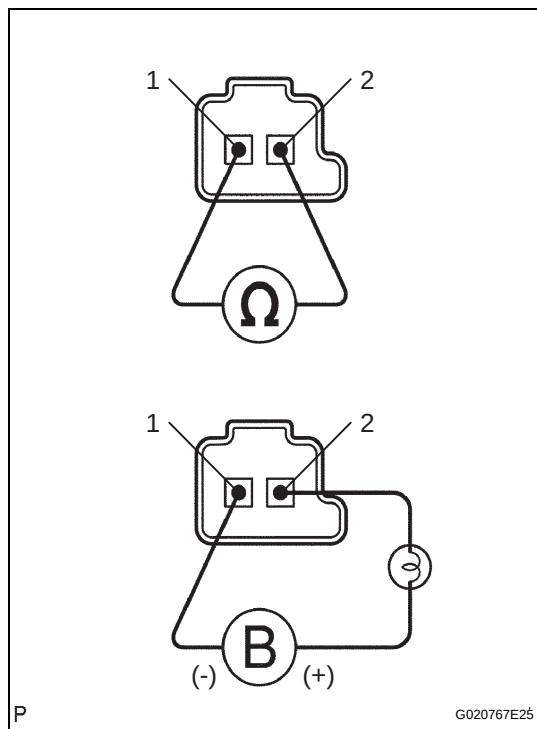
Tester Connection	Condition	Specified Condition
B30-76 (SLT+) - B30-75 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
B30-76 (SLT+) - Body ground	20°C (68°F)	1 M Ω or higher
B30-75 (SLT-) - Body ground	20°C (68°F)	1 M Ω or higher

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM

3 INSPECT SHIFT SOLENOID VALVE SLT

- (a) Remove the shift solenoid valve SLT.
- (b) Measure the resistance of the solenoid valve.

Standard resistance:

5.0 to 5.6 Ω at 20°C (68°F)

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

OK:

Valve moves and makes operating noise.

NG

REPLACE SHIFT SOLENOID VALVE SLT

OK

REPAIR OR REPLACE TRANSMISSION WIRE

DTC	P2769	Torque Converter Clutch Solenoid Circuit Low (Shift Solenoid Valve DSL)
DTC	P2770	Torque Converter Clutch Solenoid Circuit High (Shift Solenoid Valve DSL)

DESCRIPTION

The shift solenoid valve DSL is turned ON and OFF by signals from the ECM to control the hydraulic pressure acting on the lock-up relay valve, which then controls operation of the lock-up clutch.

DTC No.	DTC Detection Condition	Trouble Area
P2769	ECM detects short in shift solenoid valve DSL circuit when shift solenoid valve DSL is operated (2 trip detection logic)	- Short in shift solenoid valve DSL circuit - Shift solenoid valve DSL - ECM
P2770	ECM detects open in shift solenoid valve DSL circuit when shift solenoid valve DSL is not operated (2 trip detection logic)	- Open in shift solenoid valve DSL circuit - Shift solenoid valve DSL - ECM

Fail-safe function:

If the ECM detects a malfunction, it turns the shift solenoid valve DSL OFF.

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and shift position selection. The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input rpm (NT). The ECM calculates the actual transmission gear by comparing the input rpm (NT) to the output rpm (SP2). When conditions are appropriate, the ECM requests "lock-up" by applying control voltage to the shift solenoid valve DSL. When the shift solenoid valve DSL is opened, the shift solenoid valve DSL applies pressure to the lock-up relay valve and locks the torque converter clutch. If the ECM detects an open or short in the shift solenoid valve DSL circuit, the ECM interprets this as a fault in the shift solenoid valve DSL or its circuit. The ECM will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P2769: Shift solenoid valve DSL/Range check (Low resistance) P2770: Shift solenoid valve DSL/Range check (High resistance)
Requires sensors/Components	Shift solenoid valve DSL
Frequency of operation	Continuous
Duration	0.064 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS**P2769: Range check (Low resistance)**

The monitor will run whenever this DTC is not present	None
Shift solenoid valve DSL	ON
Solenoid current cut status	Not cut
Battery voltage	8 V or more
Starter	OFF
Ignition switch	ON

P2770: Range check (High resistance)

The monitor will run whenever this DTC is not present	None
---	------

Shift solenoid valve DSL	ON
Battery voltage	8 V or more
Starter	OFF
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

P2769: Range check (Low resistance)

Shift solenoid valve DSL resistance	8 Ω or less
-------------------------------------	--------------------

P2770: Range check (High resistance)

Shift solenoid valve DSL resistance	100 k Ω or more
-------------------------------------	------------------------

COMPONENT OPERATING RANGE

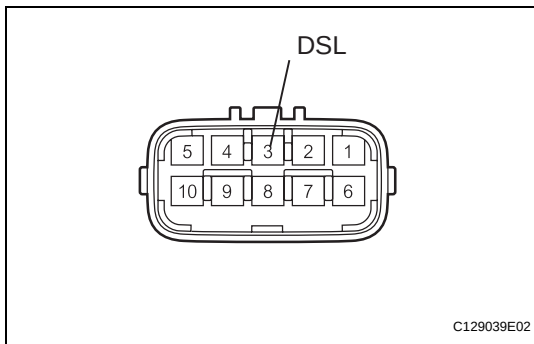
Shift solenoid valve DSL	Resistance: 11 to 13 Ω at 20°C (68°F)
--------------------------	--

WIRING DIAGRAM

Refer to DTC P0741 (see page [AX-62](#)).

INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE DSL)



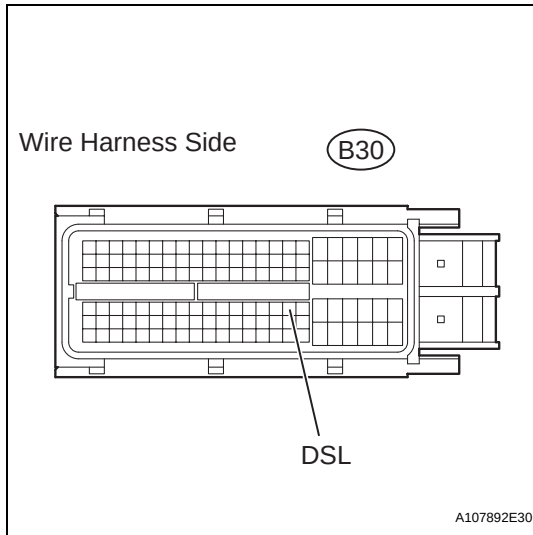
- (a) Disconnect the B27 wire connector.
 - (b) Measure the resistance of the transmission wire.
- Standard resistance**

Tester Connection	Condition	Specified Condition
3 (DSL) - Body ground	20°C (68°F)	11 to 13 Ω

NG

Go to step 3

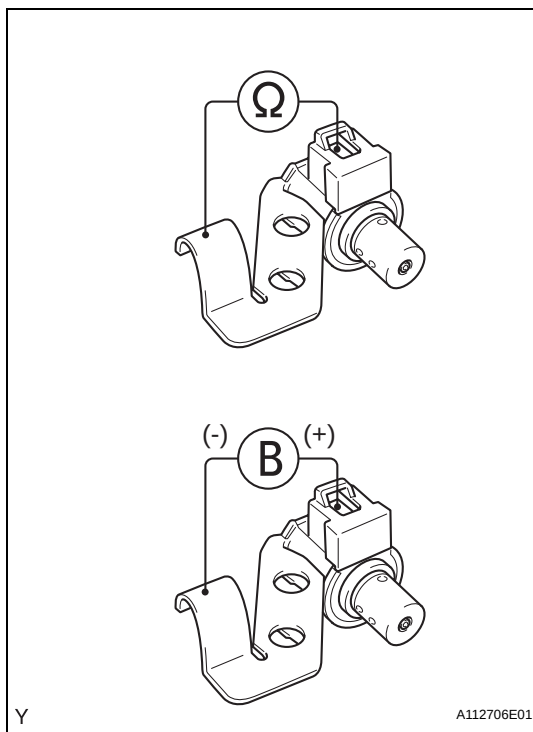
OK

2**CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)**

- (a) Disconnect the B30 ECM connector.
- (b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
B30-79 (DSL) - Body ground	20°C (68°F)	11 to 13 Ω

NG**REPAIR OR REPLACE HARNESS AND CONNECTOR****OK****REPLACE ECM****3****INSPECT SHIFT SOLENOID VALVE DSL**

- (a) Remove the shift solenoid valve DSL.
- (b) Measure the resistance between the solenoid valve terminal and solenoid valve body.

Standard resistance:**11 to 13 Ω at 20°C (68°F)**

- (c) Connect the battery's positive (+) lead to the terminal of the solenoid valve connector, and the negative (-) lead to the solenoid body. Then check that the valve moves and makes an operating noise.

OK:**Valve moves and makes operating noise.****NG****REPLACE SHIFT SOLENOID VALVE DSL****OK****REPAIR OR REPLACE TRANSMISSION WIRE****AX**

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

CAUTION:

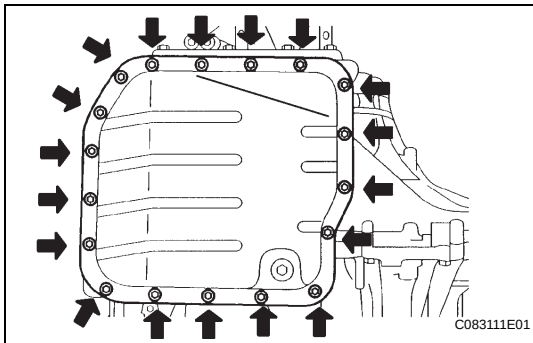
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE NO. 1 ENGINE UNDER COVER**

3. **DRAIN AUTOMATIC TRANSAXLE FLUID**

- (a) Remove the drain plug and gasket, and drain ATF.
- (b) Install a new gasket and the drain plug.

Torque: 47 N*m (479 kgf*cm, 35 ft.*lbf)



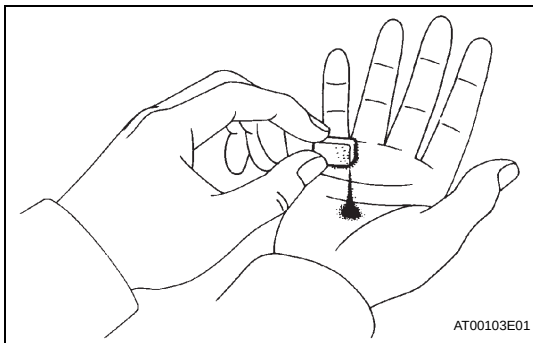
4. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**

- (a) Remove the 18 bolts, oil pan and gasket.

NOTICE:

Some fluid will remain in the oil pan. Carefully remove the oil pan.

- (b) Remove the 3 magnets from the oil pan.



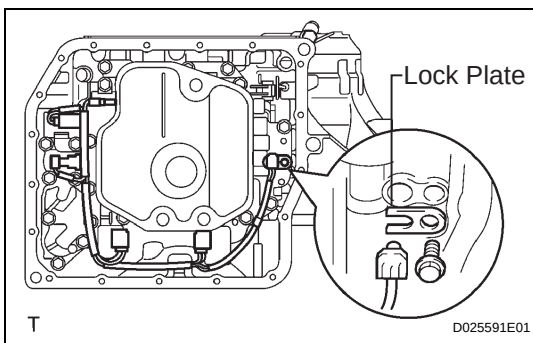
- (c) Examine particles in the pan.

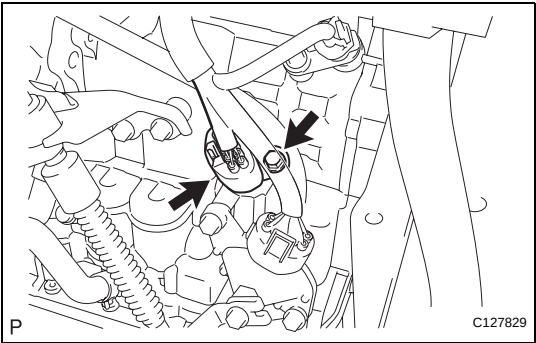
- (1) Use the removed magnets to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transaxle.
Steel (magnetic): bearing, gear and plate wear
Brass (non-magnetic): bush wear

5. **REMOVE TRANSMISSION WIRE**

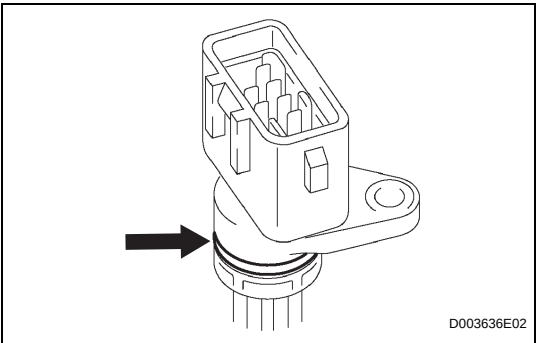
- (a) Disconnect the 5 shift solenoid valve connectors.

- (b) Remove the bolt, lock plate and ATF temperature sensor.

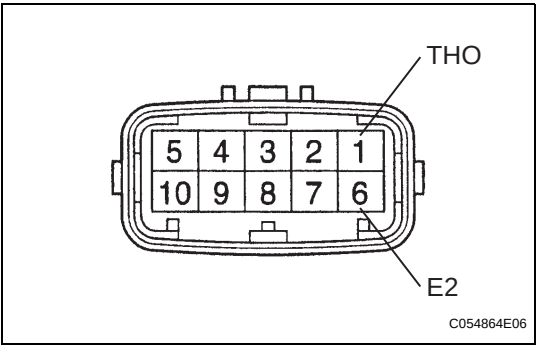




- (c) Disconnect the transmission wire connector.
- (d) Remove the bolt and transmission wire.



- (e) Remove the O-ring from the transmission wire.



INSPECTION

1. INSPECT TRANSMISSION WIRE

- (a) Disconnect the B27 wire connector.
- (b) Measure the resistance of the transmission wire.

Standard resistance

Tester Connection	Specified Condition
1 (THO) - 6 (E2)	90 Ω to 156 kΩ
1 (THO) - Body ground	1 MΩ or higher
6 (E2) - Body ground	1 MΩ or higher

HINT:
If the resistance is not as specified for either of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

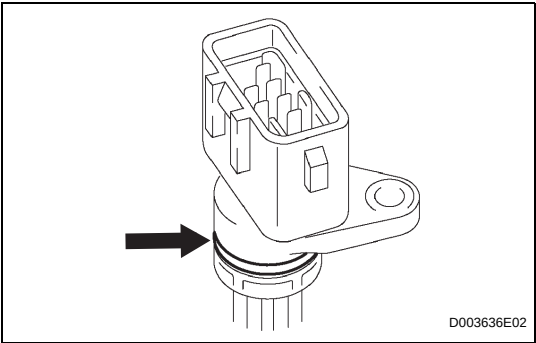
Standard resistance

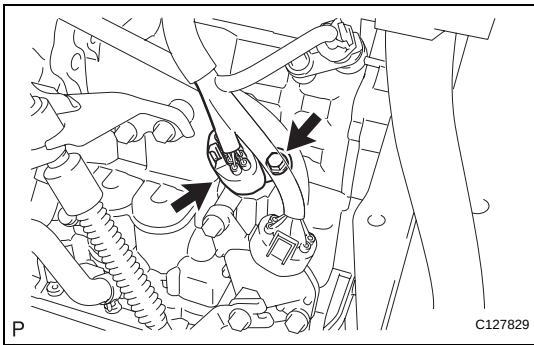
ATF Temperature	Specified Condition
10°C (68°F)	6.4 kΩ
110°C (230°F)	0.2 kΩ

INSTALLATION

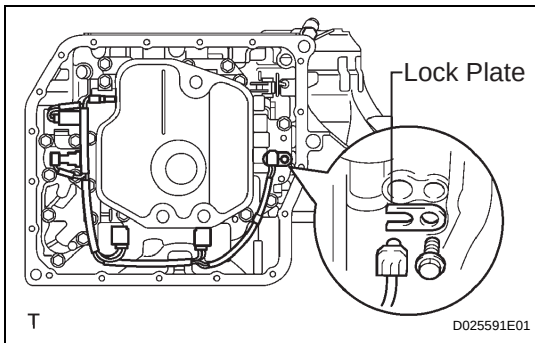
1. INSTALL TRANSMISSION WIRE

- (a) Coat a new O-ring of the transmission wire connector with ATF.

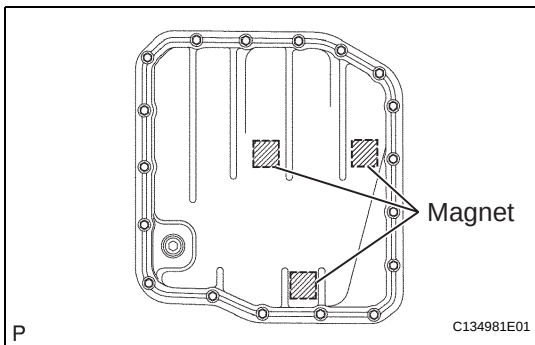




- (b) Install the transmission wire.
- (c) Install the bolt.
- (d) Connect the connector.

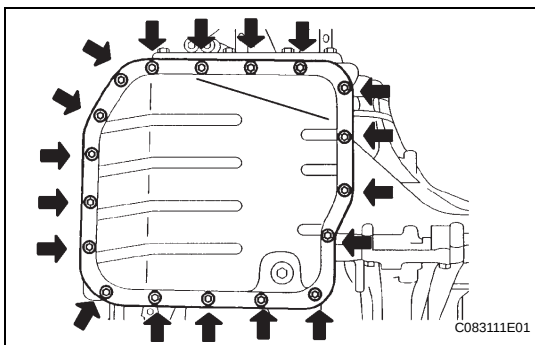


- (e) Coat the O-ring of the ATF temperature sensor with ATF.
- (f) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)
- (g) Connect the 5 shift solenoid valve connectors.



2. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

- (a) Install the 3 magnets in the oil pan.



- (b) Install a new gasket and the oil pan with the 18 bolts.
Torque: 7.6 N*m (77 kgf*cm, 67 in.*lbf)

3. INSTALL NO. 1 ENGINE UNDER COVER

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

5. ADD AUTOMATIC TRANSAXLE FLUID

Fluid type:

Toyota Genuine ATF WS

6. INSPECT TRANSAXLE FLUID LEVEL

- (a) Inspect the fluid level (see page [AX-102](#)).

7. PERFORM RESET MEMORY

- (a) Perform the RESET MEMORY procedures (A/T initialization) (see page [AX-18](#)).

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE NO. 1 ENGINE UNDER COVER**

3. **DRAIN AUTOMATIC TRANSAXLE FLUID**

- (a) Remove the drain plug and gasket, and drain ATF.
- (b) Install a new gasket and the drain plug.

Torque: 47 N*m (479 kgf*cm, 35 ft.*lbf)

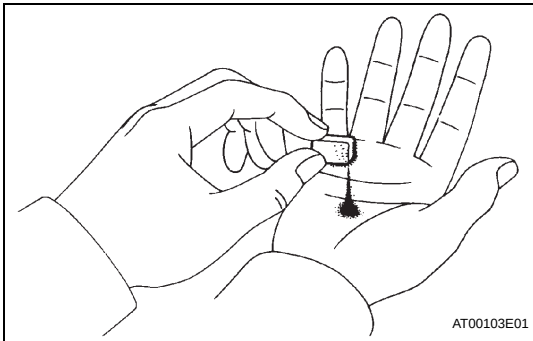
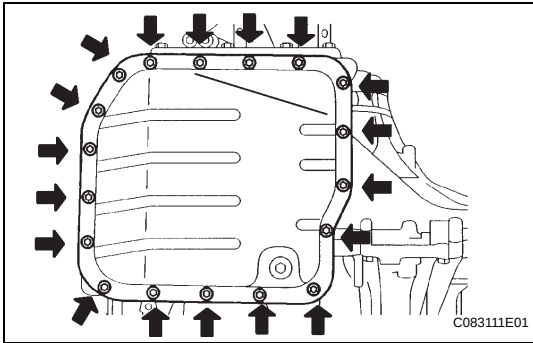
4. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**

- (a) Remove the 18 bolts, oil pan and gasket.

NOTICE:

Some fluid will remain in the oil pan. Carefully remove the oil pan sub-assembly.

- (b) Remove the 3 magnets from the oil pan.



- (c) Examine particles in the pan.

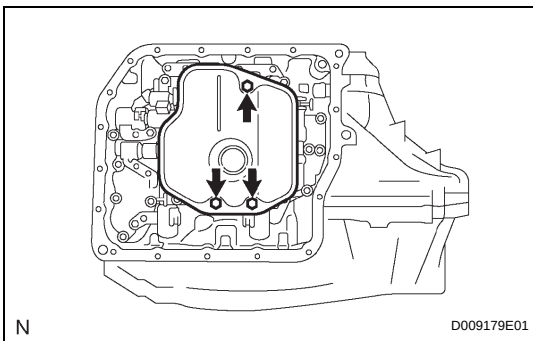
- (1) Use the removed magnets to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transaxle.
Steel (magnetic): bearing, gear and plate wear
Brass (non-magnetic): bush wear

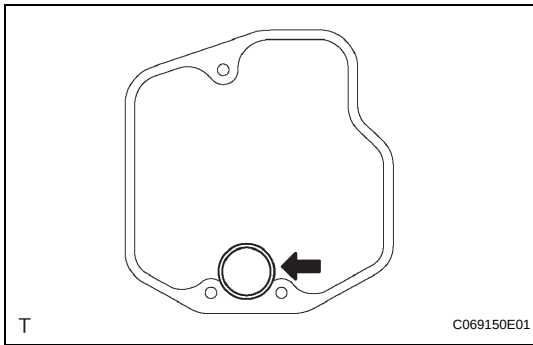
5. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY**

- (a) Remove the 3 bolts and oil strainer.

NOTICE:

Be careful as some fluid will come out with the oil strainer.

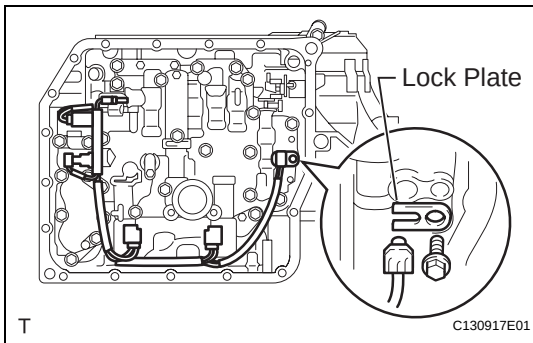




(b) Remove the O-ring from the oil strainer.

6. DISCONNECT TRANSMISSION WIRE

- Disconnect the 5 connectors.
- Remove the bolt and lock plate, and remove the ATF temperature sensor.

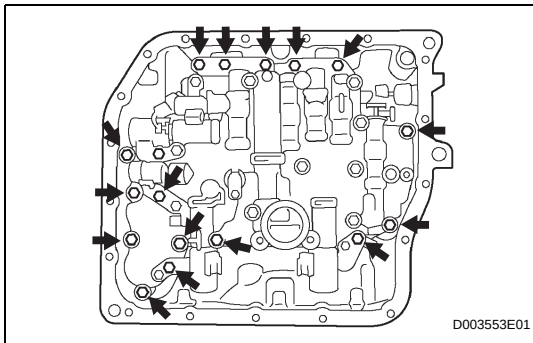


7. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

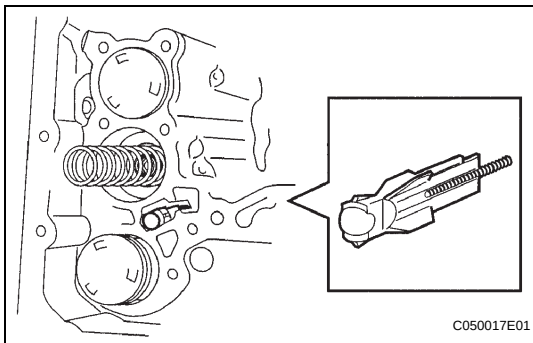
- Support the valve body and remove the 17 bolts and valve body.

NOTICE:

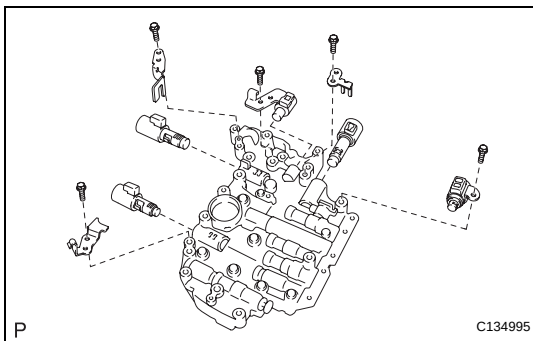
Be careful not to drop the check valve body, spring and accumulator piston.



- Remove the check ball body and spring.



- Remove the 5 bolts, 4 plates and 5 shift solenoid valves.



REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE NO. 1 ENGINE UNDER COVER**

3. **DRAIN AUTOMATIC TRANSAXLE FLUID**

- (a) Remove the drain plug and gasket, and drain ATF.
- (b) Install a new gasket and the drain plug.

Torque: 47 N*m (479 kgf*cm, 35 ft.*lbf)

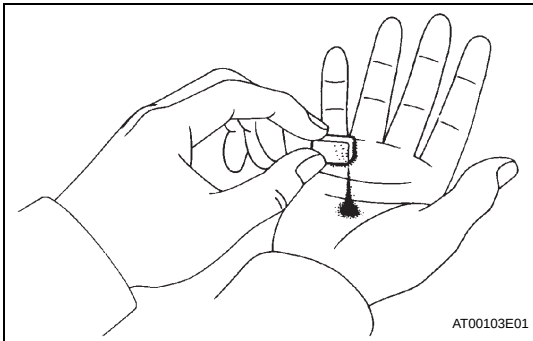
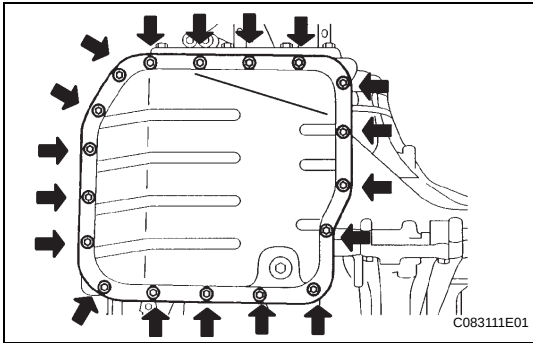
4. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**

- (a) Remove the 18 bolts, oil pan and gasket.

NOTICE:

Some fluid will remain in the oil pan. Carefully remove the oil pan sub-assembly.

- (b) Remove the 3 magnets from the oil pan.



- (c) Examine particles in the pan.

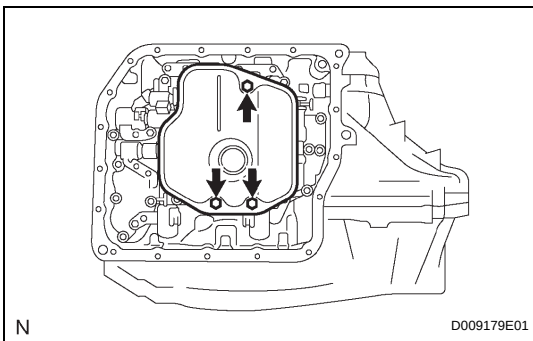
- (1) Use the removed magnets to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transaxle.
Steel (magnetic): bearing, gear and plate wear
Brass (non-magnetic): bush wear

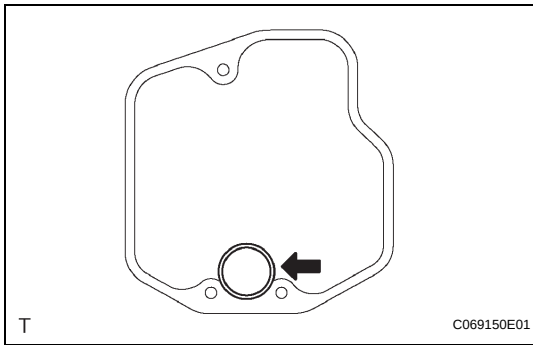
5. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY**

- (a) Remove the 3 bolts and oil strainer.

NOTICE:

Be careful as some fluid will come out with the oil strainer.

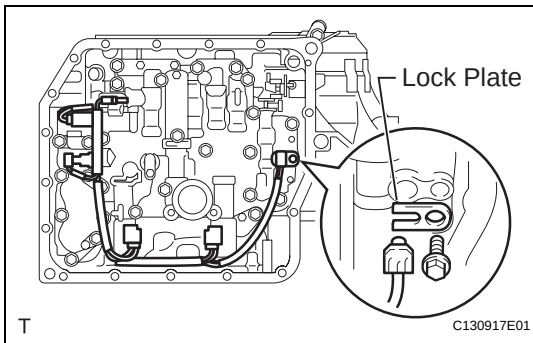




(b) Remove the O-ring from the oil strainer.

6. DISCONNECT TRANSMISSION WIRE

- Disconnect the 5 connectors.
- Remove the bolt and lock plate, and remove the ATF temperature sensor.

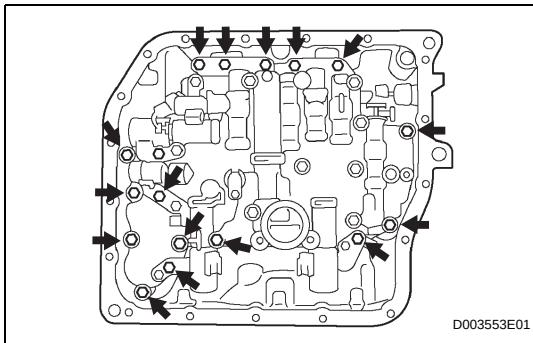


7. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

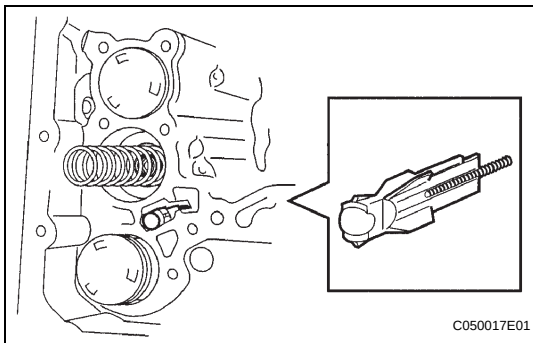
- Support the valve body and remove the 17 bolts and valve body.

NOTICE:

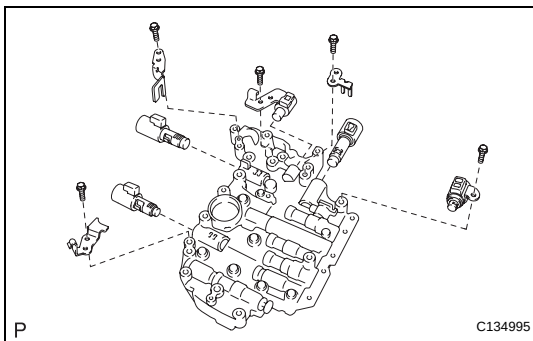
Be careful not to drop the check valve body, spring and accumulator piston.



- Remove the check ball body and spring.



- Remove the 5 bolts, 4 plates and 5 shift solenoid valves.



INSTALLATION

1. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

- (a) Install the 5 shift solenoid valves with the 5 bolts and 4 plates.

Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf) for bolt A
11 N*m (112 kgf*cm, 8 ft.*lbf) for bolt B

HINT:

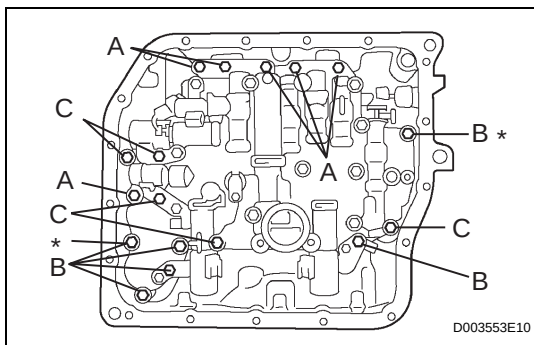
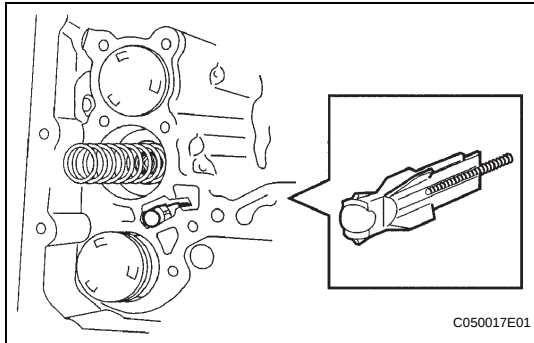
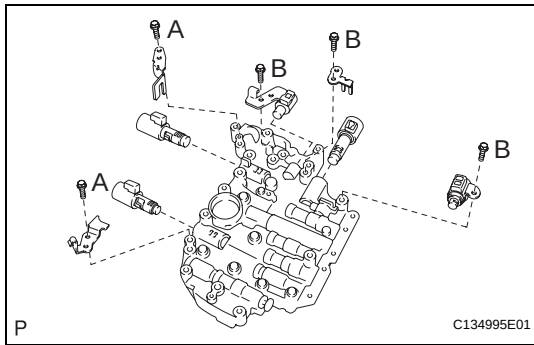
Each bolt length is indicated below.

Bolt length:

12 mm (0.47 in.) for Bolt A

45 mm (1.77 in.) for Bolt B

- (b) Install the spring and check ball body.



- (c) Align the groove of the manual valve with the pin of lever.

- (d) Install the 17 bolts.

Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

NOTICE:

- Push the valve body against the accumulator piston spring and the check ball body to install it.
- Tighten the bolts marked by * in the illustration first temporarily because they are positioning bolts.

HINT:

Each bolt length is indicated below.

Bolt length:

25 mm (0.984 in.) for Bolt A

41 mm (1.614 in.) for Bolt B

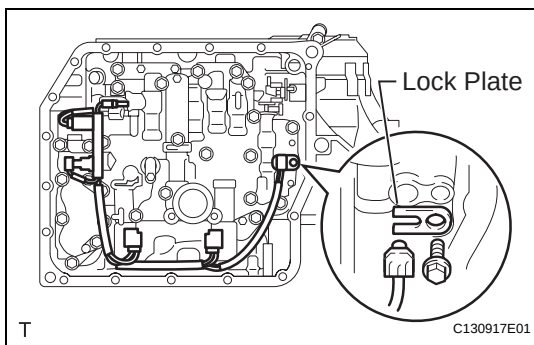
45 mm (1.771 in.) for Bolt C

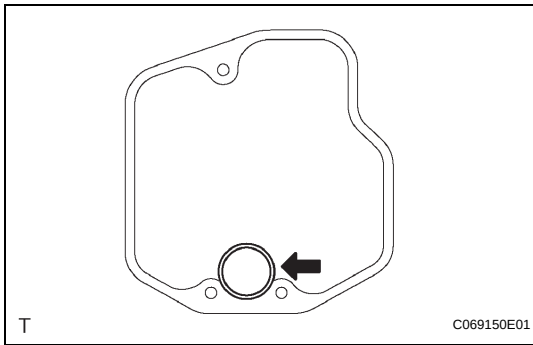
2. INSTALL TRANSMISSION WIRE

- (a) Coat the O-ring of the temperature sensor with ATF.
- (b) Install the ATF temperature sensor with the lock plate and bolt.

Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)

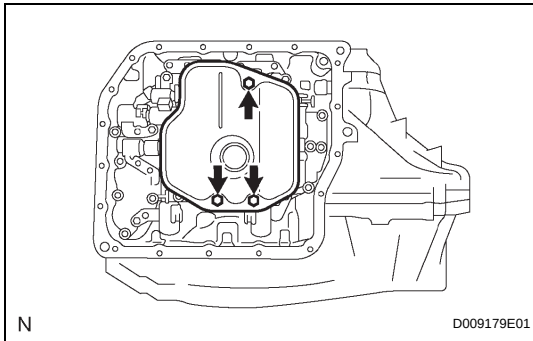
- (c) Connect the 5 shift solenoid valve connectors.



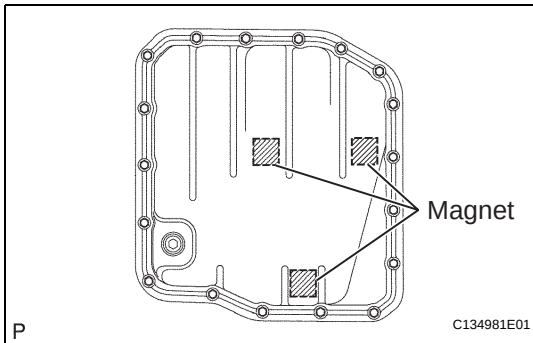


3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

- (a) Coat a new O-ring with ATF.
- (b) Install the O-ring to the oil strainer.

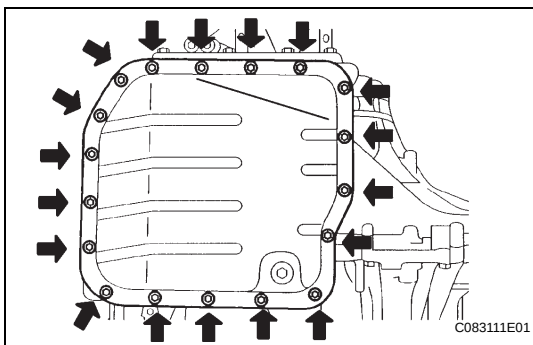


- (c) Install the oil strainer with the 3 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



4. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

- (a) Install the 3 magnets in the oil pan.



- (b) Install a new gasket and oil pan with the 18 bolts.
Torque: 7.6 N*m (77 kgf*cm, 67 in.*lbf)

5. INSTALL NO. 1 ENGINE UNDER COVER

6. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

7. ADD AUTOMATIC TRANSAXLE FLUID

Fluid type:

Toyota Genuine ATF WS

8. INSPECT TRANSAXLE FLUID LEVEL

- (a) Inspect the fluid level (see page [AX-102](#)).

9. PERFORM RESET MEMORY

- (a) Perform the RESET MEMORY procedures (A/T initialization) (see page [AX-18](#)).

INSTALLATION

1. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

- (a) Install the 5 shift solenoid valves with the 5 bolts and 4 plates.

Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf) for bolt A
11 N*m (112 kgf*cm, 8 ft.*lbf) for bolt B

HINT:

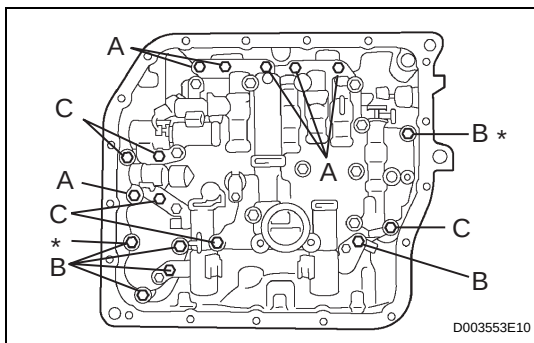
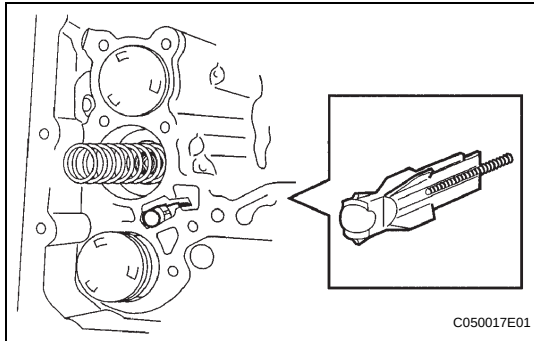
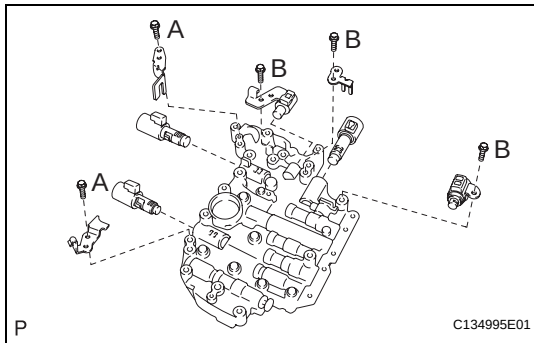
Each bolt length is indicated below.

Bolt length:

12 mm (0.47 in.) for Bolt A

45 mm (1.77 in.) for Bolt B

- (b) Install the spring and check ball body.



- (c) Align the groove of the manual valve with the pin of lever.

- (d) Install the 17 bolts.

Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

NOTICE:

- Push the valve body against the accumulator piston spring and the check ball body to install it.
- Tighten the bolts marked by * in the illustration first temporarily because they are positioning bolts.

HINT:

Each bolt length is indicated below.

Bolt length:

25 mm (0.984 in.) for Bolt A

41 mm (1.614 in.) for Bolt B

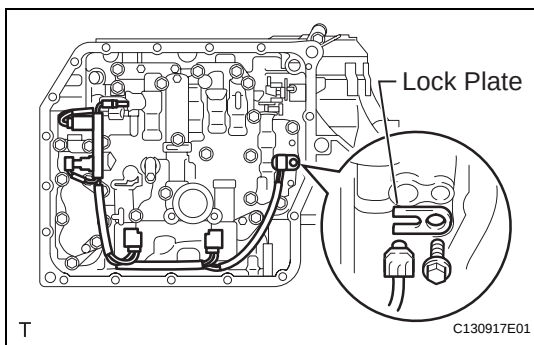
45 mm (1.771 in.) for Bolt C

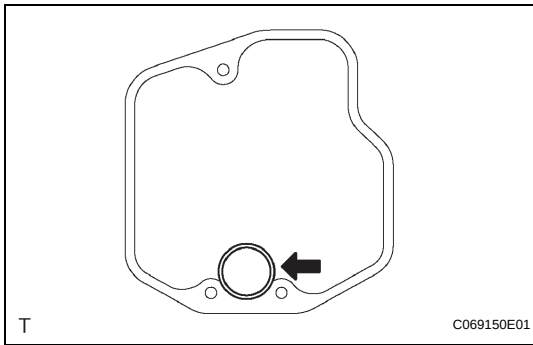
2. INSTALL TRANSMISSION WIRE

- (a) Coat the O-ring of the temperature sensor with ATF.
- (b) Install the ATF temperature sensor with the lock plate and bolt.

Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)

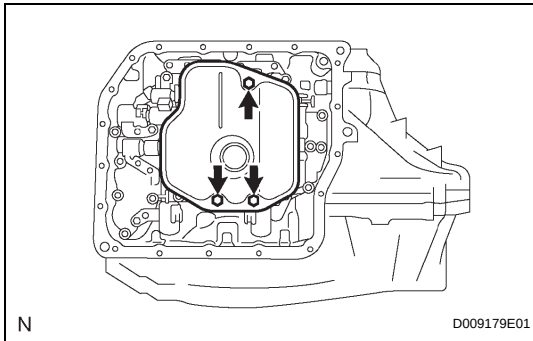
- (c) Connect the 5 shift solenoid valve connectors.



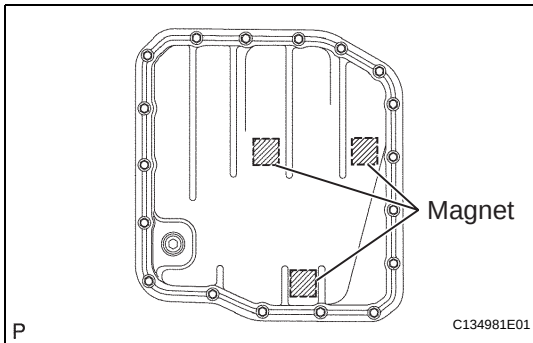


3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

- (a) Coat a new O-ring with ATF.
- (b) Install the O-ring to the oil strainer.

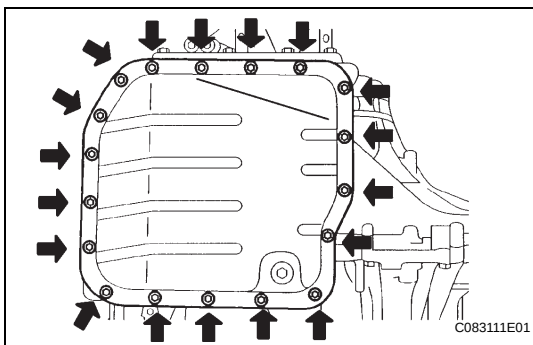


- (c) Install the oil strainer with the 3 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



4. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

- (a) Install the 3 magnets in the oil pan.



- (b) Install a new gasket and oil pan with the 18 bolts.
Torque: 7.6 N*m (77 kgf*cm, 67 in.*lbf)

5. INSTALL NO. 1 ENGINE UNDER COVER

6. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

7. ADD AUTOMATIC TRANSAXLE FLUID

Fluid type:

Toyota Genuine ATF WS

8. INSPECT TRANSAXLE FLUID LEVEL

- (a) Inspect the fluid level (see page [AX-102](#)).

9. PERFORM RESET MEMORY

- (a) Perform the RESET MEMORY procedures (A/T initialization) (see page [AX-18](#)).

ON-VEHICLE INSPECTION

1. CHECK SHIFT LOCK OPERATION

- Move the shift lever to P.
- Turn the ignition switch OFF.
- Check that the shift lever cannot be moved to any position other than P.
- Turn the ignition switch ON, depress the brake pedal and check that the shift lever can be moved to other positions.

2. CHECK SHIFT LOCK RELEASE BUTTON OPERATION

- When operating the shift lever with the shift lock release button pressed, check that the lever can be moved to any position other than P. If the operation cannot be performed as specified, check the shift lever assembly.

3. REMOVE KEY INTERLOCK OPERATION

- Turn the ignition switch ON.
- Depress the brake pedal and move the shift lever to any position other than P.
- Check that the ignition switch cannot be turned OFF.
- Move the shift lever to P, turn the ignition switch OFF and check that the key can be removed. If the results are not as specified, inspect the shift lock control unit.

4. CHECK SHIFT LOCK CONTROL UNIT ASSEMBLY

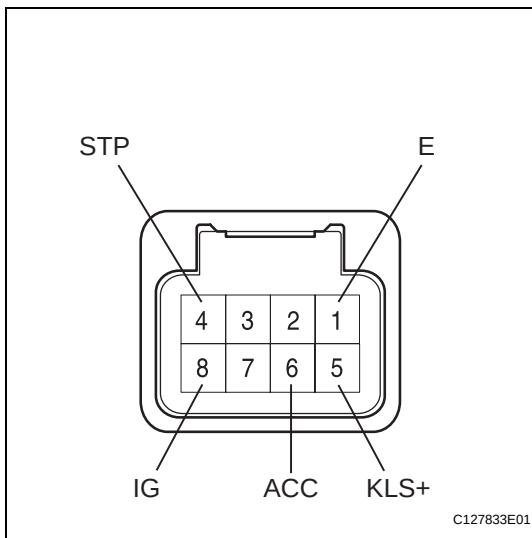
- Measure the voltage of the connector.

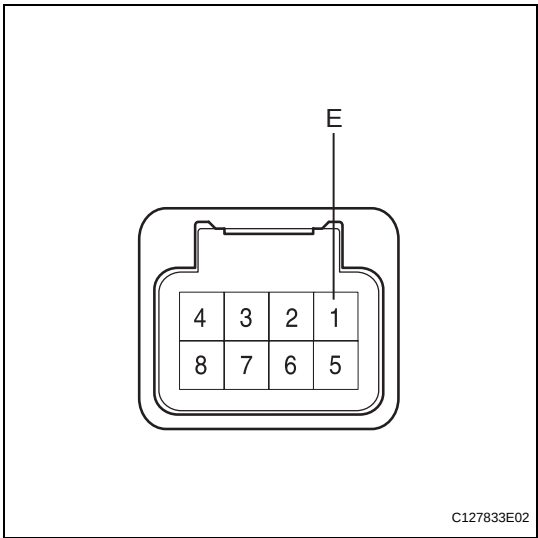
HINT:

Do not disconnect the shift lock control ECU connector.

Standard voltage

Tester Connection	Condition	Specified Condition
6 (ACC) - 1 (E)	Ignition switch ON	10 to 14 V
6 (ACC) - 1 (E)	Ignition switch ACC	10 to 14 V
6 (ACC) - 1 (E)	Ignition switch OFF	Below 1 V
4 (STP) - 1 (E)	Depress brake pedal	10 to 14 V
4 (STP) - 1 (E)	Release brake pedal	Below 1 V
5 (KLS+) - 1 (E)	Ignition switch ON and shift lever on P	Below 1 V
5 (KLS+) - 1 (E)	Ignition switch ACC and shift lever not on P	7.5 to 11 V
5 (KLS+) - 1 (E)	Ignition switch ACC and shift lever not on P (after approx. 1 second)	6 to 9 V
8 (IG) - 1 (E)	Ignition switch IG	10 to 14 V
8 (IG) - 1 (E)	Ignition switch OFF	Below 1 V



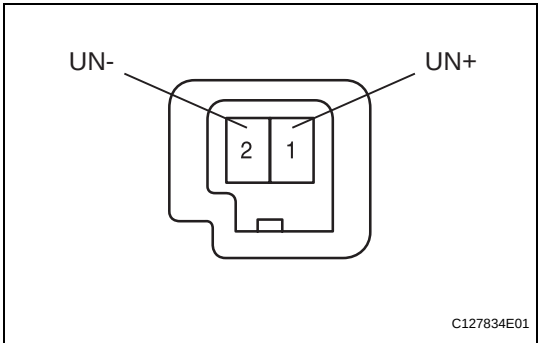


- (b) the resistance of the connector.
HINT:
Do not disconnect the shift lock control ECU connector.

Standard resistance

Tester Connection	Measuring Condition	Specified Condition
1 (E) - Body ground	Always	Below 1 Ω

If the result is not as specified, replace the shift lock control ECU.



INSPECTION

1. INSPECT KEY INTERLOCK SOLENOID

- (a) Disconnect the solenoid connector.
(b) Connect the battery's positive (+) lead to terminal 1 (UN+) and the battery's negative (-) lead to terminal 2 (UN-).
Check that the operating noise of the solenoid can be heard.
If the result is not as specified, replace the solenoid.

AUTOMATIC TRANSAXLE SYSTEM

PRECAUTION

NOTICE:

Perform the RESET MEMORY procedures (A/T initialization) when replacing the automatic transaxle assembly, engine assembly or ECM (see page [AX-18](#)).

HINT:

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

CAUTION:

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

NOTICE:

- The automatic transaxle is composed of precision-made parts, necessitating careful inspection before reassembly because even a small nick could cause fluid leakage or affect performance.
- The procedures are organized so that you work on only one component group at a time. This will help avoid confusion with similar-looking parts of different sub-assemblies being on your workbench at the same time.
- The component groups are inspected and repaired from the converter housing side.
- Whenever possible, complete the inspection, repair and reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups.
- Use of Toyota Genuine ATF WS is recommended.
- All disassembled parts should be washed clean, and compressed air should be blown through any fluid passages and holes.
- Dry all parts with compressed air. Never use cloth.
- The recommended ATF or kerosene should be used for cleaning.
- After cleaning, the parts should be arranged in the order they were removed for efficient inspection, repairs, and reassembly.
- When disassembling a valve body, be sure to match each valve with its corresponding spring.
- New discs for the brakes and clutches that will be used for replacement must be soaked in ATF for at least 15 minutes before reassembly.

- All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.
- All old gaskets and rubber O-rings must be replaced.
- Do not apply adhesive cement to gaskets and similar parts.
- Make sure that the ends of the snap rings are not aligned with any cutouts. Also make sure that snap rings are correctly installed into the grooves.
- If a worn bushing is to be replaced, the sub-assembly containing the bushing must also be replaced.
- Check the thrust bearings and races for wear or damage. Replace them if necessary.
- Use petroleum jelly to keep parts in place.
- When working with FIPG material, perform the following:

Using a razor blade and gasket scraper, remove all old FIPG material from the gasket surface.

Clean all components thoroughly to remove all foreign matter.

Clean both sealing surfaces with a non-residue solvent.

Apply FIPG material in a continuous line approximately 1 mm (0.04 in.) in diameter on the sealing surface.

Reassemble parts within 10 minutes of applying FIPG material. Failing to do so will require the FIPG material to be removed and reapplied.

AUTOMATIC TRANSAXLE FLUID

ON-VEHICLE INSPECTION

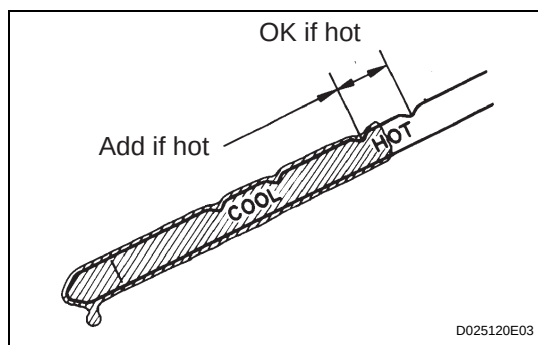
1. CHECK TRANSAXLE FLUID LEVEL

HINT:

Drive the vehicle so that the engine and transaxle are at normal operating temperature.

Fluid temperature:

70 to 80°C (158 to 176°F)

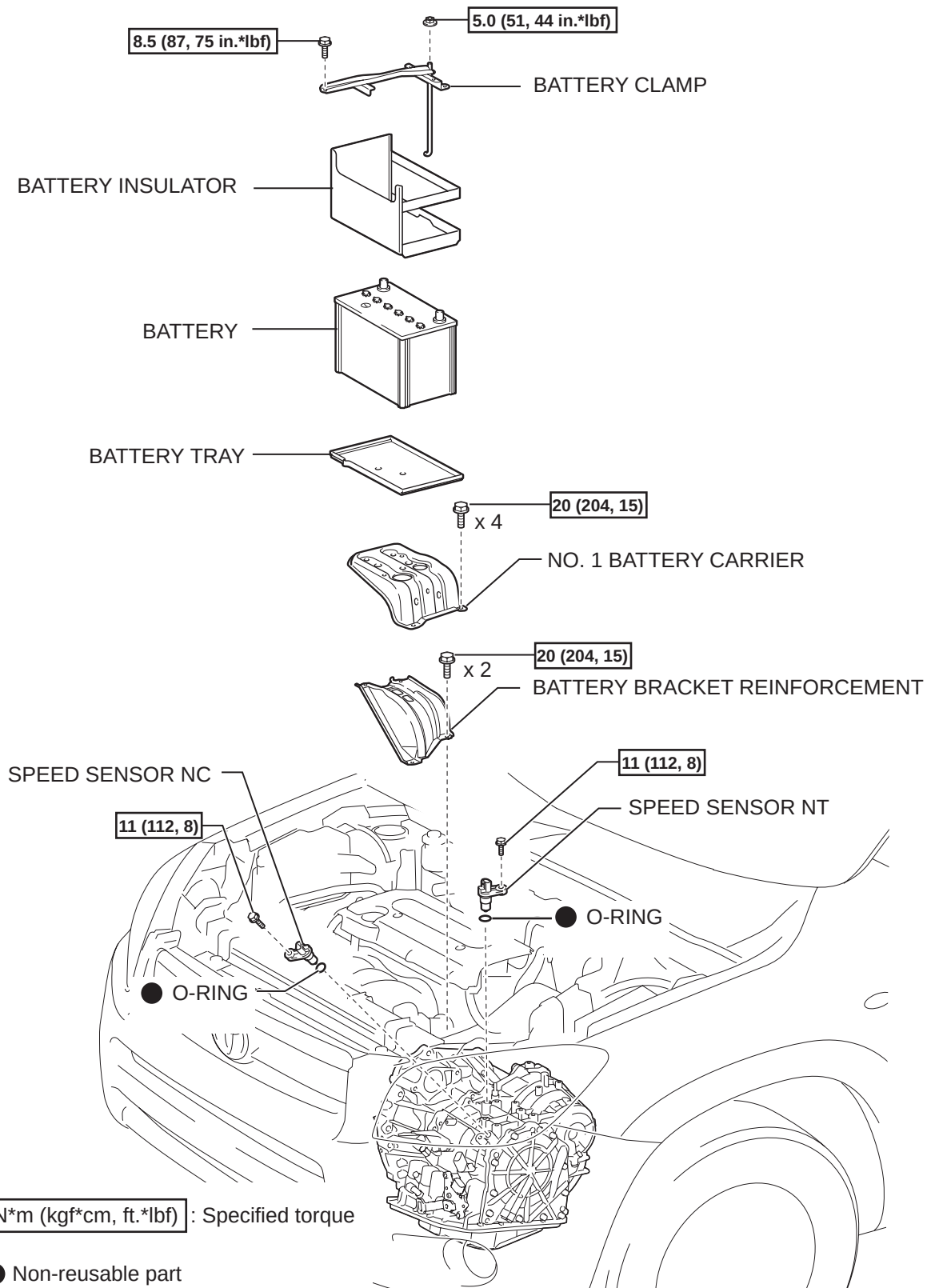


- Park the vehicle on a level surface and set the parking brake.
- With the engine idling and the brake pedal depressed, move the shift lever to each position from P to L position, and return it to the P position.
- Take out the ATF dipstick and wipe it clean.
- Fully push the dipstick back into the pipe.
- Take it out and check that the fluid level is at the HOT position.

If there are leaks, it is necessary to repair or replace O-rings, FIPGs, oil seals, plugs and/or other parts.

SPEED SENSOR

COMPONENTS



REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

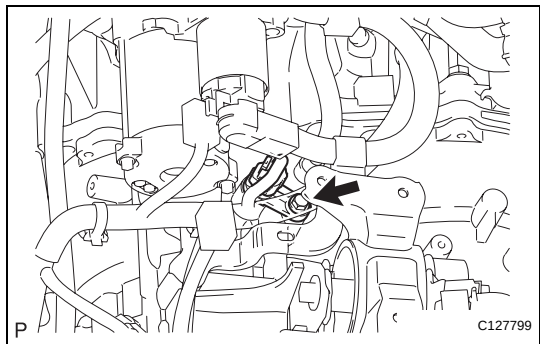
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE BATTERY

- (a) Loosen the nut and remove the bolt and battery clamp.
- (b) Remove the battery.
- (c) Remove the battery tray.
- (d) Remove the 4 bolts and battery carrier.
- (e) Remove the 2 bolts and battery bracket reinforcement.

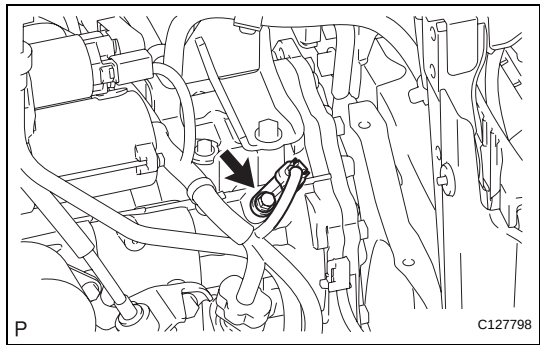
3. REMOVE SPEED SENSOR NT

- (a) Disconnect the sensor connector.
- (b) Remove the bolt and sensor.
- (c) Remove the O-ring from the sensor.



4. REMOVE SPEED SENSOR NC

- (a) Disconnect the sensor connector.
- (b) Remove the bolt and sensor.
- (c) Remove the O-ring from the sensor.



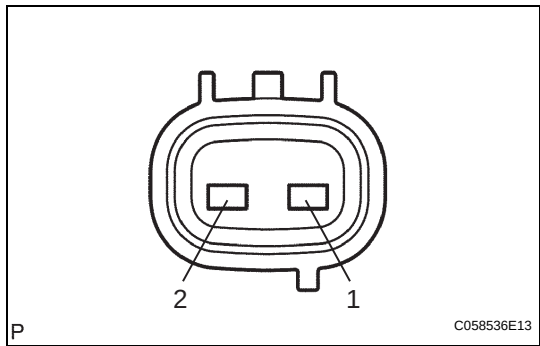
INSPECTION

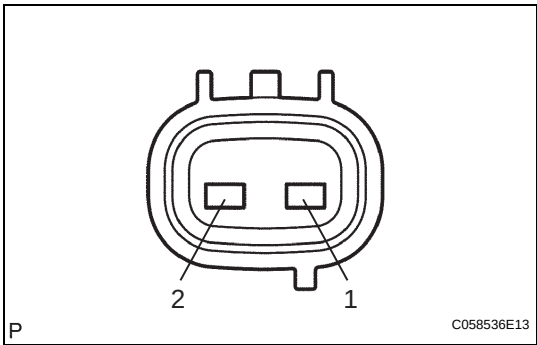
1. INSPECT SPEED SENSOR NT

Measure the resistance of the sensor.

Standard resistance

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

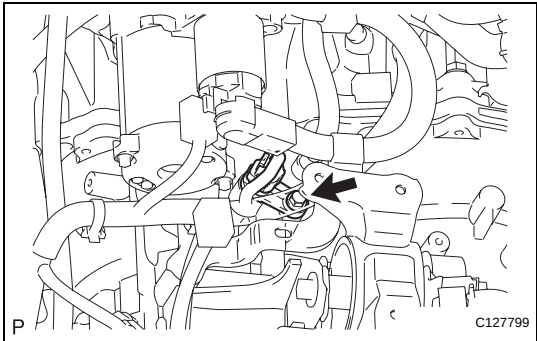




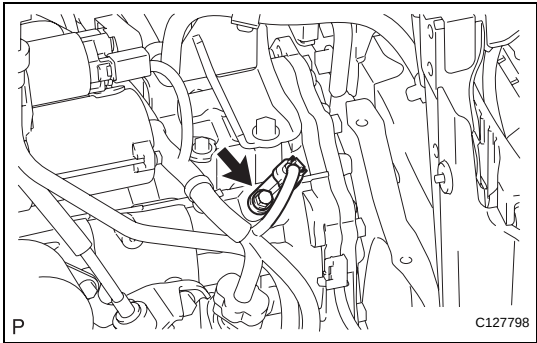
- 2. INSPECT SPEED SENSOR NC**
Measure the resistance of the sensor.
Standard resistance

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

INSTALLATION



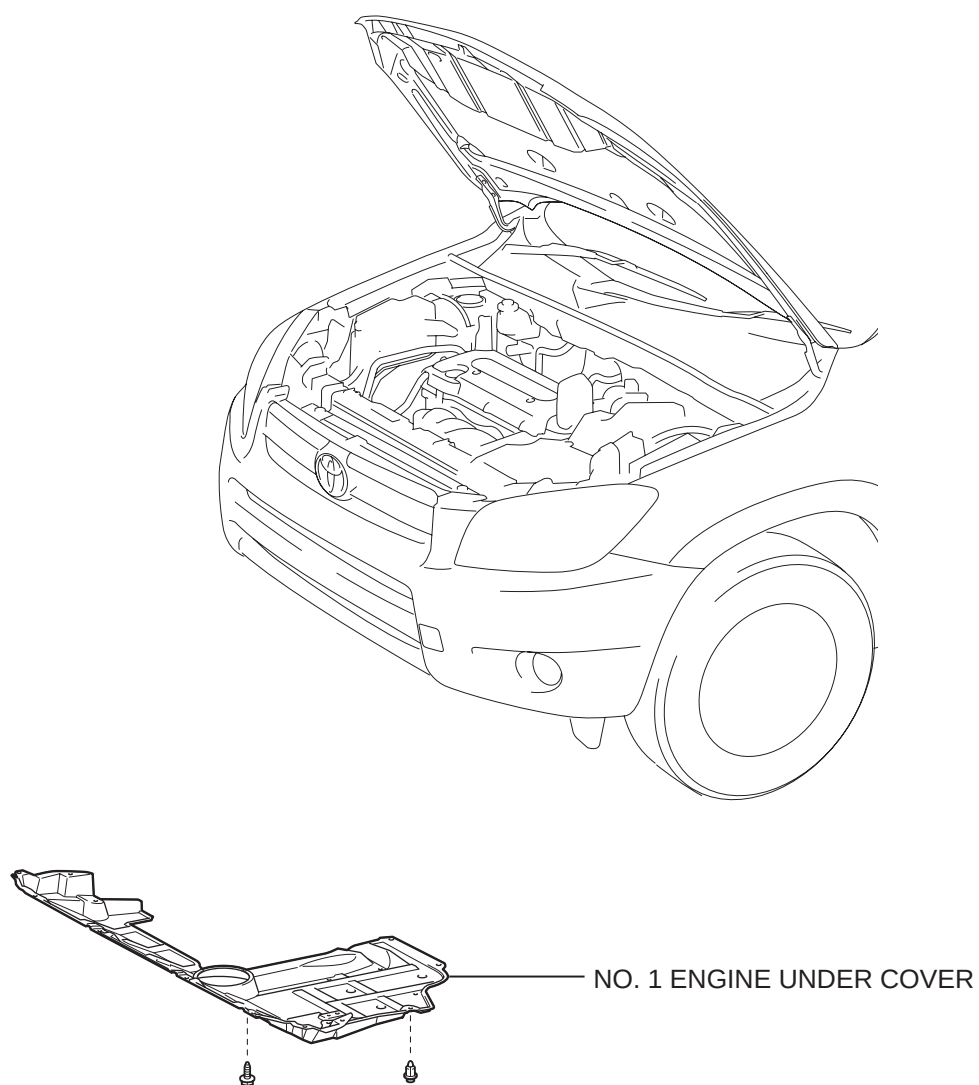
- 1. INSTALL SPEED SENSOR NC**
- (a) Coat a new O-ring with ATF.
 - (b) Install the O-ring to the sensor.
 - (c) Install the sensor with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
 - (d) Connect the sensor connector.

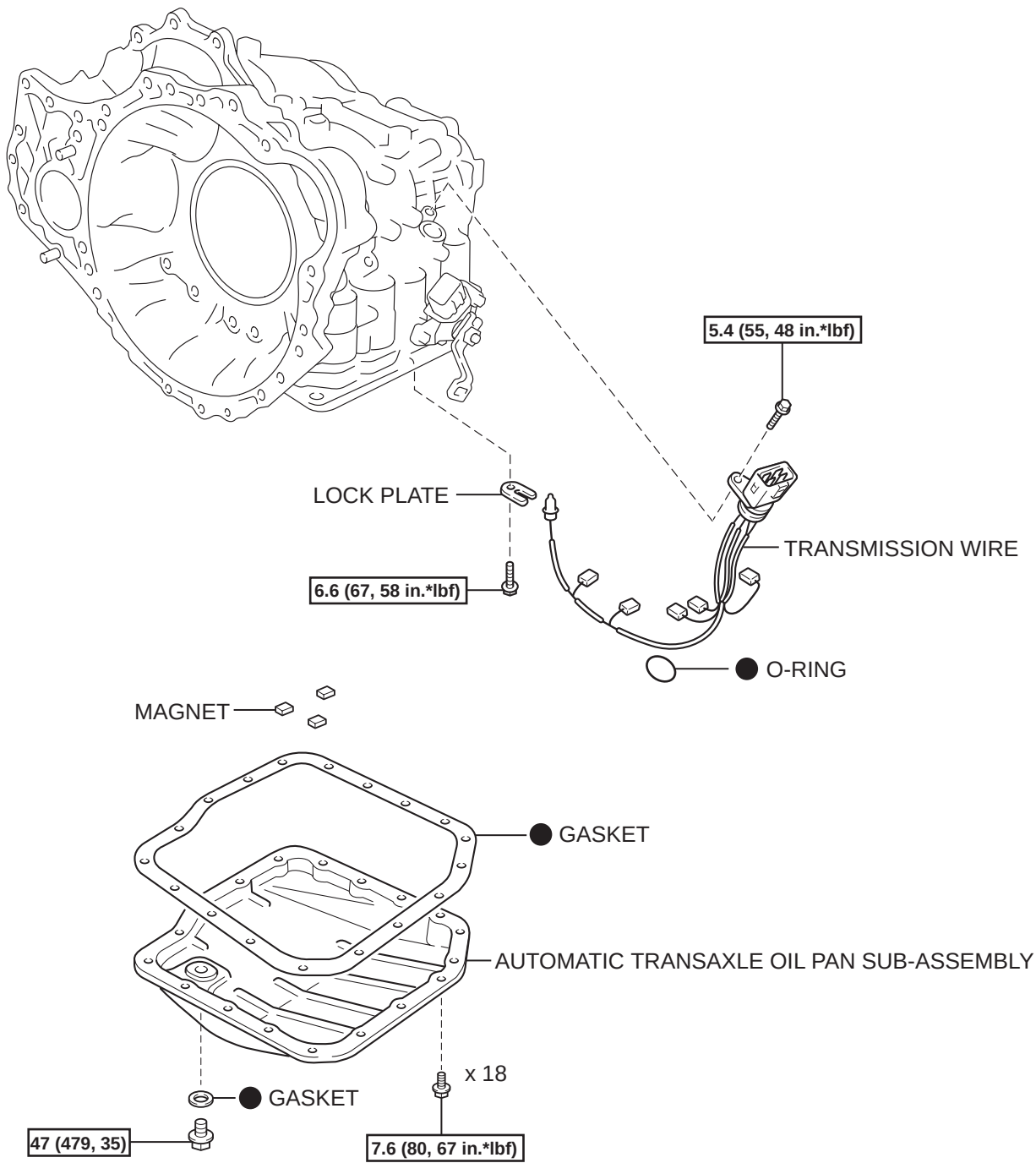


- 2. INSTALL SPEED SENSOR NT**
- (a) Coat a new O-ring with ATF.
 - (b) Install the O-ring to the sensor.
 - (c) Install the sensor with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
 - (d) Connect the sensor connector.
- 3. INSTALL BATTERY**
- (a) Install the battery bracket reinforcement with the 2 bolts.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
 - (b) Install the battery carrier with the 4 bolts.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
 - (c) Install the battery tray.
 - (d) Install the battery with the battery clamp.
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf) for bolt
5.0 N*m (51 kgf*cm, 44 in.*lbf) for nut
- 4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

TRANSMISSION WIRE

COMPONENTS



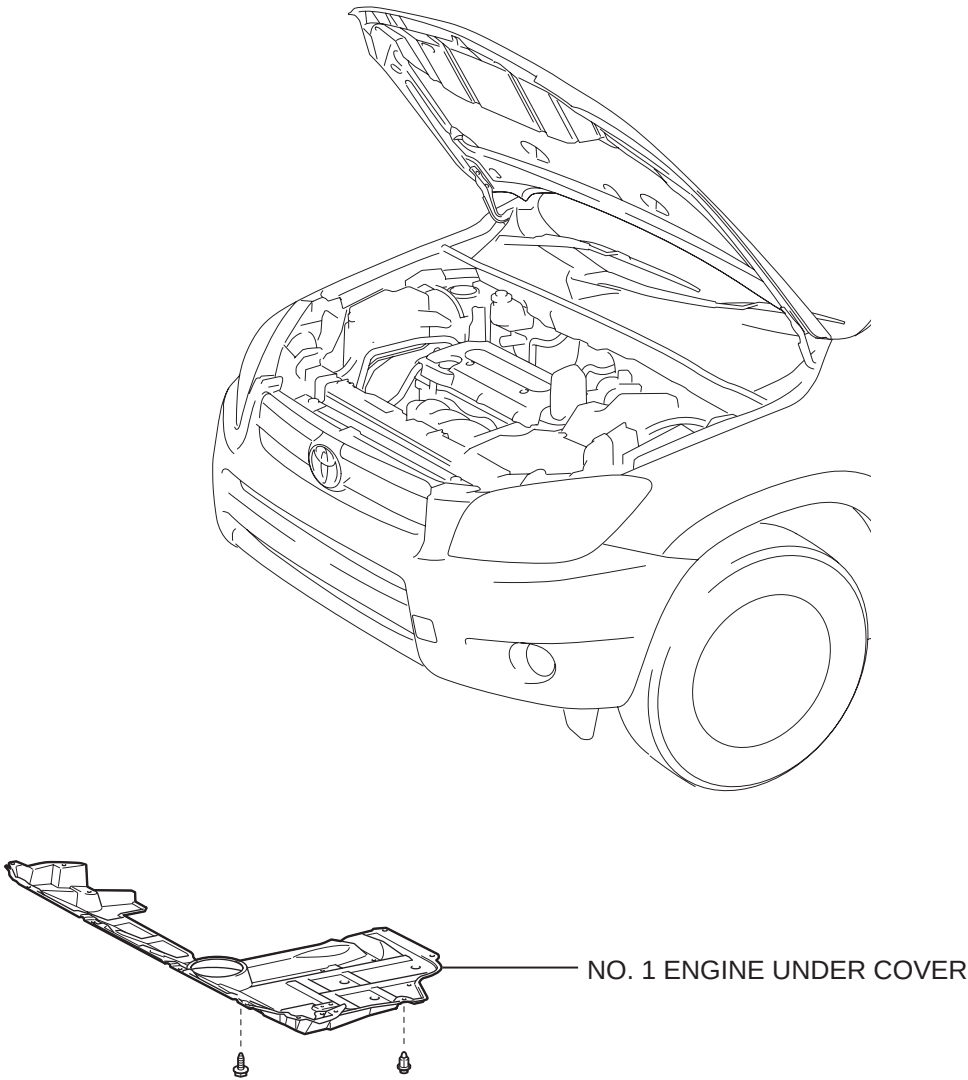


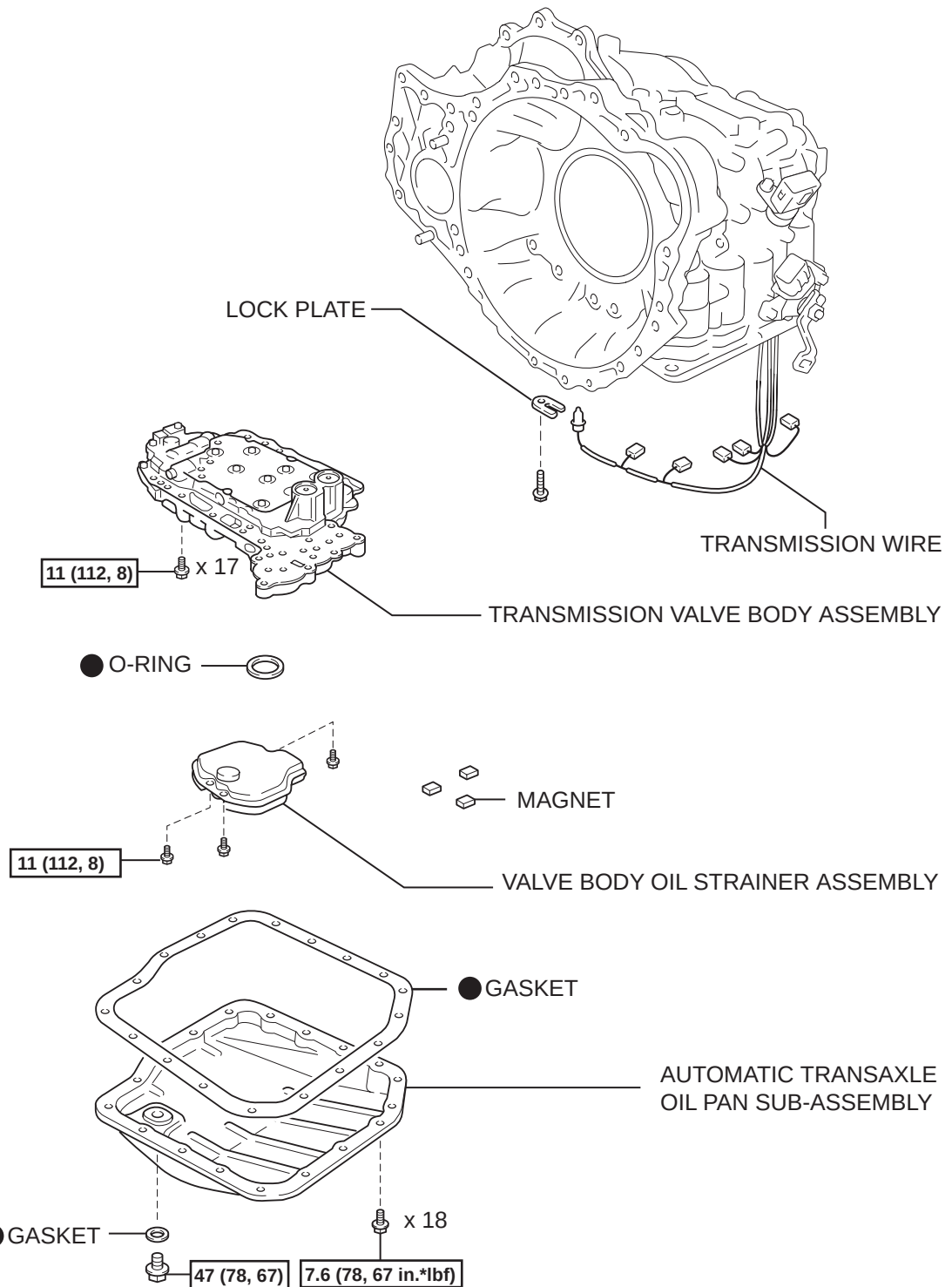
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

VALVE BODY ASSEMBLY

COMPONENTS



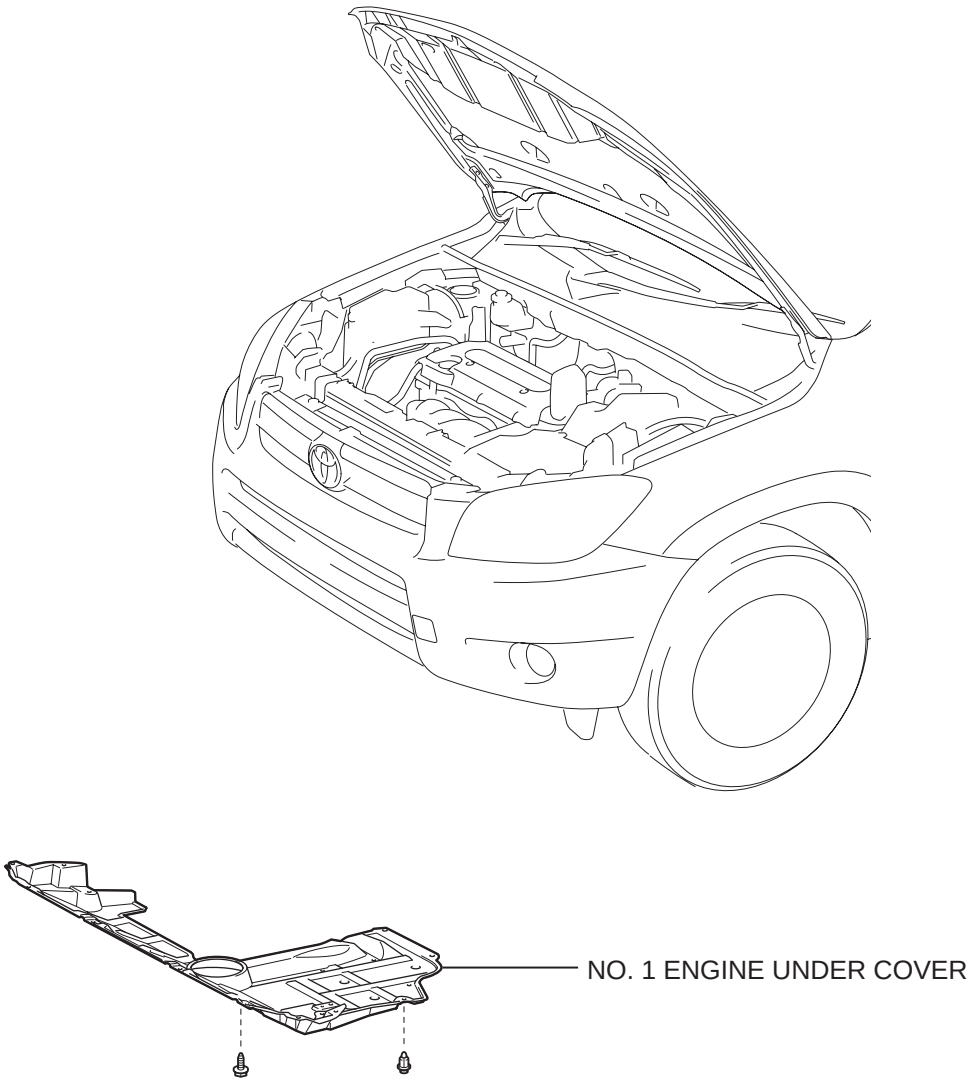


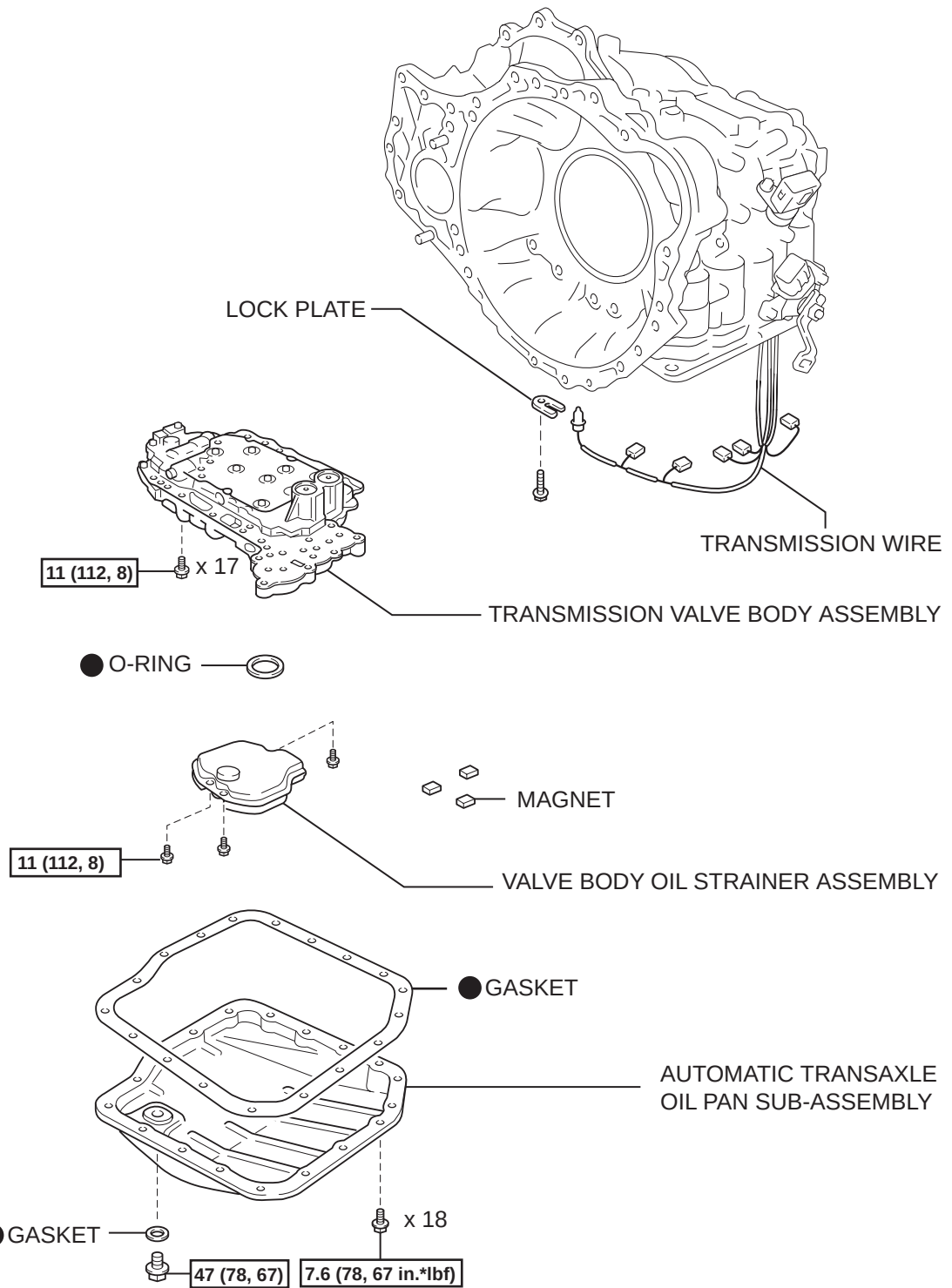
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

VALVE BODY ASSEMBLY

COMPONENTS



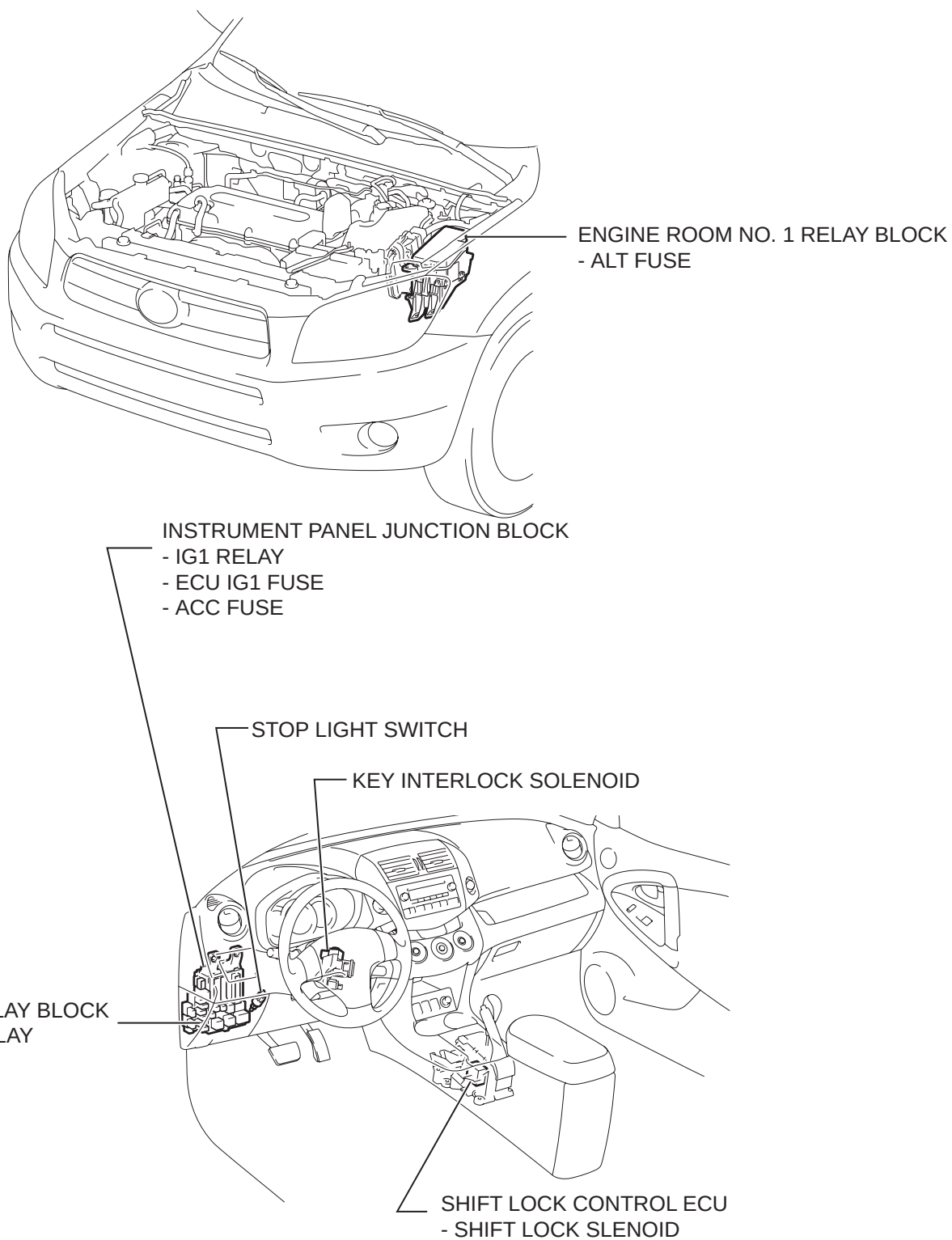


N*m (kgf*cm, ft.*lbf) : Specified torque

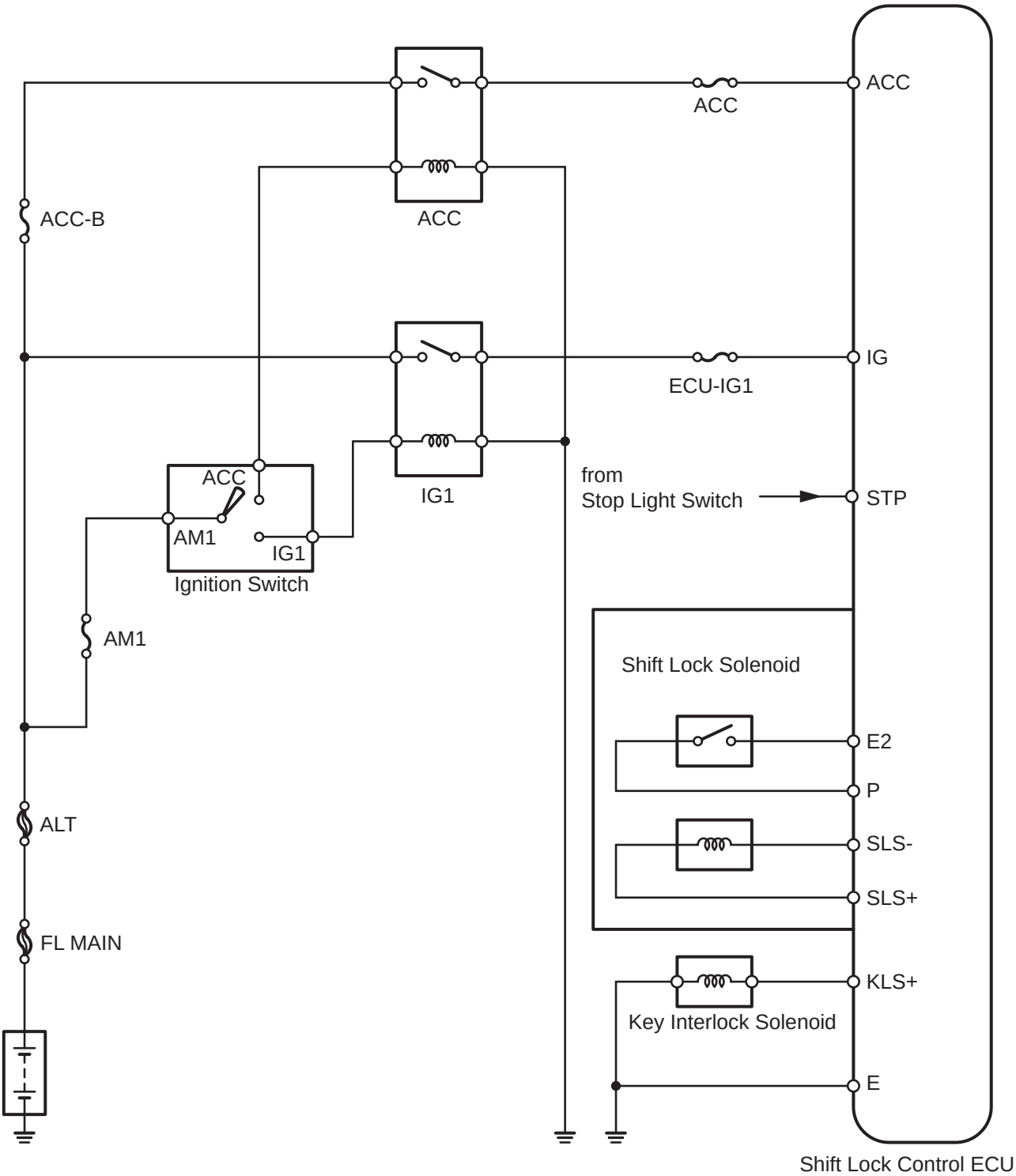
● Non-reusable part

SHIFT LOCK SYSTEM

PARTS LOCATION

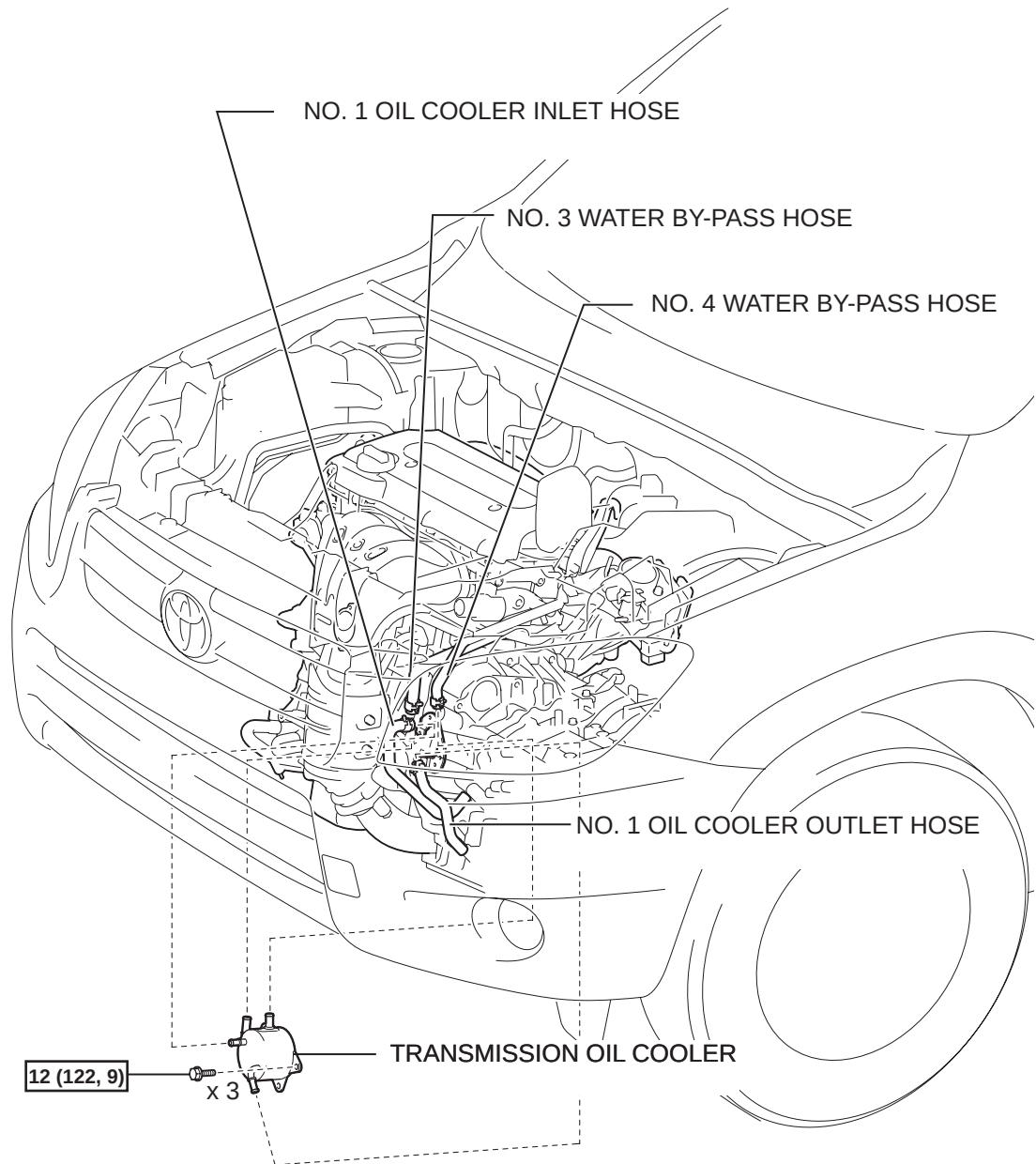


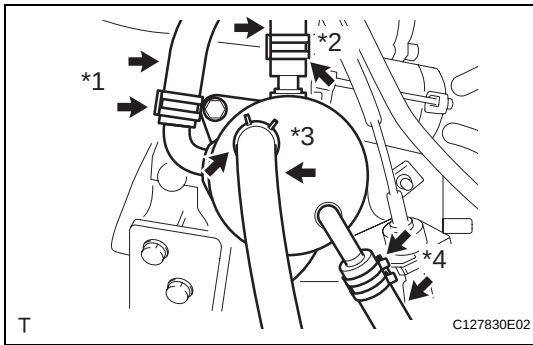
SYSTEM DIAGRAM



TRANSMISSION OIL COOLER

COMPONENTS

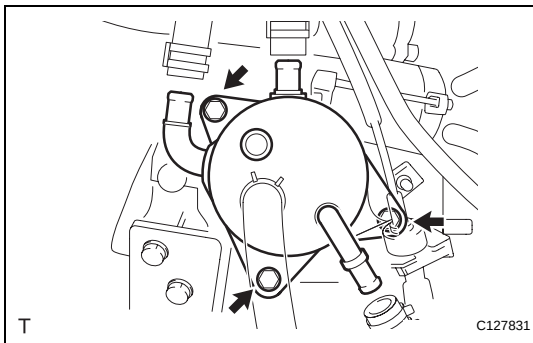
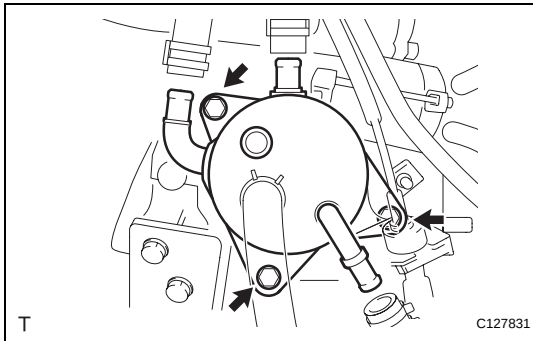




REMOVAL

1. REMOVE TRANSMISSION OIL COOLER

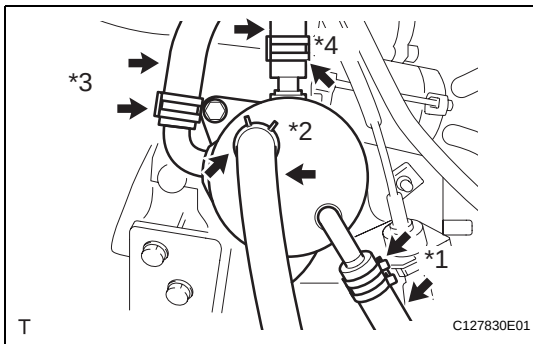
- *1: Disconnect the No. 3 water by-pass hose from the transmission oil cooler.
- *2: Disconnect the No. 4 water by-pass hose from the transmission oil cooler.
- *3: Disconnect the No. 1 oil cooler inlet hose from the transmission oil cooler.
- *4: Disconnect the No. 1 oil cooler outlet hose from the transmission oil cooler.
- Remove the 3 bolts and oil cooler from the bracket.



INSTALLATION

1. INSTALL TRANSMISSION OIL COOLER

- Install the oil cooler to the bracket with the 3 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



- *1: Connect the No. 1 oil cooler outlet hose to the transmission.
- *2: Connect the No. 1 oil cooler inlet hose to the transmission.
- *3: Connect the No. 3 water by-pass hose to the transmission.
- *4: Connect the No. 4 water by-pass hose to the transmission.

2. ADD AUTOMATIC TRANSAXLE FLUID

3. INSPECT AUTOMATIC TRANSAXLE FLUID

- Inspect the automatic transaxle fluid (see page [AX-102](#)).

4. ADD COOLANT

- Add the coolant (see page [CO-6](#)).

TRANSMISSION CONTROL CABLE ASSEMBLY

REPLACEMENT

1. **REMOVE REAR CONSOLE BOX SUB-ASSEMBLY**
 - (a) Remove the console box (see page [IP-20](#)).

2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

CAUTION:

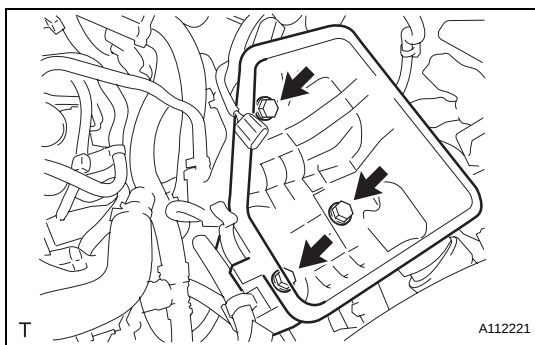
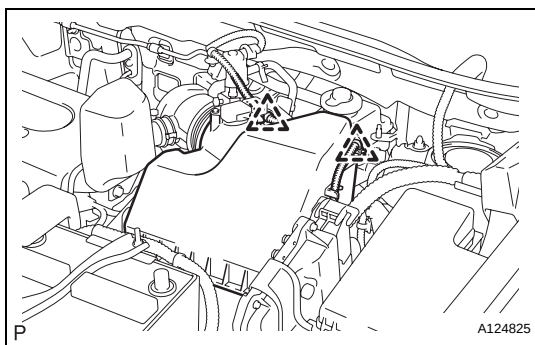
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

3. **REMOVE BATTERY**

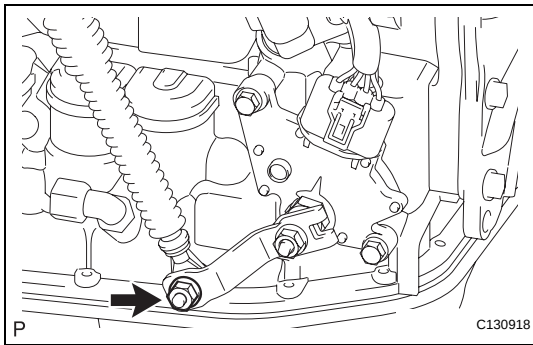
- (a) Loosen the nut and remove the bolt and battery clamp.
- (b) Remove the battery.
- (c) Remove the battery tray.
- (d) Remove the 4 bolts and battery carrier.
- (e) Remove the 2 bolts and battery bracket reinforcement.

4. **REMOVE AIR CLEANER ASSEMBLY**

- (a) Disconnect the mass air flow meter connector.
- (b) Remove the 2 clamps of the engine wire.

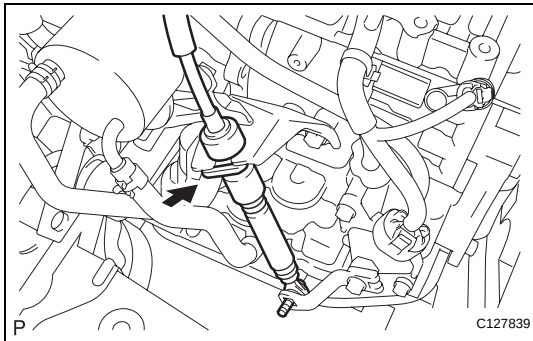


- (c) Remove the 4 bolts from the air cleaner case.
- (d) Disconnect the air cleaner case from the No. 1 air cleaner inlet.

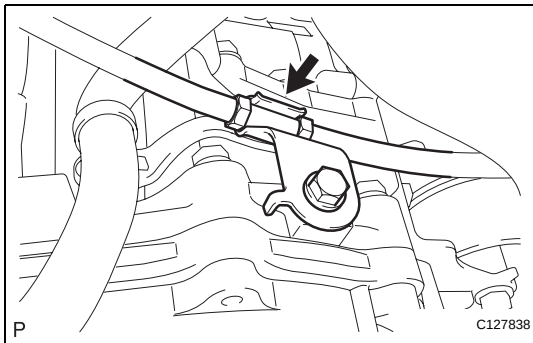


5. REMOVE TRANSAXLE CONTROL CABLE ASSEMBLY

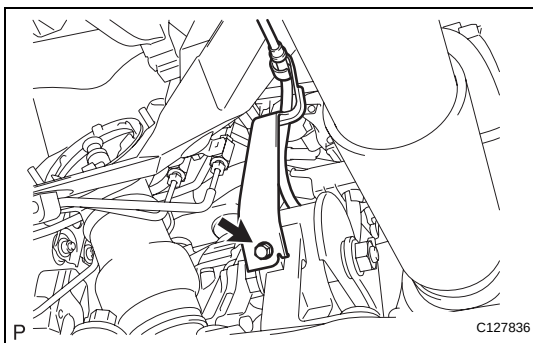
- (a) Remove the nut and disconnect the control cable from the control shaft lever.



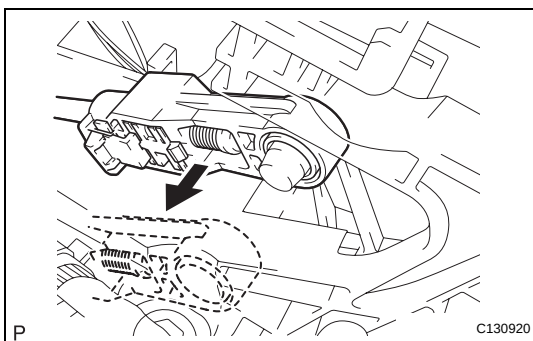
- (b) Remove the clip and disconnect the control cable from the control cable bracket.



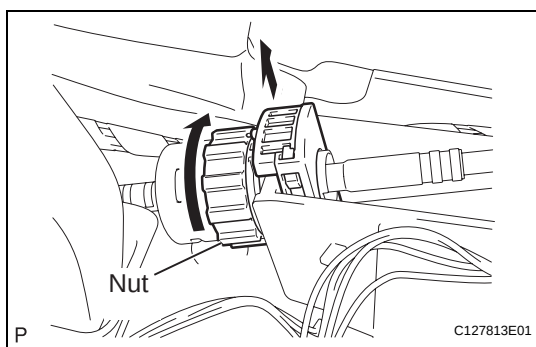
- (c) Disconnect the control cable from the control cable support.



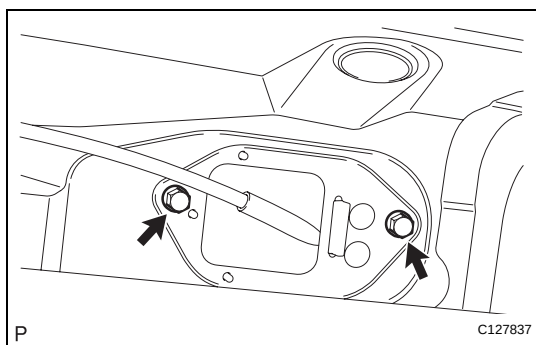
- (d) Remove the bolt and disconnect the clamp of the control cable.



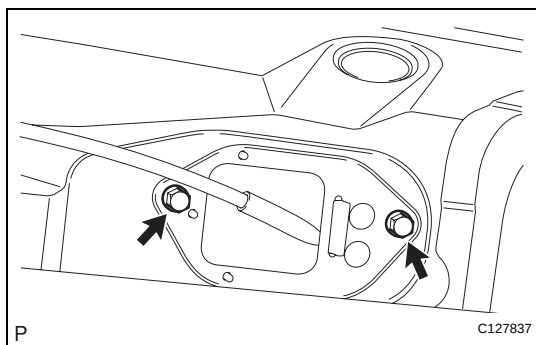
- (e) Disconnect the control cable from the shift lever.



- (f) Turn the nut and disconnect the control cable from the shift lever retainer.

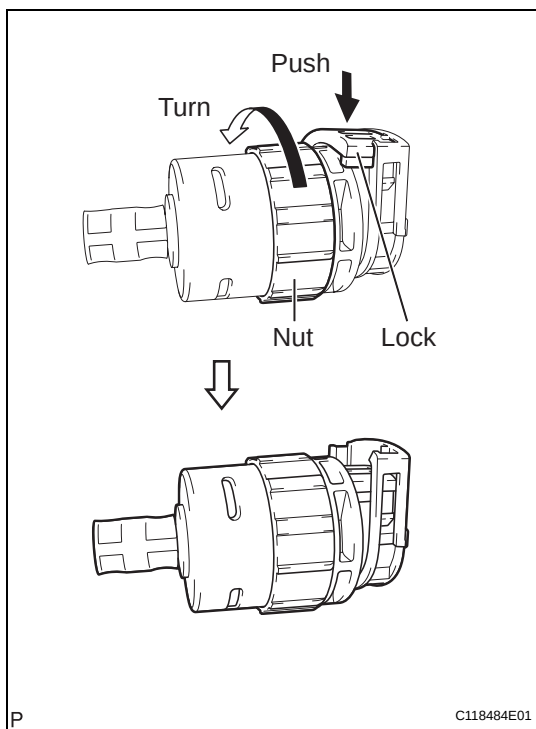


- (g) Remove the 2 bolts and control cable.

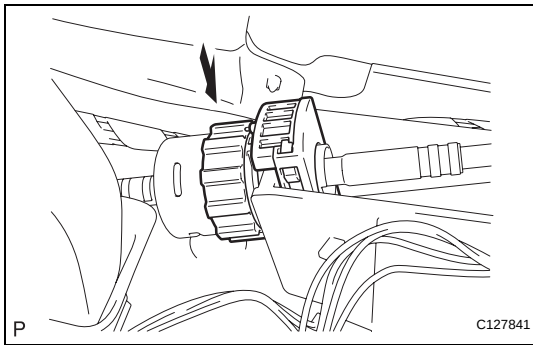


6. INSTALL TRANSAXLE CONTROL CABLE ASSEMBLY

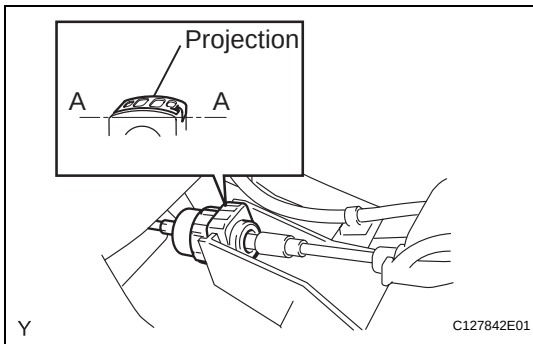
- (a) Install the control cable with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



- (b) Turn the nut of the control cable and push in the lock.

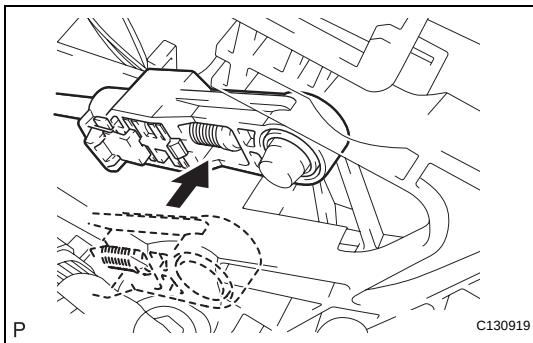


- (c) Install the control cable onto the shift lever retainer.



NOTICE:

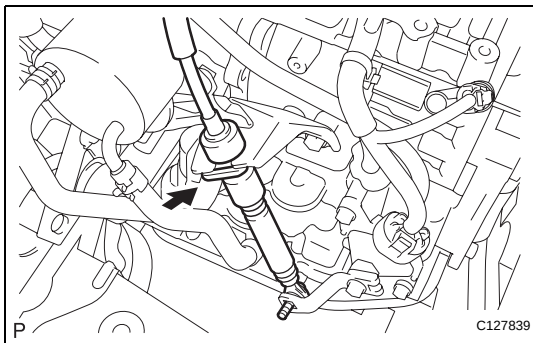
- Install the cable with the protruding portion of the cable outer facing upward.
- After installing, check that the lock of the cable outer is protruding beyond portion A-A, as shown in the illustration.



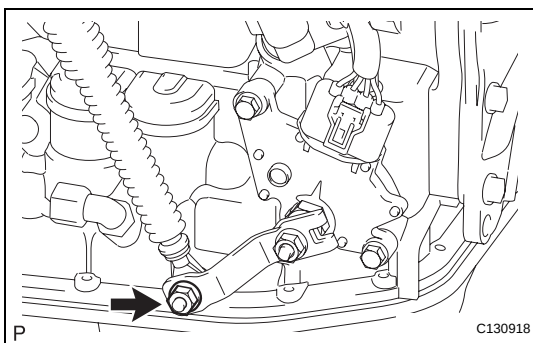
- (d) Connect the control cable to the shift lever.

NOTICE:

Connect the control cable so that the adjusting mechanism lock of the control cable is installed on the driver side of the vehicle.

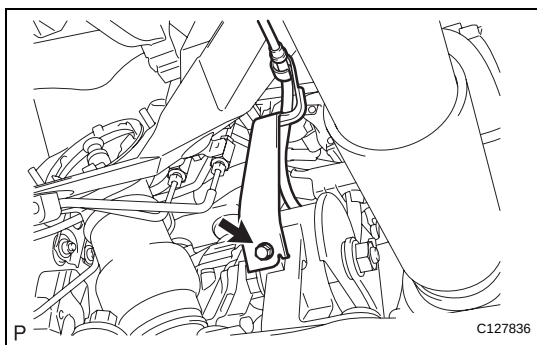


- (e) Fix the control cable onto the control cable bracket with the clip.

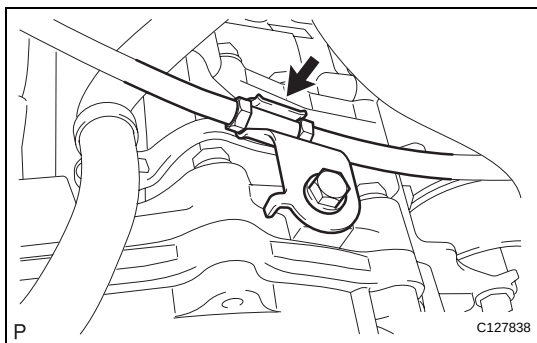


- (f) Connect the control cable onto the control shaft lever with the nut.

Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



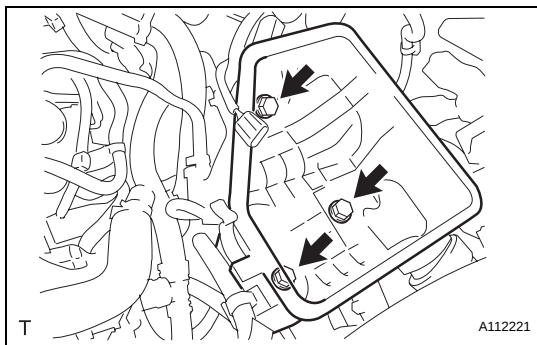
- (g) Connect the clamp of the control cable with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



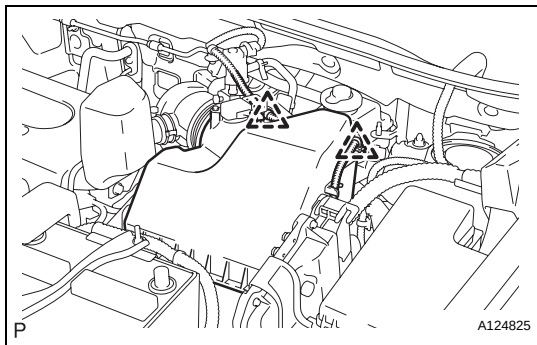
- (h) Connect the control cable to the cable support.

7. INSTALL AIR CLEANER ASSEMBLY

- (a) Connect the air cleaner case to the No. 1 air cleaner inlet.



- (b) Install the air cleaner case with the 4 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



- (c) Connect the 2 clamps of the engine wire.
 (d) Connect the mass air flow meter connector.

8. INSTALL BATTERY

- (a) Install the battery bracket reinforcement with the 2 bolts.

Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

- (b) Install the battery carrier with the 4 bolts.

Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

- (c) Install the battery tray.

- (d) Connect the 2 clamps of the engine wire.

- (e) Install the battery with the battery clamp.

Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf) for bolt
5.0 N*m (51 kgf*cm, 44 in.*lbf) for nut

9. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

10. INSPECT SHIFT LEVER POSITION

- (a) When shifting the lever from P to the R position with the ignition switch on (IG) and the brake pedal depressed, make sure that the shift lever moves smoothly and moves correctly into position.

- (b) Start the engine and make sure that the vehicle moves forward when shifting the lever from N to the D position and moves rearward when shifting the lever to the R position.
If the operation cannot be performed as specified, inspect the park/neutral position switch and check the shift lever installation condition.

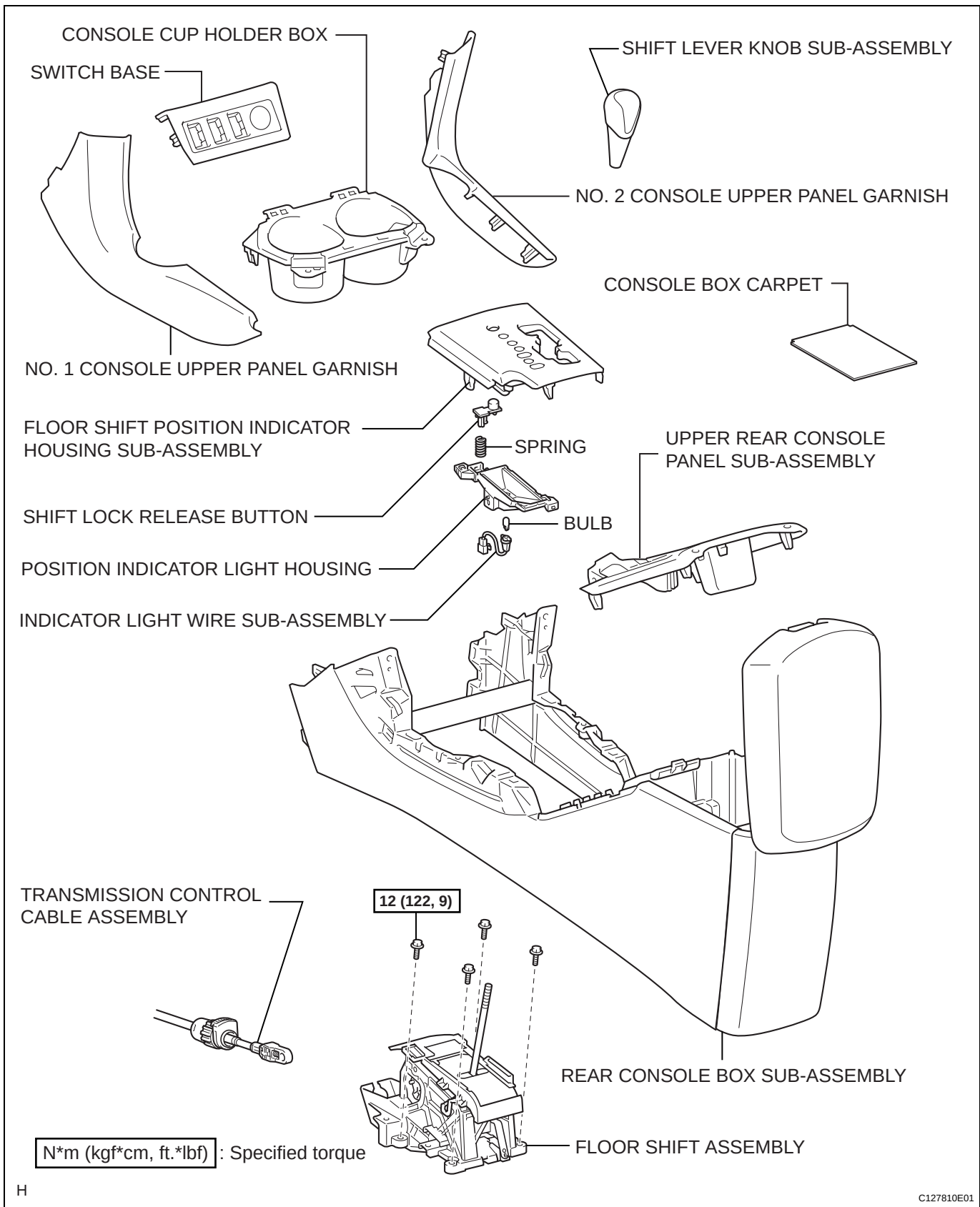
11. ADJUST SHIFT LEVER POSITION (See page [AX-138](#))

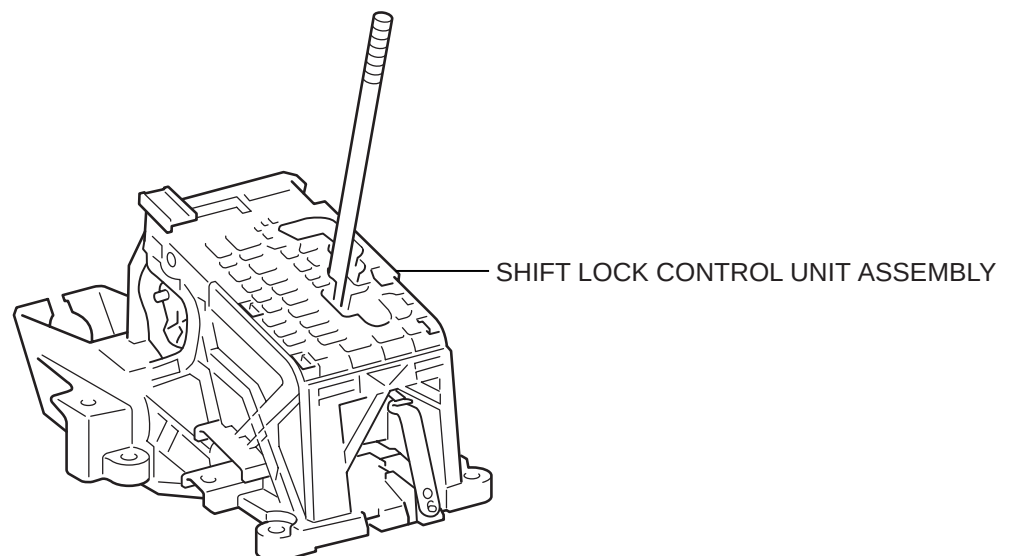
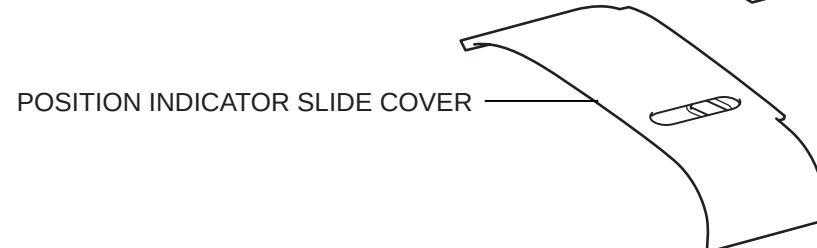
12. INSTALL REAR CONSOLE BOX SUB-ASSEMBLY

- (a) Install the rear console box (see page [IP-26](#)).

FLOOR SHIFT ASSEMBLY

COMPONENTS

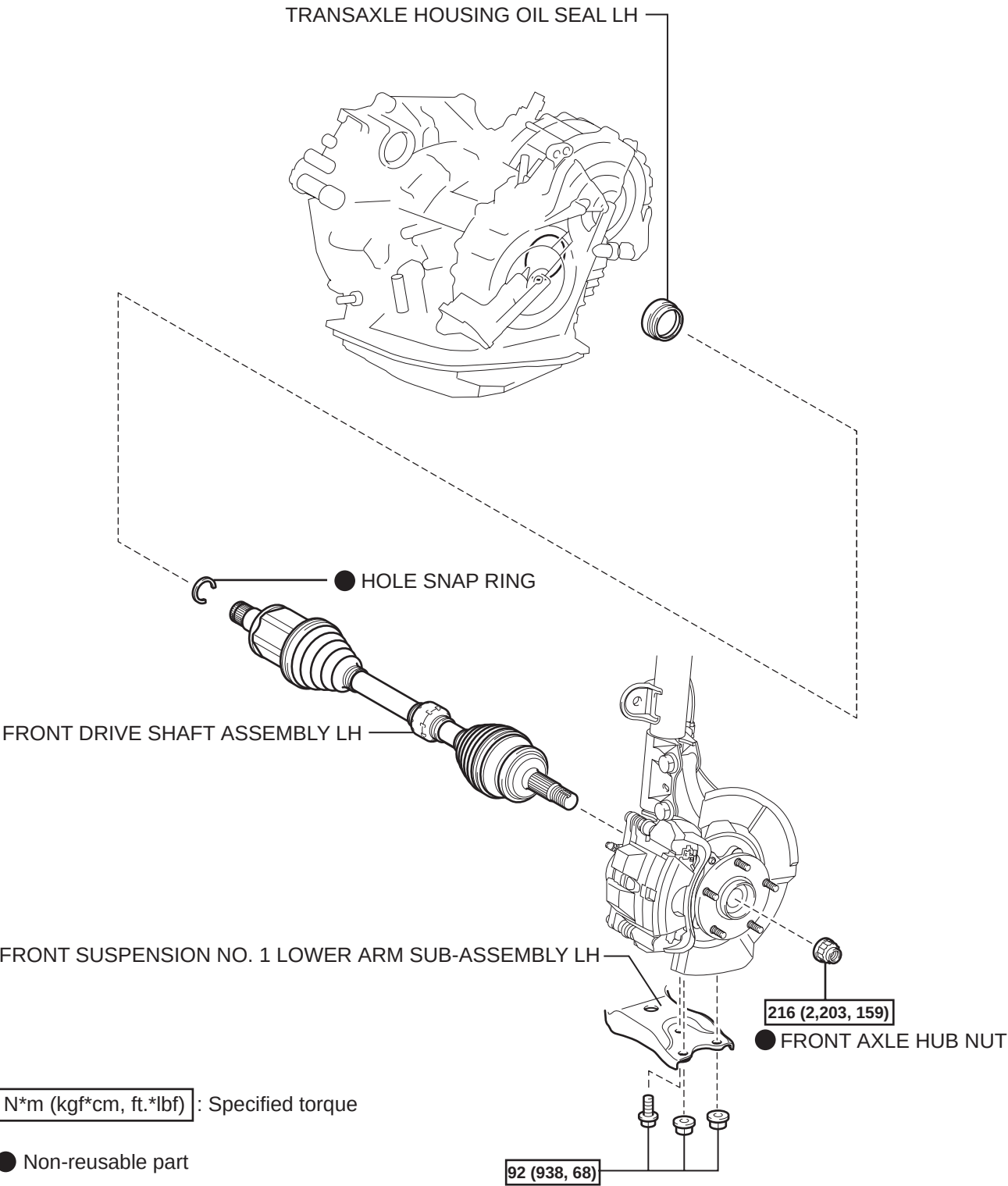


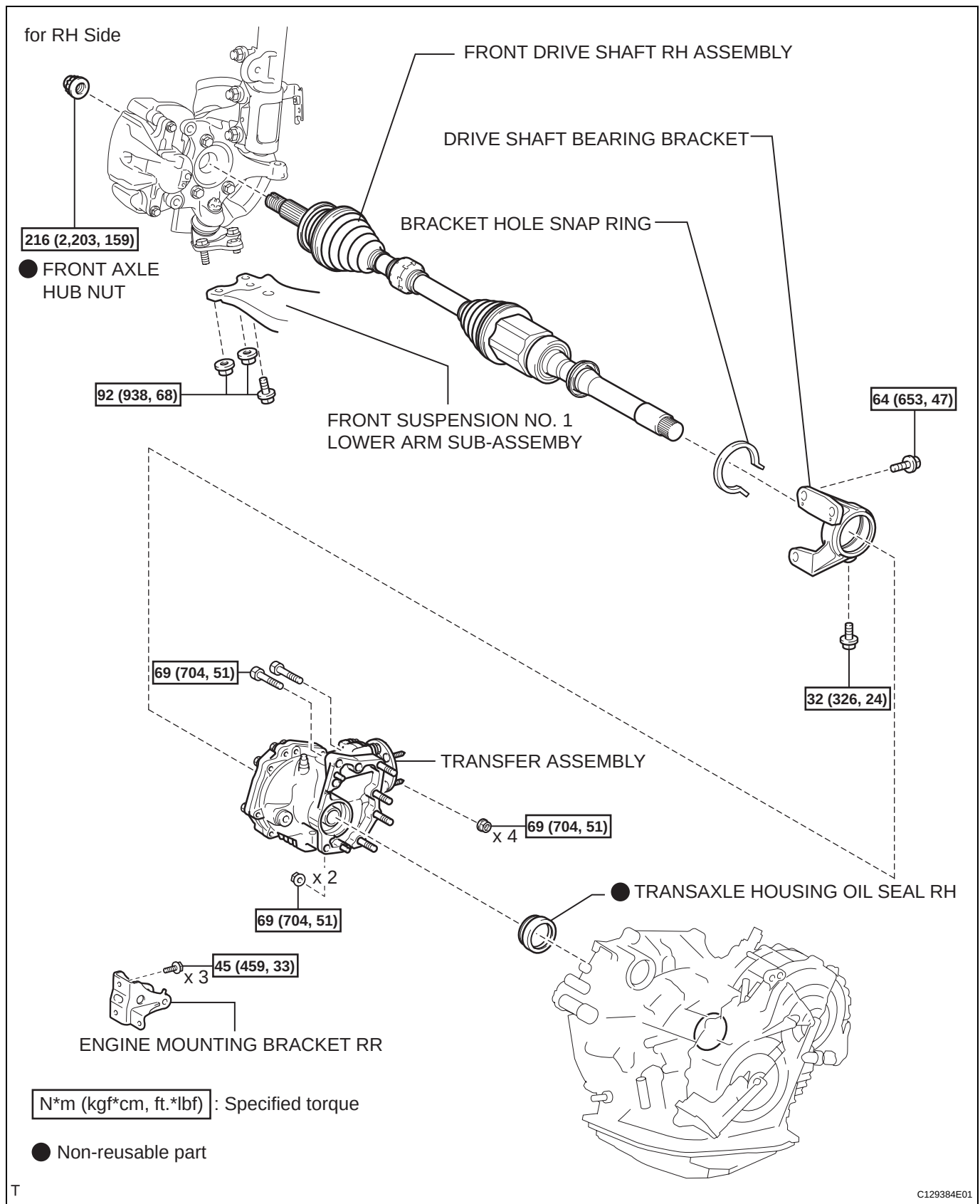


DIFFERENTIAL OIL SEAL

COMPONENTS

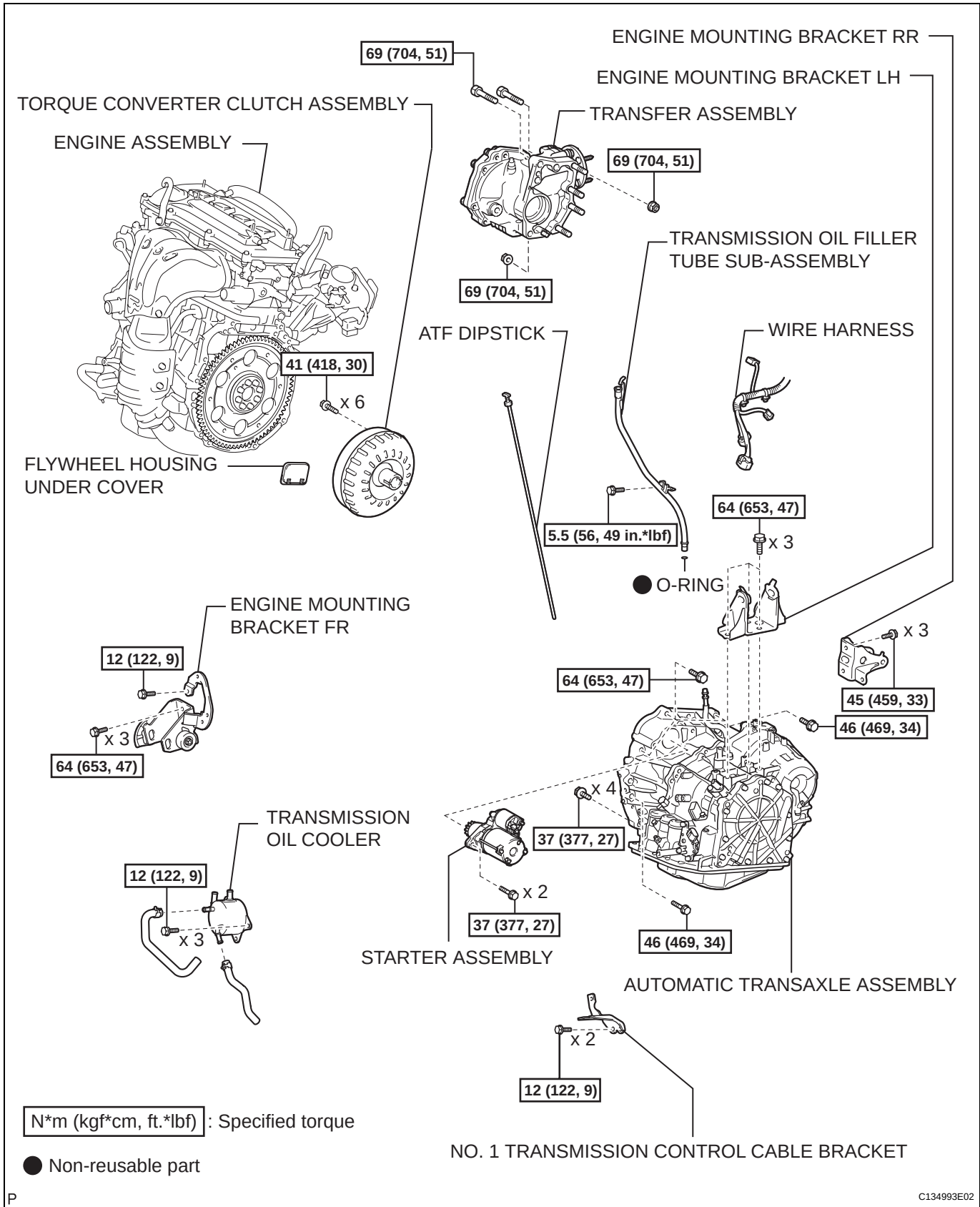
for LH Side





AUTOMATIC TRANSAXLE ASSEMBLY

COMPONENTS



REMOVAL

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

- (a) Remove the engine with transaxle (see page [EM-98](#)).

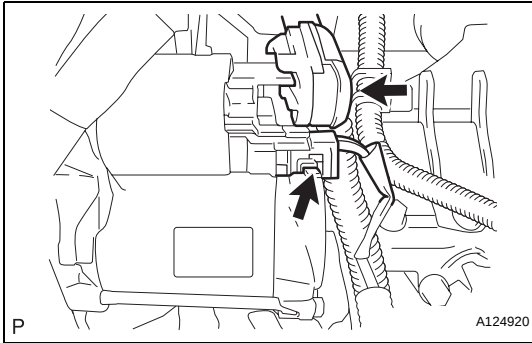
2. DRAIN AUTOMATIC TRANSAXLE FLUID

- (a) Remove the drain plug and gasket, and drain ATF.
- (b) Install a new gasket and the drain plug.

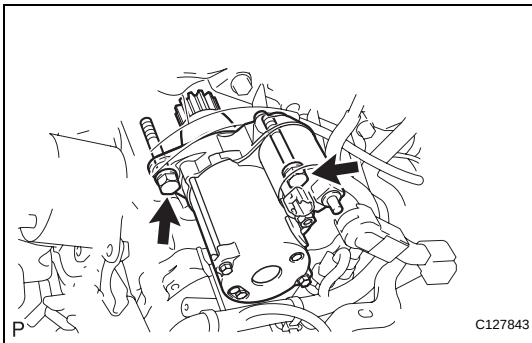
Torque: 47 N*m (479 kgf*cm, 35 ft.*lbf)

3. REMOVE STARTER ASSEMBLY

- (a) Disconnect the starter connector.
- (b) Open the terminal cap, and remove the nut and disconnect the starter wire.

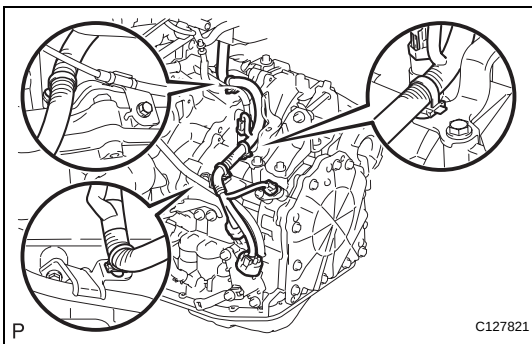


- (c) Remove the 2 bolts and starter.



4. DISCONNECT WIRE HARNESS

- (a) Disconnect the park/neutral position switch connector.
- (b) Disconnect the transaxle wire connector.
- (c) Disconnect the 2 speed sensor connectors.
- (d) Disconnect the wire harness clamps.

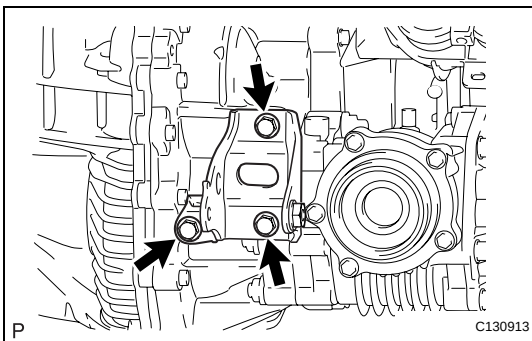


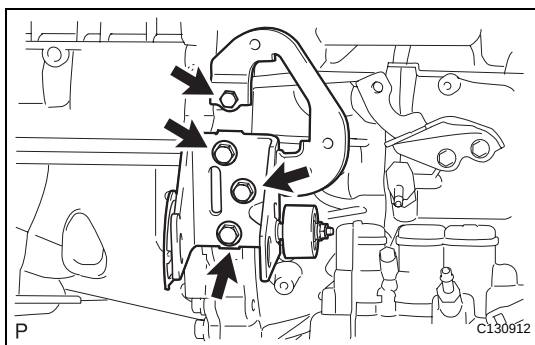
5. REMOVE TRANSMISSION OIL COOLER

- (a) Remove the oil cooler (see page [AX-127](#)).

6. REMOVE ENGINE MOUNTING BRACKET RR

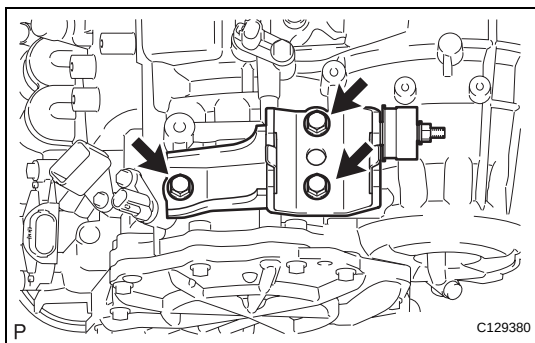
- (a) Remove the 3 bolts and mounting bracket.





7. REMOVE ENGINE MOUNTING BRACKET FR

- (a) Remove the 4 bolts and mounting bracket.

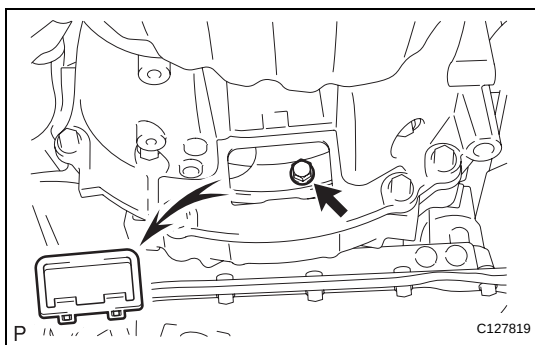


8. REMOVE ENGINE MOUNTING BRACKET LH

- (a) Remove the 3 bolts and mounting bracket.

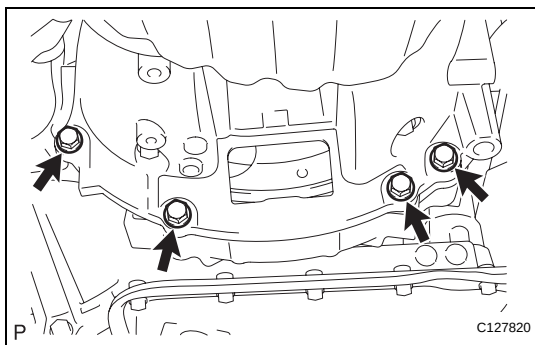
9. REMOVE TRANSFER ASSEMBLY

- (a) Remove the transfer (see page [TF-59](#)).

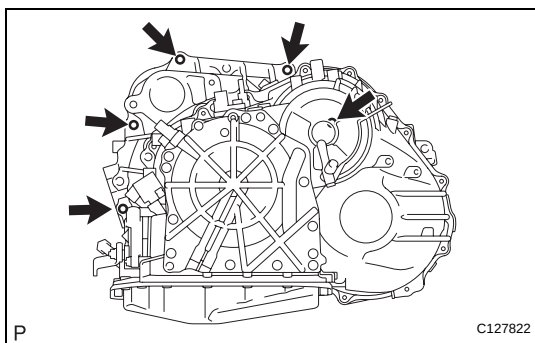


10. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

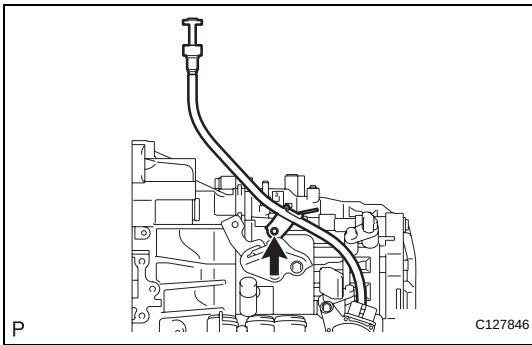
- (a) Remove the flywheel housing under cover.
 (b) Turn the crankshaft to gain access and remove the 6 bolts while holding the crankshaft pulley bolt with a wrench.



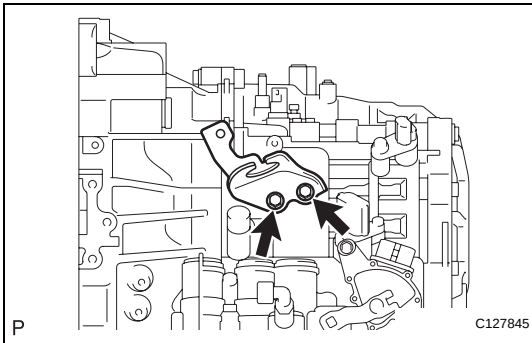
- (c) Remove the 4 lower side mounting bolts.



- (d) Remove the 5 upper side mounting bolts.
 (e) Separate and remove the automatic transaxle.

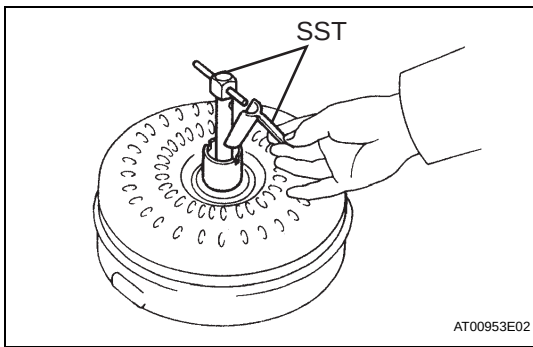
**11. REMOVE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY**

- (a) Remove the ATF dipstick.
- (b) Remove the bolt and oil filler tube.

**12. REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET**

- (a) Remove the 2 bolts and cable bracket.

13. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

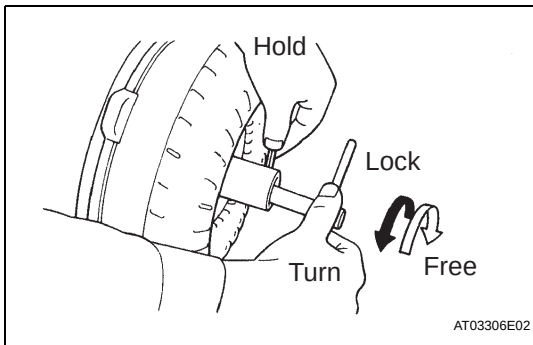


TORQUE CONVERTER AND DRIVE PLATE

INSPECTION

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

- (a) Inspect the one-way clutch.
 - (1) Install SST to the inner race of the one-way clutch.
SST 09350-32014 (09351-32010)
 - (2) Set SST so that it fits in the notch of the converter hub and in the outer race of the one-way clutch.
SST 09350-32014 (09351-32020)
 - (3) With the torque converter standing on its side, check that the clutch locks when SST is turned counterclockwise and rotates freely and smoothly when turned clockwise. If the results are not as specified, clean the converter and recheck the one-way clutch. If the results still are not as specified, replace the converter.

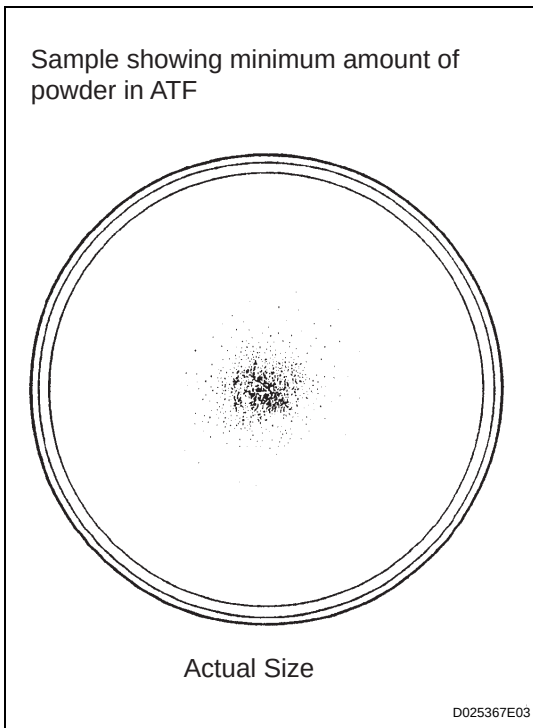


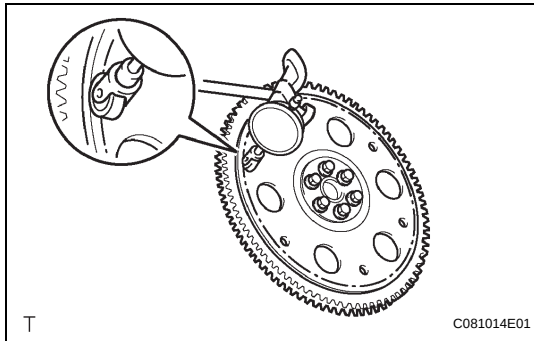
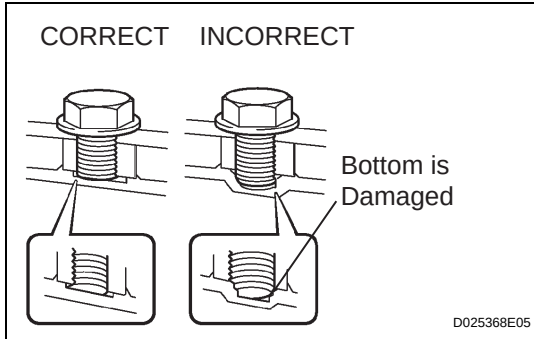
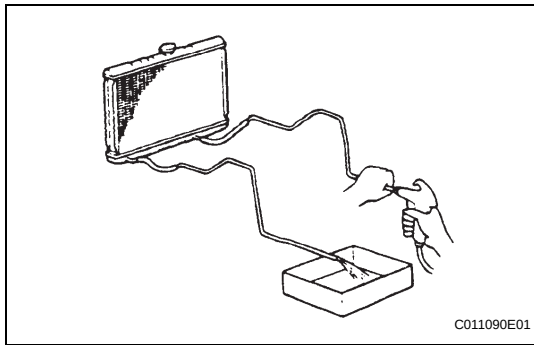
- (b) Determine the condition of the torque converter clutch.
 - (1) Check that the following conditions are met:
 - During the stall test or when the shift lever is on N, metallic sounds are not emitted from the torque converter clutch.
 - The one-way clutch turns in one direction and locks in the other direction.
 - The amount of powder in the ATF is not greater than the sample shown in the illustration.
 If the results are not as specified, replace the torque converter clutch assembly.

HINT:

The sample illustration shows approximately 0.25 liters (0.26 US qts, 0.22 Imp. qts) of the ATF taken from a removed torque converter clutch.

- (c) Replace the ATF in the torque converter clutch.
 - (1) If the ATF is discolored and/or has a foul odor, stir the ATF in the torque converter clutch thoroughly and drain the ATF with the torque converter facing upward.





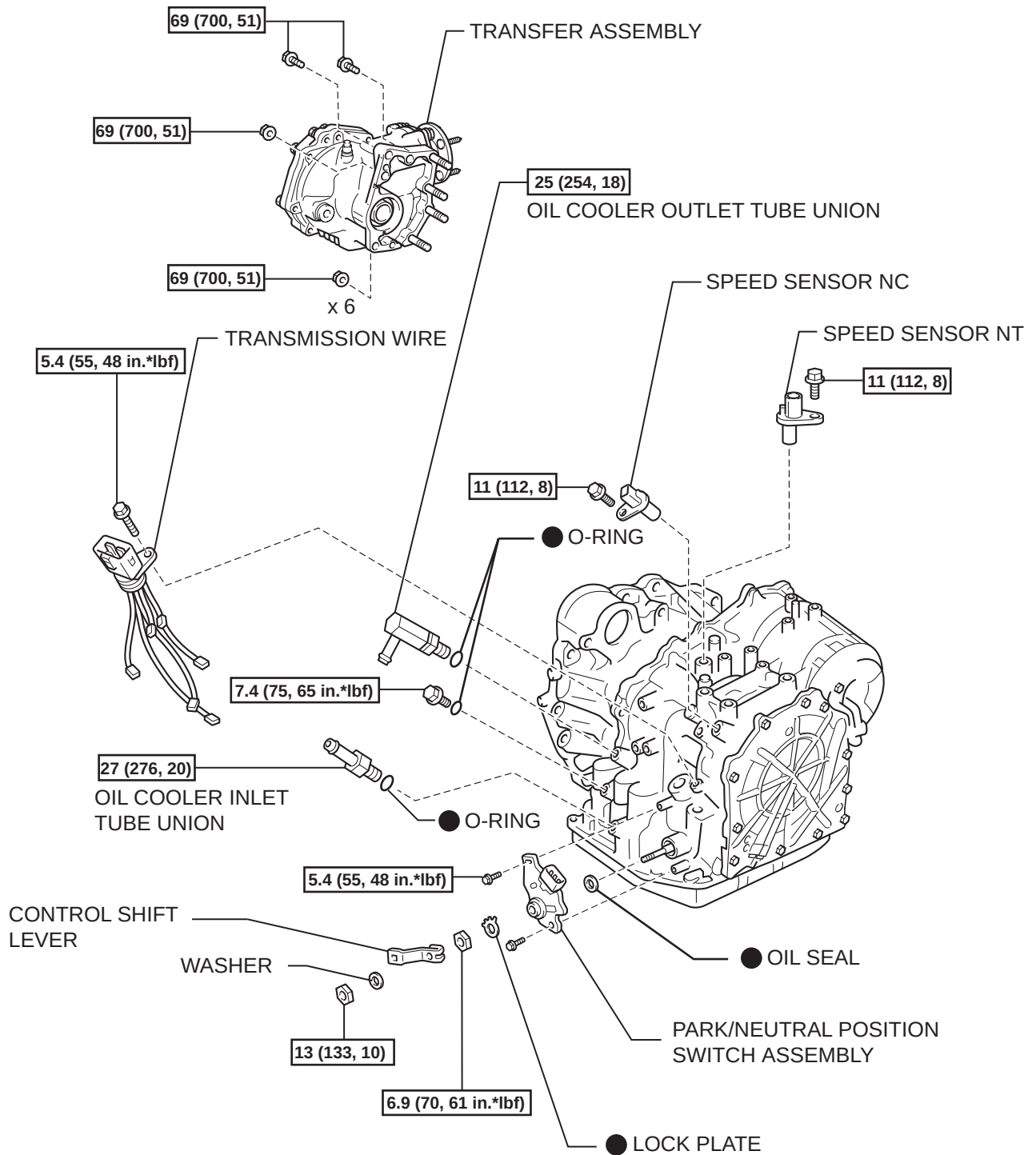
- (d) Clean and check the oil cooler and oil pipe line.
- (1) If the torque converter clutch is inspected or the ATF is replaced, clean the oil cooler and oil pipe line.
 - Apply compressed air of 196 kPa (2 kgf/cm², 28 psi) into the inlet hose.
 - If a large amount of powder is found in the ATF, add new ATF using a bucket pump and clean the oil cooler and oil pipe line again.
 - (2) If the ATF is cloudy, inspect the oil cooler (radiator).
- (e) Prevent deformation of the torque converter clutch and damage to the oil pump gear.
- (1) When any marks due to interference are found on the end of the bolt for the torque converter clutch and on the bottom of the bolt hole, replace the bolt and torque converter clutch.
 - (2) All of the bolts should be the same length.
 - (3) Make sure no spring washers are missing.

2. INSPECT DRIVE PLATE AND RING GEAR SUB-ASSEMBLY

- (a) Set up a dial indicator and measure the drive plate runout.
- Maximum runout:**
0.30 mm (0.0118 in.)
- If the runout is greater than the maximum or if the ring gear is damaged, replace the drive plate. If installing a new drive plate, note the orientation of the spacers and tighten the bolts.
- Torque: 98 N*m (999 kgf*cm, 72 ft.*lbf)**
- (b) Check the ring gear for any damage.
- If the ring gear is damaged, replace the drive plate.

AUTOMATIC TRANSAXLE UNIT

COMPONENTS



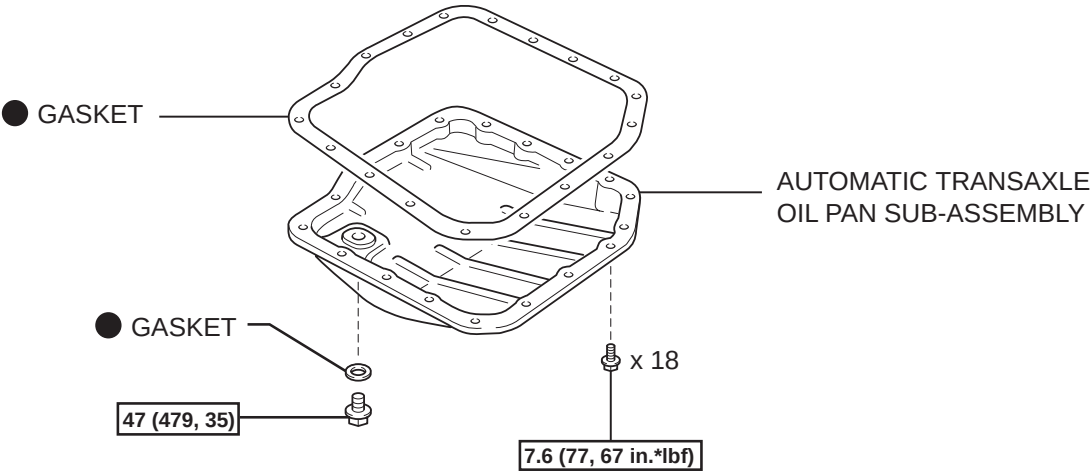
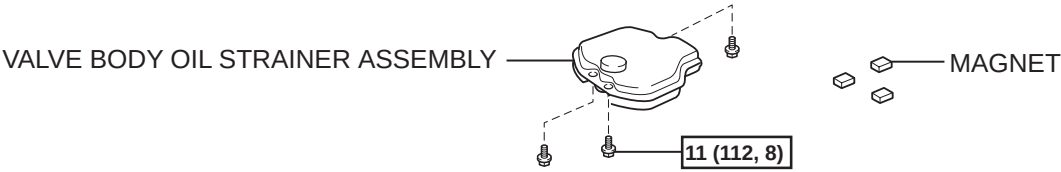
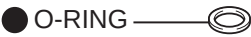
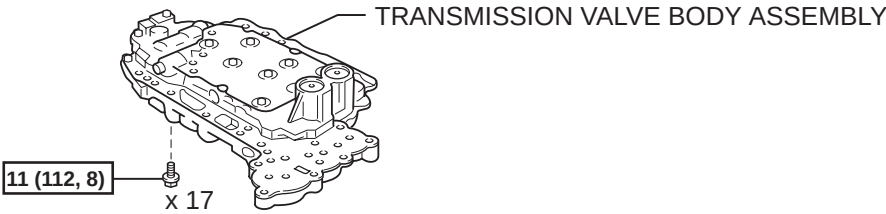
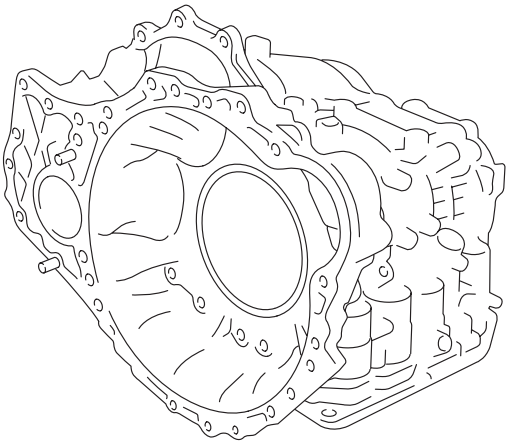
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

N

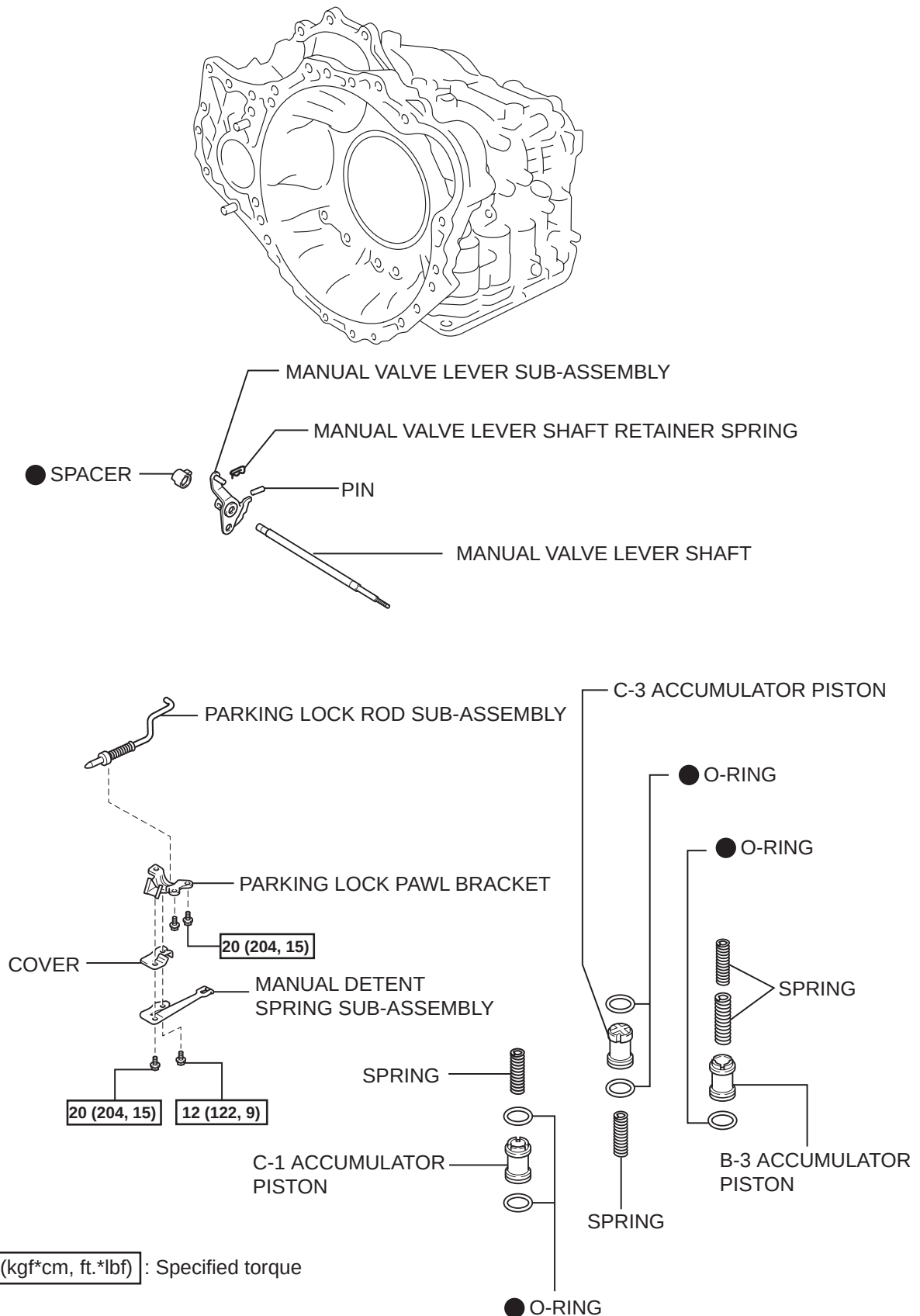
C126581E04

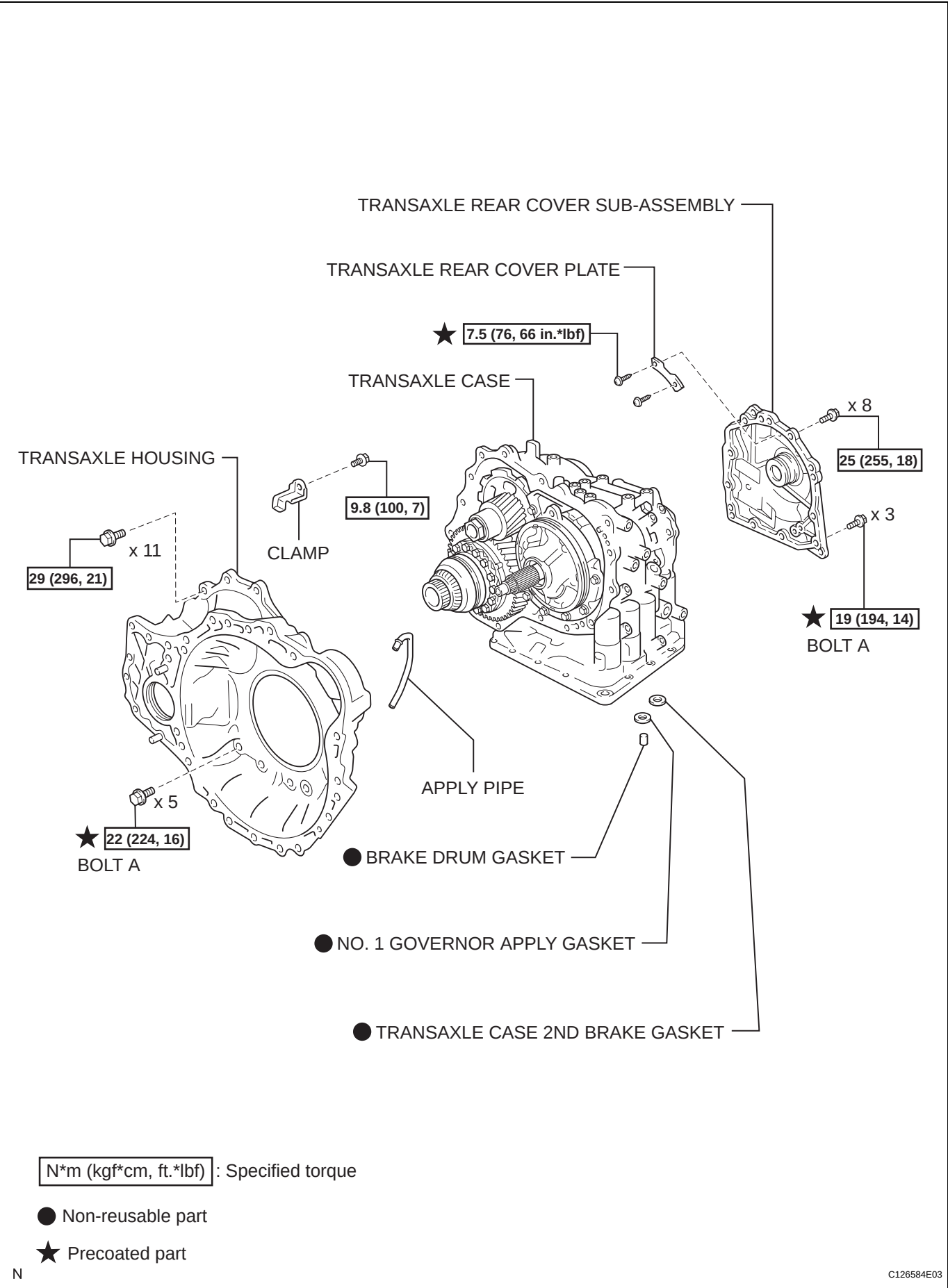
AX

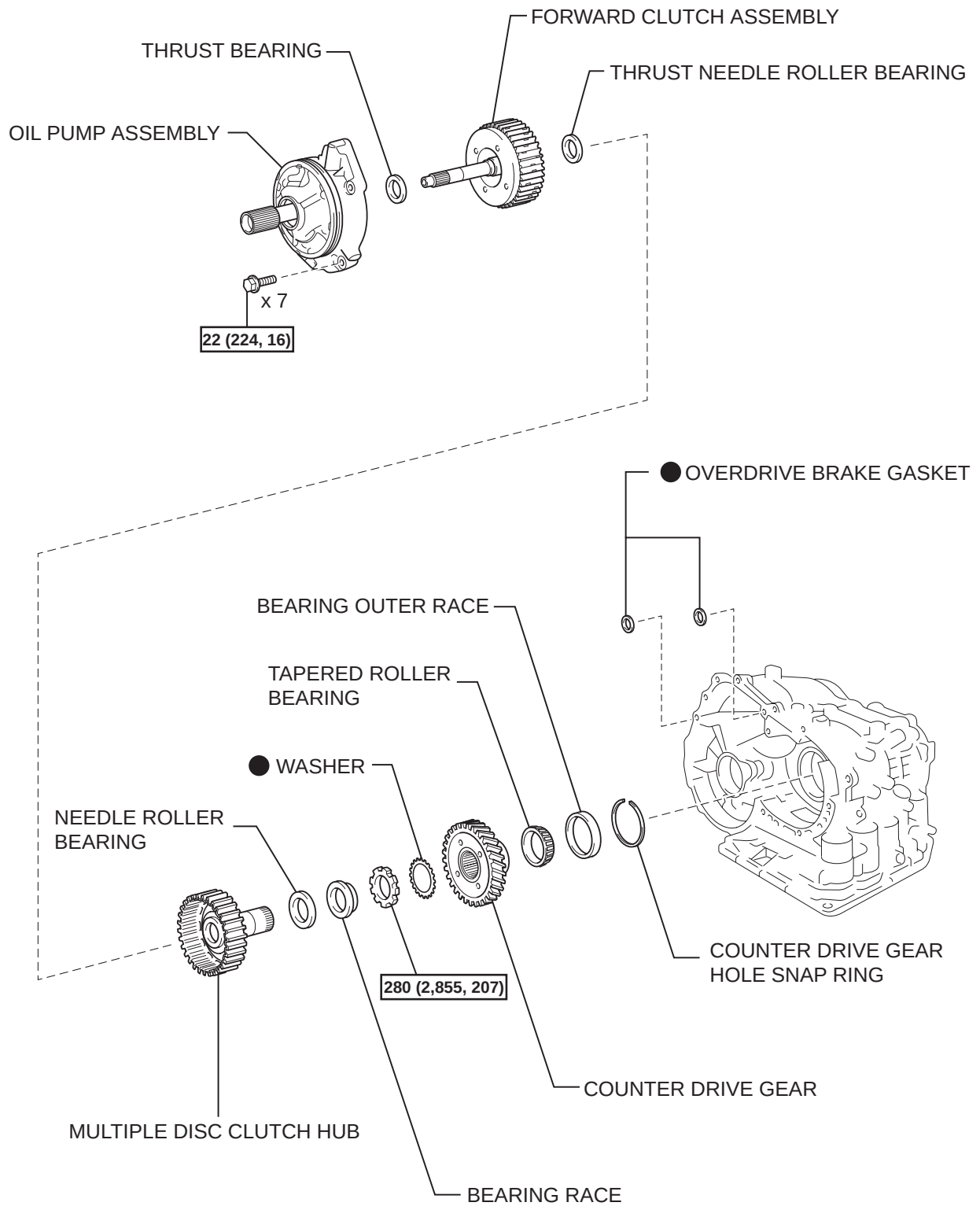


N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part



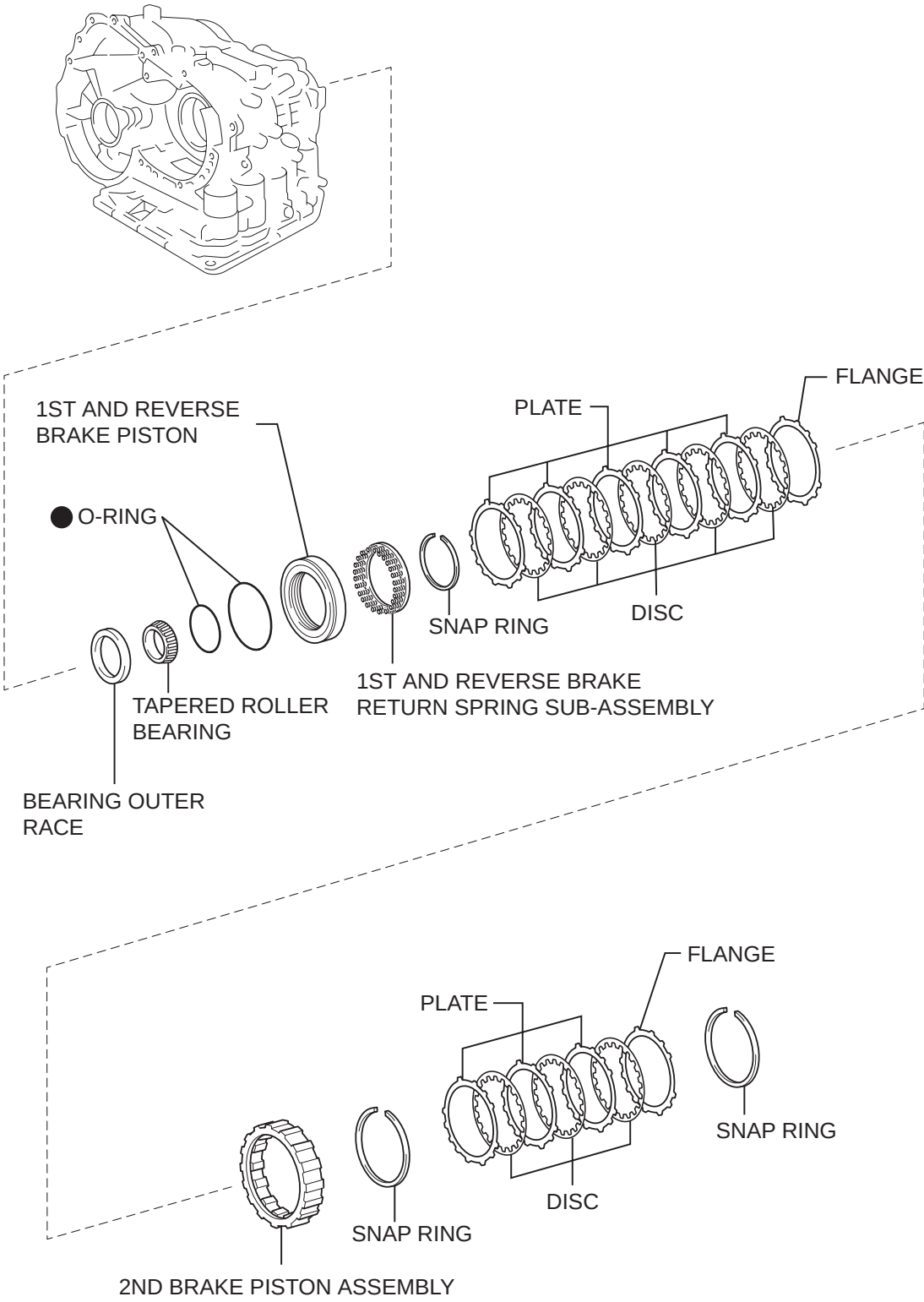




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

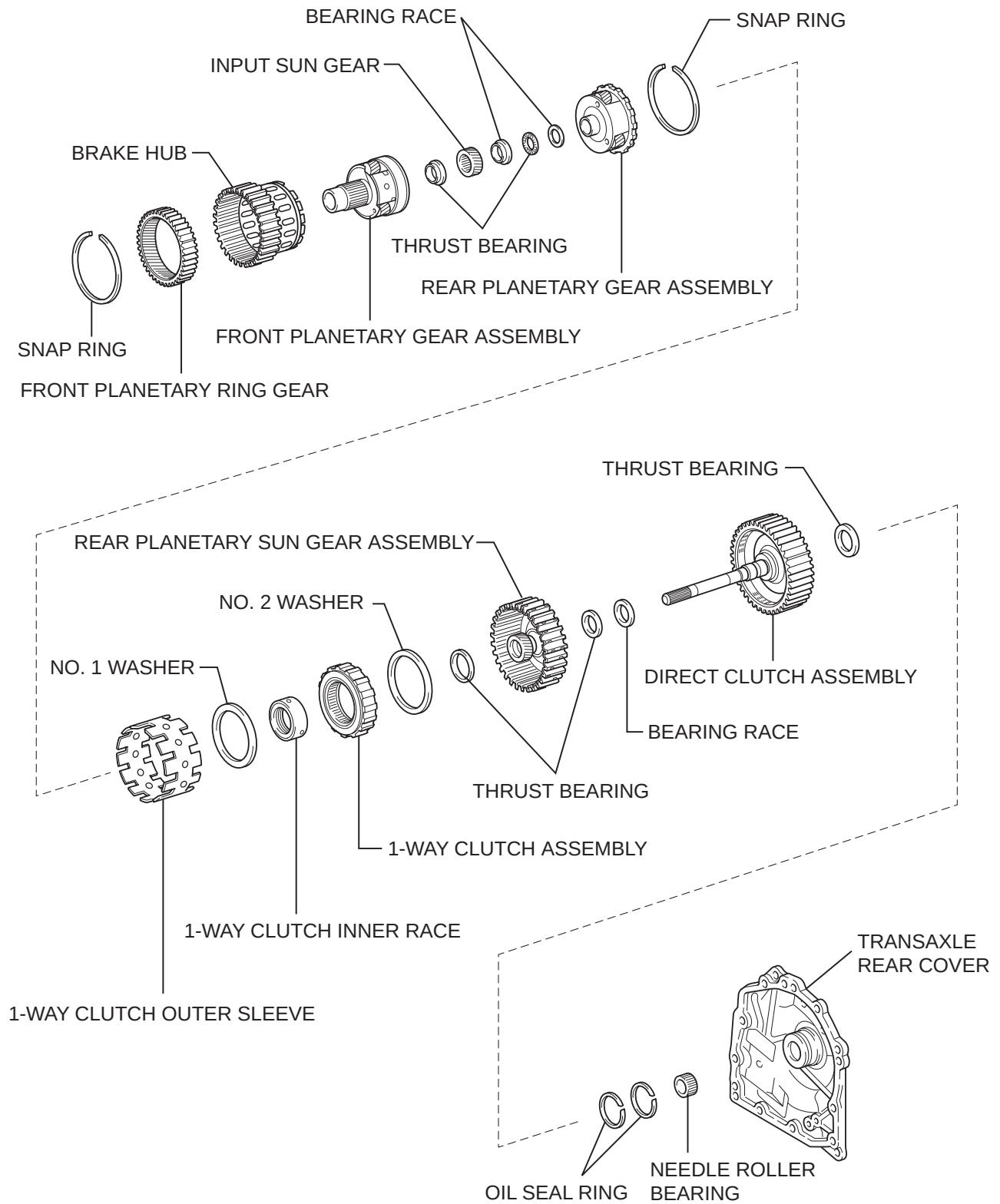
AX

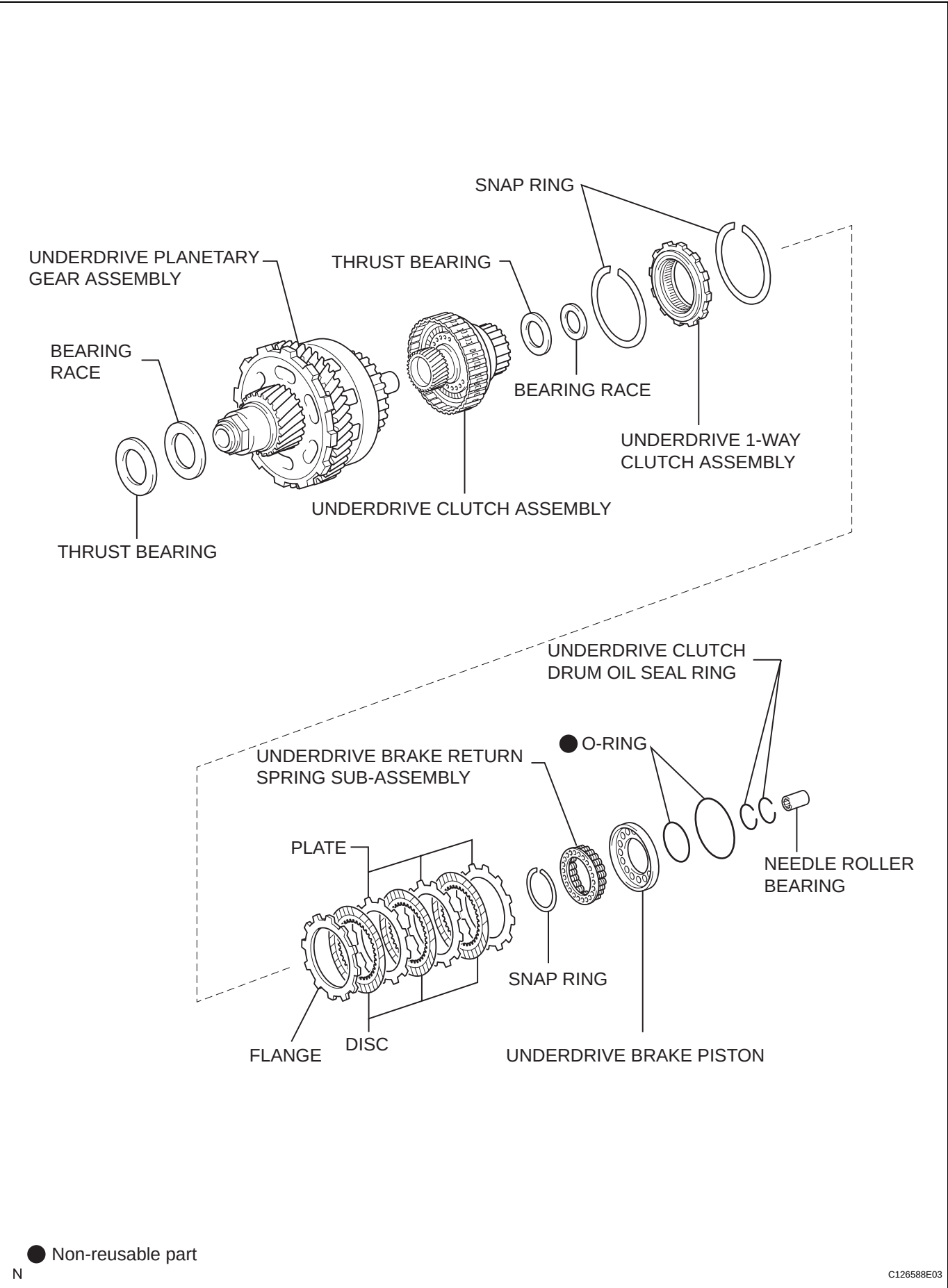


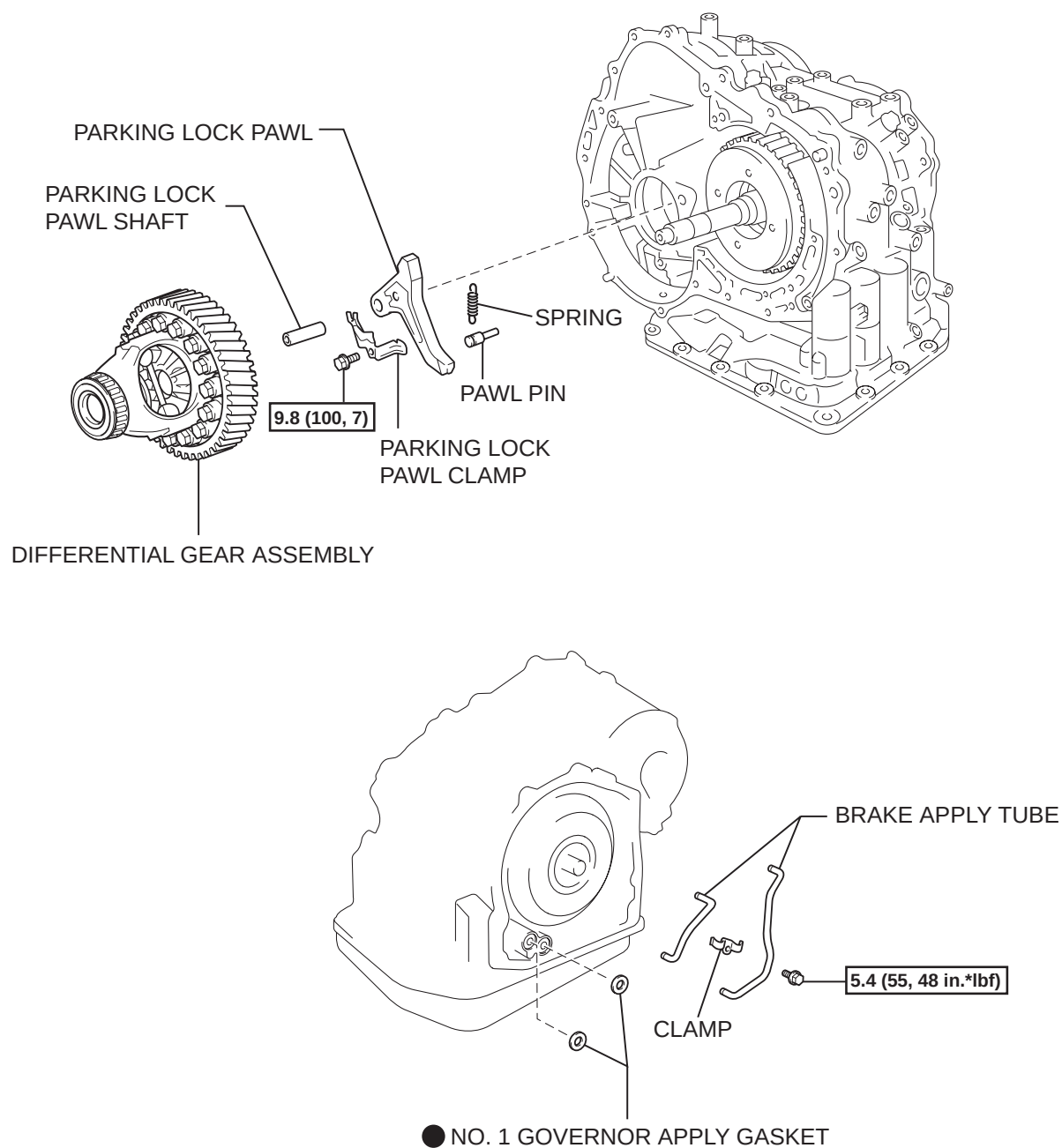
AX

● Non-reusable part

N







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

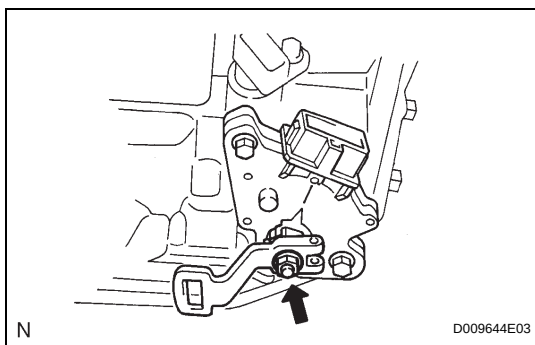
● Non-reusable part

AX

DISASSEMBLY

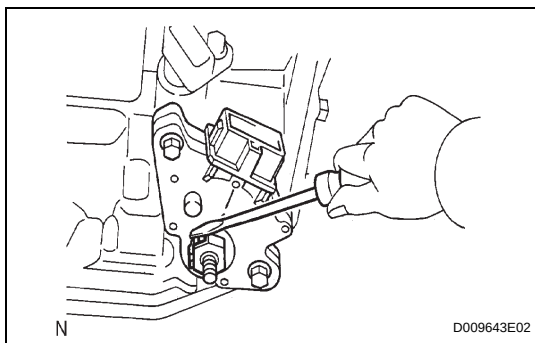
1. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Remove the nut, washer and control shaft lever.



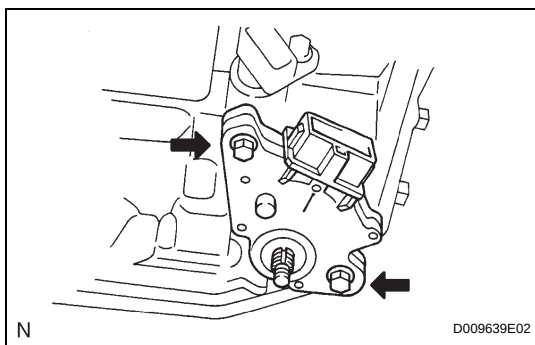
(b) Using a screwdriver, pry off the lock plate.

(c) Remove the nut and lock plate.



(d) Remove the 2 bolts and pull out the switch.

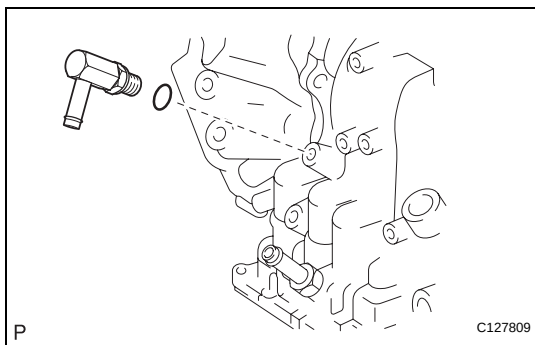
2. REMOVE BREATHER PLUG HOSE



3. REMOVE OIL COOLER OUTLET TUBE UNION

(a) Remove the union.

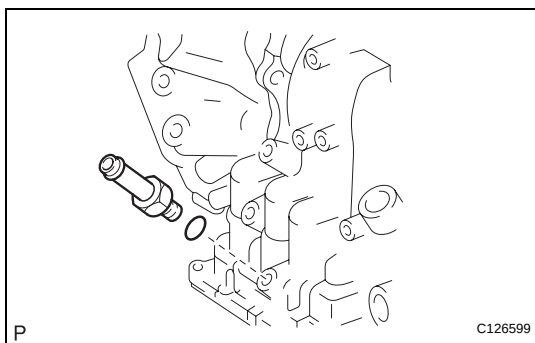
(b) Remove the O-ring from the union.

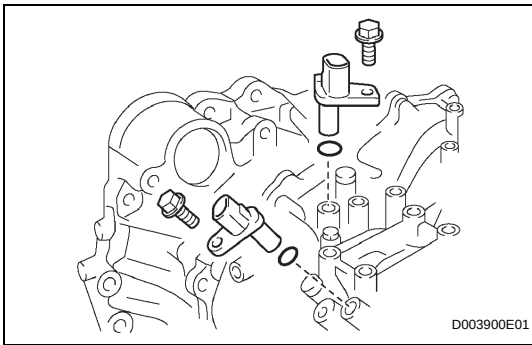


4. REMOVE OIL COOLER INLET TUBE UNION

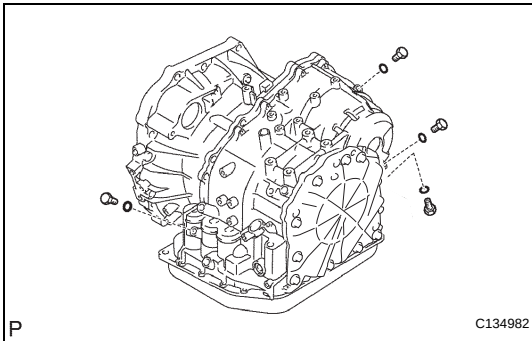
(a) Remove the union.

(b) Remove the O-ring from the union.

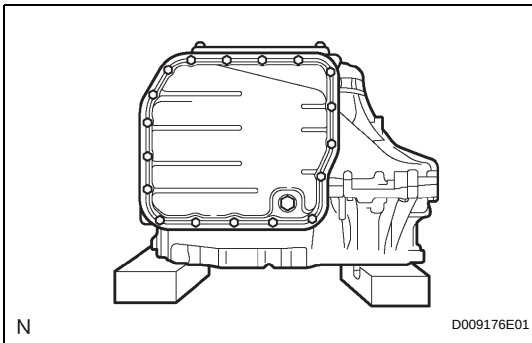
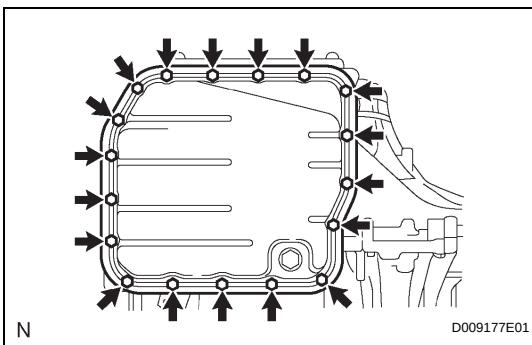


**5. REMOVE SPEED SENSOR**

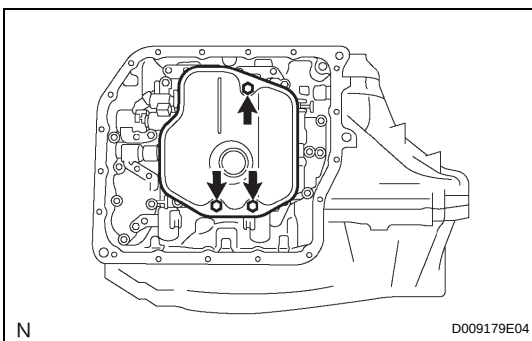
- (a) Remove the 2 bolts and 2 transmission revolution sensors from the transaxle.
- (b) Remove the 2 O-rings from the sensors.

**6. REMOVE NO. 1 TRANSAXLE CASE PLUG**

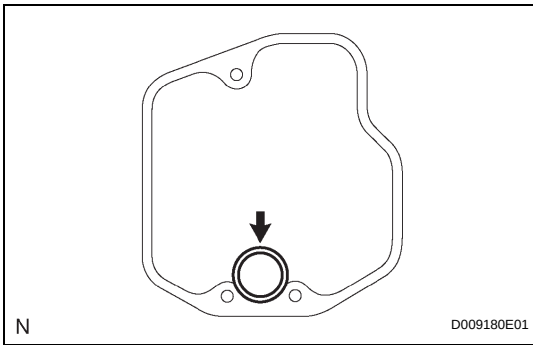
- (a) Remove the 4 plugs from the transaxle.
- (b) Remove the 4 O-rings from the 4 plugs.

**7. PLACE TRANSAXLE ON WOODEN BLOCKS****8. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**

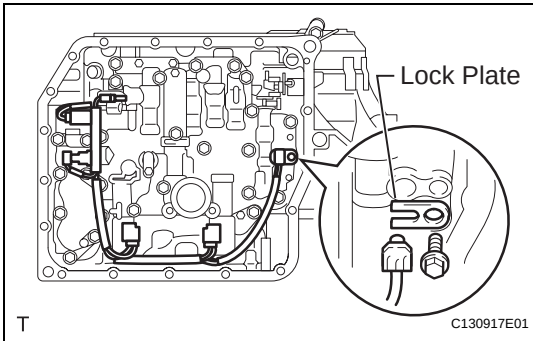
- (a) Remove the 18 bolts.
- (b) Remove the oil pan and 3 magnets.
- (c) Remove the gasket from the oil pan.

9. INSPECT AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page [AX-184](#))**10. REMOVE VALVE BODY OIL STRAINER ASSEMBLY**

- (a) Remove the 3 bolts and oil strainer.

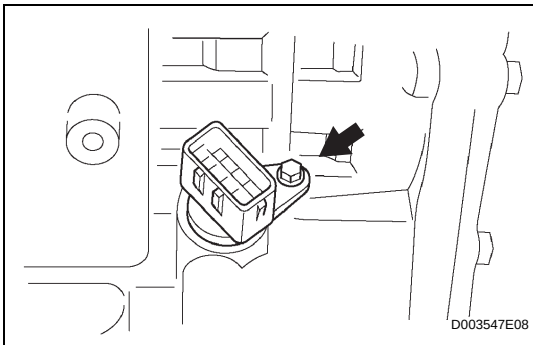


(b) Remove the O-ring from the oil strainer.

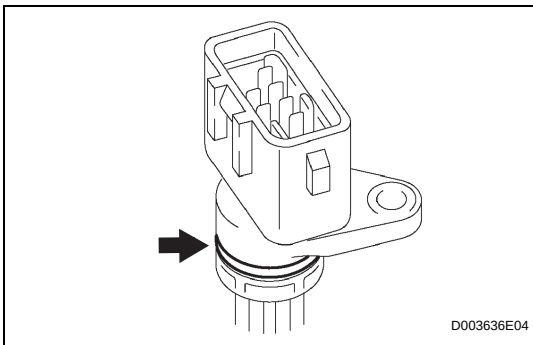


11. REMOVE TRANSMISSION WIRE

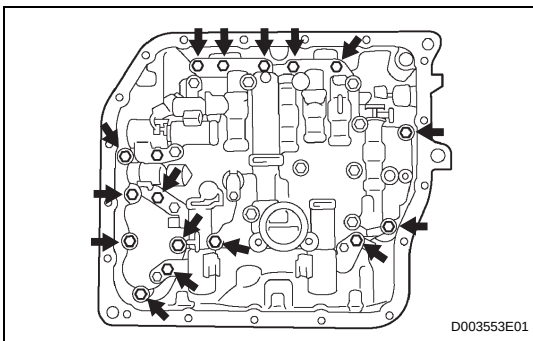
- (a) Disconnect the 5 shift solenoid valve connectors.
- (b) Remove the bolt, lock plate and ATF temperature sensor.



(c) Remove the bolt and transaxle wire.

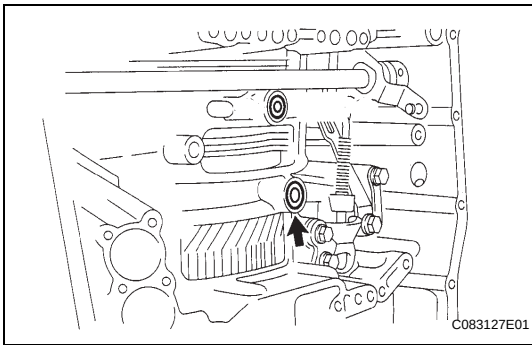


(d) Remove the O-ring from the transaxle wire.

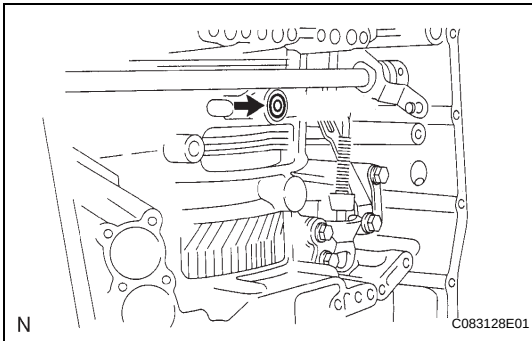


12. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

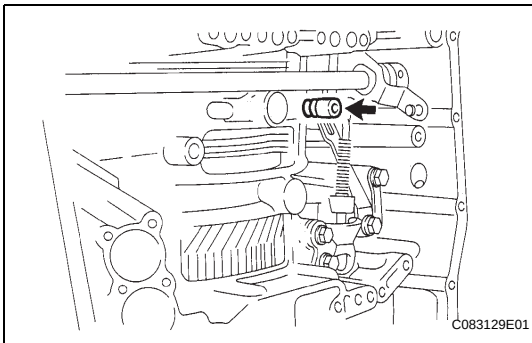
- (a) Support the valve body and remove the 17 bolts and valve body.

**13. REMOVE NO. 1 GOVERNOR APPLY GASKET**

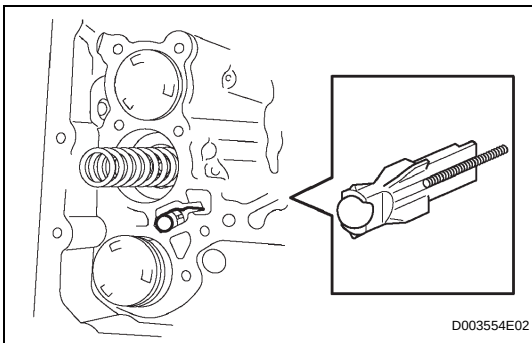
- (a) Remove the governor apply gasket from the transaxle case.

**14. REMOVE TRANSAXLE CASE 2ND BRAKE GASKET**

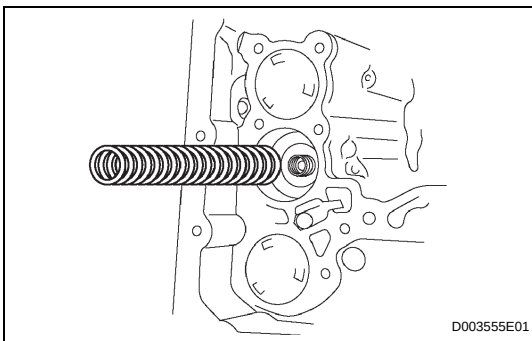
- (a) Remove the 2nd brake gasket from the transaxle.

**15. REMOVE BRAKE DRUM GASKET**

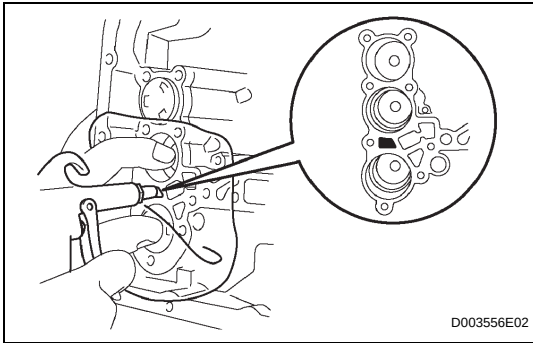
- (a) Remove the brake drum gasket from the transaxle.

**16. REMOVE CHECK BALL BODY**

- (a) Remove the check ball and spring from the transaxle.

**17. REMOVE C-3 ACCUMULATOR PISTON**

- (a) Remove the spring from the C-3 accumulator piston.

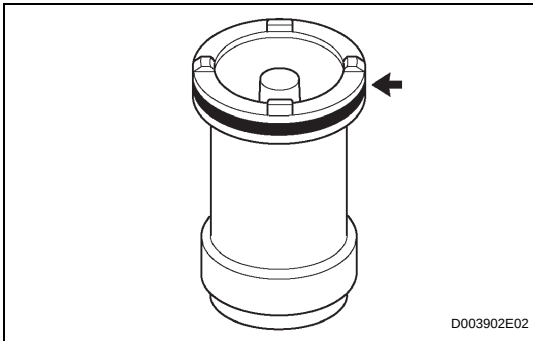


- (b) Apply compressed air (392 kPa, 4.0 kgf/cm², 57 psi) to the oil hole and remove the C-3 accumulator piston.

NOTICE:

- Applying compressed air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.
- Make sure not to spatter ATF when applying compressed air.

- (c) Remove the O-ring from the C-3 accumulator piston.

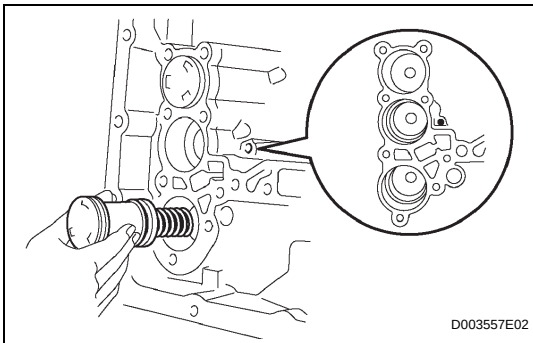


18. REMOVE C-1 ACCUMULATOR PISTON

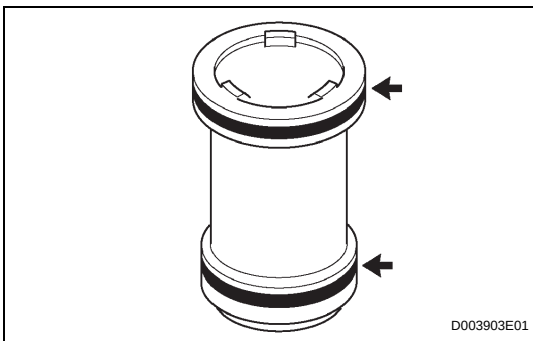
- (a) Apply compressed air (392 kPa, 4.0 kgf/cm², 57 psi) to the oil hole and remove the C-1 accumulator piston and spring.

NOTICE:

- Applying compressed air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.
- Make sure not to spatter ATF when applying compressed air.



- (b) Remove the 2 O-rings from the C-1 accumulator piston.

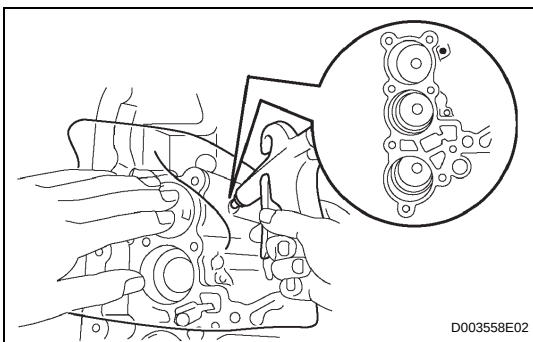


19. REMOVE B-3 ACCUMULATOR PISTON

- (a) Apply compressed air (392 kPa, 4.0 kgf/cm², 57 psi) to the oil hole and remove the B-3 accumulator piston and 2 springs.

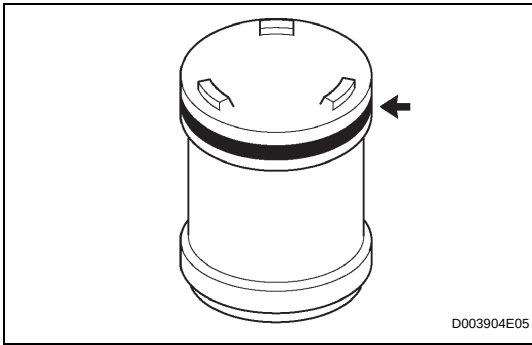
NOTICE:

- Applying compressed air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.



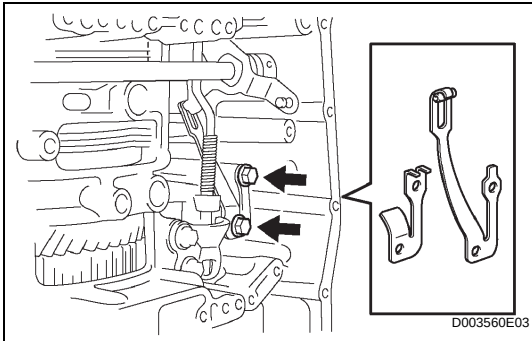
- **Make sure not to spatter ATF when applying compressed air.**

- (b) Remove the O-ring from the B-3 accumulator piston.



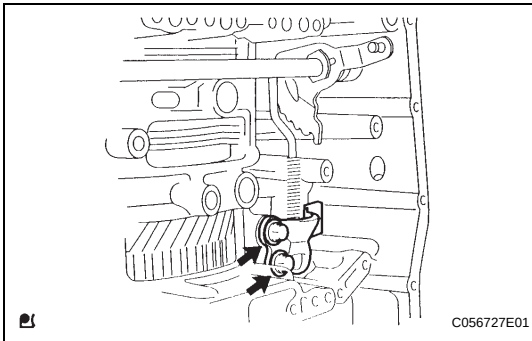
20. REMOVE MANUAL DETENT SPRING SUB-ASSEMBLY

- (a) Remove the 2 bolts, manual detent spring and cover.



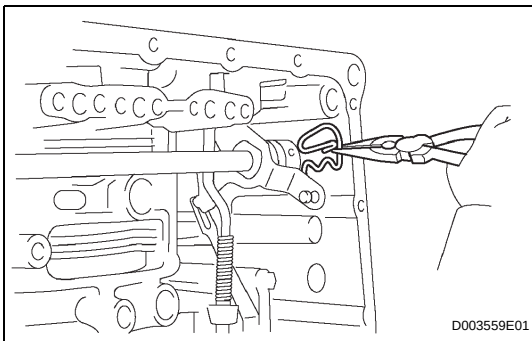
21. REMOVE PARKING LOCK PAWL BRACKET

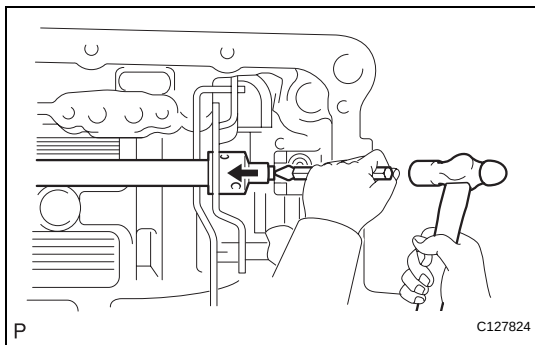
- (a) Remove the 2 bolts and parking lock pawl bracket.



22. REMOVE MANUAL VALVE LEVER SHAFT RETAINER SPRING

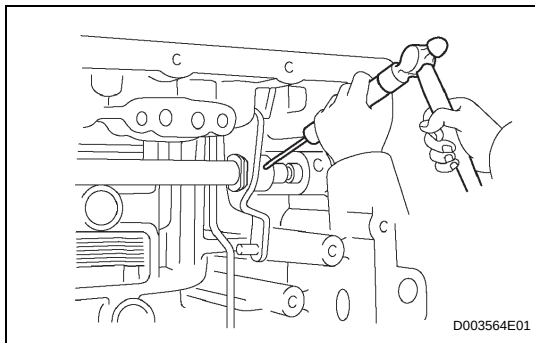
- (a) Using needle-nose pliers, remove the retainer spring.



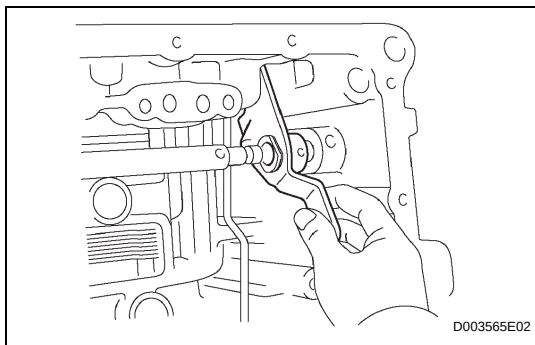


23. REMOVE MANUAL VALVE LEVER SUB-ASSEMBLY

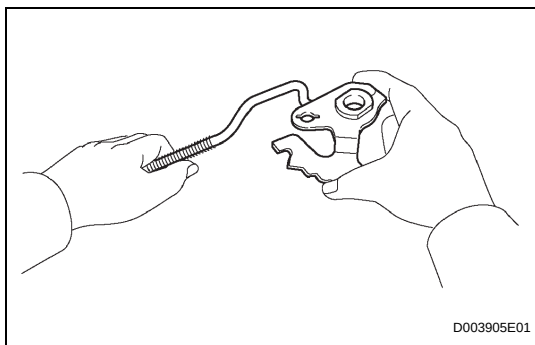
- (a) Using a chisel and hammer, unstake and remove the spacer.



- (b) Using a pin punch and hammer, tap out the pin.
HINT:
Slowly tap out the pin so that it will not fall into the transaxle.

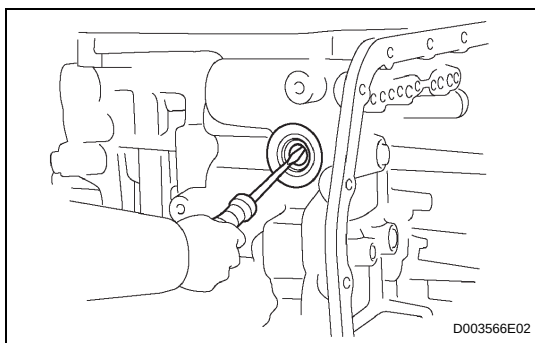


- (c) Remove the manual valve lever shaft and manual valve lever.



24. REMOVE PARKING LOCK ROD SUB-ASSEMBLY

- (a) Remove the parking lock rod from the manual valve lever.



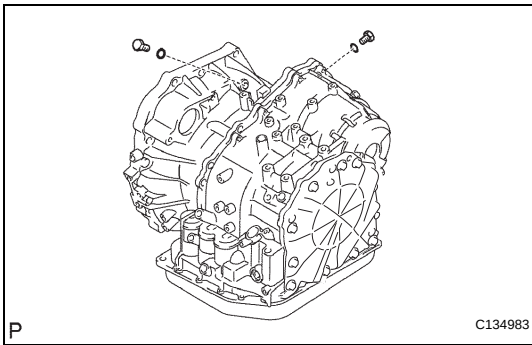
25. REMOVE MANUAL VALVE LEVER SHAFT OIL SEAL

- (a) Using a screwdriver, pry out the oil seal from the transaxle.

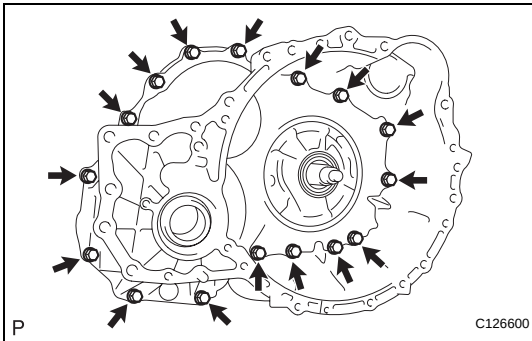
26. FIX AUTOMATIC TRANSAXLE ASSEMBLY

- (a) Fix the transaxle case with the oil pump side facing up.

27. INSPECT INPUT SHAFT END PLAY (See page [AX-184](#))

**28. REMOVE NO. 1 TRANSAXLE CASE PLUG**

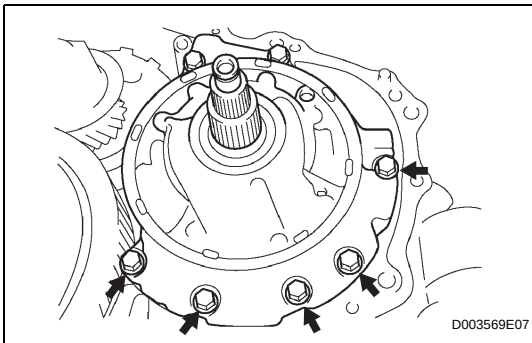
- (a) Remove the 2 plugs.
- (b) Remove the 2 O-rings from the 2 plugs.

**29. REMOVE TRANSAXLE HOUSING**

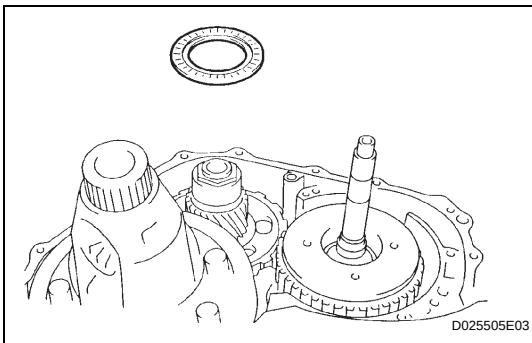
- (a) Remove the 16 bolts.
- (b) Tap on the circumference of the transaxle housing with a plastic-faced hammer to remove the transaxle housing from the transaxle case.

NOTICE:

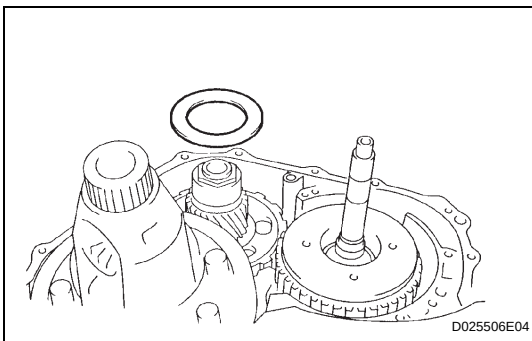
The differential may be accidentally removed when the transaxle housing is removed.

**30. REMOVE OIL PUMP ASSEMBLY**

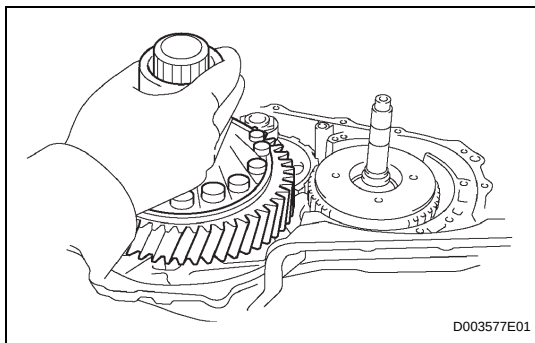
- (a) Remove the 7 bolts and oil pump from the transaxle.

**31. REMOVE THRUST NEEDLE ROLLER BEARING**

- (a) Remove thrust needle roller bearing from the underdrive planetary gear.

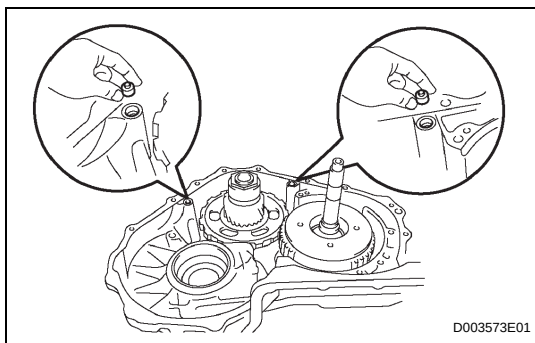
**32. REMOVE NO. 2 THRUST BEARING UNDERDRIVE RACE**

- (a) Remove the thrust bearing underdrive race from the underdrive planetary gear.



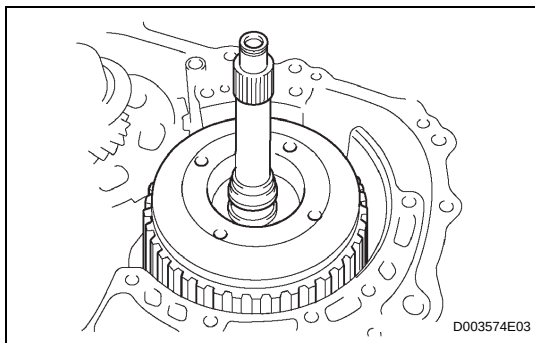
33. REMOVE DIFFERENTIAL GEAR ASSEMBLY

- (a) Remove the differential gear from the transaxle.



34. REMOVE OVERDRIVE BRAKE GASKET

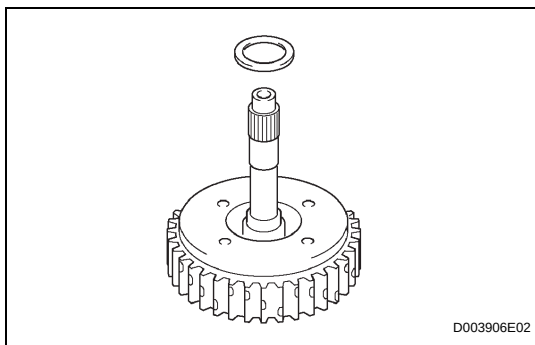
- (a) Remove the 2 overdrive brake gaskets from the transaxle.



35. REMOVE FORWARD CLUTCH ASSEMBLY

- (a) Remove the forward clutch from the transaxle.

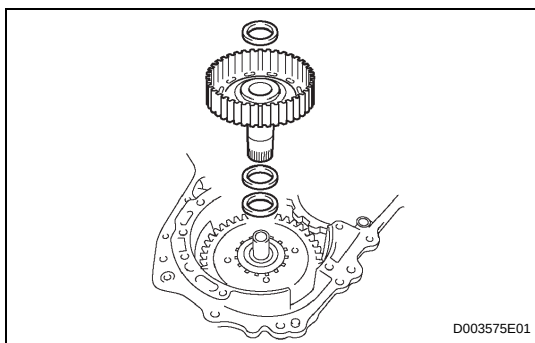
- (b) Remove the thrust bearing from the forward clutch.

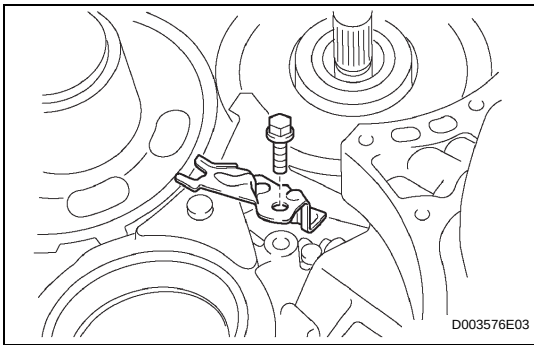


36. REMOVE MULTIPLE DISC CLUTCH HUB

- (a) Remove the thrust bearing, multiple clutch hub, needle roller bearing and bearing race from the transaxle.

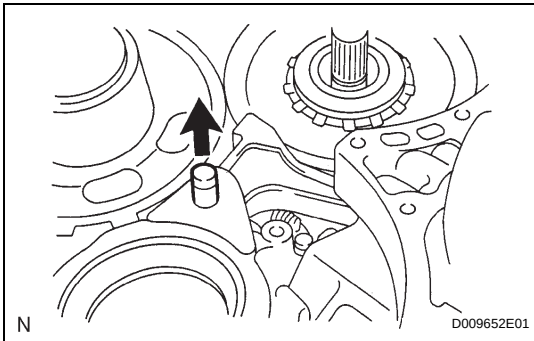
37. INSPECT MULTIPLE DISC CLUTCH HUB (See page [AX-184](#))



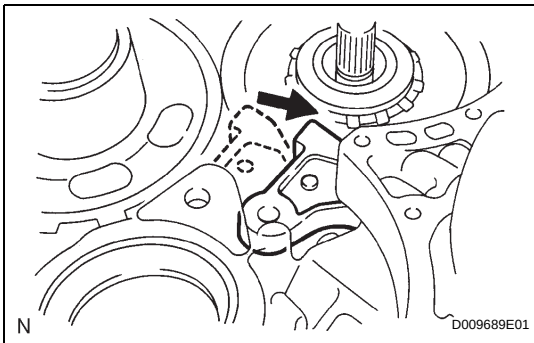


38. REMOVE UNDERDRIVE PLANETARY GEAR ASSEMBLY

- (a) Remove the bolt and parking pawl shaft clamp.



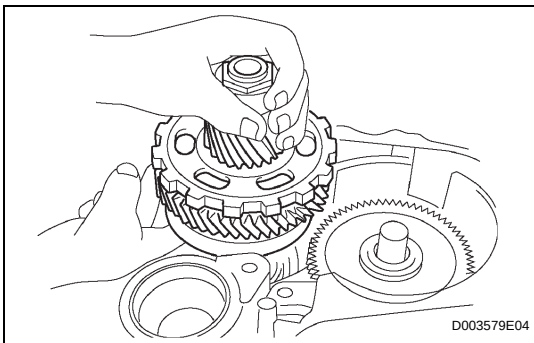
- (b) Remove the parking lock pawl shaft.



- (c) Push the parking lock pawl.

HINT:

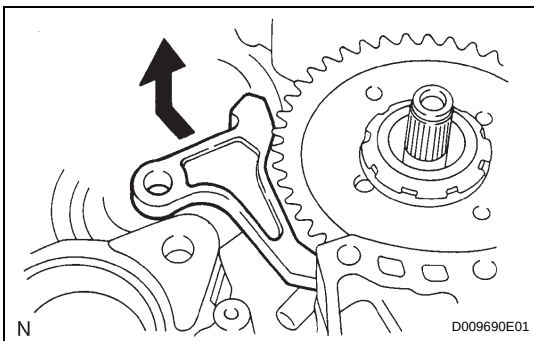
Failure to do so will cause interference when the underdrive planetary gear is removed.



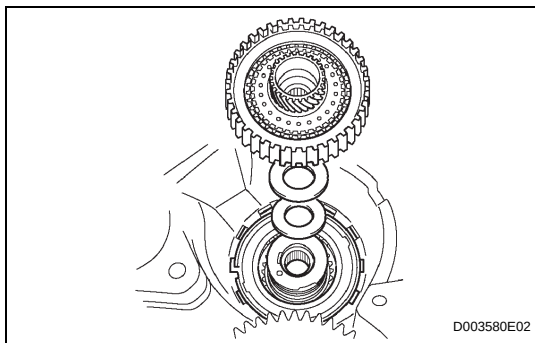
- (d) Remove the underdrive planetary gear from the transaxle.

NOTICE:

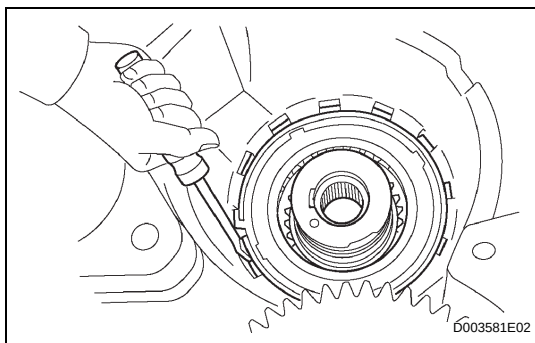
Be careful so that the underdrive planetary gear assembly will not fall out.



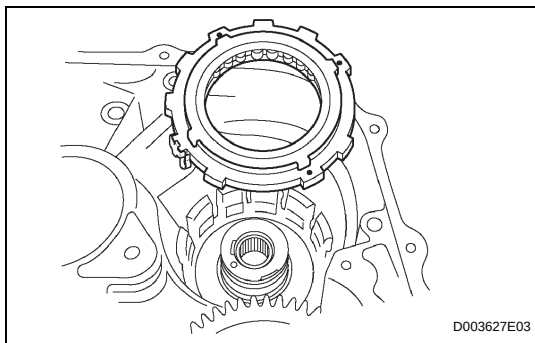
- (e) Remove the spring, pawl pin and parking lock pawl.

**39. REMOVE UNDERDRIVE CLUTCH ASSEMBLY**

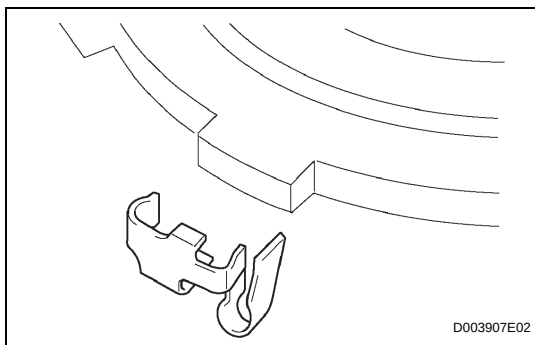
- (a) Remove the underdrive clutch, thrust bearing and bearing race from the transaxle.

**40. REMOVE UNDERDRIVE 1-WAY CLUTCH ASSEMBLY**

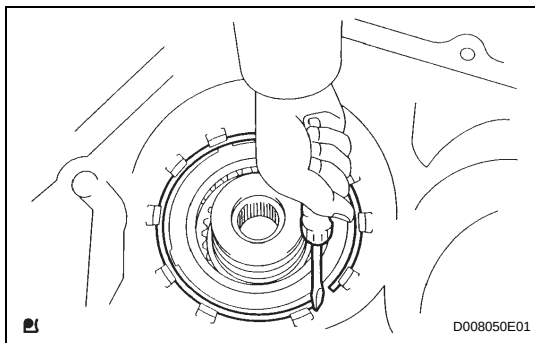
- (a) Using a screwdriver, pry out the snap ring from the transaxle.



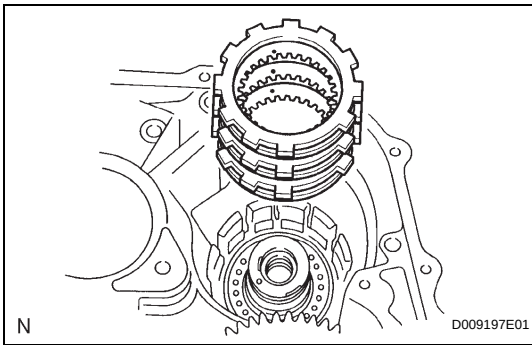
- (b) Remove the 1-way clutch from the transaxle.



- (c) Remove the outer race retainer from the 1-way clutch.

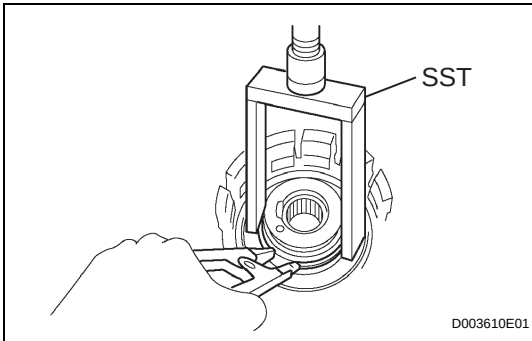
**41. REMOVE NO. 2 UNDERDRIVE CLUTCH DISC**

- (a) Using a screwdriver, pry out the snap ring.



- (b) Remove the flange, 3 discs and 3 plates from the transaxle.

42. INSPECT NO. 2 UNDERDRIVE CLUTCH DISC (See page [AX-185](#))

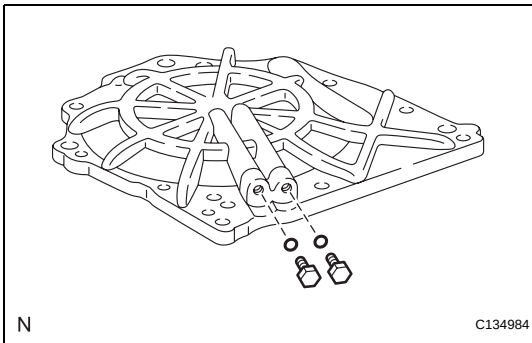


43. REMOVE UNDERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

- (a) Using SST, a snap ring expander and press, remove the snap ring and piston return spring.

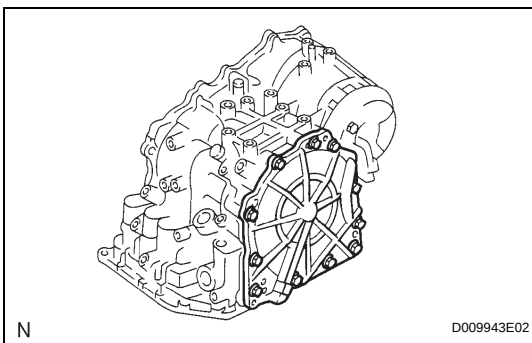
SST 09387-00020

44. INSPECT UNDERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY (See page [AX-185](#))



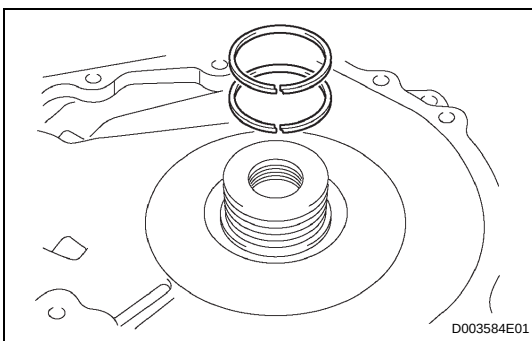
45. REMOVE NO. 1 TRANSAXLE CASE PLUG

- (a) Remove the 2 plugs from the transaxle rear cover.
(b) Remove the 2 O-rings from the 2 plugs.

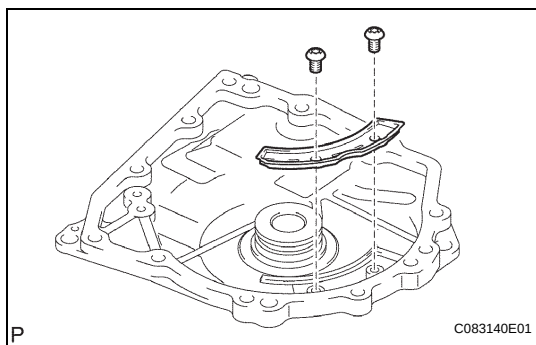


46. REMOVE TRANSAXLE REAR COVER SUB-ASSEMBLY

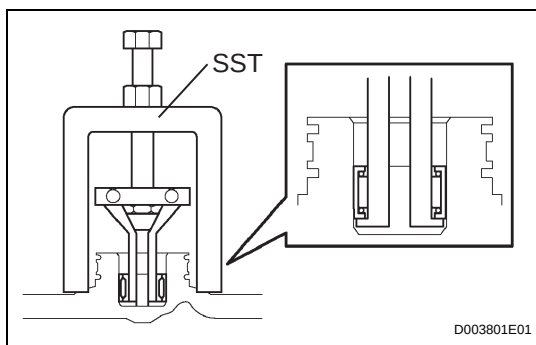
- (a) Remove the 11 bolts.



- (b) Tap in the circumference of the rear cover with a plastic-faced hammer to remove the transaxle rear cover from the transaxle.
(c) Remove the 2 oil seal rings from the transaxle rear cover.

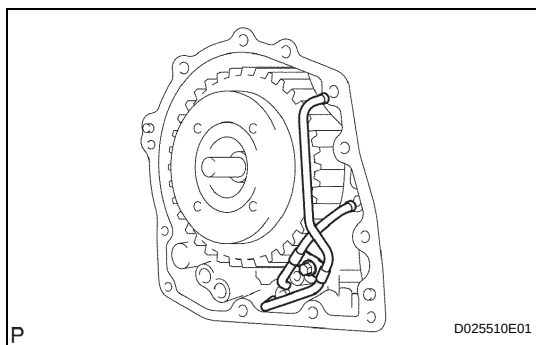


- (d) Using a T30 "torx" socket wrench, remove the 2 screws and transaxle rear cover plate.



- (e) Using SST, remove the needle-roller bearing from the transaxle rear cover.

SST 09387-00041 (09387-01040, 09387-01010, 09387-01030)

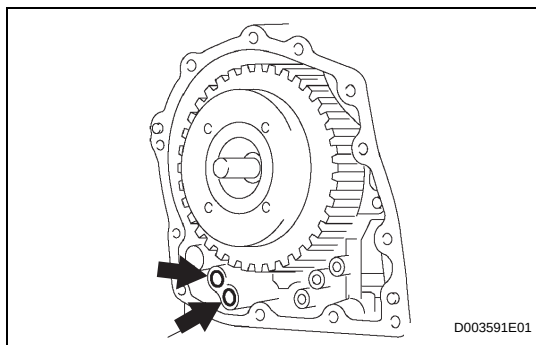


47. REMOVE BRAKE APPLY TUBE

- (a) Remove the bolt, clamp and 2 brake apply tubes.
- (b) Remove the brake apply tube from the clamp.

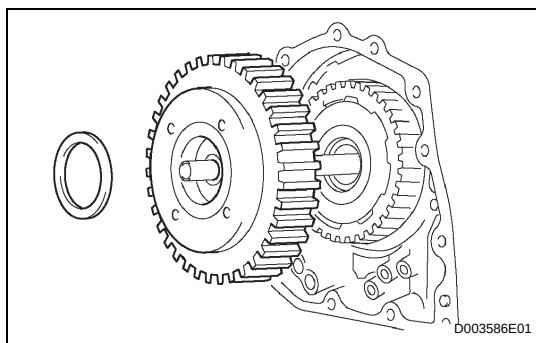
48. REMOVE FRONT CLUTCH APPLY TUBE

- (a) Remove the front clutch apply tube from the clamp.



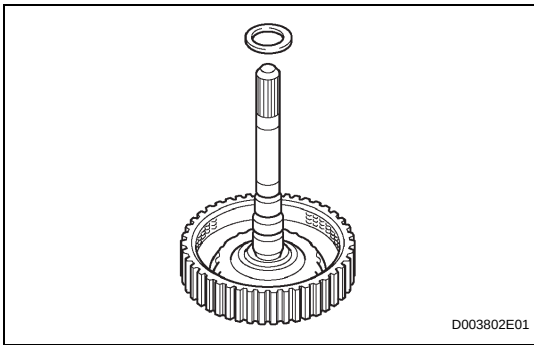
49. REMOVE NO. 1 GOVERNOR APPLY GASKET

- (a) Using a screwdriver, remove the 2 apply gaskets.

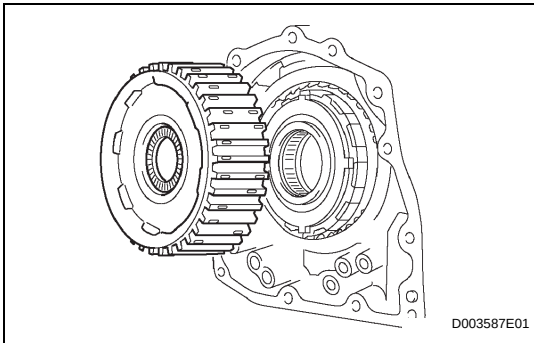


50. REMOVE DIRECT CLUTCH ASSEMBLY

- (a) Remove the thrust bearing and direct clutch from the transaxle.

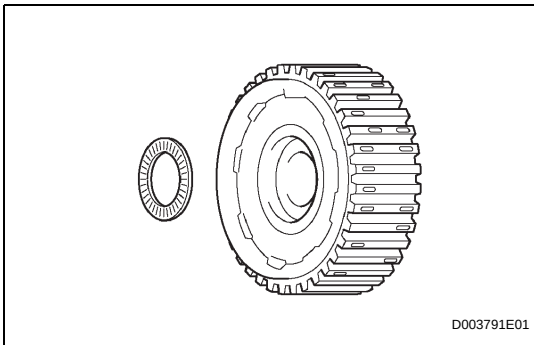


(b) Remove the bearing race from the direct clutch.

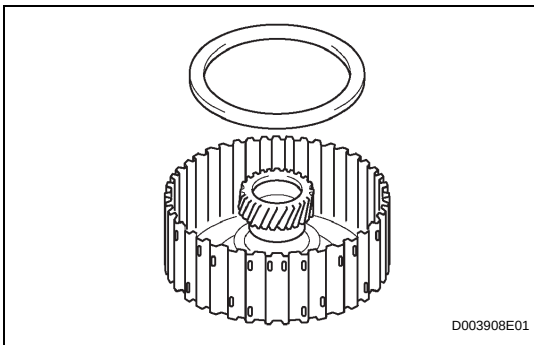


51. REMOVE REAR PLANETARY SUN GEAR ASSEMBLY

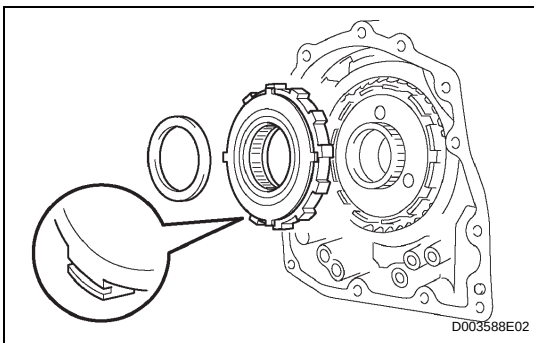
(a) Remove the rear planetary sun gear from the transaxle.



(b) Remove the thrust bearing from the rear planetary sun gear.

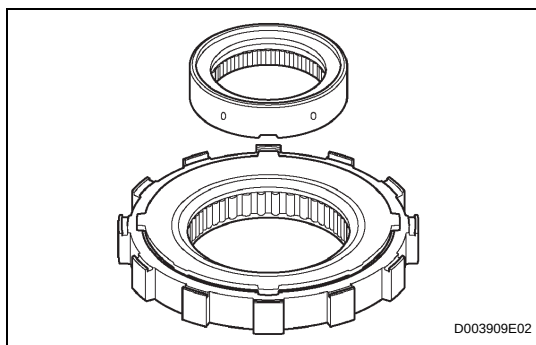


(c) Remove the No. 1 thrust washer from the rear planetary sun gear.

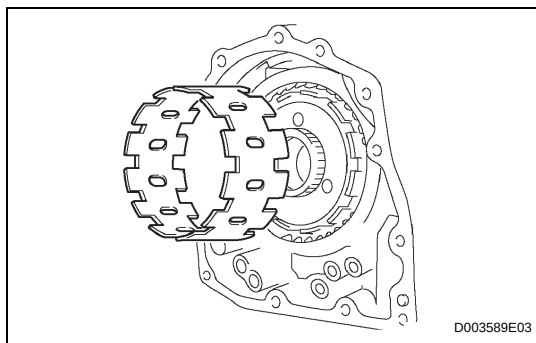


52. REMOVE 1-WAY CLUTCH ASSEMBLY

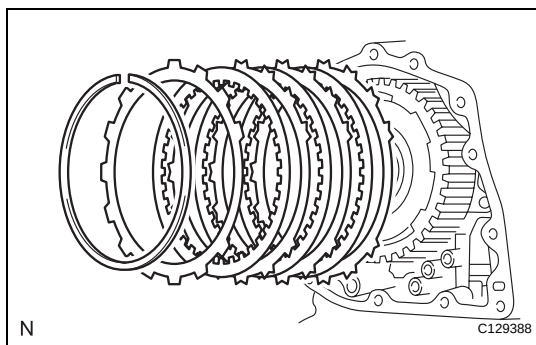
(a) Remove the 1-way clutch and thrust bearing from the transaxle.



(b) Remove the inner race from the 1-way clutch.



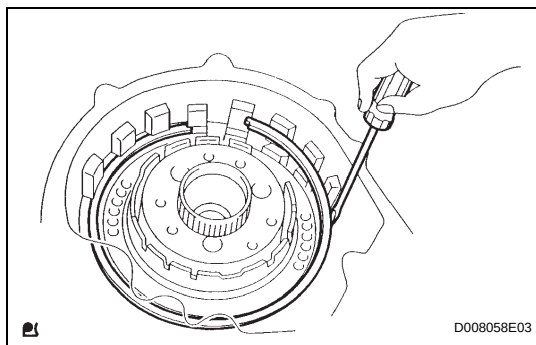
53. REMOVE 1-WAY CLUTCH OUTER SLEEVE



54. REMOVE 2ND BRAKE CLUTCH DISC

- (a) Using a screwdriver, remove the snap ring.
- (b) Remove the flange, 3 discs and 3 plates from the transaxle.

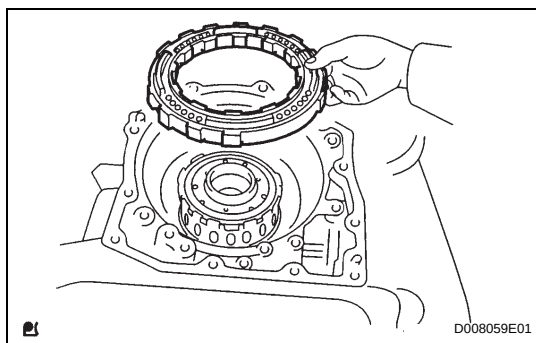
55. INSPECT 2ND BRAKE CLUTCH DISC (See page [AX-185](#))

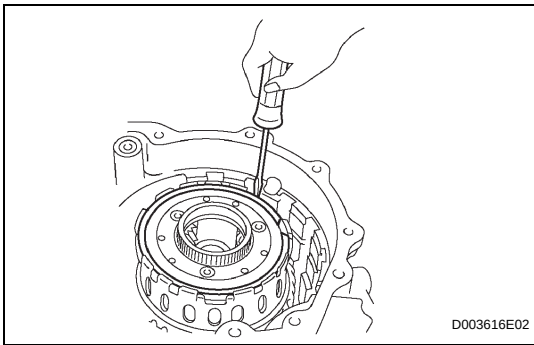


56. REMOVE 2ND BRAKE PISTON ASSEMBLY

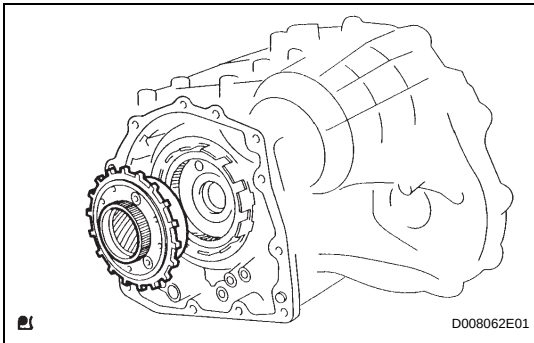
- (a) Using a screwdriver, remove the snap ring.

(b) Remove the 2nd brake piston from the transaxle.

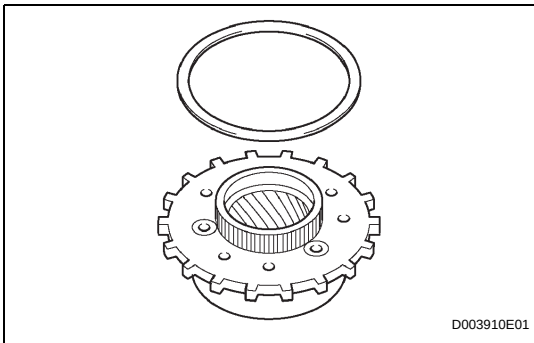


**57. REMOVE REAR PLANETARY GEAR ASSEMBLY**

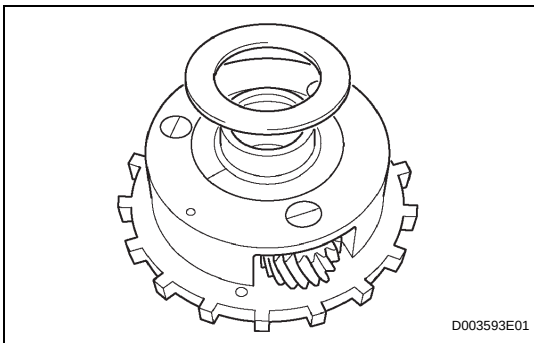
(a) Using a screwdriver, pry out the snap ring.



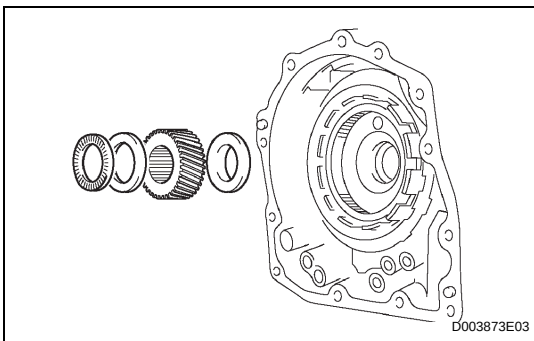
(b) Remove the rear planetary gear from the transaxle.



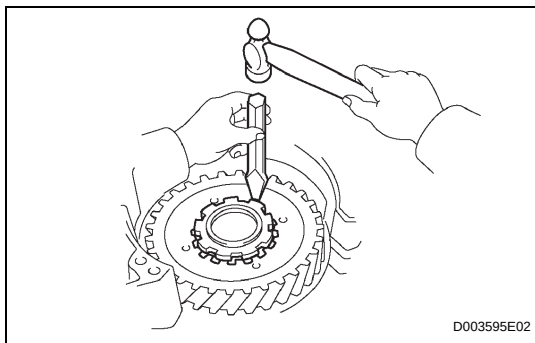
(c) Remove the No. 1 planetary carrier thrust washer from the rear planetary gear.



(d) Remove the bearing race from the rear planetary gear.

**58. REMOVE INPUT SUN GEAR**

(a) Remove the 2 thrust bearings, bearing race and input sun gear from the transaxle.

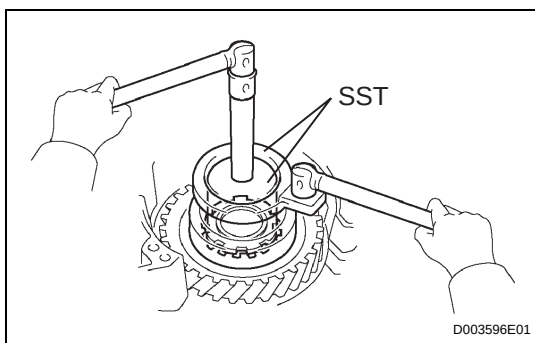


59. REMOVE FRONT PLANETARY GEAR ASSEMBLY

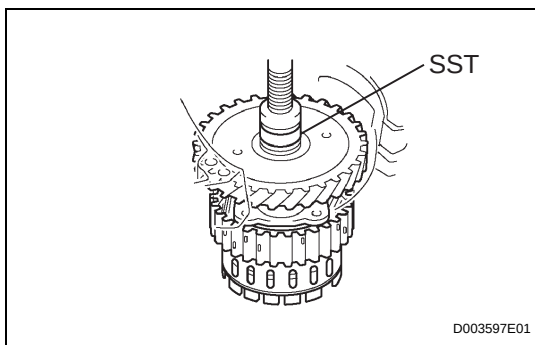
- (a) Using a chisel and hammer, unstake the lock washer.

NOTICE:

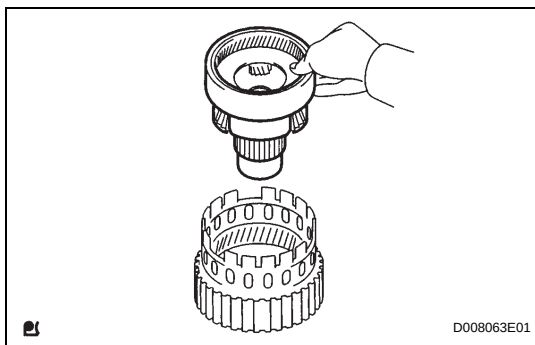
Push down all claws of the washer. Otherwise SST cannot be fully pressed against the nut and cannot loosen the nut.



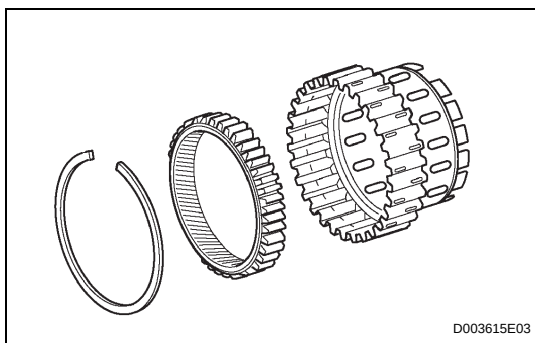
- (b) Using SST, remove the nut.
SST 09387-00030, 09387-00080



- (c) Using SST and a press, remove the front planetary gear from the counter drive gear.
SST 09950-60010 (09951-00450)

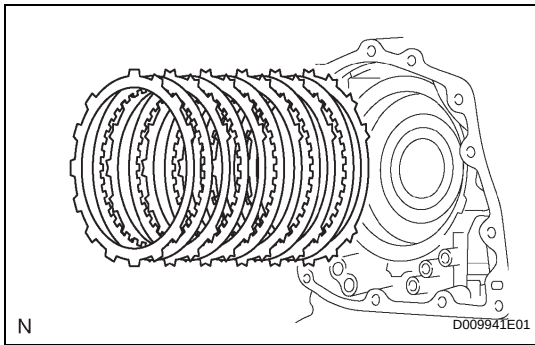


- (d) Remove the front planetary gear from the brake hub.



60. REMOVE FRONT PLANETARY RING GEAR

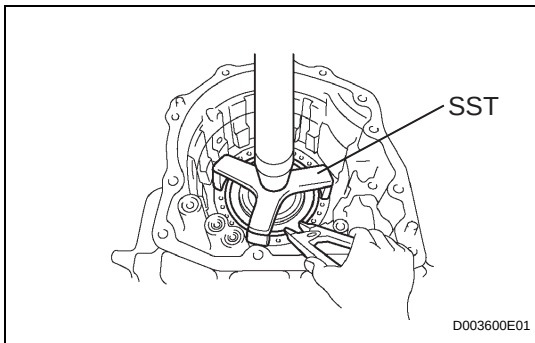
- (a) Using a screwdriver, remove the snap ring and front planetary ring gear from the brake hub.

**61. REMOVE 1ST AND REVERSE BRAKE CLUTCH DISC**

- (a) Remove the flange, 5 discs and 5 plates from the transaxle case.

62. INSPECT 1ST AND REVERSE BRAKE CLUTCH DISC

(See page [AX-185](#))

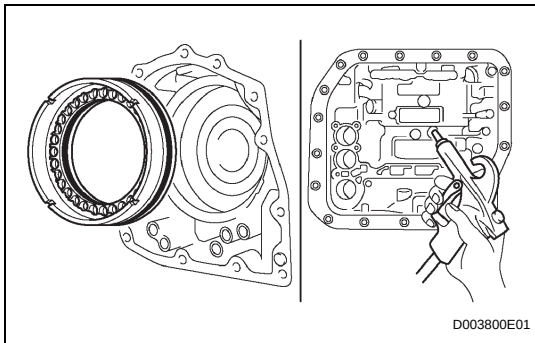
**63. REMOVE 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY**

- (a) Using SST, a press and snap ring expander, remove the snap ring and piston return spring.

SST 09387-00070

NOTICE:

- Stop the press when the spring sheet is lowered 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, preventing the spring sheet from deforming.
- Do not expand the snap ring excessively.

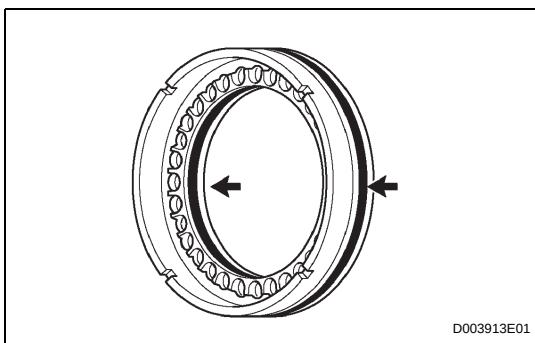
64. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY (See page [AX-186](#))**65. REMOVE 1ST AND REVERSE BRAKE PISTON**

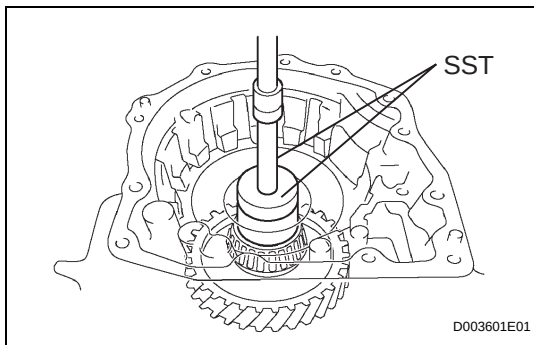
- (a) Apply compressed air (392 kPa, 4.0 kgf/cm², 57 psi) to the transaxle case to remove the 1st and reverse brake piston.

NOTICE:

- Applying compressed air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.
- Make sure not to spatter ATF when applying compressed air.

- (b) Remove the 2 O-rings from the 1st and reverse brake piston.

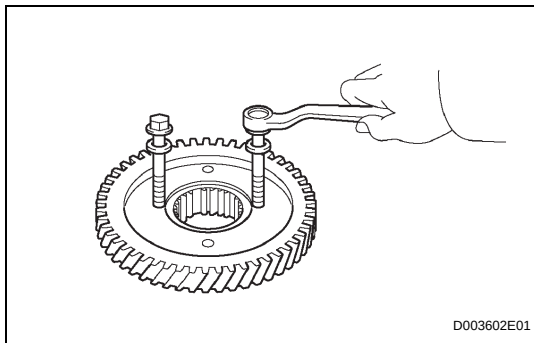




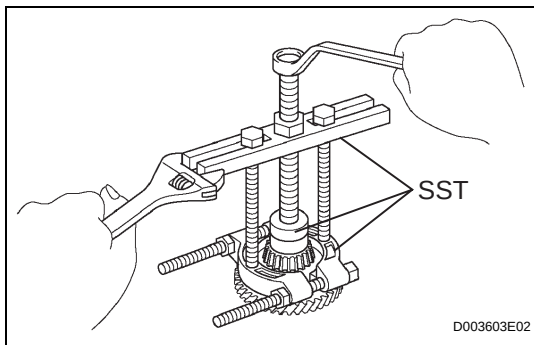
66. REMOVE COUNTER DRIVE GEAR

- (a) Using SST and a press, remove the counter drive gear from the transaxle case.

SST 09950-60010 (09951-00580), 09950-70010 (09951-07100)

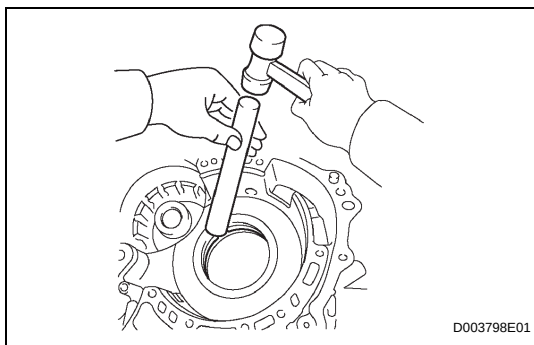


- (b) As shown in the illustration, tighten the 2 bolts evenly and make a clearance of approximately 20.0 mm (0.797 in.) between the counter drive gear and the inner race.

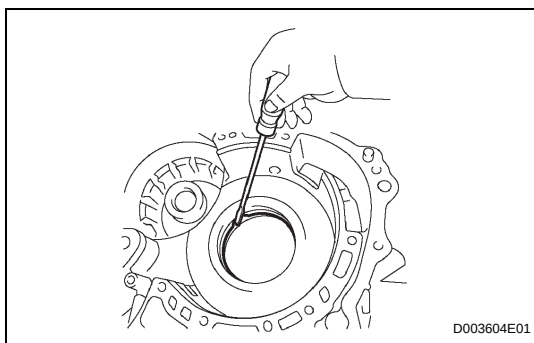


- (c) Using SST, remove the tapered roller bearing.

SST 09950-60010 (09951-00580), 09950-00020, 09950-00030



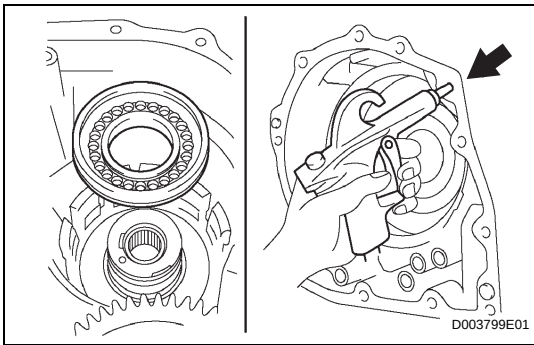
- (d) Using a brass bar and hammer, tap out the 2 bearing outer races.



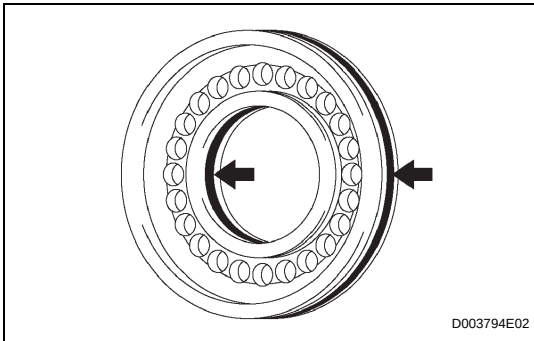
67. REMOVE COUNTER DRIVE GEAR HOLE SNAP RING

- (a) Using a screwdriver, pry out the snap ring from the transaxle.

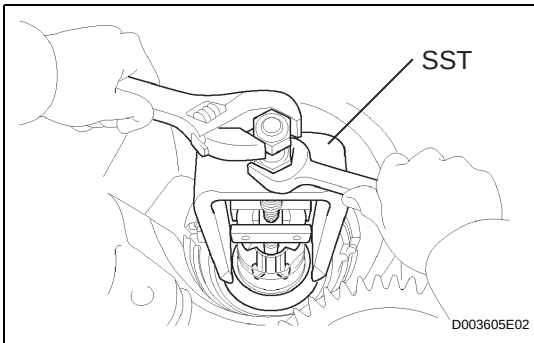
68. REMOVE NO. 2 BREATHER PLUG

**69. REMOVE UNDERDRIVE BRAKE PISTON**

- (a) Apply compressed air (392 kPa, 4.0 kgf/cm², 57 psi) to the transaxle case to remove the underdrive brake piston.

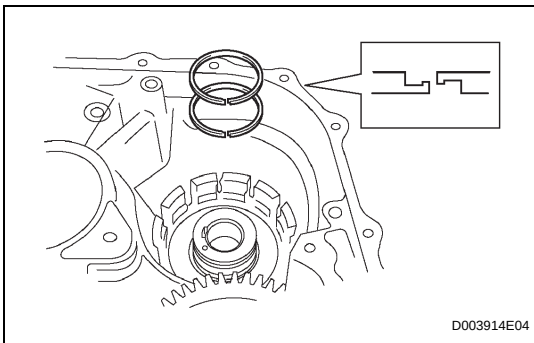


- (b) Remove the 2 O-rings from the underdrive brake piston.

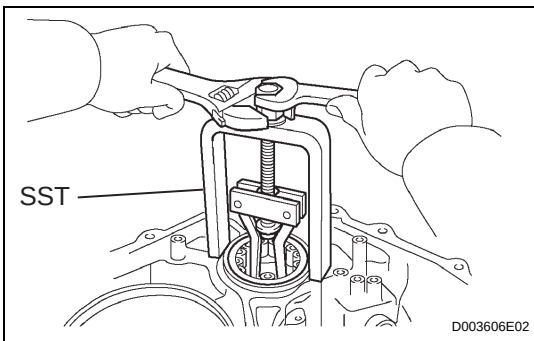


- (c) Using SST, remove the needle-roller bearing from the transaxle.

SST 09387-00041 (09387-01010, 09387-01030, 09387-01040)

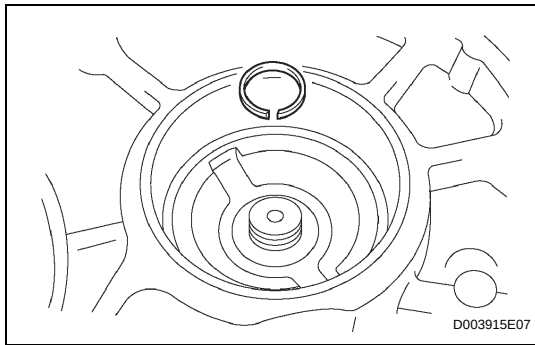
**70. REMOVE UNDERDRIVE CLUTCH DRUM OIL SEAL RING**

- (a) Remove the 2 oil seal rings from the transaxle.

**71. REMOVE UNDERDRIVE CYLINDRICAL ROLLER BEARING**

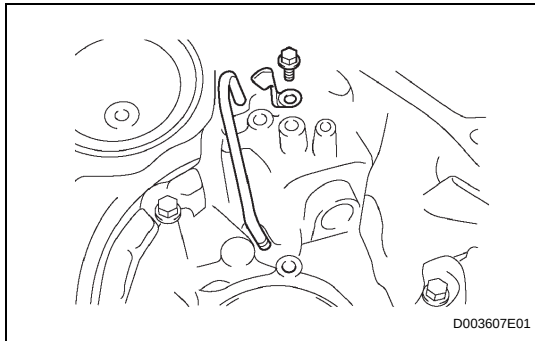
- (a) Using SST, remove the cylindrical roller bearing from the transaxle.

SST 09514-35011



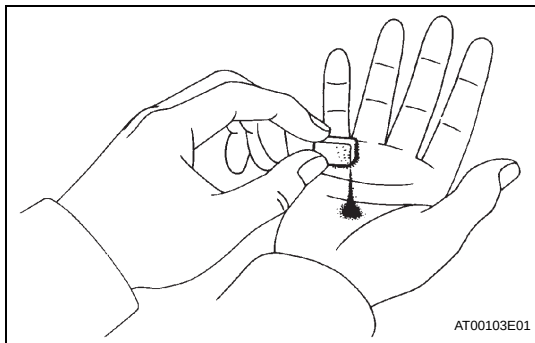
72. REMOVE UNDERDRIVE OUTPUT SHAFT OIL SEAL RING

- (a) Remove the oil seal ring from the transaxle housing.



73. REMOVE DIFFERENTIAL GEAR LUBE APPLY TUBE

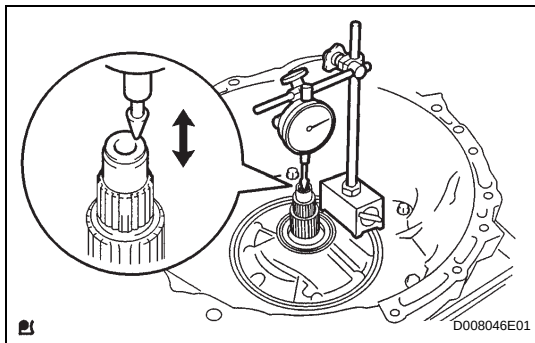
- (a) Remove the bolt, clamp and apply tube from the transaxle.



INSPECTION

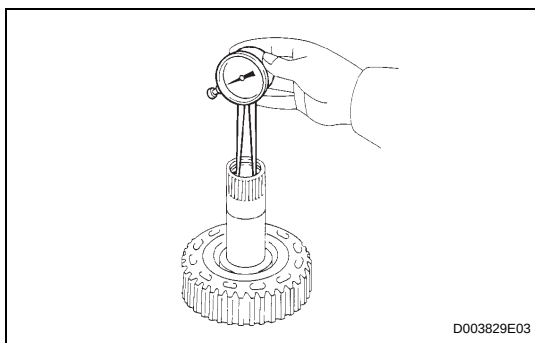
1. INSPECT AUTOMATIC TRANSAXLE OIL PANEL SUB-ASSEMBLY

- (a) Remove the magnets and use them to collect any steel chips. Examine the chips and particles in the pan and on the magnet to determine what type of wear has occurred in the transaxle.
Steel (magnetic): bearing gear and plate wear
Brass (non-magnetic): bush wear



2. INSPECT INPUT SHAFT END PLAY

- (a) Using a dial indicator, measure the input shaft end play.
Standard end play:
0.262 to 1.249 mm (0.0103 to 0.0492 in.)

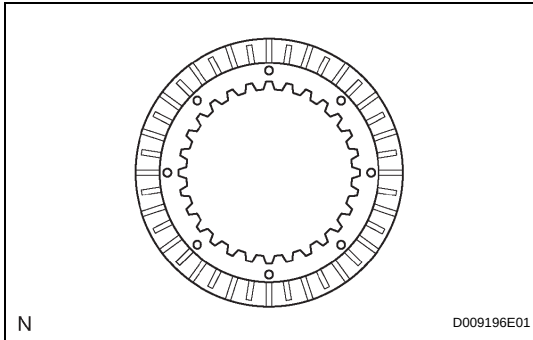


3. INSPECT MULTIPLE DISC CLUTCH HUB

- (a) Using a caliper gauge, measure the inside diameter of the forward clutch hub bushing.
Standard inside diameter:
23.025 to 23.045 mm (0.9065 to 0.9073 in.)
Maximum inside diameter:
23.09 mm (0.9091 in.)
NOTICE:
• When the diameter is over the maximum, replace the multiple disc clutch hub with a new one.

- Check the contact surface of the bush in the direct clutch shaft. If any scratch or discolor is identified, replace the direct clutch sub-assembly with a new one.

If the inside diameter is greater than the maximum, replace the forward clutch hub.

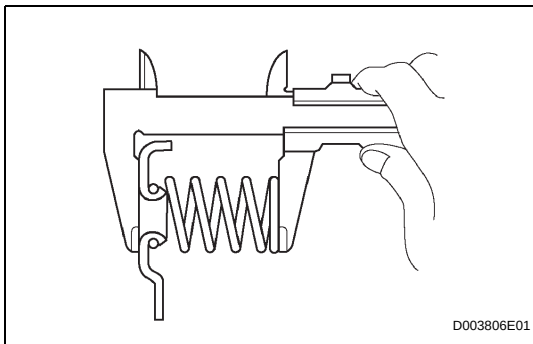


4. INSPECT NO. 2 UNDERDRIVE CLUTCH DISC

- (a) Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

NOTICE:

- If the lining of the disc is peeling off or discolored, or even if a part of the groove is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

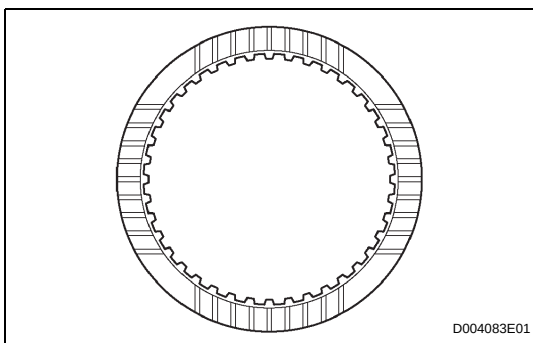


5. INSPECT UNDERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

- (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:

14.04 mm (0.5528 in.)

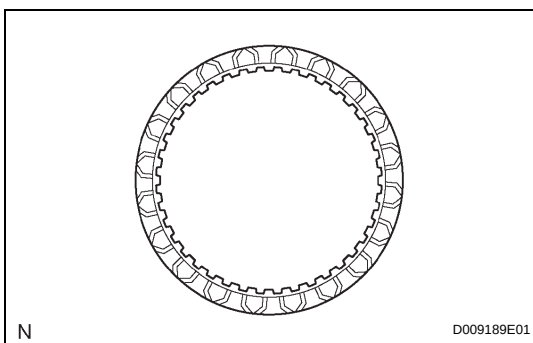


6. INSPECT 2ND BRAKE CLUTCH DISC

- (a) Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

NOTICE:

- If the lining of the disc is peeling off or discolored, or even if a part of the printed number is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

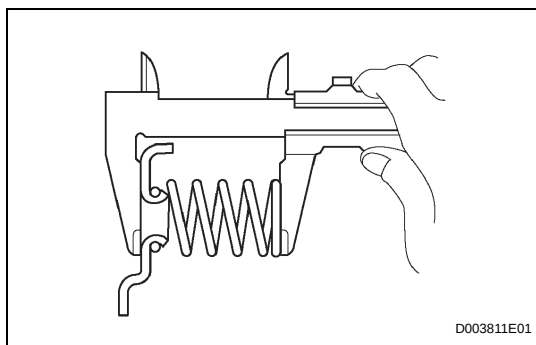


7. INSPECT 1ST AND REVERSE BRAKE CLUTCH DISC

- (a) Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

NOTICE:

- If the lining of the disc is peeling off or discolored, or even if a part of the groove is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

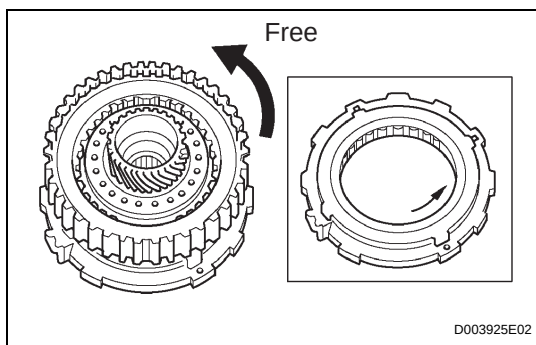


8. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

- (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:

15.51 mm (0.6106 in.)

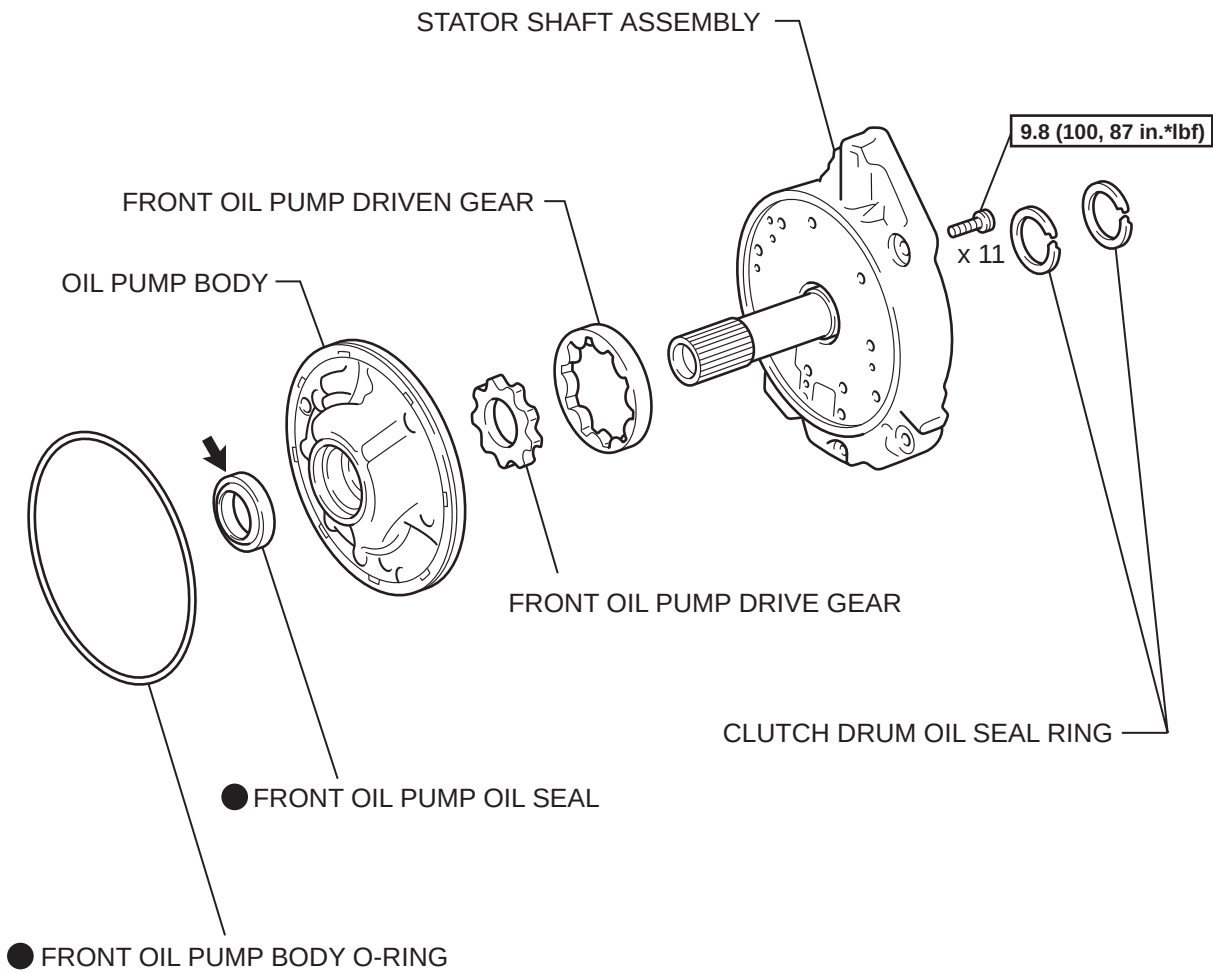


9. INSPECT UNDERDRIVE 1-WAY CLUTCH ASSEMBLY

- (a) Install the underdrive clutch assembly to the 1-way clutch. Rotate the underdrive clutch assembly to check the rotating direction for the lock or free operation.

OIL PUMP

COMPONENTS



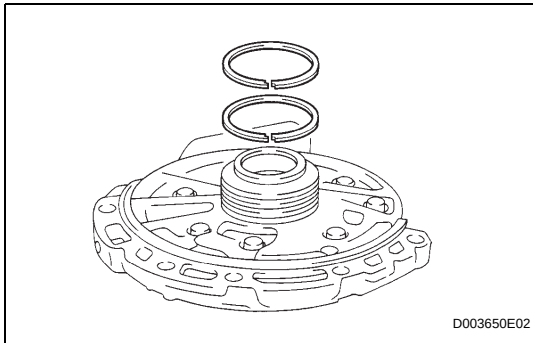
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

➡ Apply petroleum jelly

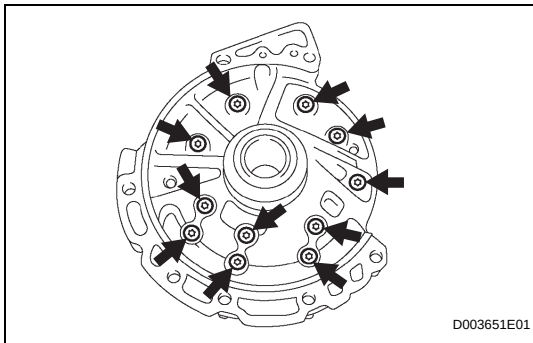
DISASSEMBLY

1. INSPECT OIL PUMP ASSEMBLY (See page [AX-218](#))



2. REMOVE CLUTCH DRUM OIL SEAL RING

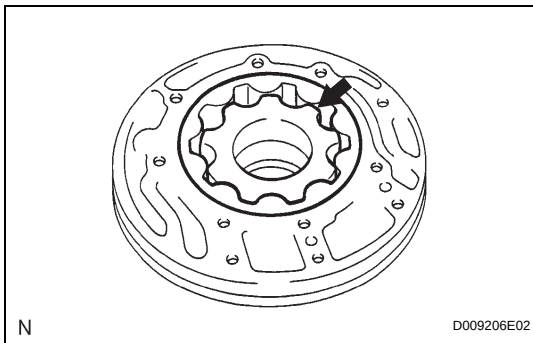
- (a) Remove the 2 clutch drum oil seal rings.



3. REMOVE STATOR SHAFT ASSEMBLY

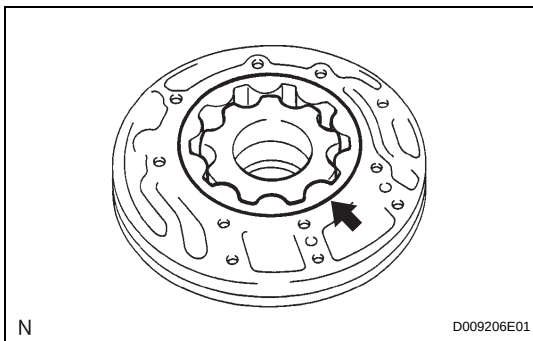
- (a) Using a T30 "torx" socket, remove the 11 bolts and stator shaft. Keep the gears in assembling order.

4. INSPECT CLEARANCE OF OIL PUMP ASSEMBLY (See page [AX-218](#))



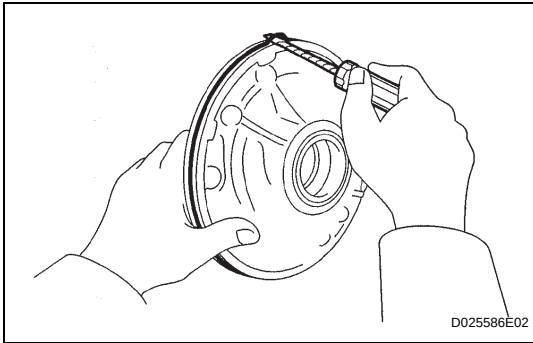
5. REMOVE FRONT OIL PUMP DRIVE GEAR

- (a) Remove the front oil pump drive gear.



6. REMOVE FRONT OIL PUMP DRIVEN GEAR

- (a) Remove the front oil pump driven gear.

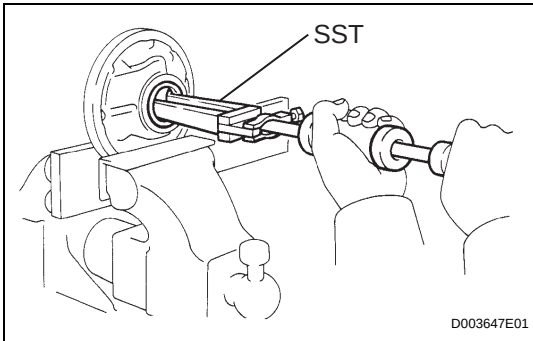


7. REMOVE FRONT OIL PUMP BODY O-RING

- (a) Using a screwdriver, pry out the O-ring.

HINT:

Tape the screwdriver before use.



8. REMOVE FRONT OIL PUMP OIL SEAL

- (a) Mount the oil pump in a soft jaw vise.

- (b) Using SST, tap out the oil seal from the oil pump body.

SST 09308-00010

9. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY (See page AX-219)

10. INSPECT STATOR SHAFT ASSEMBLY (See page AX-219)

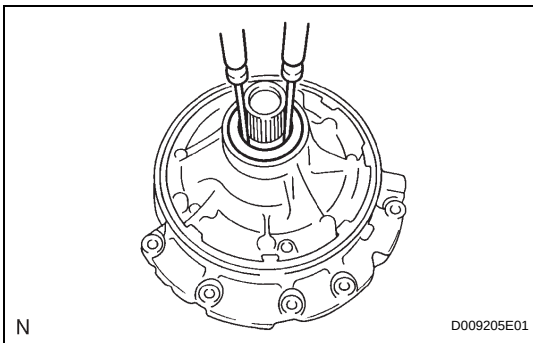
INSPECTION

1. INSPECT OIL PUMP ASSEMBLY

- (a) Turn the drive gear with 2 screwdrivers and make sure it rotates smoothly.

NOTICE:

Be careful not to damage the oil seal lip.



2. INSPECT CLEARANCE OF OIL PUMP ASSEMBLY

- (a) Push the driven gear to one side of the body. Using a feeler gauge, measure the clearance.

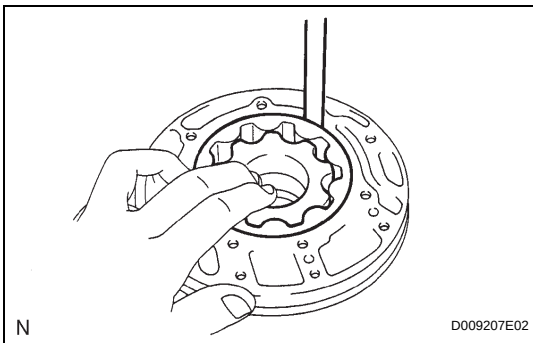
Standard body clearance:

0.10 to 0.17 mm (0.0039 to 0.0067 in.)

Maximum body clearance:

0.17 mm (0.0067 in.)

If the body clearance is greater than the maximum, replace the oil pump body sub-assembly.



- (b) Measure the tip clearance between the driven gear teeth and drive gear teeth.

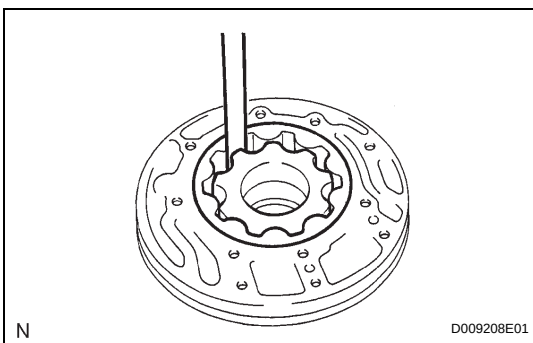
Standard tip clearance:

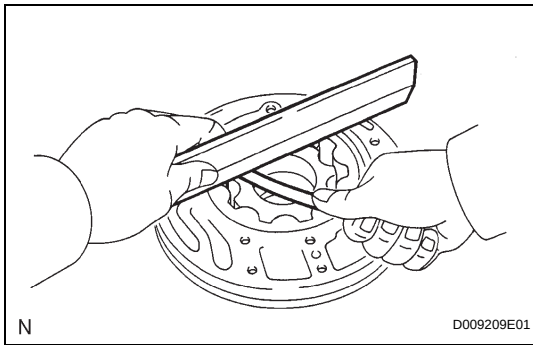
0.07 to 0.15 mm (0.0028 to 0.0059 in.)

Maximum tip clearance:

0.15 mm (0.0059 in.)

If the tip clearance is greater than the maximum, replace the oil pump body sub-assembly.





- (c) Using a straightedge and feeler gauge, measure the side clearance of both gears.

Standard side clearance:

0.02 to 0.05 mm (0.0008 to 0.0020 in.)

Maximum side clearance:

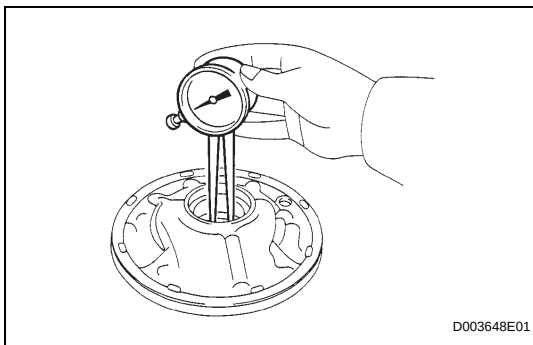
0.05 mm (0.0020 in.)

Standard drive gear thickness

Mark	Thickness
1	10.690 to 10.699 mm (0.4209 to 0.4212 in.)
2	10.700 to 10.709 mm (0.4213 to 0.4216 in.)
3	10.710 to 10.720 mm (0.4217 to 0.4220 in.)
4	10.721 to 10.730 mm (0.4221 to 0.4224 in.)
5	10.731 to 10.740 mm (0.4225 to 0.4228 in.)

Standard driven gear thickness

Mark	Thickness
1	10.690 to 10.699 mm (0.4209 to 0.4212 in.)
2	10.700 to 10.709 mm (0.4213 to 0.4216 in.)
3	10.710 to 10.720 mm (0.4217 to 0.4220 in.)
4	10.721 to 10.730 mm (0.4221 to 0.4224 in.)
5	10.731 to 10.740 mm (0.4225 to 0.4228 in.)



3. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

- (a) Using a caliper gauge, measure the inside diameter of the oil pump body bush.

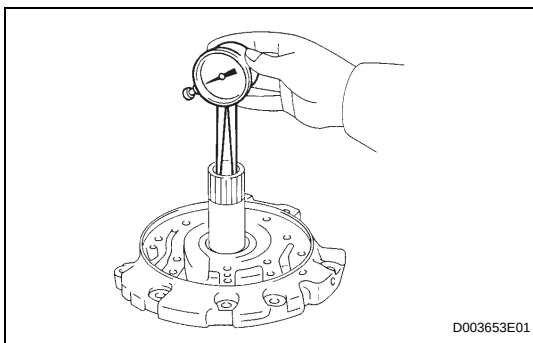
Standard inside diameter:

38.113 to 38.138 mm (1.50051 to 1.50149 in.)

Maximum inside diameter:

38.188 mm (1.50346 in.)

If the inside diameter is greater than maximum, replace the oil pump body sub-assembly.



4. INSPECT STATOR SHAFT ASSEMBLY

- (a) Using a caliper gauge, measure the inside diameter of the stator shaft bush.

Standard inside diameter:

21.500 to 21.526 mm (0.84646 to 0.84748 in.)

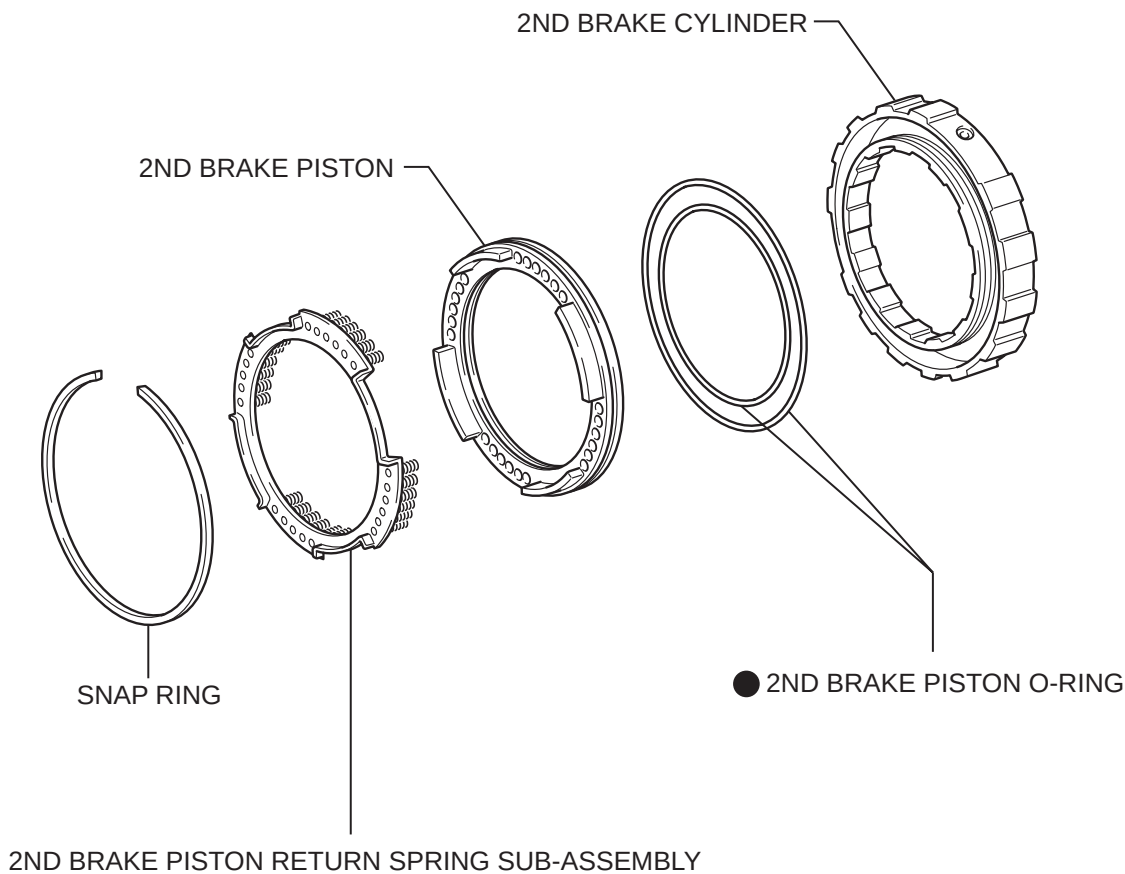
Maximum inside diameter:

21.57 mm (0.8492 in.)

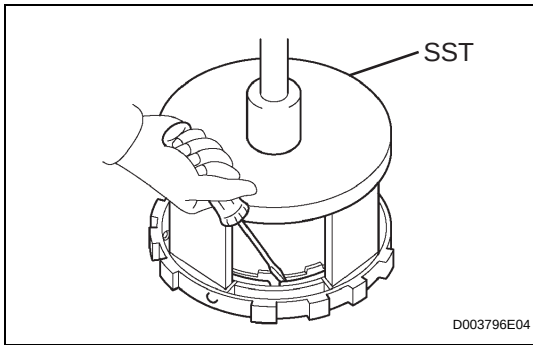
If the indicator diameter is greater than the maximum, replace the stator shaft.

SECOND BRAKE PISTON

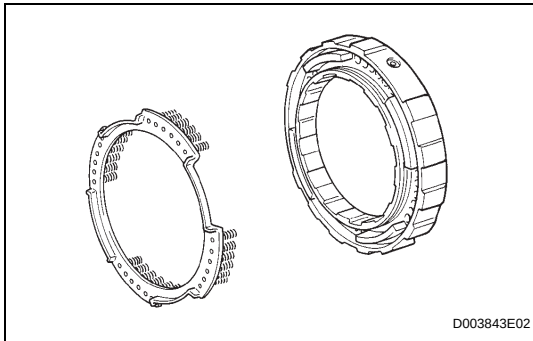
COMPONENTS



DISASSEMBLY

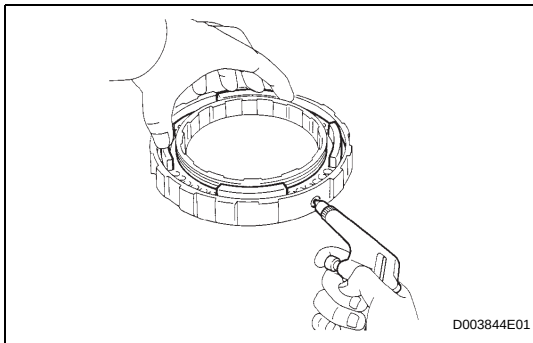


1. **REMOVE 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY**
 - (a) Place SST on the return spring and compress.
 - (b) Using a screwdriver, pry out the snap ring.

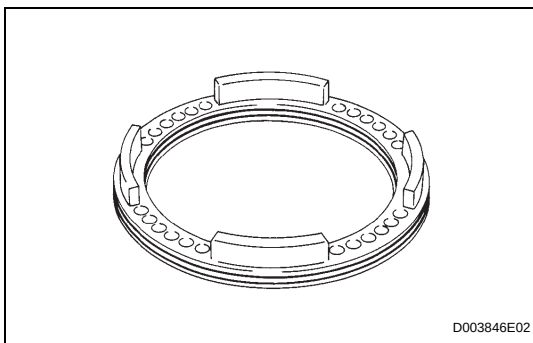


(c) Remove the piston return spring.

2. **INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY** (See page [AX-223](#))



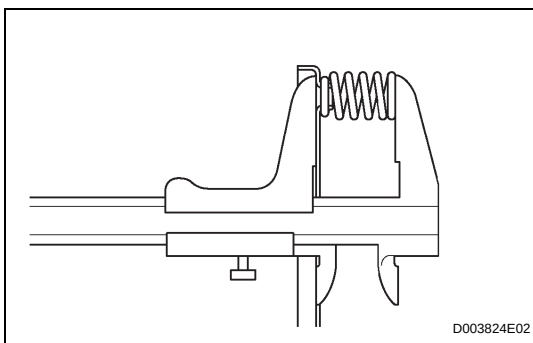
3. **REMOVE 2ND BRAKE PISTON**
 - (a) Hold the 2nd brake piston and apply compressed air (392 kPa, 4.0kgf/cm², 57 psi) to the 2nd brake cylinder to remove the 2nd brake piston.



4. **REMOVE 2ND BRAKE PISTON O-RING**
 - (a) Remove the 2 O-rings from the 2nd brake piston.

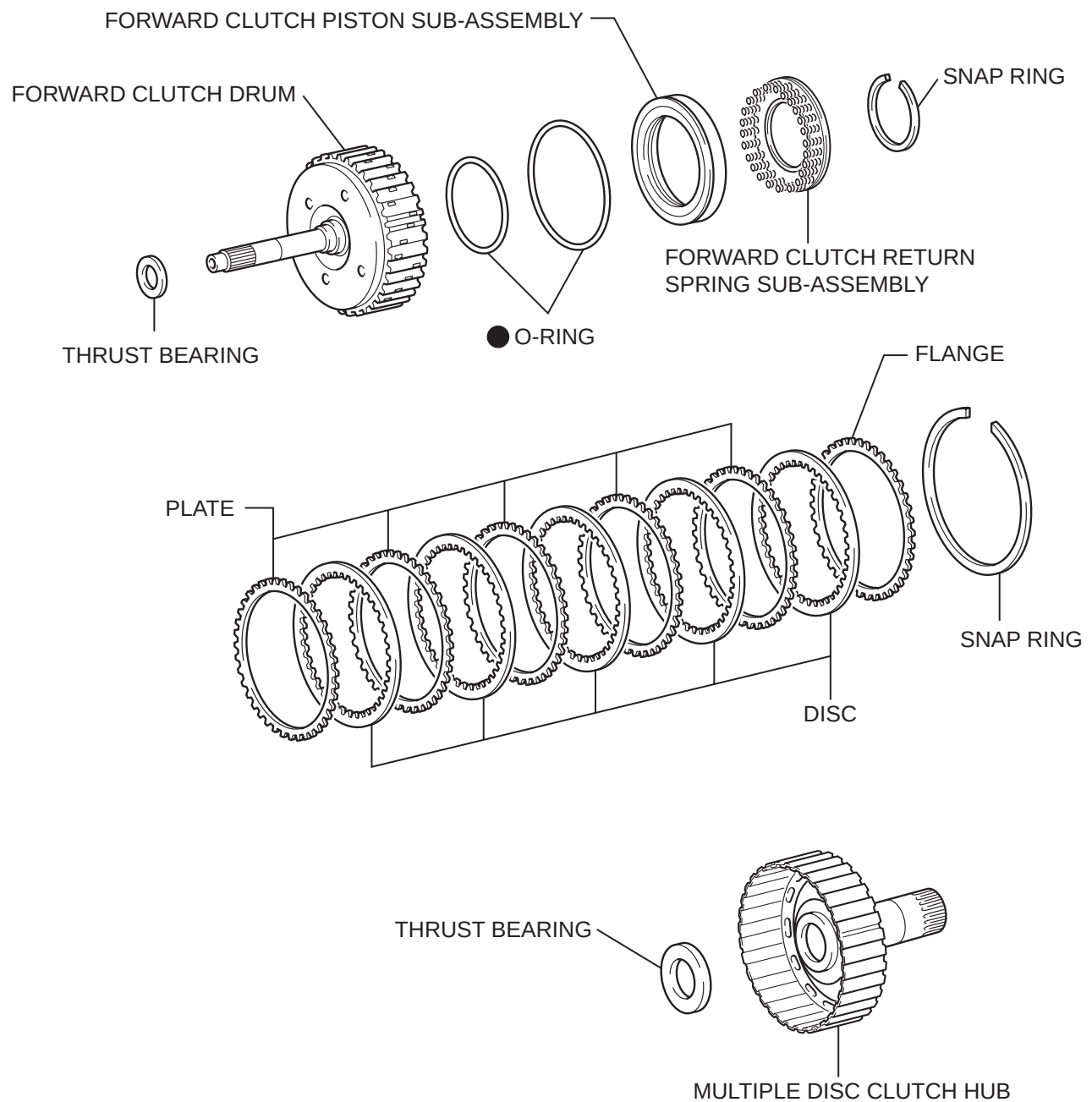
INSPECTION

1. **INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY**
 - (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
Standard free length:
16.61 mm (0.6539 in.)



FORWARD CLUTCH

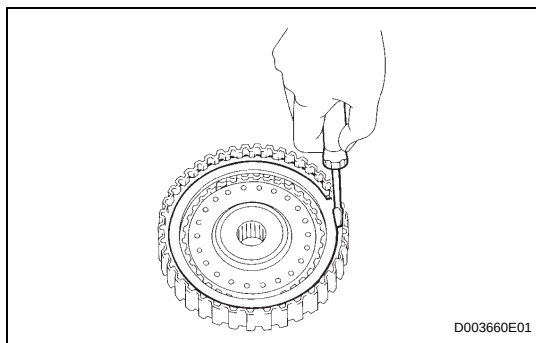
COMPONENTS



● Non-reusable part

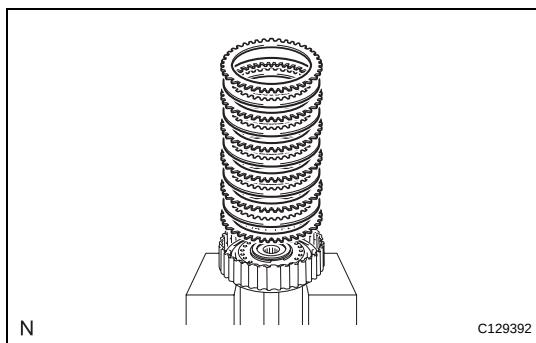
DISASSEMBLY

1. **INSPECT FORWARD CLUTCH** (See page [AX-227](#))
2. **REMOVE FORWARD MULTIPLE DISC CLUTCH DISC**
 - (a) Using a screwdriver, remove the snap ring.



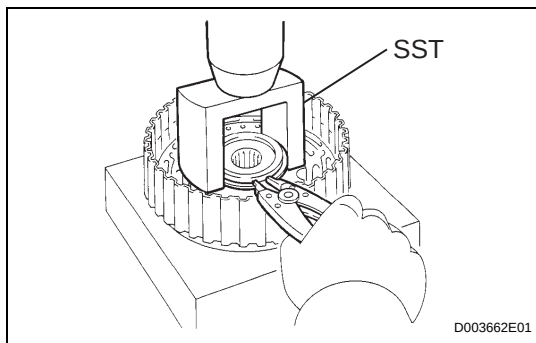
- (b) Remove the flange , 5 discs and 5 plates from the input shaft.

3. **INSPECT FORWARD MULTIPLE DISC CLUTCH DISC** (See page [AX-228](#))



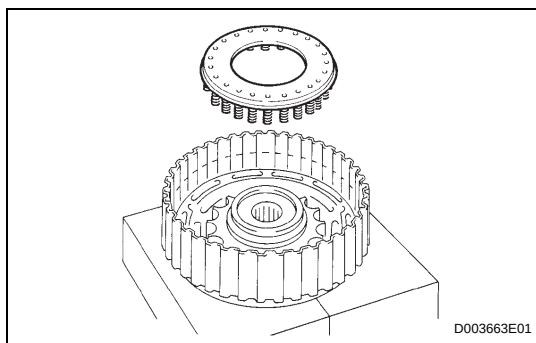
4. **REMOVE FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY**

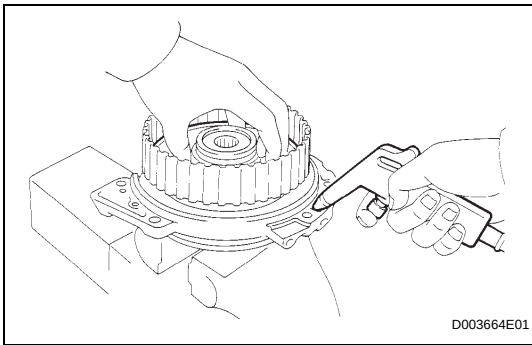
- (a) Place SST on the spring retainer and compress the return spring with a press.
SST 09350-32014 (09351-32070)
 - (b) Using a snap ring expander, remove the snap ring.



- (c) Remove the piston return spring.

5. **INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY** (See page [AX-228](#))





6. REMOVE FORWARD CLUTCH PISTON SUB-ASSEMBLY

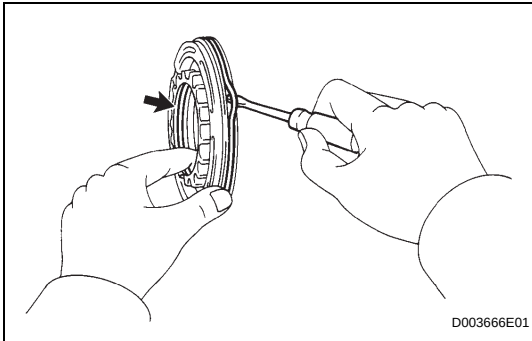
- (a) Place the forward clutch drum onto the oil pump.
- (b) Holding the forward clutch piston with your hand, apply compressed air (392 kPa, 4.0kgf/cm², 57 psi) to the oil pump to remove the forward clutch piston.

HINT:

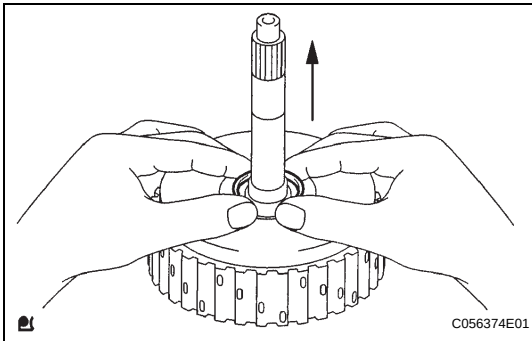
When the piston is slanted and cannot be removed, remove it by pushing down the protruding side and applying compressed air again, or using needle-nose pliers (with its tips wrapped in tape).

- (c) Using a screwdriver, pry out the 2 O-rings.

7. REMOVE FORWARD CLUTCH PISTON SUB-ASSEMBLY (See page [AX-228](#))



8. REMOVE INPUT SHAFT OIL SEAL RING



INSPECTION

1. INSPECT PACK CLEARANCE OF FORWARD CLUTCH

- (a) Install the forward clutch on the oil pump.

NOTICE:

Be careful not to damage the oil seal ring of oil pump.

- (b) Using a dial indicator, measure the forward clutch piston stroke while applying and releasing compressed air (392 kPa, 4.0 kgf/cm², 57 psi)

Standard position stroke:

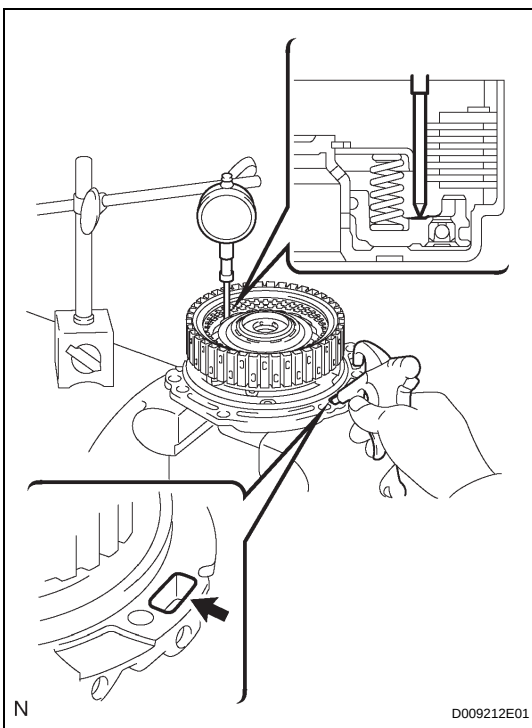
1.74 to 2.08 mm (0.0685 to 0.0819 in.)

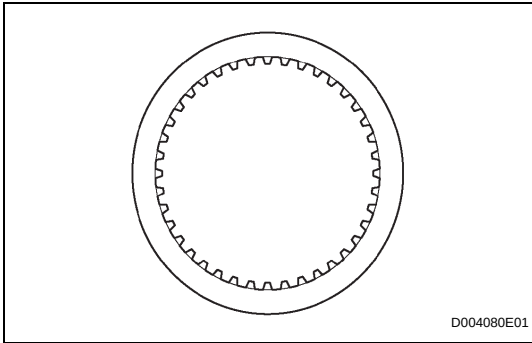
If the piston stroke is less than the minimum, the parts may have been assembled incorrectly. Check and reassemble again.

If the clearance is not as specified, select another flange.

HINT:

As the opening is big, cover it with a shop rag to prevent the compressed air from being discharged.



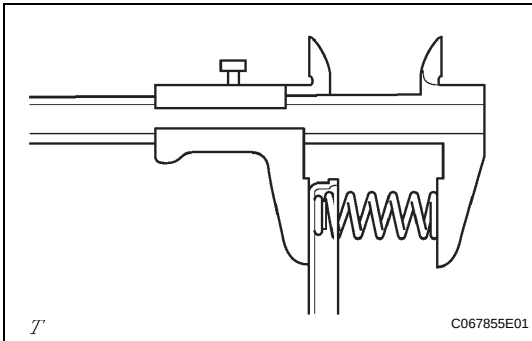


2. INSPECT FORWARD MULTIPLE DISC CLUTCH DISC

- (a) Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

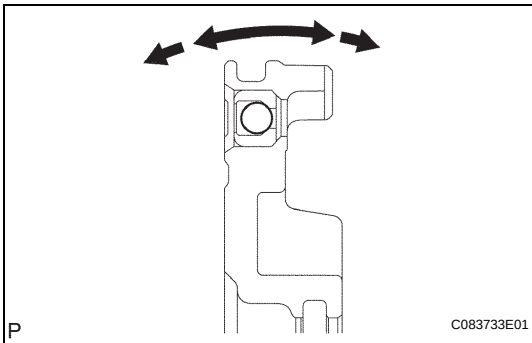


3. INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

- (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.

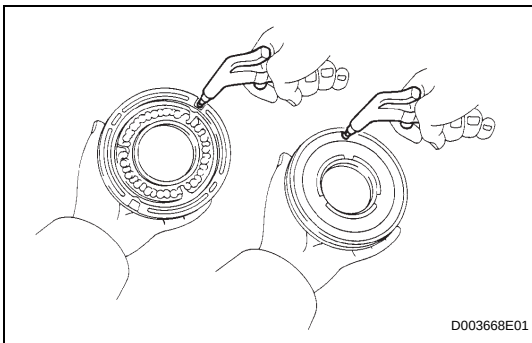
Standard free length:

28.23 mm (1.1102 in.)



4. INSPECT FORWARD CLUTCH PISTON SUB-ASSEMBLY

- (a) Shake the piston to check that the check ball is not stuck.



- (b) Check that air does not leak from the valve when applying low compressed air (392 kPa, 4.0 kgf*cm², 57 psi)

REASSEMBLY

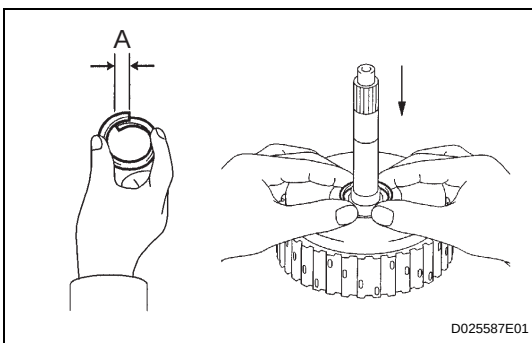
1. INSTALL INPUT SHAFT OIL SEAL RING

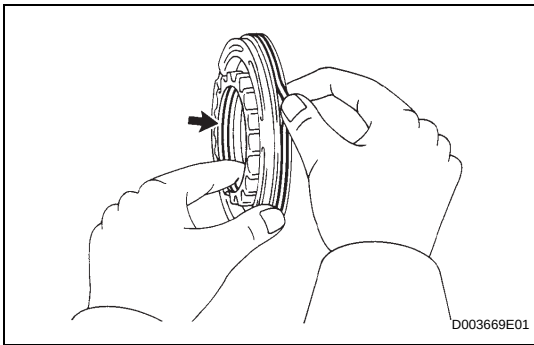
- (a) Compress the oil seal ring from both sides to reduce dimension A.

Standard dimension A:

5 mm (0.197 in.)

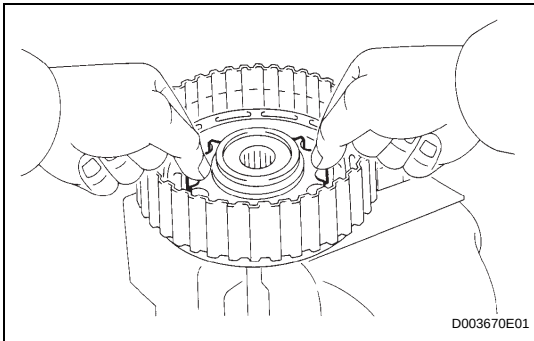
- (b) Coat the oil seal ring with ATF and install it to the input shaft.



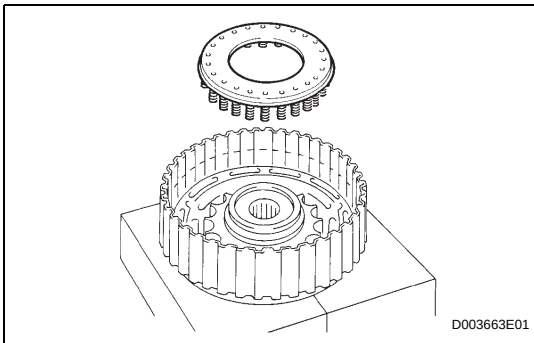


2. INSTALL FORWARD CLUTCH PISTON SUB-ASSEMBLY

- (a) Coat 2 new O-rings with ATF, and install them to the forward clutch piston.

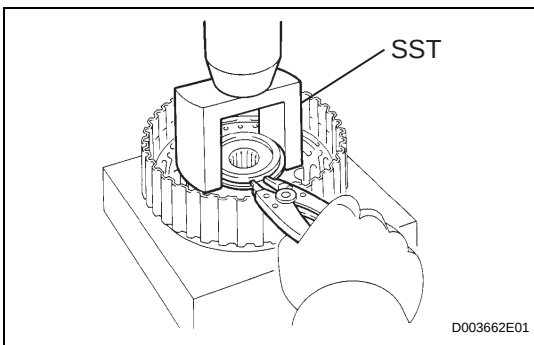


- (b) Install the forward clutch piston to the forward clutch drum.



3. INSTALL FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

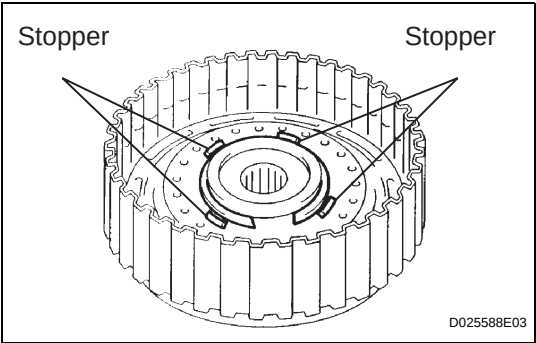
- (a) Place the return spring onto the piston.
SST 09350-32014 (09351-32070)



- (b) Place SST on the return spring, and compress the return spring with a press.
- (c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring retainer claw.

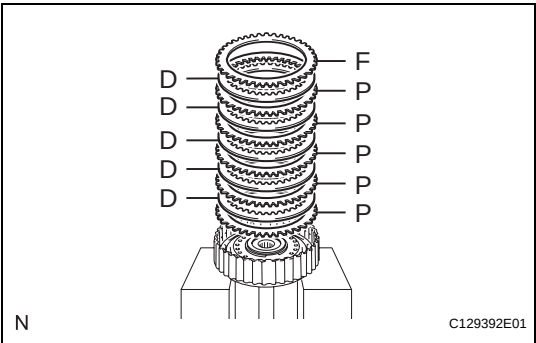
NOTICE:

- Stop the press when the spring sheet is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove.
- This prevents the spring sheet from being deformed.
- Do not expand the snap ring excessively.



- (d) Set the end gap of the snap ring in the piston shown in the illustration.

NOTICE:
The end gap of the snap ring should not coincide with any of the stoppers.

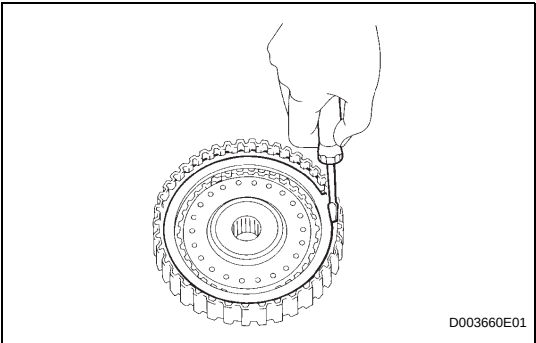


4. INSTALL FORWARD MULTIPLE DISC CLUTCH DISC

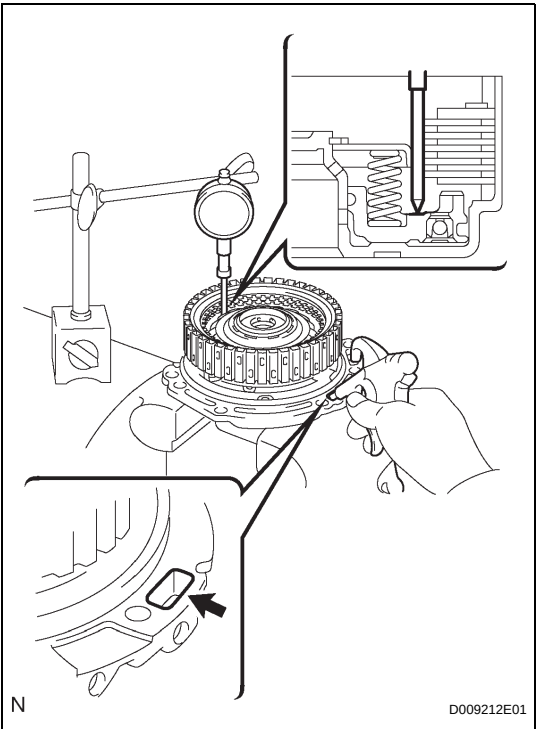
- (a) Install the 5 plates, 5 discs and flange.

Install in order:
P - D - P - D - P - D - P - D - P - D - F

HINT:
P = Plate
D = Disc
F = Flange



- (b) Using a screwdriver, install the snap ring.
(c) Check that the end gap of the snap ring is not aligned with one of the cutouts.



5. INSPECT PACK CLEARANCE OF FORWARD CLUTCH

- (a) Install the forward clutch on the oil pump.

NOTICE:
Be careful not to damage the oil seal ring of the oil pump.

- (b) Using a dial indicator, measure the forward clutch piston stroke while applying and releasing compressed air (392 kgf/cm², 4.0 kPa, 57 psi)

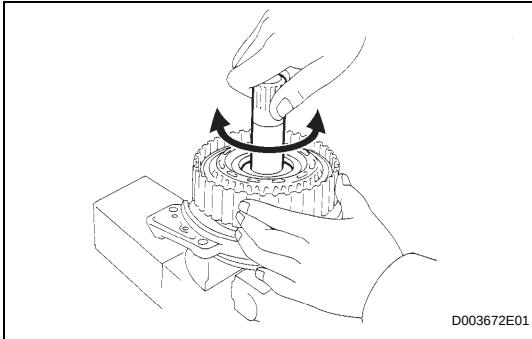
Standard piston stroke:
1.74 to 2.08 mm (0.0685 to 0.0819 in.)

If the piston stroke is less than the minimum, parts may have been assembled incorrectly. Check and reassemble again. If the clearance is not as specified, select another flange.

NOTICE:
There are 5 different flanges in thickness.
Standard flange thickness

No.	Thickness	No.	Thickness
1	3.00 mm (0.1181 in.)	4	3.45 mm (0.1358 in.)

No.	Thickness	No.	Thickness
2	3.15 mm (0.1240 in.)	5	3.60 mm (0.1417 in.)
3	3.30 mm (0.1299 in.)	-	-



6. INSPECT FORWARD MULTIPLE DISC CLUTCH CLUTCH DISC

(a) Inspect the clutch disc rotation.

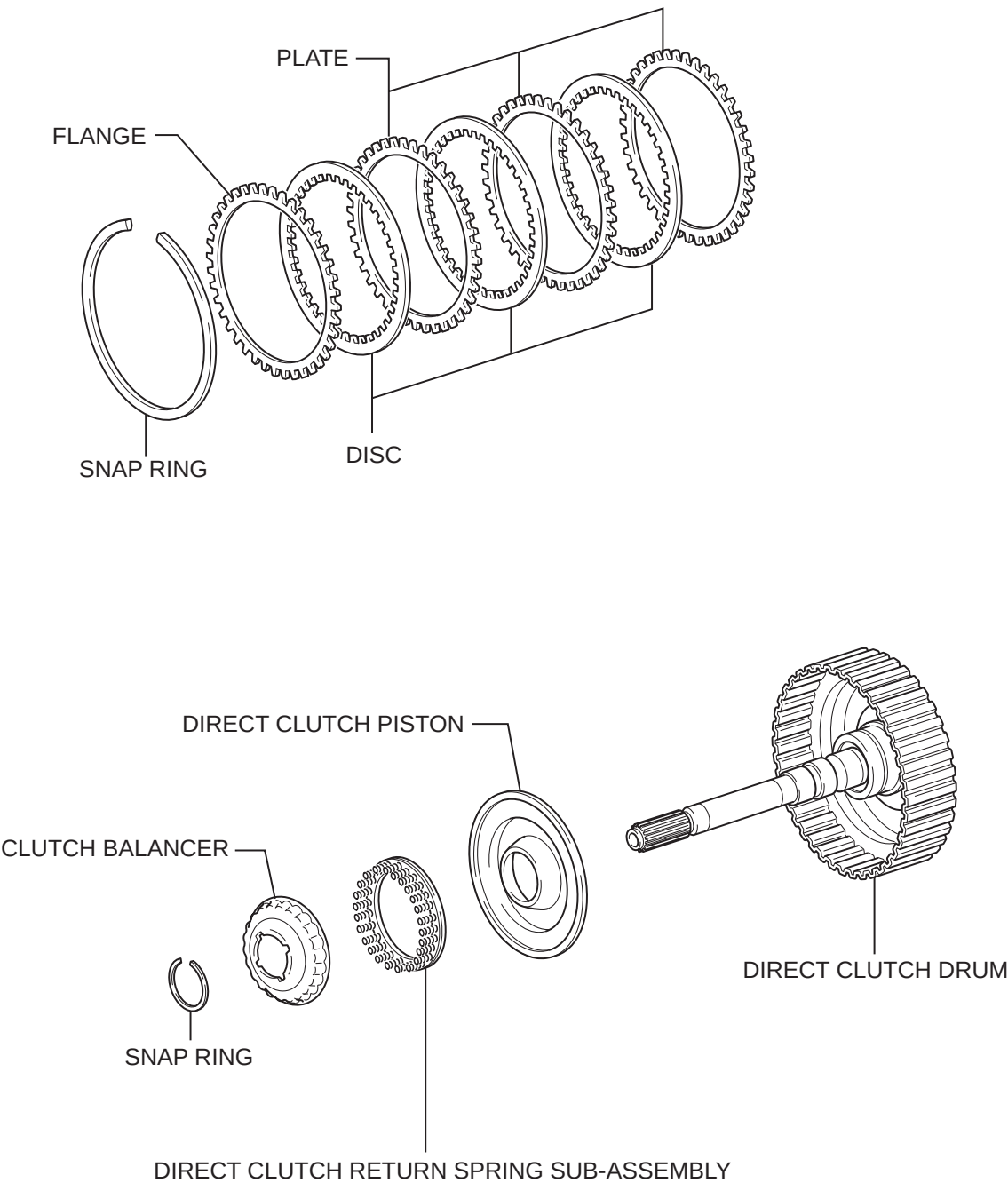
- (1) After inserting the multiple disc clutch into the multiple disc clutch hub, rotate the forward clutch and check that the disc lightly rotates.

NOTICE:

Do not place the forward clutch in a vise.

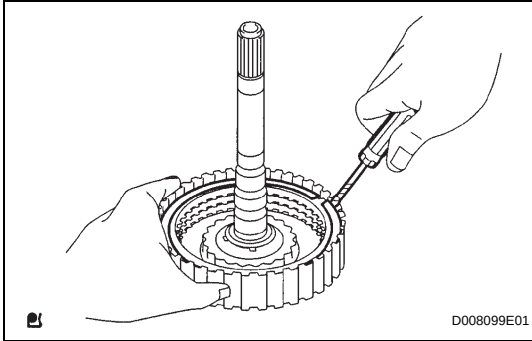
DIRECT CLUTCH

COMPONENTS

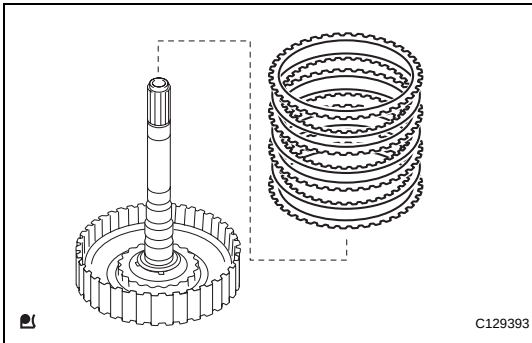


DISASSEMBLY

1. **INSPECT PACK CLEARANCE OF DIRECT CLUTCH**
(See page [AX-234](#))

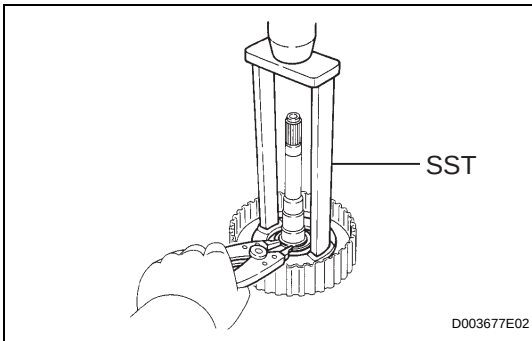


2. **REMOVE DIRECT MULTIPLE DISC CLUTCH DISC**
 - (a) Using a screwdriver, pry out the snap ring from the direct clutch drum.



- (b) Remove the flange, 3 discs and 3 plates from the direct clutch drum.

3. **INSPECT DIRECT MULTIPLE DISC CLUTCH DISC**
(See page [AX-234](#))



4. **REMOVE DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY**

- (a) Place SST on the clutch balancer and compress the spring with a press.

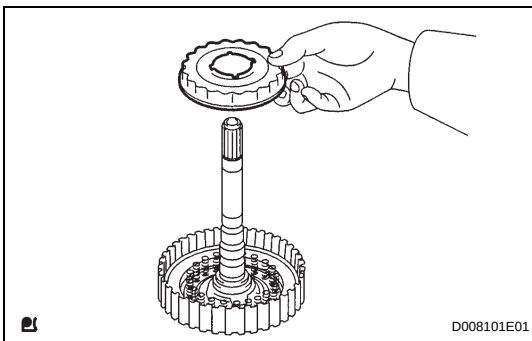
SST 09387-00020

- (b) Using a snap ring expander, remove the snap ring from the direct clutch drum.

NOTICE:

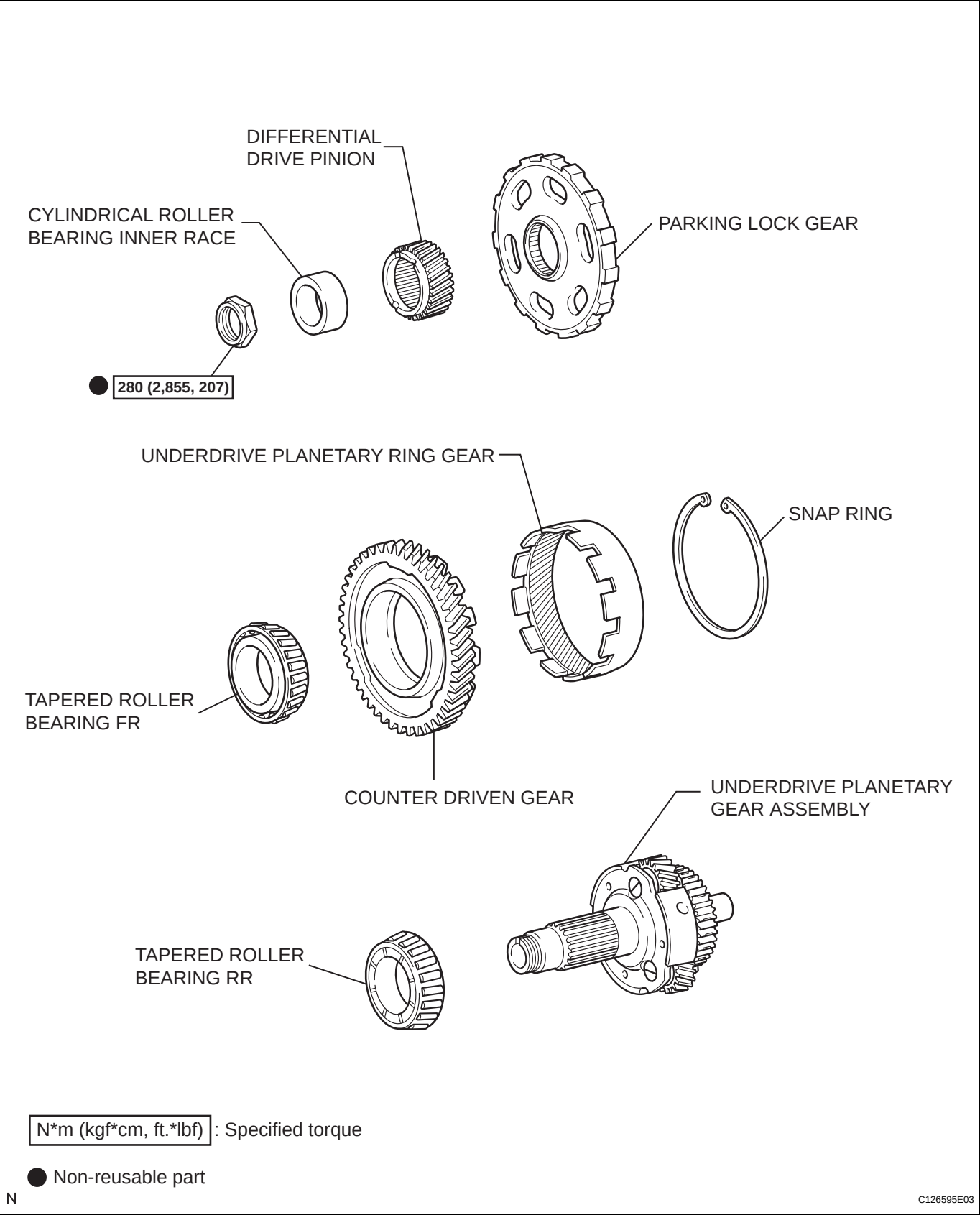
- Stop the press when the spring sheet is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove.
- This prevents the spring sheet from being deformed.
- Do not expand the snap ring excessively.

- (c) Remove the clutch balancer from the direct clutch drum.



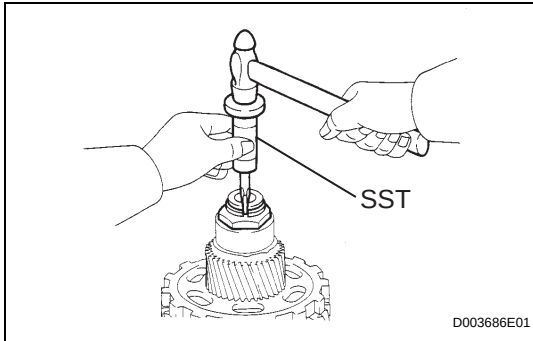
UNDERDRIVE PLANETARY GEAR

COMPONENTS



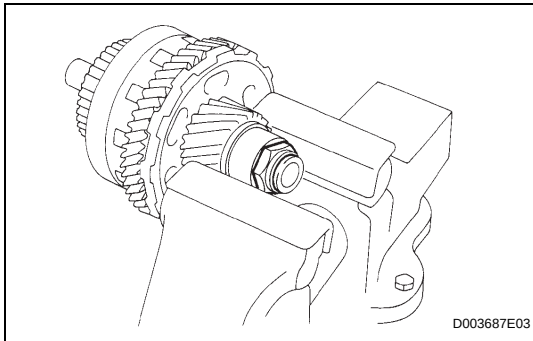
DISASSEMBLY

1. REMOVE UNDERDRIVE PLANETARY GEAR PRELOAD (See page [AX-240](#))



2. REMOVE UNDERDRIVE INPUT SHAFT NUT SST 09930-00010 (09931-00010, 09931-00020), 09387-00050, 09564-16020

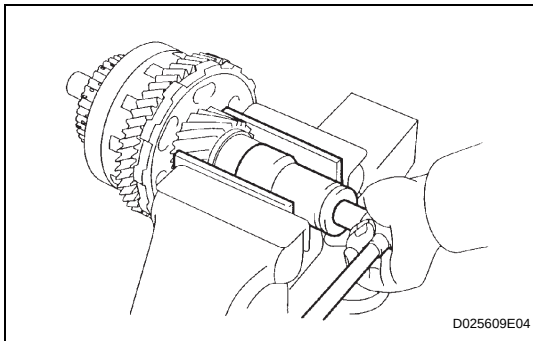
(a) Using SST, loosen the staked part of the nut.



(b) Clamp the underdrive planetary gear in soft jaw vise.

NOTICE:

Be careful not to damage the differential drive pinion.

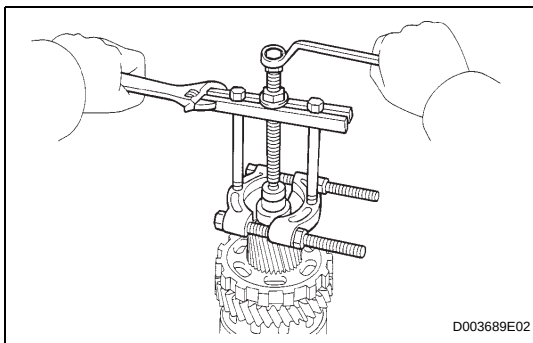


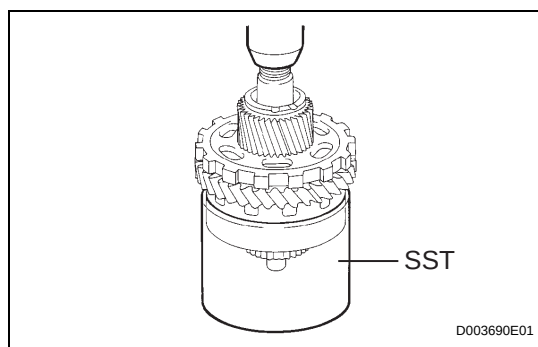
(c) Using SST, remove the lock nut.
SST 09387-00050

3. REMOVE CYLINDRICAL ROLLER BEARING INNER RACE

(a) Using SST, remove the cylindrical roller bearing race inner.

SST 09950-00020, 09950-00030, 09950-60010
(09951-00340)

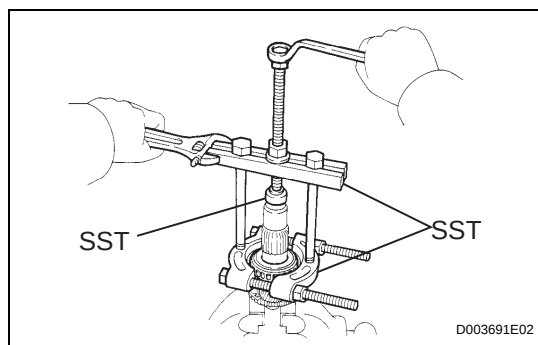




4. REMOVE UNDERDRIVE PLANETARY GEAR ASSEMBLY

- (a) Using SST and a press, remove the differential drive pinion, parking lock gear, counter driven gear with underdrive planetary ring gear and front tapered roller bearing.

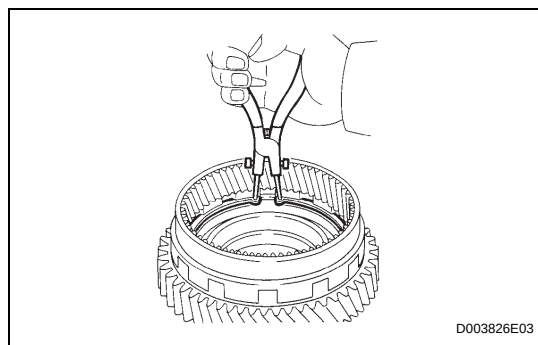
SST 09387-00050



- (b) Clamp the underdrive planetary gear in soft jaw vise.

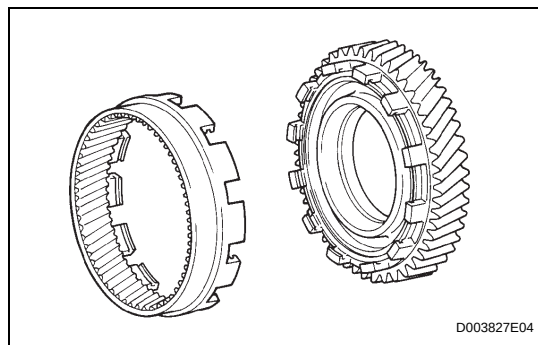
- (c) Using SST, remove the rear tapered roller bearing from the underdrive planetary gear.

SST 09950-00020, 09950-00030, 09950-60010 (09951-00340)



5. REMOVE UNDERDRIVE PLANETARY RING GEAR

- (a) Using snap ring pliers, remove the snap ring.



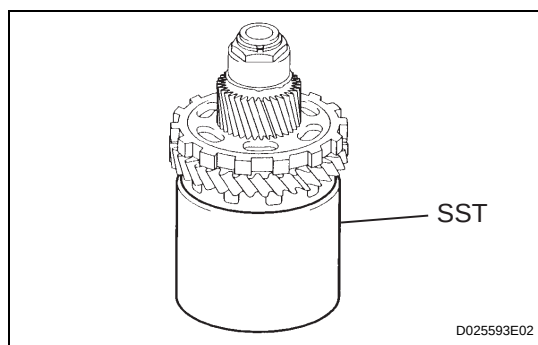
- (b) Remove the underdrive planetary ring gear from the counter driven gear.

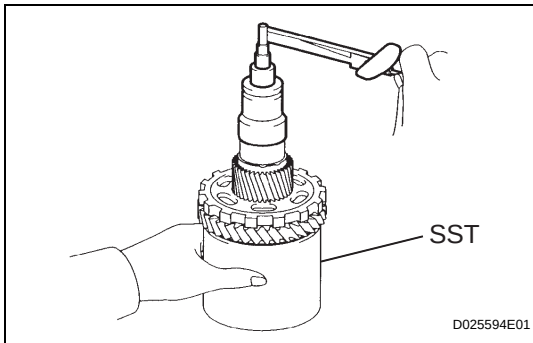
INSPECTION

1. INSPECT UNDERDRIVE PLANETARY GEAR PRELOAD

- (a) Using SST, fix the underdrive planetary gear.

SST 09387-00050

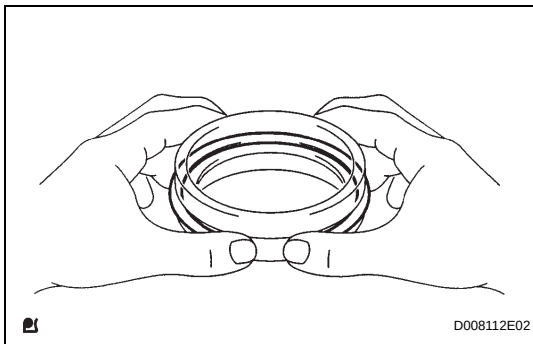




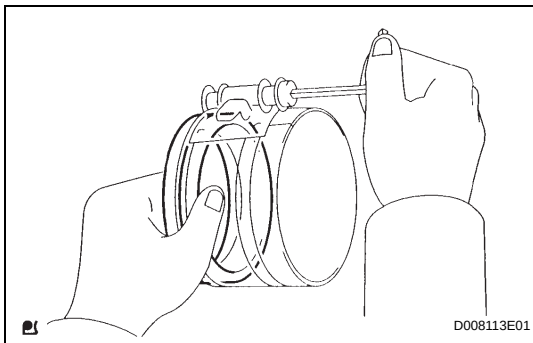
- (b) Using SST and a torque wrench, measure the turning torque of the underdrive planetary gear in place while rotating the torque wrench at 60 rpm.
SST 09387-00050
Torque: Turning torque at 60 rpm
0.10 to 4.41 N*m (1.0 to 45 kgf*cm, 0.9 to 39 in.*lbf)

HINT:

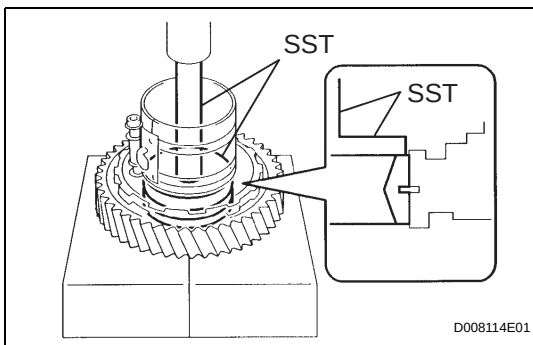
Use a torque wrench with a fulcrum length of 160 mm (6.3 in.)

REASSEMBLY**1. INSTALL UNDERDRIVE PLANETARY RING GEAR**

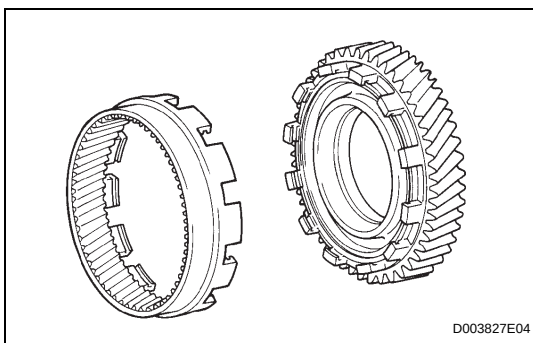
- (a) Install a new snap ring to the outer race of the tapered roller bearing.



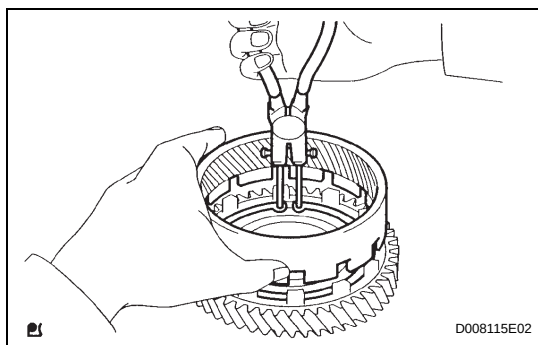
- (b) Using a piston ring compressor, squeeze the snap ring.



- (c) Using SST a press, press in the outer race of the tapered roller bearing.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07100)



- (d) Install the underdrive planetary ring gear to the counter driven gear.



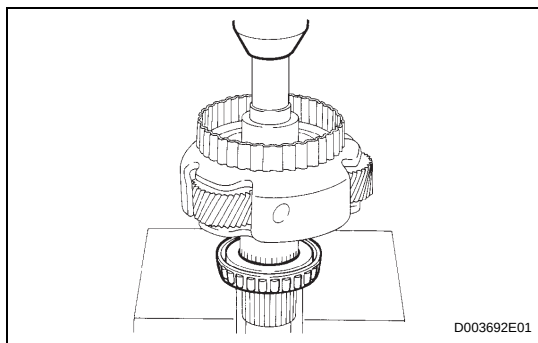
(e) Using snap ring pliers, install the snap ring.

2. INSTALL UNDERDRIVE PLANETARY GEAR ASSEMBLY

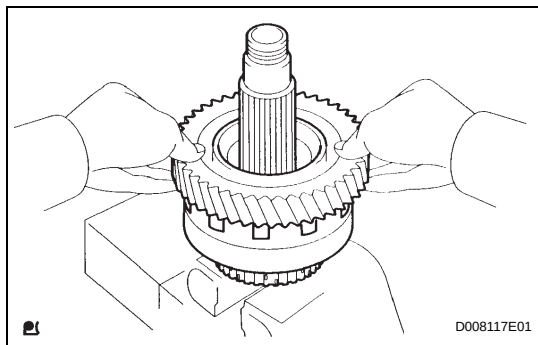
(a) Using a press, press in the rear tapered roller bearing to the underdrive planetary gear.

NOTICE:

Press in the bearing until it becomes flat at the bottom



(b) Install the counter driven gear with planetary ring gear to the underdrive planetary gear.

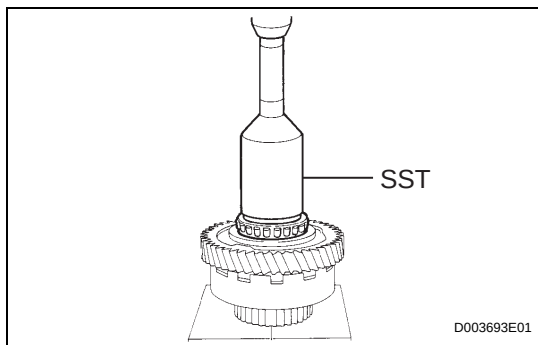


(c) Using SST and a press, press in the front tapered roller bearing.

SST 09214-76011

NOTICE:

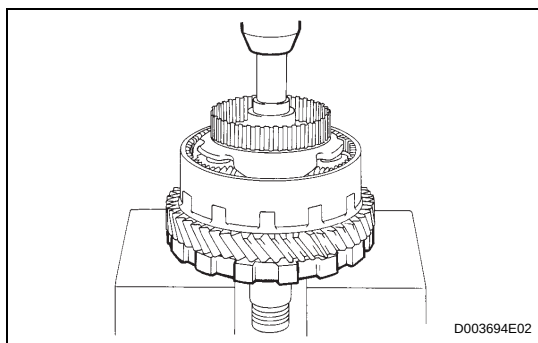
Press in the counter driven gear while rotating it.

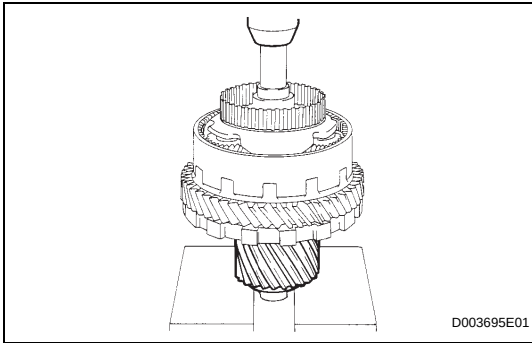


(d) Using a press, press in the parking lock gear.

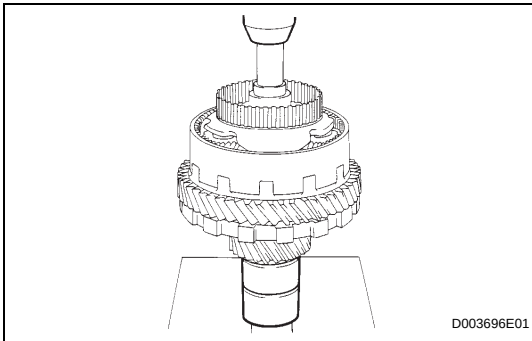
NOTICE:

Press in the counter driven gear while rotating it.



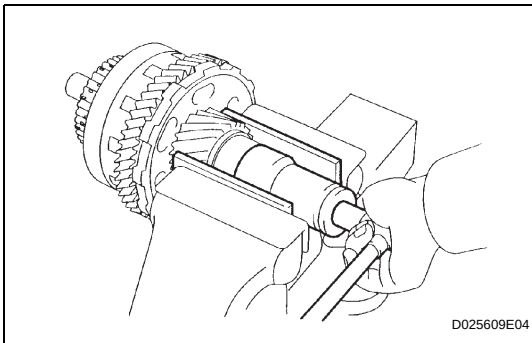


- (e) Using a press, press in the differential drive pinion.
NOTICE:
Press in the counter driven gear while rotating it.



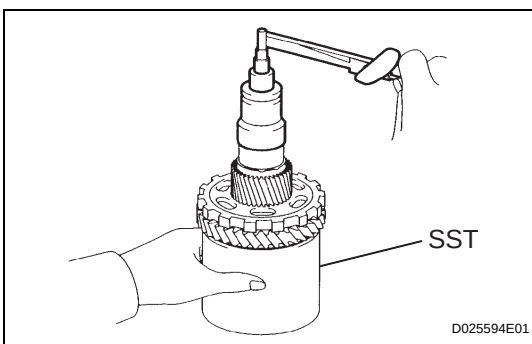
3. INSTALL CYLINDRICAL ROLLER BEARING INNER RACE

- (a) Using a press, press in the cylindrical roller bearing race inner.
NOTICE:
Press in the counter driven gear while rotating it.



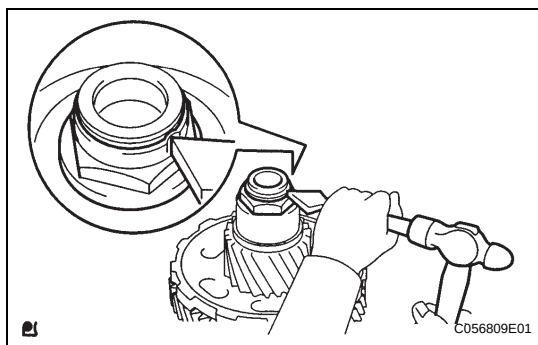
4. INSTALL UNDERDRIVE INPUT SHAFT NUT

- (a) Clamp the underdrive planetary gear in a soft jaw vise.
NOTICE:
Be careful not to damage the differential drive pinion.
 (b) Using a socket wrench, install a new lock nut.
Torque: 280 N*m (2,855 kgf*cm, 207 in.*lbf)
HINT:
 Use a torque wrench with a fulcrum length of 750 mm (29.53 in.)



5. INSPECT UNDERDRIVE PLANETARY GEAR PRELOAD

- (a) Using SST and a torque wrench, measure the turning torque of underdrive planetary gear assembly while rotating the torque wrench at 60 rpm.
SST 09387-00050
Torque: Turning torque at 60 rpm
0.10 to 4.41 N*m (1.0 to 45 kgf*cm, 0.9 to 39 in.*lbf)
HINT:
 Use a torque wrench with a fulcrum length of 160 mm (6.30 in.)



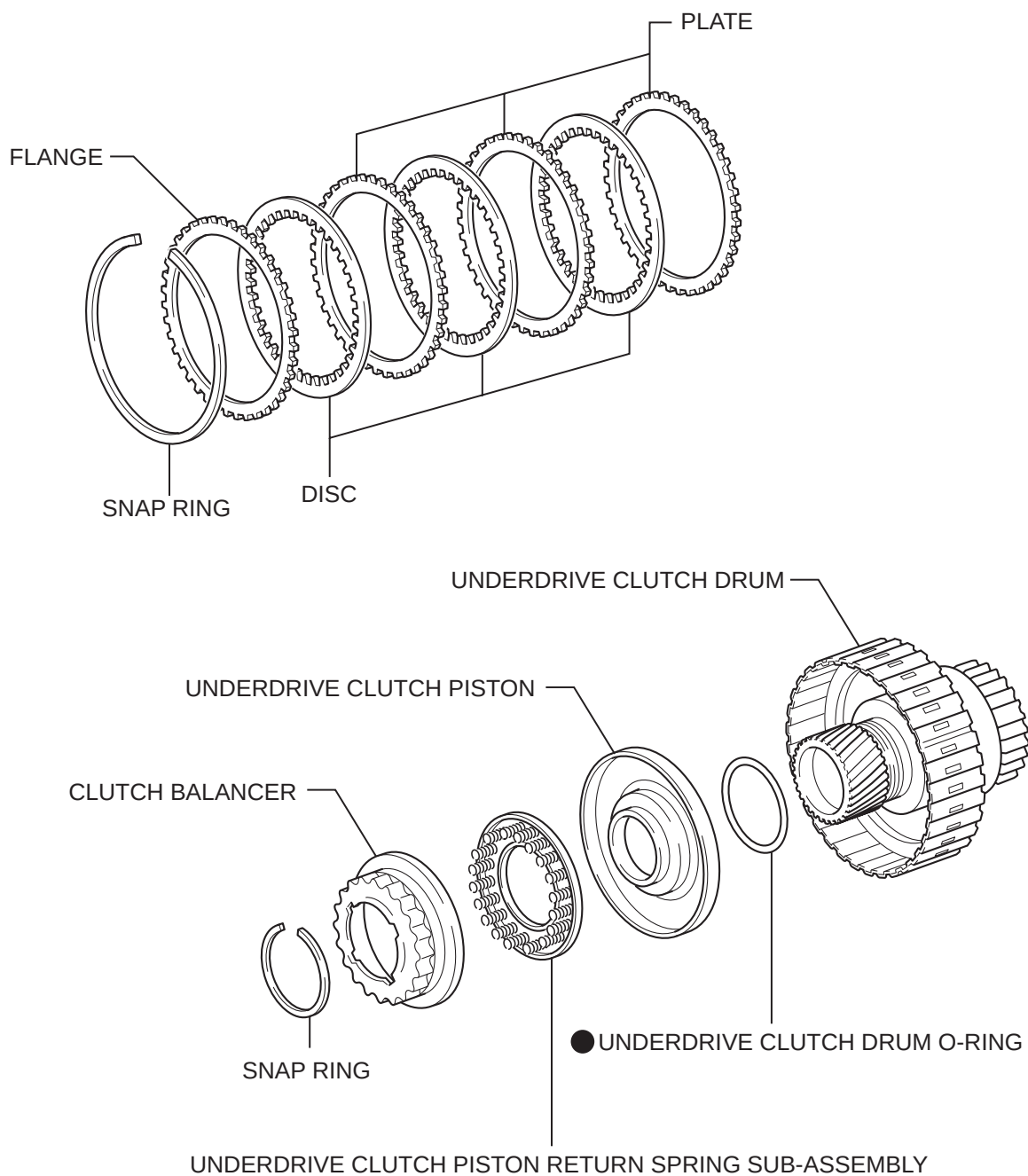
- (b) Using a pin punch and a hammer, stake the lock nut.

NOTICE:

Make sure that there are no cracks on the nut.

UNDERDRIVE CLUTCH

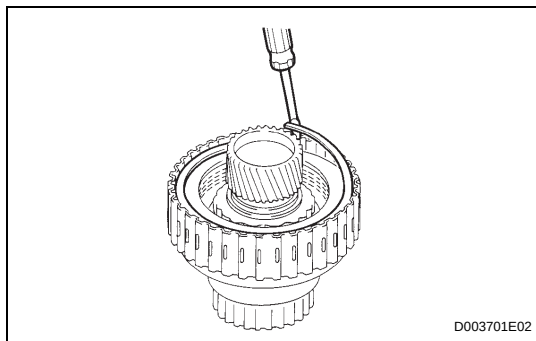
COMPONENTS



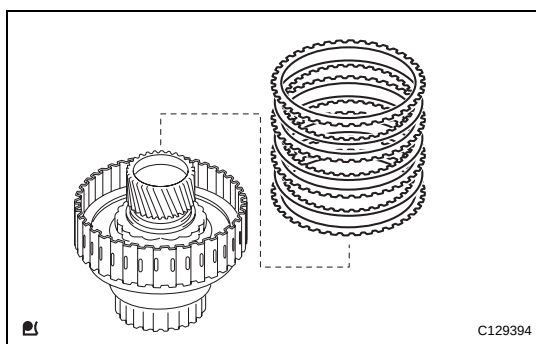
● Non-reusable part

DISASSEMBLY

1. **INSPECT PACK CLEARANCE OF UNDERDRIVE CLUTCH** (See page [AX-247](#))



2. **REMOVE NO. 1 UNDERDRIVE CLUTCH DISC**
 - (a) Using a screwdriver, pry out the underdrive clutch flange snap ring.

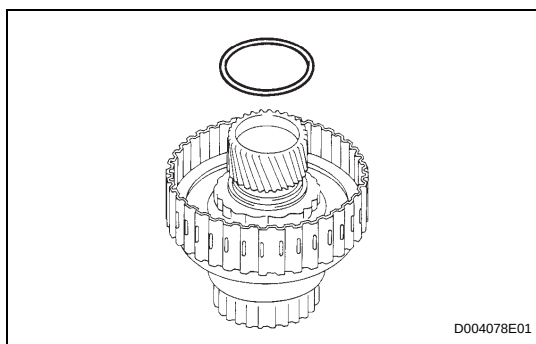


- (b) Remove the flange, 3 discs and 3 plates from the underdrive clutch drum.

3. **INSPECT NO. 1 UNDERDRIVE CLUTCH DISC** (See page [AX-248](#))

4. **INSPECT UNDERDRIVE CLUTCH DRUM SUB-ASSEMBLY** (See page [AX-248](#))

5. **REMOVE UNDERDRIVE CLUTCH DRUM O-RING**



6. **REMOVE UNDERDRIVE CLUTCH PISTON SET**

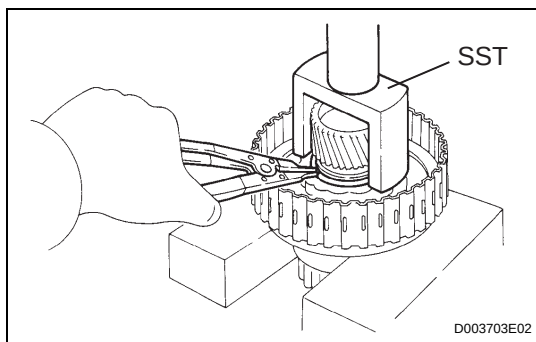
- (a) Place SST on the clutch balancer and compress the spring with a press.

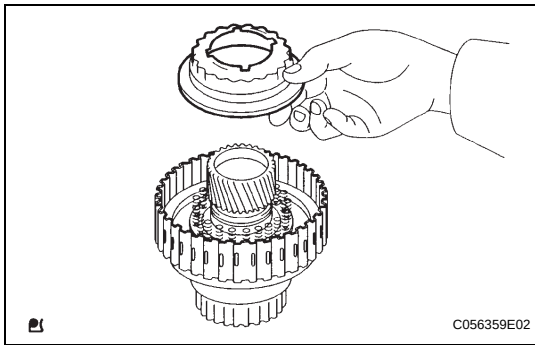
SST 09350-32014 (09351-32070)

- (b) Using a snap ring expander, remove the snap ring.

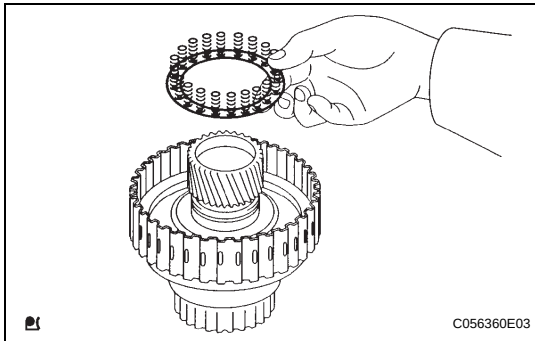
NOTICE:

- Stop the press when the spring sheet is lowered to a position 1 to 2 mm (0.04 to 0.08 in.) from the snap ring groove.
- This prevents the spring sheet from being deformed.
- Do not expand the snap ring excessively.

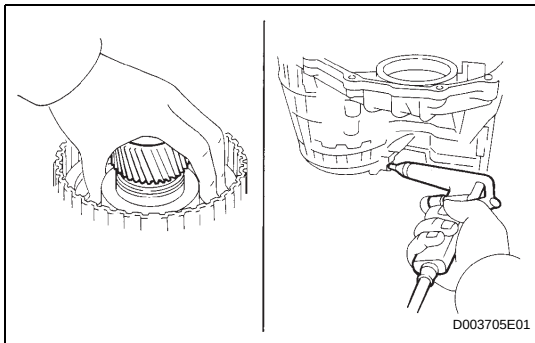




- (c) Remove the clutch balancer from the underdrive clutch drum.



- (d) Remove the piston return spring from the underdrive clutch drum.



- (e) Install the underdrive clutch to the transaxle.

NOTICE:

Be careful not to damage the oil seal rings.

- (f) Holding the underdrive clutch piston with your hand, apply compressed air (392 kPa, 4.0 kgf/cm², 57 psi) to the transaxle case to remove the underdrive clutch piston.

7. INSPECT UNDERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY (See page [AX-248](#))

INSPECTION

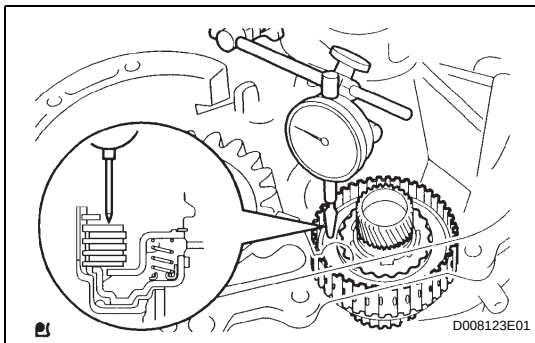
1. INSPECT UNDERDRIVE CLUTCH PACK CLEARANCE

- (a) Install the underdrive clutch to the transaxle.

NOTICE:

Be careful not to damage the oil seal rings.

- (b) Install a dial indicator as shown in the illustration.

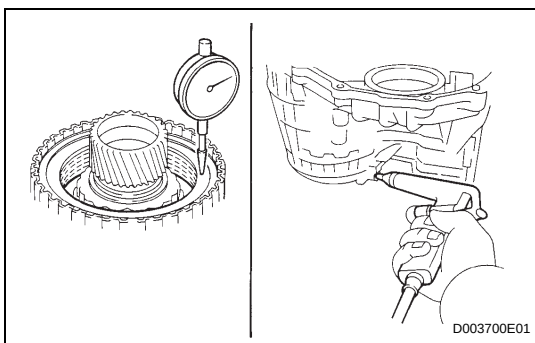


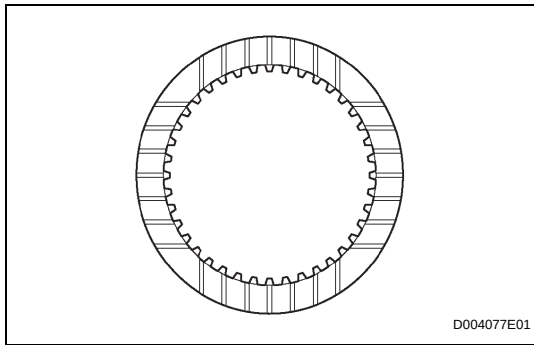
- (c) Measure the underdrive clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0kgf/cm², 57 psi)

Standard pack clearance:

1.51 to 1.90 mm (0.0594 to 0.0748 in.)

If the pack clearance is not as specified, inspect the discs, plates and flange.



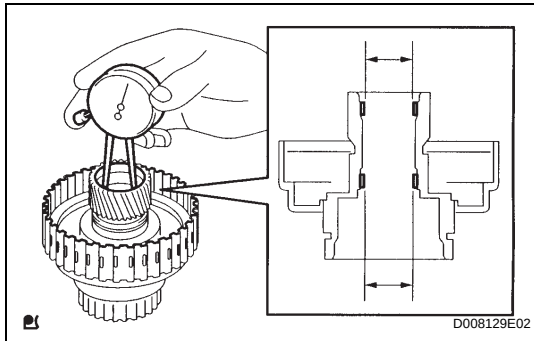


2. INSPECT NO. 1 UNDERDRIVE CLUTCH DISC

- (a) Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- If the lining of the discs is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



3. INSPECT UNDERDRIVE CLUTCH DRUM SUB-ASSEMBLY

- (a) Using a caliper gauge measure the inside diameter of the underdrive clutch drum bush.

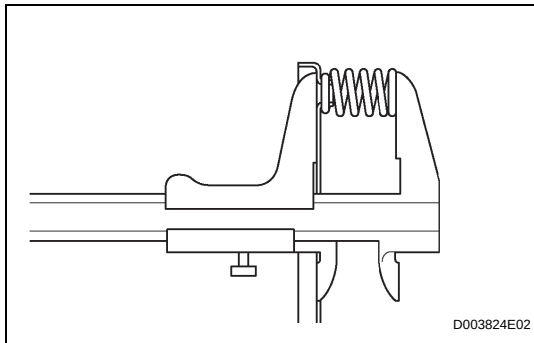
Standard drum bush:

37.06 to 37.08 mm (1.4591 to 1.4598 in.)

Maximum drum bush:

37.13 mm (1.4618 in.)

If the inside diameter is greater than the maximum, replace the underdrive clutch drum sub-assembly.

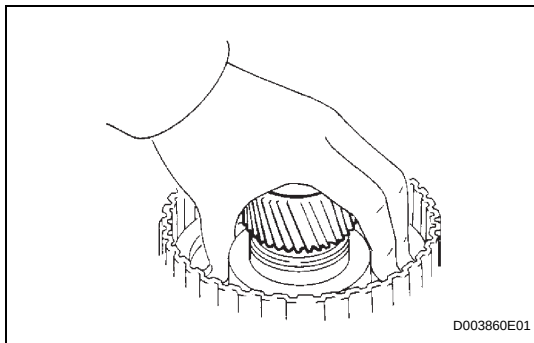


4. INSPECT UNDERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY

- (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.

Standard free length:

17.14 mm (0.6752 in.)



INSTALLATION

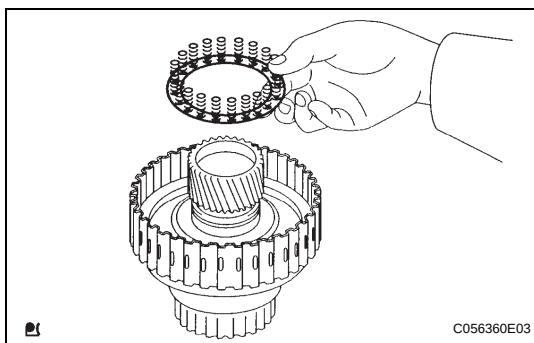
1. INSTALL UNDERDRIVE CLUTCH PISTON SET

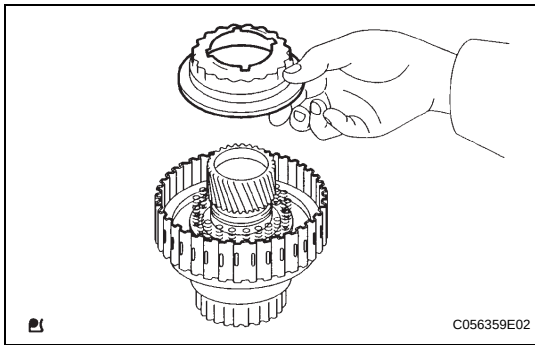
- (a) Coat the underdrive clutch piston with ATF, and install it to the underdrive clutch piston drum.

NOTICE:

Be careful not to damage the O-ring.

- (b) Install the piston return spring to the underdrive clutch drum.

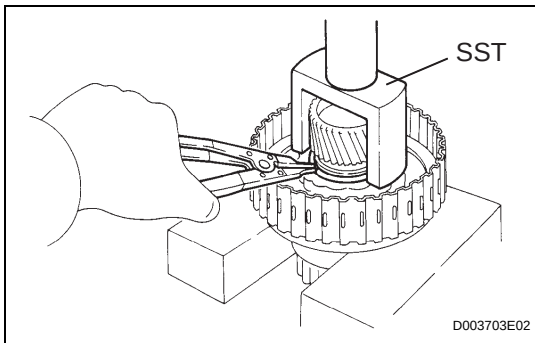




- (c) Install the clutch balancer to the underdrive clutch drum.

NOTICE:

Be careful not to damage the lip seal of the clutch balancer.



- (d) Place SST on the clutch balancer and compress the piston return spring with a press.

SST 09350-32014 (09351-32070)

- (e) Using a snap ring expander, install the snap ring to the underdrive clutch drum.

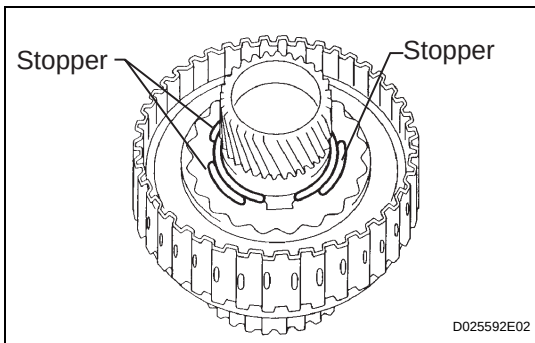
NOTICE:

- Be sure the end gap of the snap ring is not aligned with the clutch balancer's claw.
- Stop the press when the spring sheet is lowered to a position 1 to 2 mm (0.039 0.078 in.) from the snap ring groove.
- This prevents the spring sheet from being deformed.
- Do not expand the snap ring excessively.

- (f) Set the end gap of the snap ring in the underdrive clutch drum shown in the illustration.

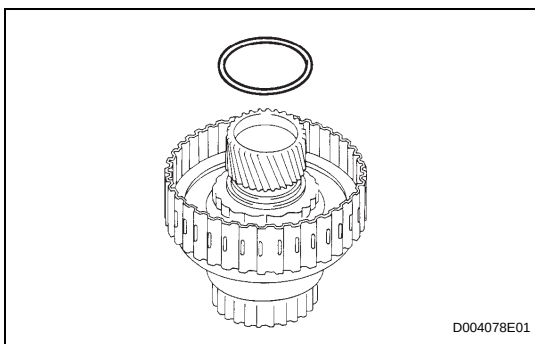
NOTICE:

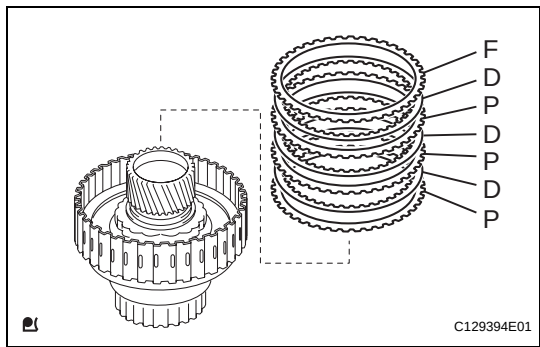
The end gap of the snap ring should not coincide with any of the stopper.



2. INSTALL UNDERDRIVE CLUTCH DRUM O-RING

- (a) Coat the new O-ring with ATF, and install it to the underdrive clutch drum.





3. INSTALL NO. 1 UNDERDRIVE CLUTCH DISC

- (a) Install the 3 plates, 3 discs and flange to the underdrive clutch drum.

Install in order:

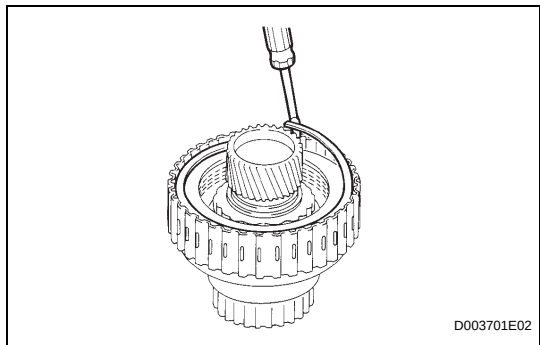
P - D - P - D - P - D - F

HINT:

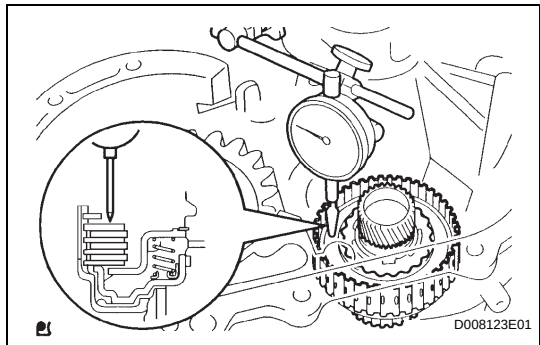
P = Plate

D = Disc

F = Flange



- (b) Using a screwdriver, install the underdrive clutch flange hole snap ring.
- (c) Check that the end gap of the snap ring is not aligned with one of the cutouts.



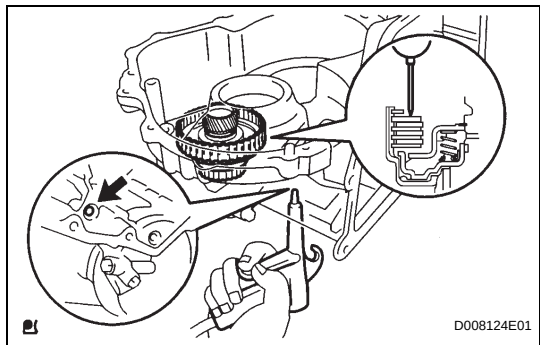
4. INSPECT UNDERDRIVE CLUTCH PACK CLEARANCE

- (a) Install the underdrive clutch to the transaxle.

NOTICE:

Be careful not to damage the oil seal rings.

- (b) Set a dial indicator as shown in the illustration.



- (c) Measure the underdrive clutch piston stroke while applying and releasing compressed air (392 kPa, 4.0 kgf/cm², 57 psi).

Standard pack clearance:

1.51 to 1.90 mm (0.0594 to 0.0748 in.)

If the pack clearance is less than the minimum, parts may have been assembled incorrectly, so check and reassemble again.

If the pack clearance is not as specified, select another flange.

HINT:

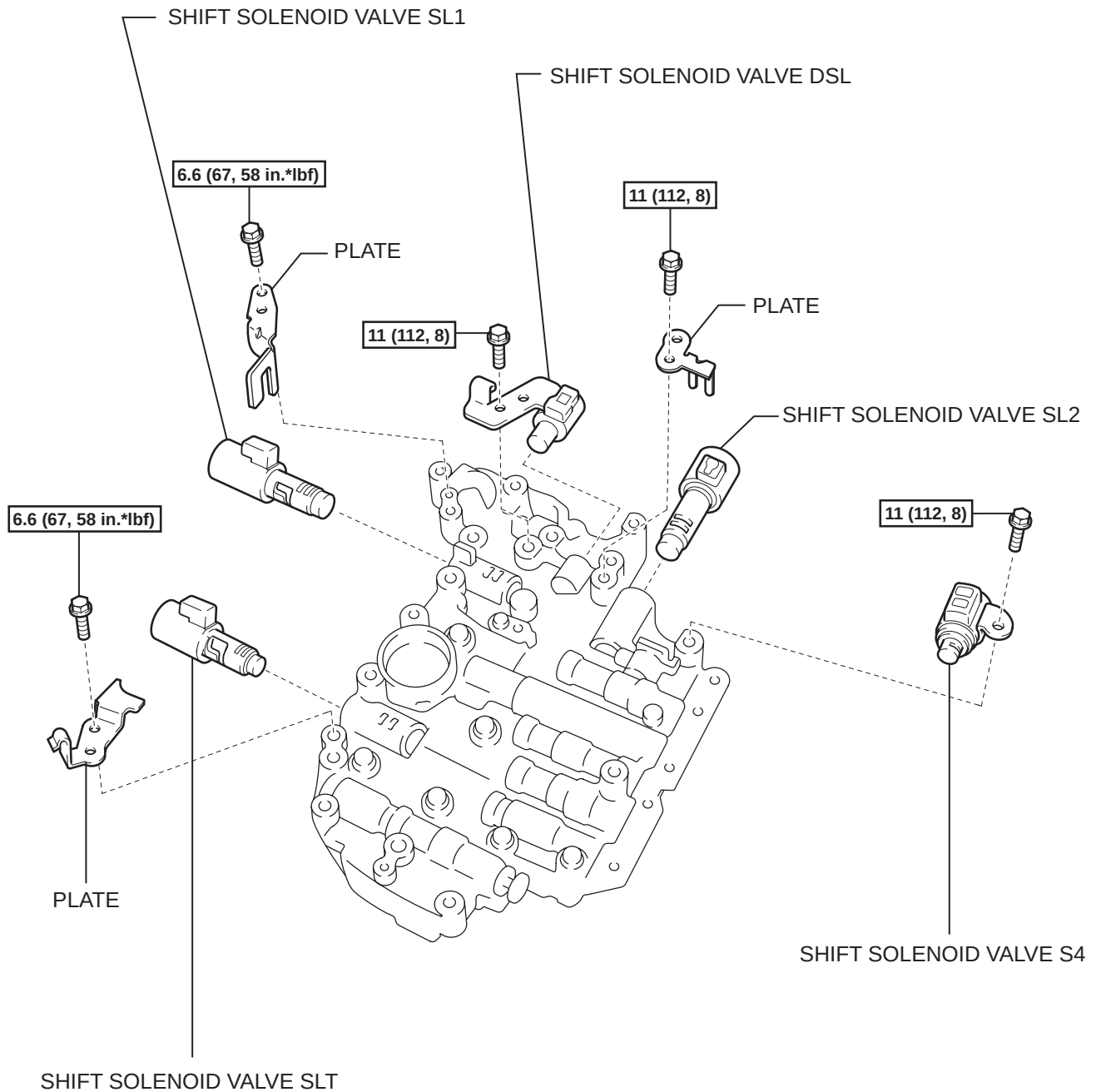
There are 3 flanges in different thickness.

Standard flange thickness

No.	Thickness	No.	Thickness
1	3.0 mm (0.118 in.)	3	3.4 mm (0.134 in.)
2	3.2 mm (0.126 in.)	-	-

VALVE BODY

COMPONENTS

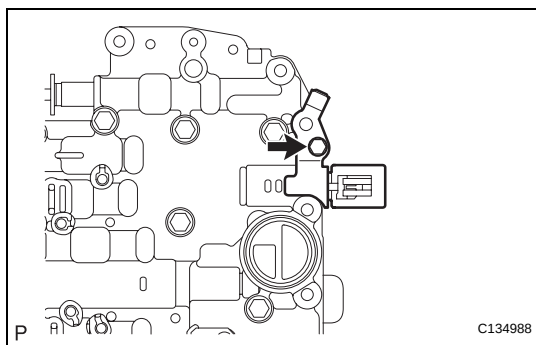


N*m (kgf*cm, ft.*lbf) : Specified torque

DISASSEMBLY

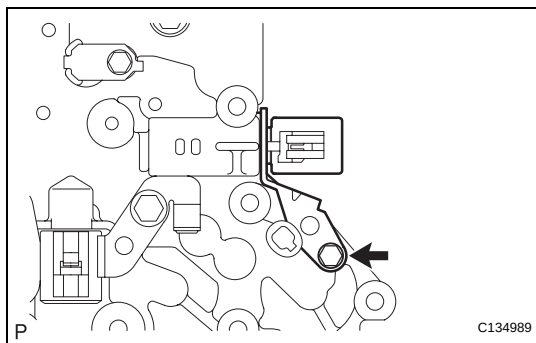
1. REMOVE SHIFT SOLENOID VALVE SLT

- (a) Remove the bolt, plate and shift solenoid valve SLT from the valve body.



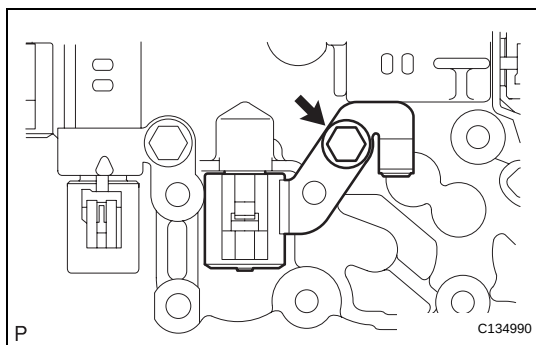
2. REMOVE SHIFT SOLENOID VALVE SL1

- (a) Remove the bolt, plate and shift solenoid valve SL1 from the valve body.



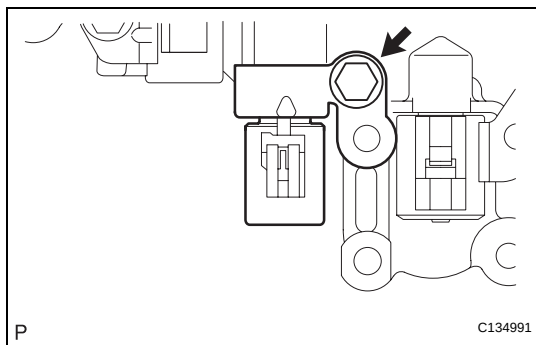
3. REMOVE SHIFT SOLENOID VALVE DSL

- (a) Remove the bolt and shift solenoid valve DSL from the valve body.



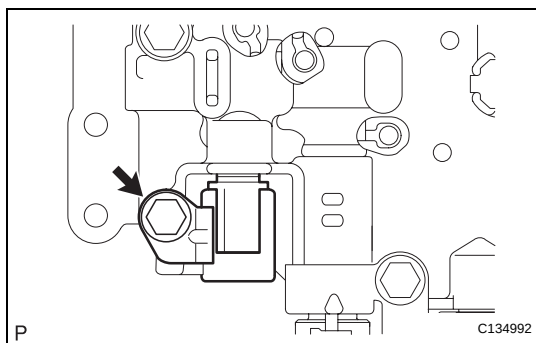
4. REMOVE SHIFT SOLENOID VALVE SL2

- (a) Remove the bolt, plate and shift solenoid valve SL2 from the valve body.



5. REMOVE SHIFT SOLENOID VALVE S4

- (a) Remove the bolt and shift solenoid valve S4 from the valve body.

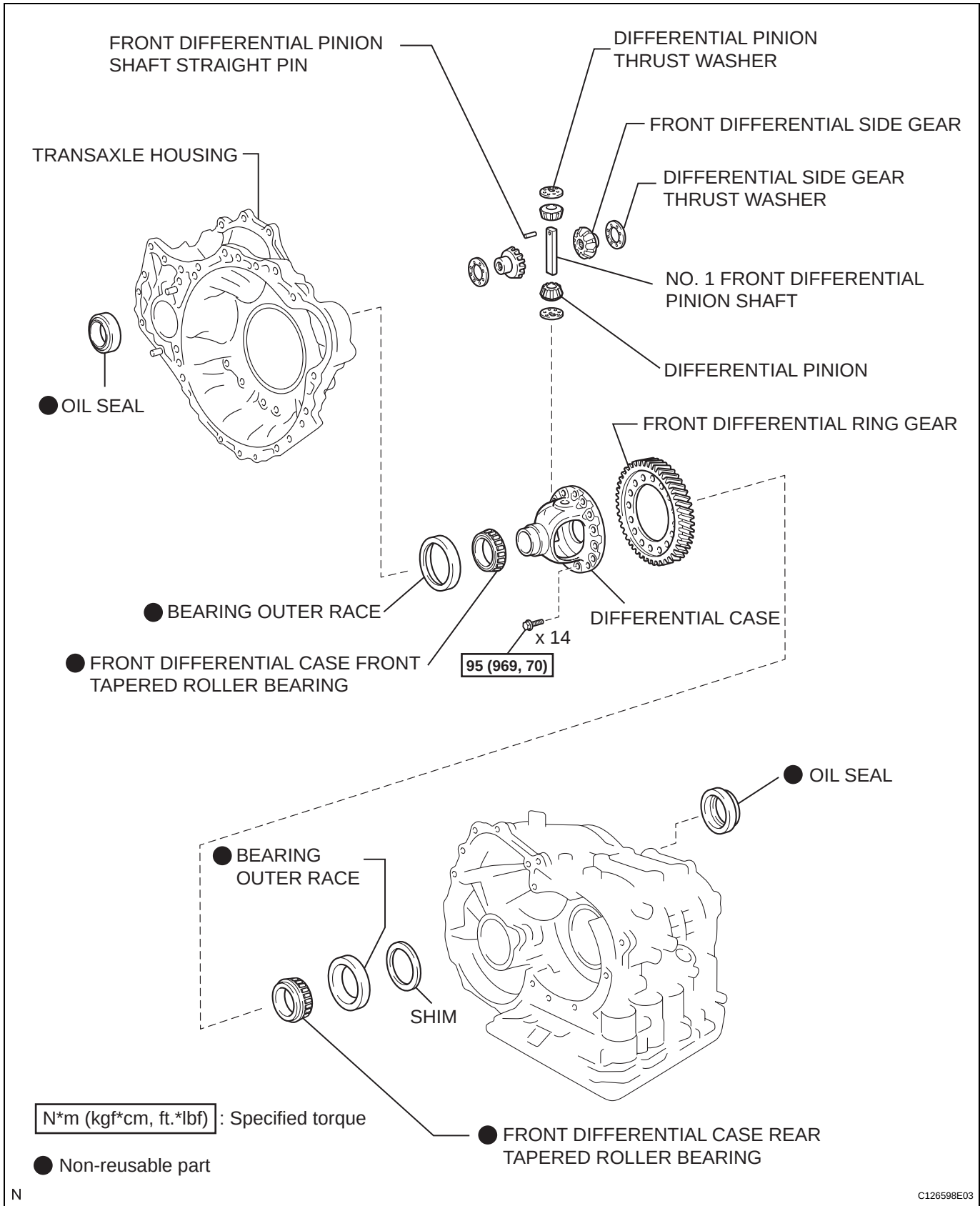


6. REMOVE MANUAL VALVE

- (a) Remove the manual valve from the valve body.

DIFFERENTIAL CASE

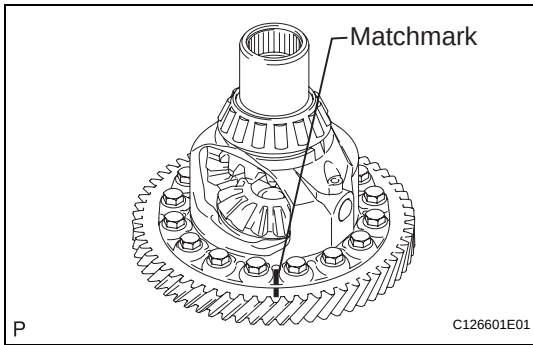
COMPONENTS



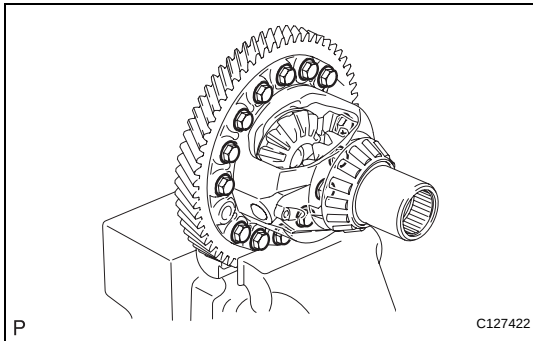
DISASSEMBLY

1. REMOVE FRONT DIFFERENTIAL RING GEAR

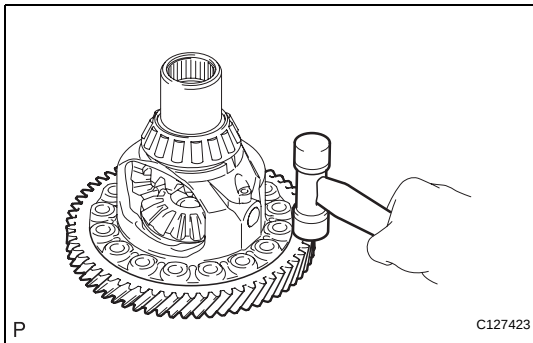
- (a) Place the matchmarks on the ring gear and differential case.



- (b) Remove the 14 bolts.



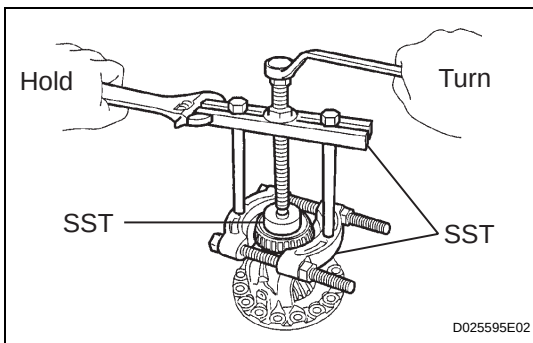
- (c) Using a plastic-faced hammer, tap on the ring gear to remove it from the case.



2. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

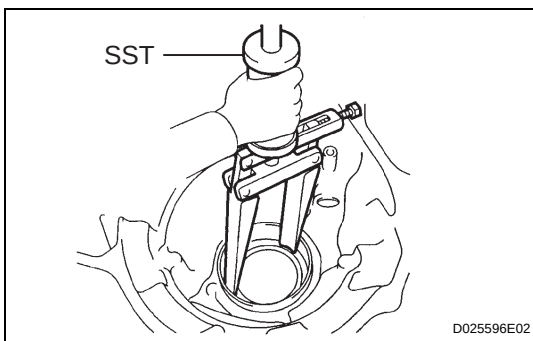
- (a) Using SST, tap out the front differential case front tapered roller bearing from the differential case.

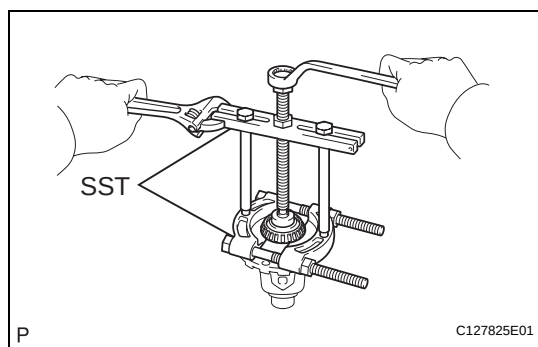
SST 09950-00020, 09950-00030, 09950-60010 (09951-00500)



- (b) Using SST, remove the front differential case front tapered roller bearing outer race.

SST 09308-00010

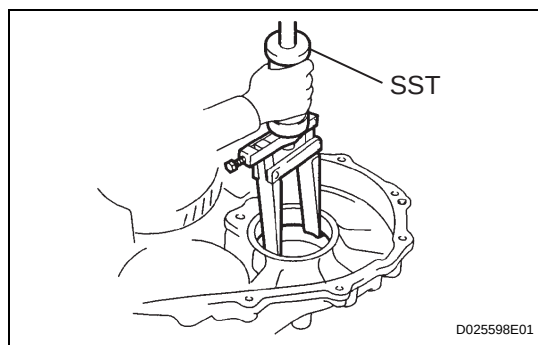




3. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

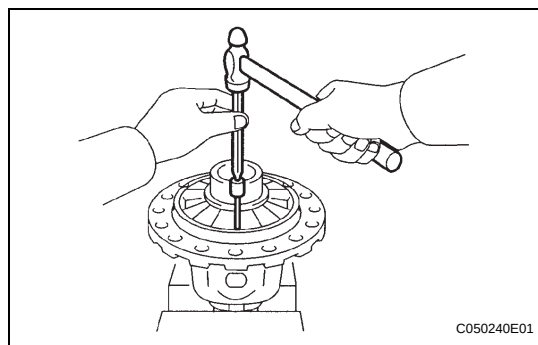
- (a) Using SST, remove the front differential case rear tapered roller bearing from the differential case.

SST 09950-00020, 09950-00030, 09950-60010 (09951-00500)



- (b) Using SST, tap out the front differential case front tapered roller bearing outer race.

SST 09308-00010

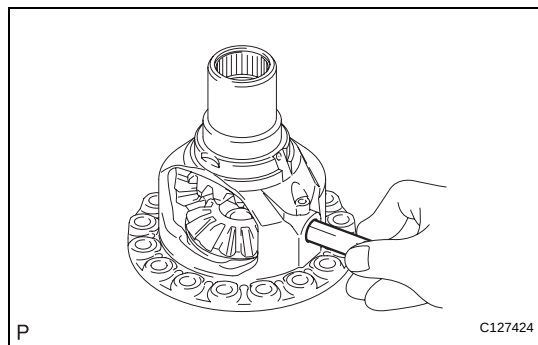


4. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

- (a) Using a pin punch and hammer, tap in the straight pin.

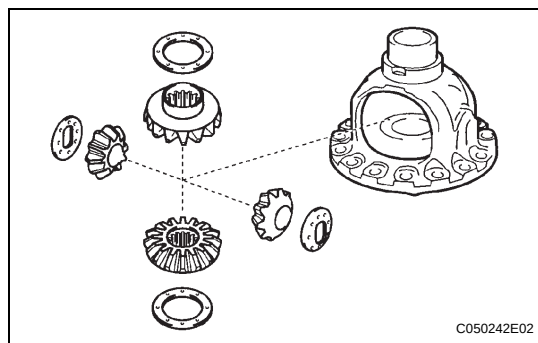
NOTICE:

Before removing the straight pin, unstake it with a pin punch.



5. REMOVE NO. 1 FRONT DIFFERENTIAL PINION SHAFT

- (a) Remove the front differential pinion shaft from the differential case.



6. REMOVE FRONT DIFFERENTIAL SIDE GEAR

- (a) Remove the 2 front differential pinions, 2 pinion thrust washers, 2 front differential side gears and 2 side gear thrust washers from the differential case.