AUTOMATIC TRANSAXLE SYSTEM

PRECAUTION

NOTICE:

- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assembly, engine assembly or ECM (See page AX-14).**
- **Perform the REGISTRATION (VIN registration) when replacing the ECM (See page ES-13).**

HINT:
The RESET MEMORY cannot be completed by only disconnecting the battery cable.

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

NOTICE:

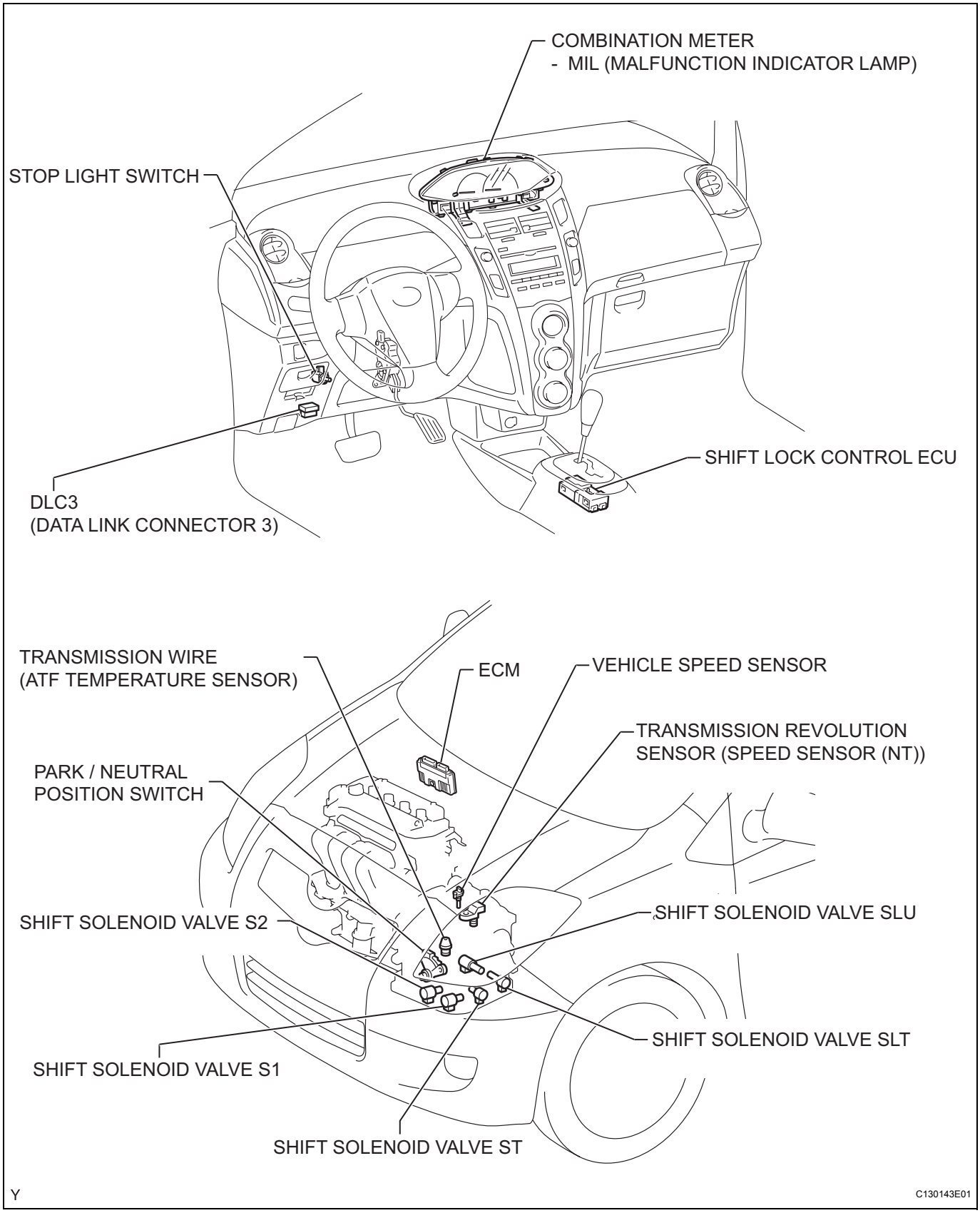
- **The automatic transaxle is composed of high precision parts which need careful inspection before reassembly. Even a small nick could cause fluid leakage or affect the performance. The instructions here are organized so that you work on only one component group at a time. This will help avoid confusion caused by 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. As far as 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 that group immediately. If a component group cannot be assembled because some parts are on order, 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.**
- **When changing the automatic transmission fluid, use only "Toyota Genuine ATF WS" (ATF JWS3324 or NWS9638).**
- **All disassembled parts should be washed clean and any fluid passages and holes should be blown through with compressed air.**
- **Dry all parts with compressed air. Never use a shop rag or a piece of cloth to dry them.**
- **Only recommended ATF or kerosene should be used for cleaning.**
- **After cleaning, the parts should be arranged in the correct order for efficient inspection, repair, and reassembly.**
- **When disassembling a valve body, be sure to match each valve with the corresponding spring.**

- **New brake and clutch discs that are to 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 gaskets and rubber O-rings should be replaced with new ones.**
- **Do not apply adhesive cements to gaskets or similar parts.**
- **Make sure that the ends of snap rings are not aligned with any cutouts and are installed in the grooves correctly.**
- **When replacing a worn bushing, the sub-assembly containing the bushing must also be replaced.**
- **Check thrust bearings and races for wear and damage. Replace them as necessary.**
- **When working with FIPG material, you must observe the following:**
  - **Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surface.**
  - **Clean both sealing surfaces with a non-residue solvent.**
  - **Parts must be reassembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.**

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	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling conditions	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 one sensor is being monitored, the next sensor or component is not monitored until the current monitoring is concluded.
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 malfunctions only one time during a single driving cycle. "Continuous" means that the ECM detects malfunctions every time the enabling conditions are 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 when the typical enabling conditions are met.
Malfunction thresholds	Beyond this value, the ECM concludes that there is a malfunction and sets 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 next driving cycle.
Component operating range	Normal operating ranges of sensors and solenoids under normal driving conditions. Use these ranges as references. They cannot be used to judge if a sensor or solenoid is defective or not.

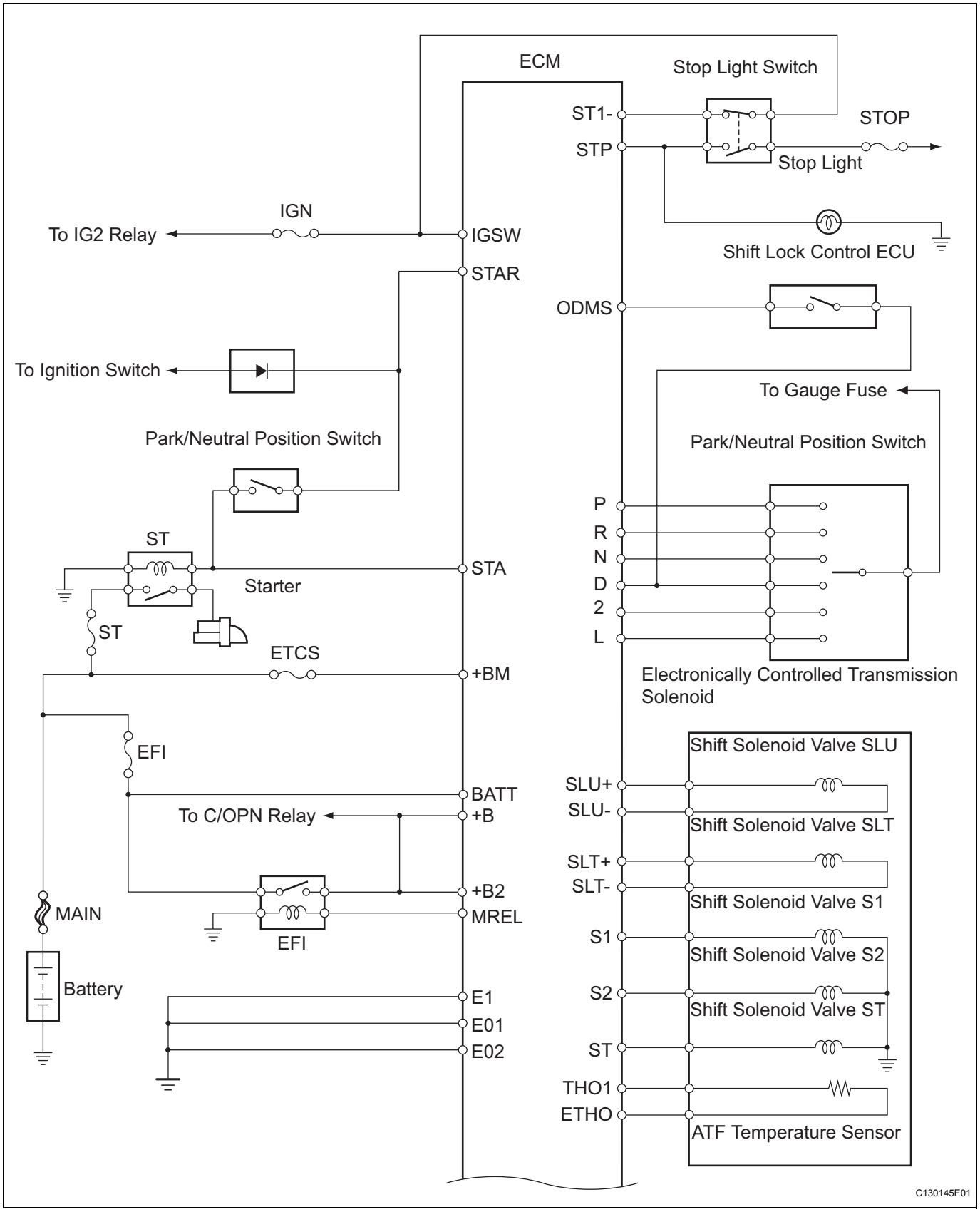
PARTS LOCATION



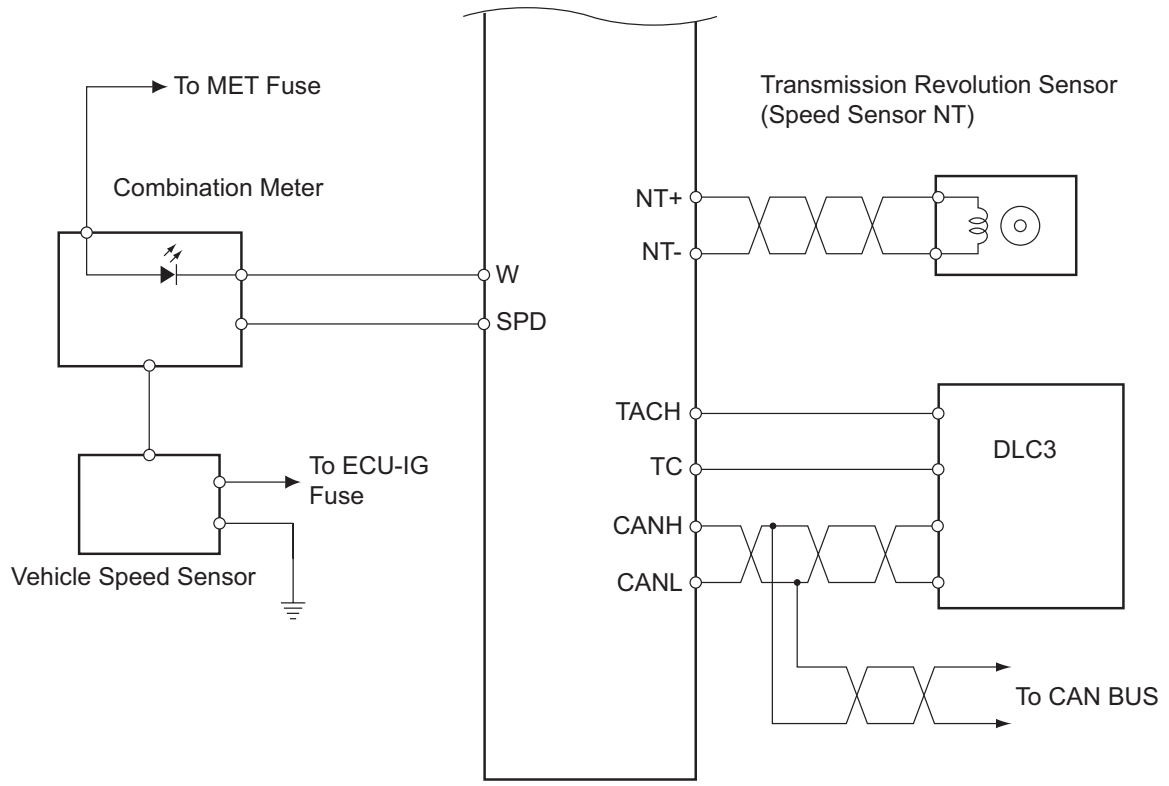
AX

SYSTEM DIAGRAM

The configuration of the electronic control system in the U340E automatic transaxle is as shown in the following chart.



AX


To MET Fuse
Combination Meter
W
SPD
To ECU-IG Fuse
Vehicle Speed Sensor
Transmission Revolution Sensor (Speed Sensor NT)
NT+
NT-
TACH
TC
CANH
CANL
DLC3
To CAN BUS
C130144E01

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

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

- 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 communication system. Therefore, before starting troubleshooting, be sure to check that there is no trouble in the CAN communication system.
- The intelligent tester can be used in steps 3, 4, 6, and 9.

1	**Vehicle Brought to Workshop**

NEXT

2	**Customer Problem Analysis**

NEXT

3	**Connect Intelligent Tester to DLC3**

NEXT

4	**Check and Clear DTCs and Freeze Frame Data**

HINT:
(See page AX-25).

AX

NEXT

5	**Visual Inspection**

NEXT

6	**Setting Check Mode Diagnosis**

HINT:
(See page AX-26).

NEXT

7	**Problem Symptom Confirmation**

HINT:
(See page AX-9).

	Symptom does not occur: Go to step 8
	Symptom occurs: Go to step 9

8	Symptom Simulation

HINT:
(See page IN-26).

NEXT

9	DTC Check

HINT:
(See page AX-25).

DTC is not output: Go to step 10

DTC is output: Go to step 17

10	Basic Inspection

HINT:
(See page AX-93, AX-106 and AX-107).

NG → Go to step 19

OK

11	Mechanical System Test

HINT:
(See page AX-11).

NG → Go to step 16

OK

12	Hydraulic Test

HINT:
(See page AX-13).

NG → Go to step 16

OK

13	Manual Shifting Test

HINT:
(See page AX-14).

NG → Go to step 15

OK

AX

14	**Problem Symptoms Table Chapter 1**

HINT:
(See page AX-17).

NG → **Go to step 18**

OK

15	**Problem Symptoms Table Chapter 2**

HINT:
(See page AX-17).

NEXT

16	**Part Inspection**

→ **Go to step 19**

17	**DTC Chart**

HINT:
(See page AX-32).

NEXT

AX

18	**Circuit Inspection**

NEXT

19	**Repair or Replace**

NEXT

20	**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. PERFORM ROAD TEST

NOTICE:

Perform the test at the ATF (Automatic Transmission Fluid) temperature 50° to 80 °C (122° to 176 °F) in the normal operation.

(a) D position test

Shift into the D position, fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that 1st to 2nd, 2nd to 3rd and 3rd to 4th up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-19).

HINT:

4th Gear Up-shift Prohibition Control

- Engine coolant temperature is 60 °C (140 °F) or less.
- ATF temperature is 10 °C (50 °F) or less.

4th Gear Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Engine coolant temperature is 60 °C (140 °F) or less.
- ATF temperature is 10 °C (50 °F) or less.

(2) Check for shift shock and slippage.

Check for shock and slippage when up-shifting from 1st to 2nd, 2nd to 3rd and 3rd to 4th.

(3) Check for abnormal noises and vibration.

Check for abnormal noise and vibration when up-shifting from 1st to 2nd, 2nd to 3rd and 3rd to 4th while driving with the shift lever in the D position, and also check while driving in the lock-up condition.

HINT:

The cause of abnormal noises and vibration must be checked very thoroughly as it could also cause loss of balance in parts, such as the differential and torque converter.

(4) Check kick-down operation.
Check the possible kick-down vehicle speeds when the 2nd to 1st, 3rd to 2nd and 4th to 3rd kick-downs take place while driving with the shift lever in the D position. Confirm that each takes place within the applicable vehicle speed range indicated in the automatic shift schedule (See page SS-19).
(5) Check for abnormal shock and slippage during kick-down.
(6) Check the lock-up mechanism.
- Drive in the D position (4th gear) at a constant speed (lock-up ON) of approximately 37 mph (60 km/h).
- 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, 2nd and 3rd gears in the D position.
- If there is a sudden increase in engine speed, lock-up has not occurred.

(b) 3 position test
Shift into the 3 position, fully depress the accelerator pedal and check the following points:
(1) Check the transmission control switch operation.
While driving in the D position (4th gear), shift the shift lever into the 3 position, and check that the 4th to 3rd down-shift takes place.
(2) Check up-shift operation.
Check that the 1st to 2nd and 2nd to 3rd up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-19).
HINT:
There is no 3rd to 4th up-shift in the 3 position.
(3) Check engine braking.
While driving in the 3 position and 3rd gear, release the accelerator pedal and check the engine braking effect.

(c) 2 position test
Shift into the 2 position and fully depress the accelerator pedal and check the following points.
(1) Check up-shift operation.
Check that the 1st to 2nd up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-19).
HINT:
There is no lock-up function in the 2 position.
(2) Check engine braking.
While driving in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

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

(d) L position test
Shift into the L position, fully depress the accelerator pedal and check the following points.
(1) Check that no up-shift takes place.
While driving in the L position, check that there is no up-shift to 2nd gear.
(2) Check engine braking.
While driving in the L position, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration.

(e) R position test
Shift into the R position, fully depress the accelerator pedal and check for slippage.
CAUTION:
Before conducting this test, ensure that the test area is free from people and obstructions.

(f) P position test
Stop the vehicle on a slope (more than 5°), shift into the P position and release the parking brake. Check that the vehicle does not move.

MECHANICAL SYSTEM TESTS

1. STALL SPEED TEST

HINT:

This test is to check the overall performance of the engine and transaxle by measuring the stall speeds in the D position.

NOTICE:

- **Do not perform the stall speed test for longer than 5 seconds.**
- **To ensure safety, perform this test in a wide, clear level area which provides good traction.**
- **The stall speed test must always be carried out by pairs of technicians. One technician must watch the wheels and wheel stoppers from outside the vehicle to make sure they do not slip, while the other performs the test.**

(a) Connect the intelligent tester to the DLC3.

(b) Run the vehicle until the ATF (Automatic Transmission Fluid) temperature reaches 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 firmly depressed with your left foot.

(f) Shift the shift lever to the D position.

(g) Depress the accelerator pedal all the way down with your right foot.

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

Standard value:

1,850 to 2,450 rpm

AX

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 is insufficient
Stall speed is higher than standard value	• Line pressure is too low • Forward clutch (C1) is slipping • No. 2 one-way clutch (F2) is not operating properly

2. SHIFT TIME LAG TEST

HINT:

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

(a) Connect the intelligent tester to the DLC3.

(b) Run the vehicle until the ATF (Automatic Transmission Fluid) temperature reaches 50° to 80°C (122° to 176°F).

(c) Allow the engine to idle with the air conditioning OFF.

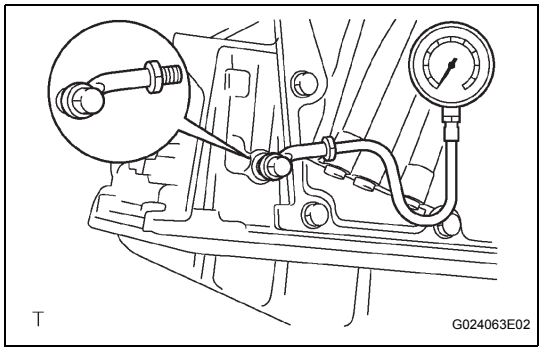
(d) Set the parking brake and keep the brake pedal firmly depressed with your left foot.

(e) Check the D range time lag.
(1) Shift the shift lever into the N position and wait for 1 minute. (*1)
(2) Shift the shift lever into the D position and measure the time until the shock is felt. (*2)
(3) Repeat procedures (*1) and (*2) three times, and calculate the average time of the three tests.

(f) Check the R range time lag.
(1) Shift the shift lever into the N position and wait for 1 minute. (*3)
(2) Shift the shift lever into the R position and measure the time until the shock is felt. (*4)
(3) Repeat procedures (*3) and (*4) three times, and calculate the average time of the three 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 too low • Forward clutch (C1) is worn • No. 2 one-way clutch (F2) is not operating properly
R range time lag exceeds standard value	• Line pressure is too low • Reverse clutch (C3) is worn • 1st and reverse brake (B3) is worn



HYDRAULIC TEST

1. PERFORM HYDRAULIC TEST

(a) Measure the line pressure.
NOTICE:
- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature 50° to 80°C (122° to 176°F).**
- **The line pressure test must always be carried out by pairs of technicians. One technician must observe the condition of the wheels and wheel stoppers outside the vehicle, while the other is performing the test.**
- **Prevent the SST hose from interfering with the exhaust pipe.**
- **This test must be conducted after checking and adjusting the engine.**
- **Perform this test with the air conditioning OFF.**
- **Do not continue the stall test for more than 5 seconds.**

(1) Warm up the ATF.
(2) Lift the vehicle up.
(3) Remove the engine under cover.
(4) Remove the test plug on the transmission case center right side and connect SST.
SST 09992-00095 (09992-00231, 09992-00271)
(5) Connect the intelligent tester to the DLC3.

AX

(6) Fully apply the parking brake and chock all 4 wheels.
(7) Start the engine and check the idling speed.
(8) Keep your left foot pressing firmly on the brake pedal and shift into the D position.
(9) Measure the line pressure when the engine is idling.
(10) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.
(11) Perform the test in the R position in the same manner.

Standard line pressure

Condition	D position kPa (kgf / cm^2, psi)	R position kPa (kgf / cm^2, psi)
Idling	**372 to 412 kPa (3.8 to 4.2 kgf/cm^2, 54 to 60 psi)**	**553 to 623 kPa (5.6 to 6.4 kgf/cm^2, 80 to 90 psi)**
Stall	**1,126 to 1,226 kPa (11.5 to 12.5 kgf/cm^2, 163 to 178 psi)**	**1,664 to 1,864 kPa (17.0 to 19.0 kgf/cm^2, 241 to 270 psi)**

Evaluation:

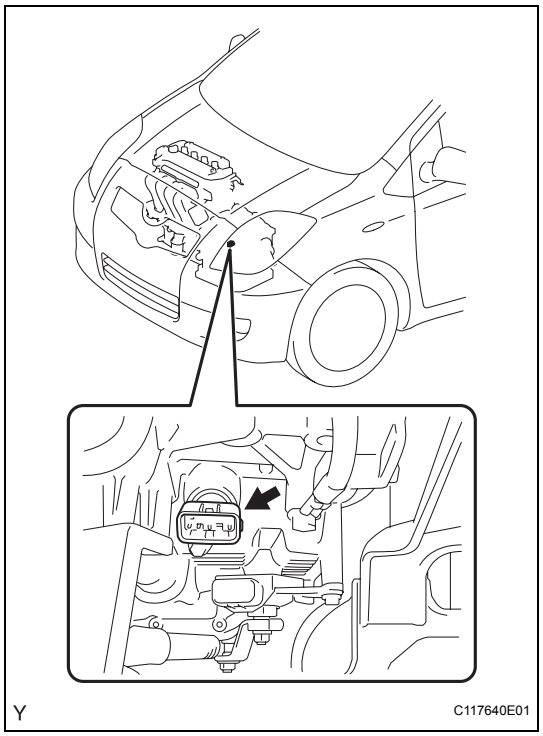
Problem	Possible Cause
Measured values are higher than specified values in all positions	• Shift solenoid valve SLT defective • Regulator valve defective
Measured values are lower than specified values in all positions	• Shift solenoid valve SLT defective • Regulator valve defective • Oil pump defective
Pressure is low in D position only	• D position circuit fluid leak • Forward clutch defective
Pressure is low in R position only	• R position circuit fluid leak • Reverse clutch defective • 1st and reverse brake defective

MANUAL SHIFTING TEST

1. PERFORM MANUAL SHIFTING TEST

HINT:

- This test can be used to determine whether the trouble is occurring in the electrical circuit or 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 transmission wire connector.
HINT:
It is possible to deactivate the electrical shift control by disconnecting the transmission wire. In this way, it is possible to change gear positions by mechanical shift change using the shift lever.

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

Shift Position	Shifting Condition
D	3rd
3	3rd
2	3rd
L	3rd
R	Reverse
P	Pawl Lock

(c) Connect the transmission wire connector.

(d) Clear the DTC (See page AX-25).

AX

INITIALIZATION

1. RESET MEMORY

NOTICE:

- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assembly, engine assembly or ECM.**
- **The RESET MEMORY can only be performed using an intelligent tester.**

HINT:

The ECM stores the conditions that the ECT controls the automatic transaxle assembly and engine assembly in accordance with those characteristics. Therefore, when the automatic transaxle assembly, engine assembly, or ECM is replaced, it is necessary to reset the memory so that the ECM can store the new information.

The reset procedure is as follows.

(a) Turn the ignition switch off.

(b) Connect the intelligent tester to the DLC3.

(c) Turn the ignition switch to the ON position and push the intelligent tester main switch on.

(d) Select the following items: DIAGNOSIS / ENHANCED OBD II.

(e) Perform the reset memory procedure from the ENGINE menu.

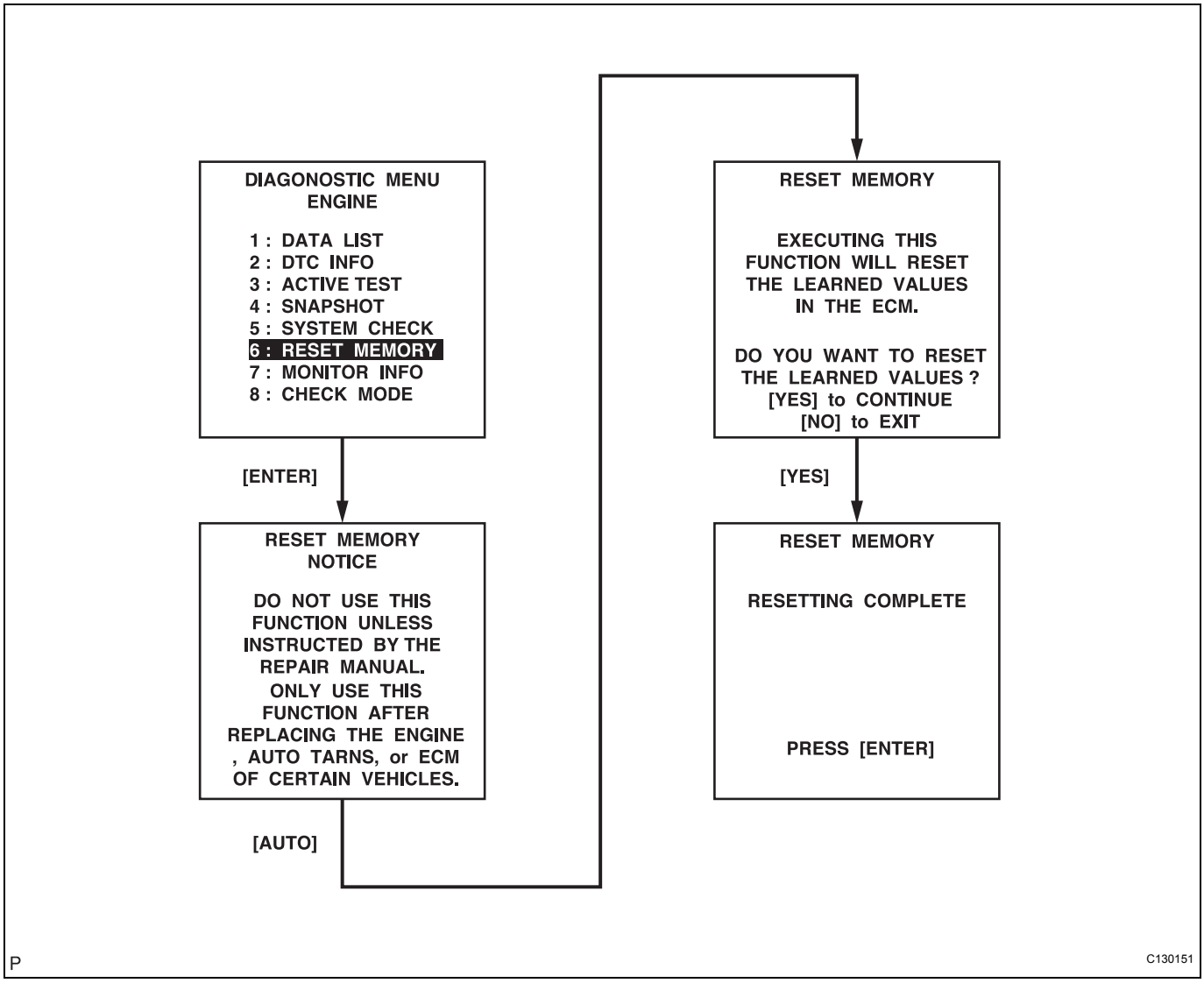
CAUTION:

After performing the RESET MEMORY, be sure to perform the ROAD TEST (See page AX-9) as described earlier.

HINT:

The ECM stores learned values by performing the ROAD TEST.

(1) Tester menu flow:


DIAGONOSTIC MENU
ENGINE
1 : DATA LIST
2 : DTC INFO
3 : ACTIVE TEST
4 : SNAPSHOT
5 : SYSTEM CHECK
6 : RESET MEMORY
7 : MONITOR INFO
8 : CHECK MODE
[ENTER]
RESET MEMORY
NOTICE
DO NOT USE THIS FUNCTION UNLESS INSTRUCTED BY THE REPAIR MANUAL.
ONLY USE THIS FUNCTION AFTER REPLACING THE ENGINE , AUTO TARNS, or ECM OF CERTAIN VEHICLES.
[AUTO]
RESET MEMORY
EXECUTING THIS FUNCTION WILL RESET THE LEARNED VALUES IN THE ECM.
DO YOU WANT TO RESET THE LEARNED VALUES ?
[YES] to CONTINUE
[NO] to EXIT
[YES]
RESET MEMORY
RESETTING COMPLETE
PRESS [ENTER]
P
C130151

AX

MONITOR DRIVE PATTERN

1. MONITOR DRIVE PATTERN FOR ECT TEST

(a) Perform this drive pattern as one method to simulate the detection conditions of ECT malfunctions. (The DTCs may not be detected due to the actual driving conditions. And some DTCs may not be detected through this drive pattern.)

HINT:

Preparation for driving

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

Driving note

- Drive the vehicle through all gears. Stop → 1st → 2nd → 3rd → 4th (lock-up ON).
- Repeat the above driving pattern three times or more.

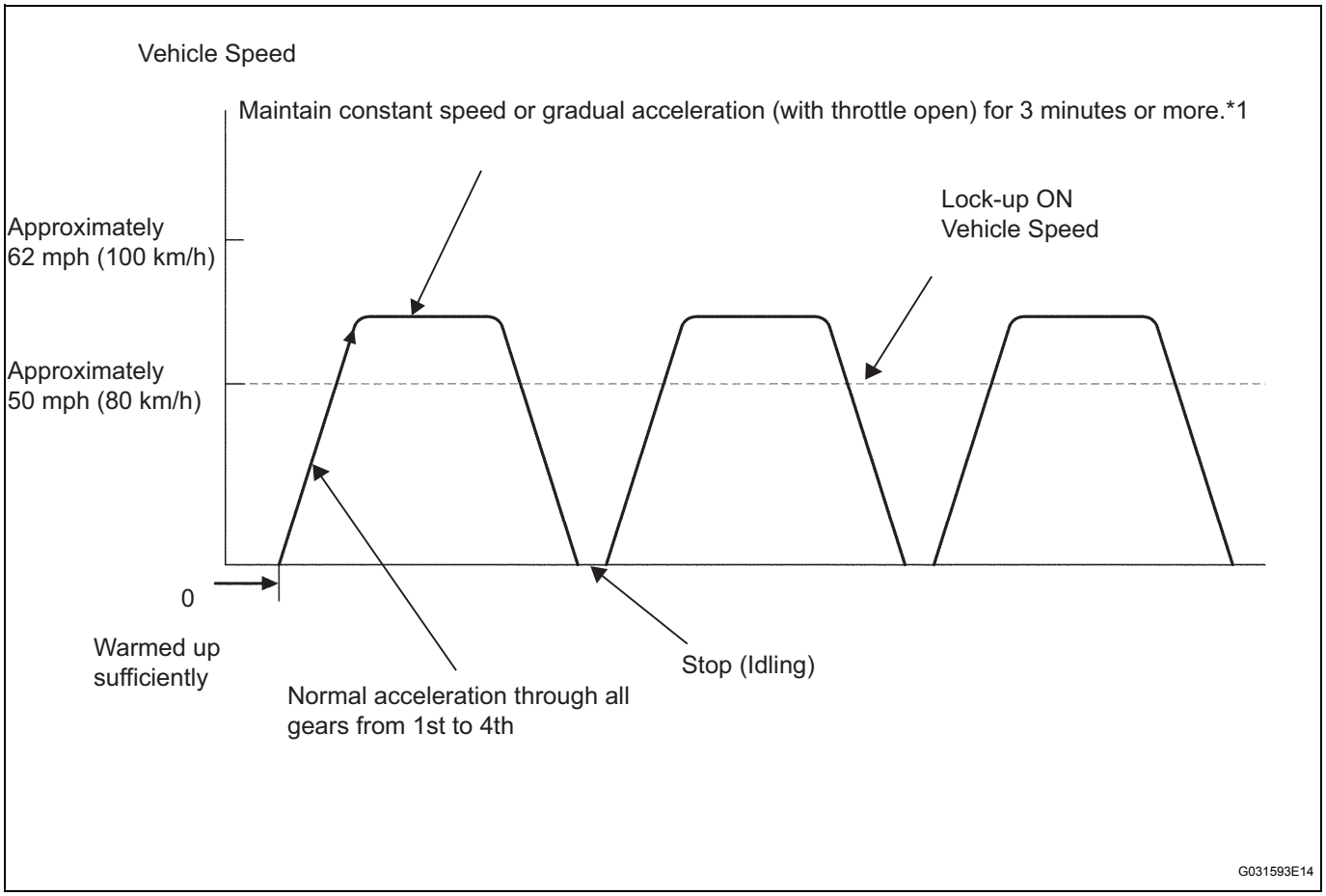
NOTICE:

- **The monitor status can be checked using the intelligent tester. When using an intelligent tester, monitor status can be found in the ENHANCED OBD II / DATA LIST or under CARB OBD II.**
- **In the event that the drive pattern must be interrupted (possibly 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 as level a road as possible and strictly observe the posted speed limits and traffic laws while driving.

AX



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

NOTICE:
To detect DTC P0711 (ATF temperature sensor malfunction), drive the vehicle for approximately 30 minutes.

AX

PROBLEM SYMPTOMS TABLE

HINT:

- If a normal code is displayed during the DTC check although the trouble still occurs, check the electrical circuits for each symptom in the order given in the following charts and proceed to the page given for troubleshooting.
- The Matrix Chart is divided into 2 chapters.
- When the circuit on which *1 is attached malfunctions, a DTC could be output.

Chapter 1: Electronic Circuit Matrix Chart

Refer to the table below when the trouble cause is considered to be electrical. If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check and replace the ECM.

Symptom	Suspected area	See page
No up-shift (Particular gear, from 1st to 3rd gear, is not up-shifted)	ECM	IN-34
No up-shift (From 3rd to 4th)	1. Shift lock control unit circuit	AX-47
	2. ECM	IN-34
No down-shift (From 4th to 3rd)	1. Shift lock control unit circuit	AX-47
	2. ECM	IN-34
No down-shift (Particular gear, from 1st to 3rd gear, is not down-shifted)	ECM	IN-34
No lock-up or No lock-up off	1. Stop light switch circuit *1	ES-48
	2. Engine coolant temperature sensor circuit *1	ES-48
	3. Vehicle speed sensor circuit *1	ES-48
	4. Speed sensor (NT) circuit *1	AX-50
	5. ATF temperature sensor circuit *1	AX-42
	6. Shift solenoid valve S1 *1	AX-67
	7. Shift solenoid valve S2 *1	AX-71
	8. Shift solenoid valve SLU *1	AX-89
	9. Throttle position sensor circuit *1	ES-48
	10. ECM	IN-34
Shift point too high or too low	1. Throttle position sensor circuit *1	ES-48
	2. ECM	IN-34
Up-shift to 2nd while in L position	ECM	IN-34
Up-shift to 3nd while in 2 position	ECM	IN-34
Up-shift from 3rd to 4th in 3 position	1. Shift lock control unit circuit	AX-47
	2. Park/neutral position switch *1	AX-35
	3. ECM	IN-34
Up-shift from 3rd to 4th while engine is cold	1. Engine coolant temperature sensor circuit *1	ES-48
	2. ECM	IN-34
Harsh engagement (From N to D)	1. Park/neutral position switch *1	AX-35
	2. ECM	IN-34
Harsh engagement (From 3rd to 4th)	1. Shift solenoid valve ST *1	AX-63
	2. ECM	IN-34
Harsh engagement (Lock-up)	1. Shift solenoid valve SLU *1	AX-89
	2. ECM	IN-34
Harsh engagement (Any driving position)	1. Throttle position sensor circuit *1	ES-48
	2. ECM	IN-34
Poor acceleration	ECM	IN-34
No kick-down	ECM	IN-34

Symptom	Suspected area	See page
Engine stalls when starting off or stopping	ECM	IN-34
Malfunction in shifting	1. Park/neutral position switch *1	AX-35
	2. Shift lock control unit circuit	AX-47
	3. ECM	IN-34

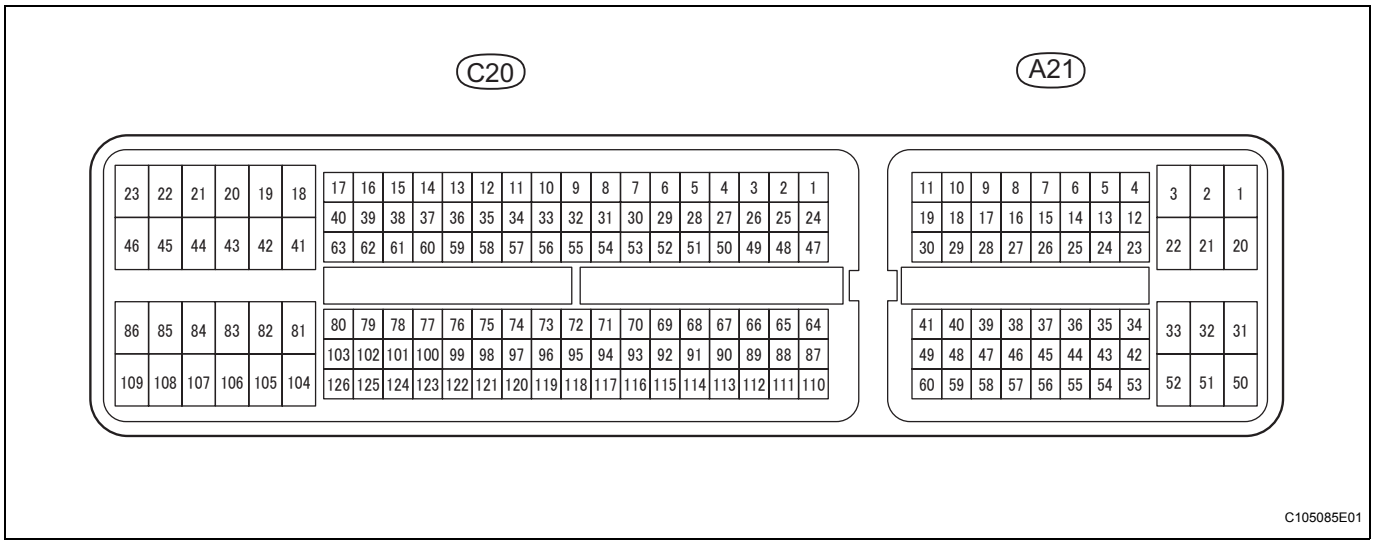
Chapter 2: On-Vehicle Repair and Off-Vehicle Repair

Symptom	Suspected area	See page
Vehicle does not move in any forward positions or in R position	1. Manual valve	AX-253
	2. Valve body assembly	AX-113
	3. Planetary gear unit	AX-173
	4. Forward clutch (C1)	AX-173
	5. No. 2 one-way clutch (F2)	AX-173
	6. Reverse clutch (C3)	AX-173
	7. 1st and reverse brake (B3)	AX-173
Vehicle does not move in R position	1. Manual valve	AX-253
	2. Valve body assembly	AX-113
	3. Planetary gear unit	AX-173
	4. Reverse clutch (C3)	AX-173
	5. 1st and reverse brake (B3)	AX-173
No up-shift (From 1st to 2nd)	1. Valve body assembly	AX-113
	2. 2nd brake (B2)	AX-173
	3. No. 1 one-way clutch (F1)	AX-173
No up-shift (From 2nd to 3rd)	1. Valve body assembly	AX-113
	2. Direct clutch (C2)	AX-173
No up-shift (From 3rd to 4th)	1. Valve body assembly	AX-113
	2. O/D and 2nd brake (B1)	AX-173
No down-shift (From 4th to 3rd)	Valve body assembly	AX-113
No down-shift (From 3rd to 2nd)	Valve body assembly	AX-113
No down-shift (From 2nd to 1st)	Valve body assembly	AX-113
No lock-up or No lock-up off	1. Valve body assembly	AX-113
	2. Torque converter clutch	AX-171
Harsh engagement (From N to D)	1. Valve body assembly	AX-113
	2. Forward clutch (C1)	AX-173
	3. No. 2 one-way clutch (F2)	AX-173
Harsh engagement (Lock-up)	1. Valve body assembly	AX-113
	2. Torque converter clutch	AX-171
Harsh engagement (From N to R)	1. Valve body assembly	AX-113
	2. C3 accumulator	AX-173
	3. Reverse clutch (C3)	AX-173
	4. 1st and reverse brake (B3)	AX-173
Harsh engagement (From 1st to 2nd)	1. B2 accumulator	AX-173
	2. Valve body assembly	AX-113
	3. 2nd brake (B2)	AX-173
	4. No. 1 one-way clutch (F1)	AX-173
Harsh engagement (From 2nd to 3rd)	1. C2 accumulator	AX-173
	2. Valve body assembly	AX-113
	3. Direct clutch (C2)	AX-173
Harsh engagement (From 3rd to 4th)	1. Shift solenoid valve ST	AX-63
	2. Valve body assembly	AX-113
	3. O/D and 2nd brake (B1)	AX-173

Symptom	Suspected area	See page
Harsh engagement (From 4th to 3rd)	1. Shift solenoid valve ST	AX-63
	2. Valve body assembly	AX-113
Harsh engagement (D, 2, L position)	Valve body assembly	AX-113
Slippage or shuddering (Forward position)	1. Valve body assembly	AX-113
	2. Oil strainer	AX-113
	3. Torque converter clutch	AX-171
	4. Forward clutch (C1)	AX-173
	5. Direct clutch (C2)	AX-173
	6. O/D and 2nd brake (B1)	AX-173
	7. 2nd brake (B2)	AX-173
	8. No. 1 one-way clutch (F1)	AX-173
	9. No. 2 one-way clutch (F2)	AX-173
Slippage or shuddering (R position)	1. Valve body assembly	AX-113
	2. Oil strainer	AX-113
	3. Reverse clutch (C3)	AX-173
	4. 1st and reverse brake (B3)	AX-173
Slippage or shuddering (1st)	No. 2 one-way clutch (F2)	AX-173
Slippage or shuddering (2nd)	1. 2nd brake (B2)	AX-173
	2. No.1 one-way clutch (F1)	AX-173
Slippage or shuddering (3rd)	Direct clutch (C2)	AX-173
Slippage or shuddering (4th)	O/D and 2nd brake (B1)	AX-173
No engine braking (1st: L position)	1. Valve body assembly	AX-113
	2. 1st and reverse brake (B3)	AX-173
No engine braking (2nd: 2 position)	1. Valve body assembly	AX-113
	2. 2nd and O/D brake (B1)	AX-173
No kick-down	Valve body assembly	AX-113
Poor acceleration	1. Valve body assembly	AX-113
	2. Torque converter clutch	AX-171
Engine stalls when starting off or stopping	Torque converter clutch	AX-171

TERMINALS OF ECM

1. ECM

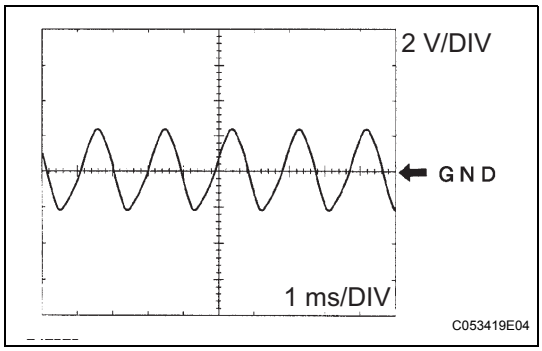


HINT:
Each ECM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specific Condition".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
L (C20-74) - E1 (C20-104)	V - W	L shift position switch signal	Ignition switch ON and shift lever L position	11 to 14 V
			Ignition switch ON and shift lever other than L position	Below 1 V
2 (C20-55) - E1 (C20-104)	G - W	2 shift position switch signal	Ignition switch ON and shift lever 2 position	11 to 14 V
			Ignition switch ON and shift lever other than 2 position	Below 1 V
ODMS (A21-26) - E1 (C20-104)	O - W	3 shift position switch signal	Ignition switch ON and shift lever 3 position	11 to 14 V
			Ignition switch ON and shift lever other than 3 position	Below 1 V
D (C20-56) - E1 (C20-104)	L - W	D shift position switch signal	Ignition switch ON and shift lever D or 3 position	11 to 14 V
			Ignition switch ON and shift lever other than D and 3 positions	Below 1 V
R (C20-53) - E1 (C20-104)	R - W	R shift position switch signal	Ignition switch ON and shift lever R position	11 to 14 V
			Ignition switch ON and shift lever other than R position	Below 1 V

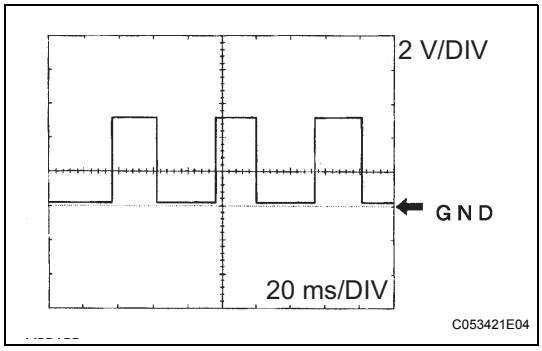
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
N (C20-54) - E1 (C20-104)	SB - W	N shift position switch signal	Ignition switch ON and shift lever N position	11 to 14 V
			Ignition switch ON and shift lever other than N position	Below 1 V
P (C20-73) - E1 (C20-104)	R - W	P shift position switch signal	Ignition switch ON and shift lever P position	11 to 14 V
			Ignition switch ON and shift lever other than P position	Below 1 V
NT+ (C20-125) - NT- (C20-124)	B - G	Speed sensor (NT) signal	Engine running	Pulse generation (See waveform 1)
STP (A21-36) - E1 (C20-104)	G - W	Stop light switch signal	Brake pedal depressed	7.5 to 14 V
			Brake pedal released	Below 1.5 V
SPD (A21-8) - E1 (C20-104)	V - W	Speed signal	Ignition switch ON and driving wheel rotating slowly	Pulse generation (See waveform 2)
S1 (C20-79) - E1 (C20-104)	SB - W	S1 solenoid signal	Ignition switch ON	11 to 14 V
			1st or 2nd gear	11 to 14 V
			3rd or 4th gear	Below 1 V
S2 (C20-78) - E1 (C20-104)	L - W	S2 solenoid signal	Ignition switch ON	Below 1 V
			1st or 4th gear	11 to 14 V
			2nd or 3rd gear	Below 1 V
ST (C20-80) - E1 (C20-104)	GR - W	ST solenoid signal	D position (3rd gear ⟷ 4th gear)	Below 1 V ⟷ 11 to 14 V
SLT+ (C20-76) - SLT- (C20-75)	G - W	SLT solenoid signal	Engine idling speed	Pulse generation (See waveform 3)
SLU+ (C20-57) - SLU- (C20-77)	P - O	SLU solenoid signal	Engine idling speed	Pulse generation (See waveform 4)
THO1 (C20-72) - ETHO (C20-95)	Y - B	ATF (Automatic Transmission Fluid) temperature sensor signal	ATF temperature: 10°C (50°F) to 145°C (293°F)	4 to 0 V

AX



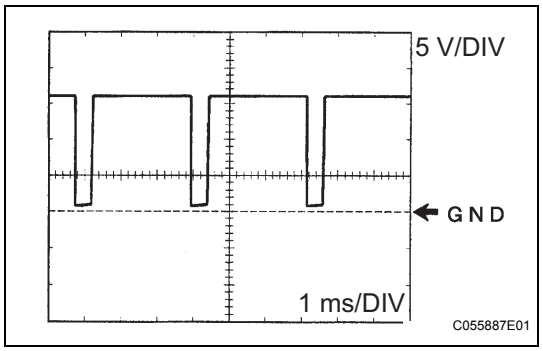
(a) Waveform 1

Terminal	NT+ - NT-
Tool setting	2 V/DIV, 1ms/DIV
Vehicle conditions	Driving at approximately 12 mph (20 km/h)



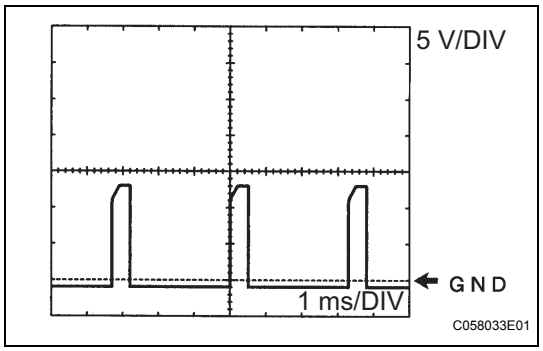
(b) Waveform 2

Terminal	SPD - E1
Tool setting	2 V/DIV, 20 ms/DIV
Vehicle conditions	Driving at approximately 12 mph (20 km/h)



(c) Waveform 3

Terminal	SLT+ - SLT-
Tool setting	5 V/DIV, 1 ms/DIV
Vehicle conditions	Engine idling speed



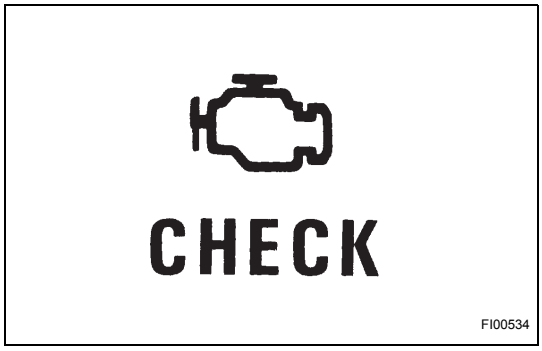
(d) Waveform 4

Terminal	SLU+ - SLU-
Tool setting	5 V/DIV, 1 ms/DIV
Vehicle conditions	Engine idling speed

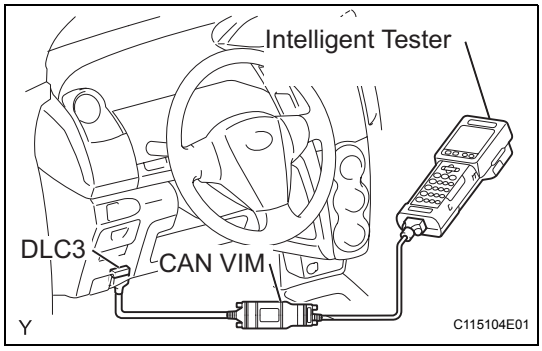
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is to connect an intelligent tester (complying with SAE J1987) to the vehicle, and read off various data output by the vehicle's ECM.



(b) OBD II regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in the drive system components which affect the vehicle emissions. In addition to illuminating the MIL when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page AX-32).
If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain in the ECM memory.



(c) To check the DTCs, connect the intelligent tester to the DLC3 of the vehicle. The intelligent tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For operating instructions, see the instruction book).

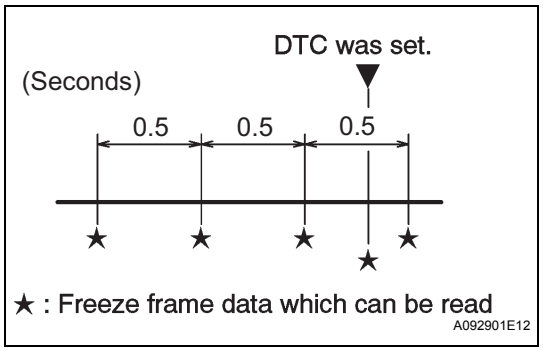
(d) The DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See page AX-32).

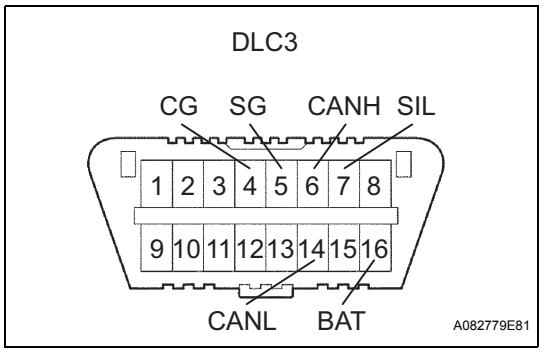
(e) The diagnosis system operates in normal mode during normal vehicle use. In normal mode, 2-trip detection logic is used to ensure accurate detection of malfunctions. Check mode is also available to technicians as an option. In check mode, 1-trip detection logic is used for simulating malfunction symptoms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

(f) 2-trip detection logic: When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the ignition switch is turned off and then turned to the ON position again, and same malfunction is detected again, the MIL illuminates.

(g) Freeze frame data records the engine conditions, such as fuel system, calculated load, engine coolant temperature, fuel trim, engine speed and vehicle speed 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.

(h) The intelligent tester records freeze frame data in five 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 conditions 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.





2. INSPECT DLC3

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

AX

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	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher

NOTICE:

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

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

HINT:

If your display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the intelligent tester to the DLC3, turned the ignition switch to the ON position and operated the tester, there is a problem with the vehicle or the tester.

- If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible 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.

3. CHECK BATTERY VOLTAGE

(a) Measure the battery voltage.

Standard voltage:

11 to 14 V

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

4. CHECK MIL

(a) The MIL comes on when the ignition switch is turned to the ON position and the engine is not running.

HINT:

If the MIL does not light up, troubleshoot the combination meter.

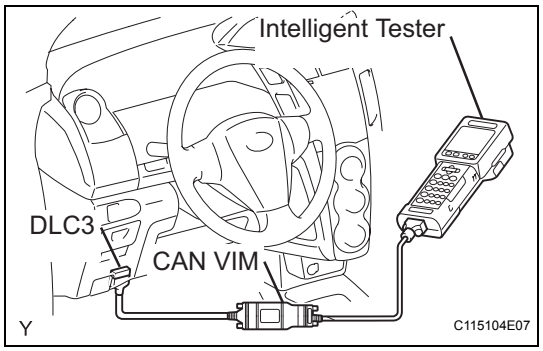
(b) When the engine is started, the MIL should go off. If the lamp remains on, it means that the diagnosis system has detected a malfunction or abnormality in the system.

DTC CHECK / CLEAR

1. DTC CHECK (NORMAL MODE)

NOTICE:

When the diagnostic system is switched from normal mode to check mode, all the DTCs and freeze frame data recorded in normal mode are erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.



(a) Check DTCs using an intelligent tester.
  (1) Turn the ignition switch off.
  (2) Connect the intelligent tester to the DLC3.
  (3) Turn the ignition switch to the ON position and turn the intelligent tester main switch on.
  (4) Select the following items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
  (5) Read the DTCs and freeze frame data displayed on the tester and note them down.

  NOTICE:

  When simulating symptoms with an intelligent tester to check the DTCs, use normal mode. For DTCs in the DTC chart, which are subject to 2-trip detection logic, perform the following.

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

2. DTC CLEAR

(a) Clear the DTCs: When using an intelligent tester.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch to the ON position and turn the intelligent tester main switch on.
  (3) Select the following items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES [YES] button.

  HINT:

  When operating the intelligent tester to erase the DTCs, the freeze frame data are also erased.

(b) Clear the DTCs: When not using an intelligent tester.
  (1) Disconnect the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more.

AX

CHECK MODE PROCEDURE

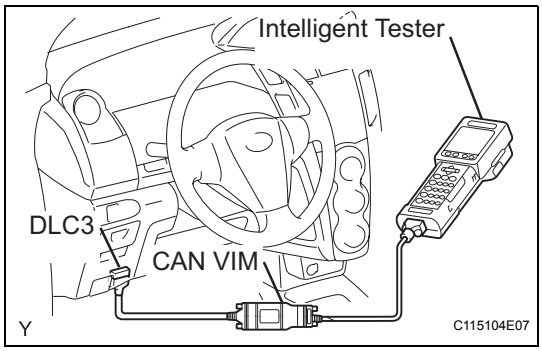
1. DESCRIPTION

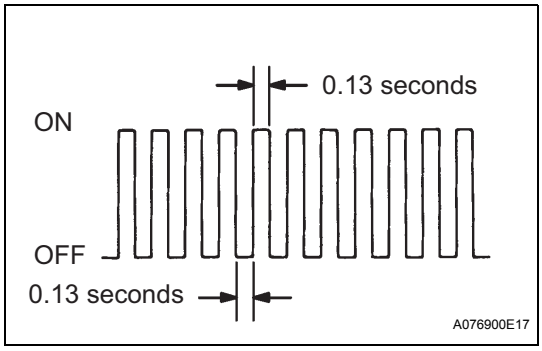
(a) Check mode has a higher sensitivity to malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect. In check mode, DTCs are detected with 1-trip detection logic.

2. DTC CHECK (CHECK MODE)

HINT:

Intelligent tester only: Compared to normal mode, check mode is more sensitive for detecting malfunctions. Furthermore, the same diagnostic items which are detected in normal mode can also be detected in check mode.





(a) Procedure for check mode using the intelligent tester.

(1) Check the initial conditions.
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transaxle in the P or N position
- A/C switched OFF

(2) Turn the ignition switch off.

(3) Connect the intelligent tester to the DLC3.

(4) Turn the ignition switch to the ON position and turn the intelligent tester main switch on.

(5) Select the following items: DIAGNOSIS / ENHANCED OBD II / CHECK MODE (Check that the MIL flashes as shown in the illustration).
NOTICE:
All DTCs and freeze frame data recorded are 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 the ON position to the ACC or LOCK position.

(6) Start the engine (the MIL goes off after the engine starts).

(7) Perform MONITOR DRIVE PATTERN for the ECT test (See page AX-16), or simulate the conditions of the malfunction described by the customer.
NOTICE:
Leave the ignition switch in the ON position until you have checked the DTCs.

(8) After simulating malfunction conditions, use the intelligent tester to check the DTCs and freeze frame data.

AX

FAIL-SAFE CHART

1. FAIL-SAFE

(a) This function minimizes the loss of ECT functions when any malfunction occurs in the sensors or solenoids.

Malfunction Part	Function
Vehicle Speed Sensor	During vehicle speed sensor signal malfunction, 4th up-shift is prohibited.
Transmission Revolution Sensor (Speed Sensor (NT))	During transmission revolution sensor (NT) signal malfunction, 4th up-shift is prohibited.
ATF (Automatic Transmission Fluid) Temperature Sensor	During ATF temperature sensor malfunction, 4th up-shift is prohibited.
Shift Solenoid Valve S1 or S2	During shift solenoid valve S1 or S2 malfunction, current to faulty shift solenoid valve is cut off and control is effected by operating normal solenoid valve. Shift control effect depends on failed solenoid as described in table below.
Shift Solenoid Valve ST	During shift solenoid valve ST malfunction, 4th up-shift is prohibited.
Shift Solenoid Valve SLT	During shift solenoid valve SLT malfunction, 4th up-shift is prohibited.
Engine Coolant Temperature Sensor, Knock Sensor or Throttle Position Sensor	During engine coolant temperature sensor, knock sensor or throttle position sensor malfunction, 4th up-shift is prohibited.

(b) Fail-safe chart for shift solenoid valve S1 and/or S2:
Fail safe function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid ON or 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 circuit solenoid).
Even if starting the engine in fail-safe mode, the gear position remains in the same position.

AX

Normal:

Shift Lever Position		Shift Solenoid Valve S1	Shift Solenoid Valve S2	Gear
D	1st	ON	ON	1st
	2nd	ON	OFF	2nd
	3rd	OFF	OFF	3rd
	4th	OFF	ON	4th
3	1st	ON	ON	1st
	2nd	ON	OFF	2nd
	3rd	OFF	OFF	3rd
2	1st	ON	ON	1st
	2nd	ON	OFF	2nd
L	1st	ON	ON	1st

Shift Solenoid Valve S1 malfunction:

Shift Lever Position		Shift Solenoid Valve S1	Shift Solenoid Valve S2	Gear
D	1st	X	OFF	3rd
	2nd	X	OFF	3rd
	3rd	X	OFF	3rd
	4th	X	ON	4th
3	1st	X	OFF	3rd
	2nd	X	OFF	3rd
	3rd	X	OFF	3rd

Shift Lever Position		Shift Solenoid Valve S1	Shift Solenoid Valve S2	Gear
2	1st	X	OFF	3rd
	2nd	X	OFF	3rd
L	1st	X	OFF	3rd

X: Malfunctions

Shift Solenoid Valve S2 malfunction:

Shift Lever Position		Shift Solenoid Valve S1	Shift Solenoid Valve S2	Gear
D	1st	ON	X	2nd
	2nd	ON	X	2nd
	3rd	OFF	X	3rd
	4th	OFF	X	3rd
3	1st	ON	X	2nd
	2nd	ON	X	2nd
	3rd	OFF	X	3rd
2	1st	ON	X	2nd
	2nd	ON	X	2nd
L	1st	ON	X	2nd

X: Malfunctions

Shift Solenoid Valve S1 and S2 malfunction:

Shift Lever Position		Shift Solenoid Valve S1	Shift Solenoid Valve S2	Gear
D	1st	X	X	3rd
	2nd	X	X	3rd
	3rd	X	X	3rd
	4th	X	X	3rd
3	1st	X	X	3rd
	2nd	X	X	3rd
	3rd	X	X	3rd
2	1st	X	X	3rd
	2nd	X	X	3rd
L	1st	X	X	3rd

X: Malfunctions

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the DATA LIST displayed by the intelligent tester, you can read the values of the switches, sensors, actuators and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method of shortening labor 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 together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.

(d) Turn the ignition switch to the ON position.

(e) Turn on the tester.

(f) Select the following items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.

(g) In accordance with the display on the tester, read the DATA LIST.

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle Speed display/ min.: 0 mph (0 km/h) max.: 158 mph (255 km/h)	• Vehicle stopped: 0 mph (0 km/h) • Same as speedometer reading	-
SPD (NT)	Input Turbine Speed/ display: 50 rpm min.: 0 rpm max.: 12750 rpm	HINT: • Lock-Up ON (After warming up engine): Input turbine speed (NT) equal to engine speed • Lock-Up OFF (Idling at P or N position): Input turbine speed (NT) nearly equal to engine speed • Vehicle stopped in D position: 0 rpm	-
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position; P or N: ON Except P and 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-35.
STOP LIGHT SW	Stop Light SW Status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF	-
SHIFT	ECM Gearshift Command/ 1st, 2nd, 3rd or 4th	Shift lever position; • L: 1st • 2: 1st or 2nd • 3: 1st, 2nd or 3rd • D: 1st, 2nd, 3rd or 4th	-

AX

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
REVERSE	PNP SW Status/ ON or OFF	Shift lever position; R: ON Except 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-35.
PARKING	PNP SW Status/ ON or OFF	Shift lever position; P: ON Except P: OFF	
NEUTRAL	PNP SW Status/ ON or OFF	Shift lever position; N: ON Except N: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position; D or 3: ON Except D and 3: OFF	
3RD	PNP SW Status/ ON or OFF	Shift lever position; 3: ON Except 3: OFF	-
2ND	PNP SW Status/ ON or OFF	Shift lever position; 2: ON Except 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-35.
LOW	PNP SW Status/ ON or OFF	Shift lever position; L: ON Except L: OFF	
A/T OIL TEMP1	ATF (Automatic Transmission Fluid) 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 when cold soak	If value is "-40°C (-40°F)" or " 150°C (302°F) or more ", ATF temperature sensor circuit is open or short.
ATF	ATF Condition	ATF Condition; NG: ON OK: OFF	Replace ATF when ATF condition is ON.
LOCK UP	Lock Up Status/ ON or OFF	• Lock Up: ON • Except Lock Up: OFF	-
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	• Lock up solenoid ON: ON • Lock up solenoid OFF: OFF	-
SOLENOID (ST)	Shift Solenoid ST Status/ ON or OFF	Up-shifting and down-shifting between 3rd and 4th gears while driving: OFF → ON → OFF	-
SOLENOID (SLU)	Shift Solenoid SLU Status/ ON or OFF	• Lock Up: ON • Except Lock Up: OFF	-
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	• Accelerator pedal is depressed: OFF • Accelerator pedal is released: ON	-

AX

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the following items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(g) In accordance with the display on the tester, perform the ACTIVE TEST.

Item	Test Details	Diagnostic Note
SOLENOID (SLU)	[Test Details] Operate shift solenoid SLU [Vehicle Condition] • Vehicle Stopped • Shift lever P or N position	-
SOLENOID (SLT)*	[Test Details] Operate shift solenoid SLT and raise the line pressure. [Vehicle Condition] • Vehicle Stopped • IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLT)" is performed, ECM commands SLT solenoid to turn off.) ON: No action (normal operation)	-
SOLENOID (S1)	[Test Details] Operate shift solenoid S1 [Vehicle Condition] • Vehicle Stopped • Shift lever P or N position	-
SOLENOID (S2)	[Test Details] Operate shift solenoid S2 [Vehicle Condition] • Vehicle Stopped • Shift lever P or N position	-
LOCK UP	[Test Details] Control shift solenoid SLU to set automatic transaxle to lock-up condition. [Vehicle Condition] Vehicle Speed: 36 mph (60 km/h) or more, and 4th gear	Possible to check SLU operation.
SHIFT	[Test Details] Operate shift solenoid valve and set each shift position manually. [Vehicle Condition] Vehicle Speed: Less than 30 mph (50 km/h) [Others] • Press →button: Shift up • Press ←button: Shift down	Possible to check operation of shift solenoid valves.
SOLENOID (ST)	[Test Details] Operate shift solenoid ST [Vehicle Condition] • Vehicle Stopped • IDL: ON	-

AX

*: 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-13) as well.
HINT:
The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.

DIAGNOSTIC TROUBLE CODE CHART

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

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

AUTOMATIC TRANSMISSION SYSTEM

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	1. Open or short in park/neutral position switch circuit 2. Park/neutral position switch 3. Shift lock control ECU 4. ECM	Comes on	DTC stored	AX-35
P0710	Transmission Fluid Temperature Sensor "A" Circuit	1. Open or short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. ECM	Comes on	DTC stored	AX-42
P0711	Transmission Fluid Temperature Sensor "A" Performance	1. ATF level 2. Transmission wire (ATF temperature sensor) 3. ECM	Comes on	DTC stored	AX-47
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	1. Short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. ECM	Comes on	DTC stored	AX-42
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	1. Open in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. ECM	Comes on	DTC stored	AX-42
P0717	Turbine Speed Sensor Circuit No Signal	1. Open or short in transmission revolution sensor (Speed sensor (NT)) circuit 2. Transmission revolution sensor 3. Automatic transaxle (clutch, brake or gear etc.) 4. ECM	Comes on	DTC stored	AX-50

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0751	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	1. Shift solenoid valve S1 remains open or closed 2. Valve body is blocked 3. Shift solenoid valve S1 4. Automatic transaxle (clutch, brake or gear etc.) 5. ECM	Comes on	DTC stored	AX-53
P0756	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	1. Shift solenoid valve S2 remains open or closed 2. Valve body is blocked 3. Shift solenoid valve S2 4. Automatic transaxle (clutch, brake or gear etc.) 5. ECM	Comes on	DTC stored	AX-58
P0787	Shift / Timing Solenoid Low (Shift Solenoid Valve ST)	1. Short in shift solenoid valve ST circuit 2. Shift solenoid valve ST 3. ECM	Comes on	DTC stored	AX-63
P0788	Shift / Timing Solenoid High (Shift Solenoid Valve ST)	1. Open in shift solenoid valve ST circuit 2. Shift solenoid valve ST 3. ECM	Comes on	DTC stored	AX-63
P0973	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	1. Short in shift solenoid valve S1 circuit 2. Shift solenoid valve S1 3. ECM	Comes on	DTC stored	AX-67
P0974	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)	1. Open in shift solenoid valve S1 circuit 2. Shift solenoid valve S1 3. ECM	Comes on	DTC stored	AX-67
P0976	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	1. Short in shift solenoid valve S2 circuit 2. Shift solenoid valve S2 3. ECM	Comes on	DTC stored	AX-71
P0977	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)	1. Open in shift solenoid valve S2 circuit 2. Shift solenoid valve S2 3. ECM	Comes on	DTC stored	AX-71

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	1. Shift solenoid valve SLT remains open or closed 2. Valve body is blocked 3. Torque converter clutch 4. Automatic transaxle (clutch, brake or gear etc.) 5. ECM	Comes on	DTC stored	AX-75
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	1. Open or short in shift solenoid valve SLT circuit 2. Shift solenoid valve SLT 3. ECM	Comes on	DTC stored	AX-80
P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	1. Shift solenoid valve SLU remains open or closed 2. Valve body is blocked 3. Shift solenoid valve SLU 4. Torque converter clutch 5. Automatic transaxle (clutch, brake or gear etc.) 6. Line pressure is too low 7. ECM	Comes on	DTC stored	AX-84
P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	1. Open or short in shift solenoid valve SLU circuit 2. Shift solenoid valve SLU 3. ECM	Comes on	DTC stored	AX-89

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P0705	(a) Any 2 or more of following signals are ON simultaneously. (2-trip detection logic) • P input signal • R input signal • N input signal • D input signal • 2 input signal • L input signal (b) All switches are OFF simultaneously for P, R, N, D, 2 and L positions. (2-trip detection logic) (c) L or 3 input signal is ON for P, R or N position. (2-trip detection logic)	• Open or short in park/neutral position switch circuit • Park/neutral position switch • Shift lock control ECU • ECM

MONITOR DESCRIPTION

This DTC indicates a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.
The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For safety, the park/neutral position switch detects the shift lever position so that the engine can be started only when the shift lever is in the P or N position.
The park/neutral position switch sends a signal to the ECM according to the shift position (P, R, N, D, 2 or L). The ECM determines that there is a problem with the switch or related parts if it receives 2 or more position signals simultaneously. The ECM turns on the MIL and stores the DTC.

MONITOR STRATEGY

AX

Related DTCs	P0705: Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch
Frequency of operation	Continuous
Duration	Condition (a) and (c): 2 seconds Condition (b): 60 seconds
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor runs whenever the following DTCs are not present.	None
Ignition switch	ON
Battery voltage	10.5 V or more

TYPICAL MALFUNCTION THRESHOLDS

One of the following conditions is met: Condition (a), (b) or (c)

Condition (a):

Number of following signals input simultaneously	2 or more
P switch	ON
R switch	ON
N switch	ON
D switch	ON

2 switch	ON
L switch	ON

Condition (b):
All of the following conditions are met.

P switch	OFF
R switch	OFF
N switch	OFF
D switch	OFF
2 switch	OFF
L switch	OFF

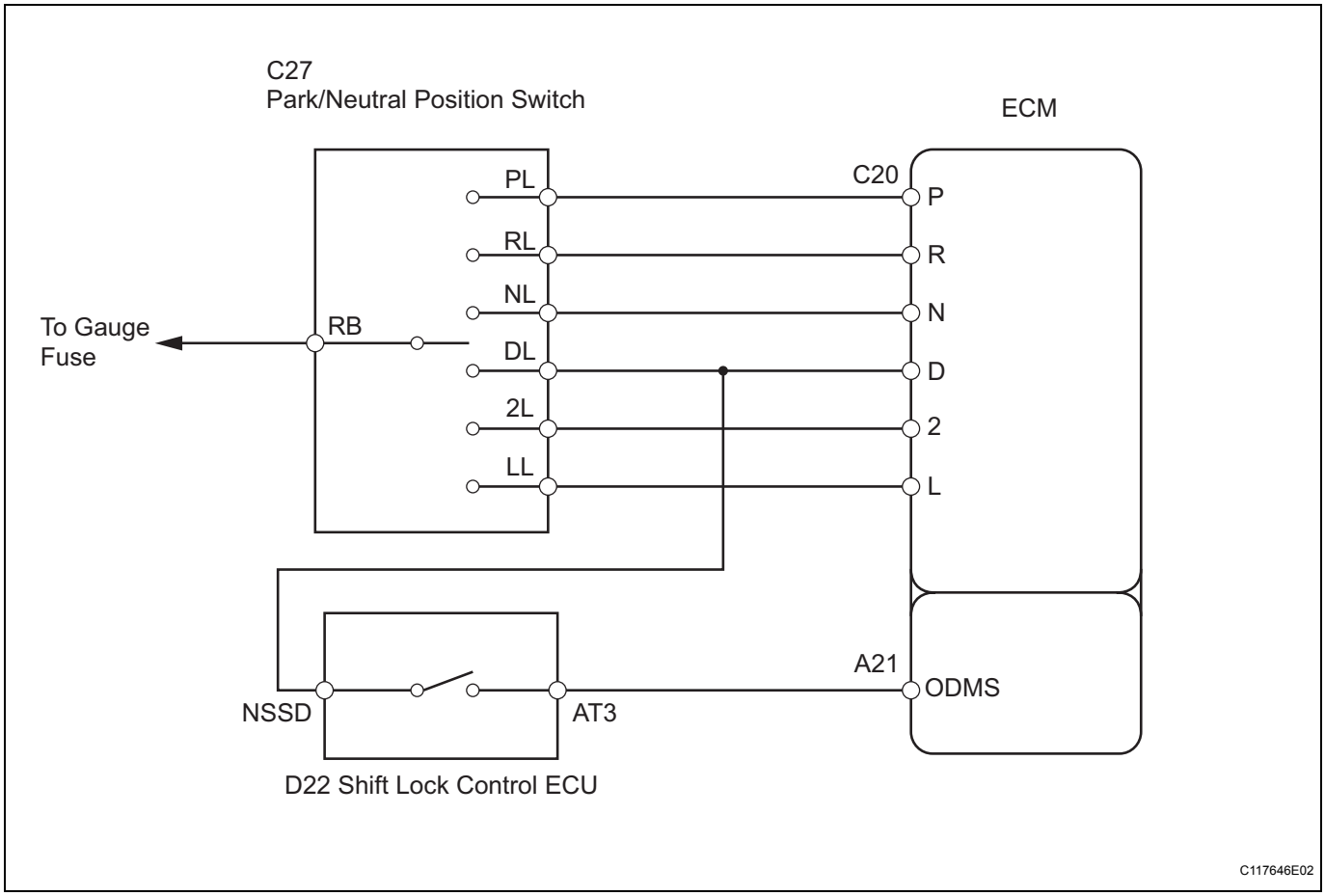
Condition (c):
When shift lever is in P, R or N position, either of following conditions is met.

3 switch	ON
L switch	ON

COMPONENT OPERATING RANGE

Park/neutral position switch	The park/neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1. DATA LIST

HINT:

Using the DATA LIST displayed by the intelligent tester, you can read the values of the switches, sensors, actuators and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method of shortening labor time.

(a) Turn the ignition switch off.
(b) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the following items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(f) In accordance with the display on the tester, read the DATA LIST.

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
REVERSE	PNP (Park/Neutral Position) SW Status/ ON or OFF	Shift lever position; R: ON Except 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 SW Status/ ON or OFF	Shift lever position; P: ON Except P: OFF	
NEUTRAL	PNP SW Status/ ON or OFF	Shift lever position; N: ON Except N: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position; D or 3: ON Except D and 3: OFF	
3RD	PNP SW Status/ ON or OFF	Shift lever position; 3: ON Except 3: OFF	-
2ND	PNP SW Status/ ON or OFF	Shift lever position; 2: ON Except 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 SW Status/ ON or OFF	Shift lever position; L: ON Except L: OFF	

1	READ VALUE OF DATA LIST (PARK/NEUTRAL POSITION SWITCH)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn on the intelligent tester.
(d) Select the following items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.

AX

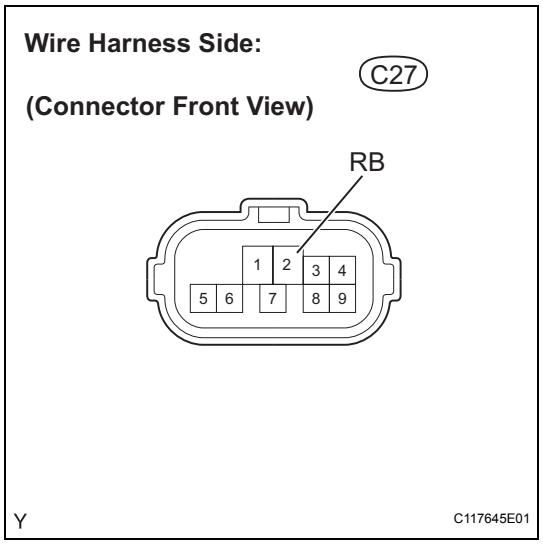
(e) In accordance with the display on the tester, read the DATA LIST.

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
REVERSE	PNP (Park/Neutral Position) SW Status/ ON or OFF	Shift lever position; R: ON Except 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 SW Status/ ON or OFF	Shift lever position; P: ON Except P: OFF	
NEUTRAL	PNP SW Status/ ON or OFF	Shift lever position; N: ON Except N: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position; D or 3: ON Except D and 3: OFF	
2ND	PNP SW Status/ ON or OFF	Shift lever position; 2: ON Except 2: OFF	
LOW	PNP SW Status/ ON or OFF	Shift lever position; L: ON Except L: OFF	

OK → **Go to step 5**

NG

2 CHECK HARNESS AND CONNECTOR (POWER SOURCE OF PARK/NEUTRAL POSITION SWITCH)



(a) Disconnect the park/neutral position switch connector.
(b) Turn the ignition switch to the ON position, and measure the voltage.

Standard voltage

Tester Connection	Specified Condition
2 (RB) - Body ground	11 to 14 V

NG → **CHECK POWER SOURCE OF ECM**

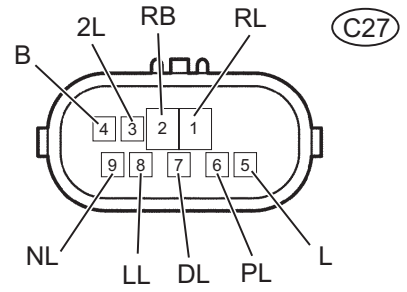
OK

AX

3 INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

Component Side:

(Connector Front View)



C130119E04

(a) Disconnect the park/neutral position switch connector.
(b) Measure the resistance when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
P or N	4 (B) - 5 (L)	Below 1 Ω
Except P and N	4 (B) - 5 (L)	10 kΩ or higher
P	2 (RB) - 6 (PL)	Below 1 Ω
Except P	2 (RB) - 6 (PL)	10 kΩ or higher
R	1 (RL) - 2 (RB)	Below 1 Ω
Except R	1 (RL) - 2 (RB)	10 kΩ or higher
N	2 (RB) - 9 (NL)	Below 1 Ω
Except N	2 (RB) - 9 (NL)	10 kΩ or higher
D or 3	2 (RB) - 7 (DL)	Below 1 Ω
Except D and 3	2 (RB) - 7 (DL)	10 kΩ or higher
2	2 (RB) - 3 (2L)	Below 1 Ω
Except 2	2 (RB) - 3 (2L)	10 kΩ or higher
L	2 (RB) - 8 (LL)	Below 1 Ω
Except L	2 (RB) - 8 (LL)	10 kΩ or higher

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY**

OK

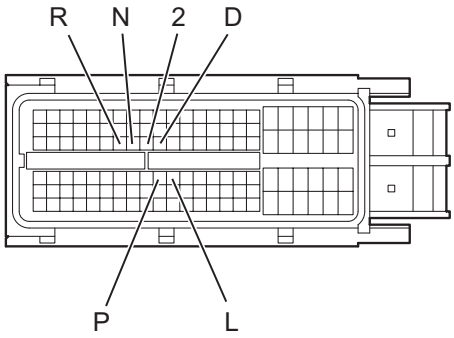
AX

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

Wire Harness Side:

C20

(Connector Front View)



C130155E01

(a) Connect the park/neutral position switch connector.
(b) Disconnect the ECM connector.
(c) Turn the ignition switch to the ON position, and measure the voltage when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
P	73 (P) - Body ground	11 to 14 V
Except P	73 (P) - Body ground	Below 1 V
R	53 (R) - Body ground	11 to 14 V*
Except R	53 (R) - Body ground	Below 1 V
N	54 (N) - Body ground	11 to 14 V
Except N	54 (N) - Body ground	Below 1 V
D or 3	56 (D) - Body ground	11 to 14 V
Except D and 3	56 (D) - Body ground	Below 1 V
2	55 (2) - Body ground	11 to 14 V
Except 2	55 (2) - Body ground	Below 1 V
L	74 (L) - Body ground	11 to 14 V
Except L	74 (L) - Body ground	Below 1 V

HINT:
*: The voltage will drop slightly due to the back up light being turned on.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5 READ VALUE OF DATA LIST (PARK/NEUTRAL POSITION SWITCH)

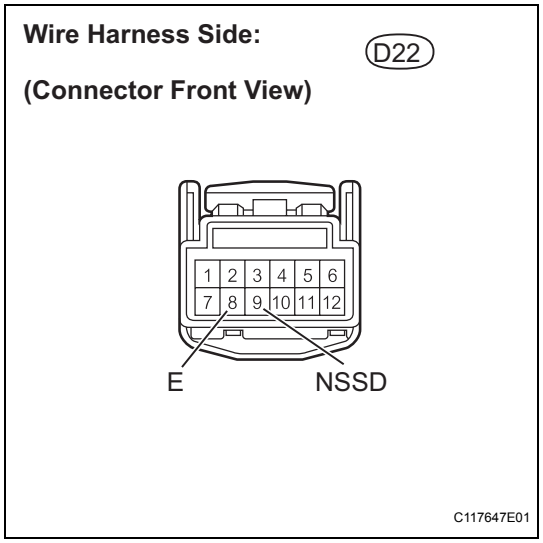
(a) Connect the ECM connector.
(b) Turn the ignition switch to the ON position.
(c) Turn on the intelligent tester.
(d) Select the following items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(e) In accordance with the display on the tester, read the DATA LIST.

Item	Measurement Item/ Range (display)	Normal Condition
3RD	PNP SW Status/ ON or OFF	Shift lever position; 3: ON Except 3: OFF

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

6 CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - SHIFT LOCK CONTROL ECU)



(a) Disconnect the shift lock control ECU connector.
(b) Turn the ignition switch to the ON position, and measure the voltage when the shift lever is moved to each position.

Standard voltage

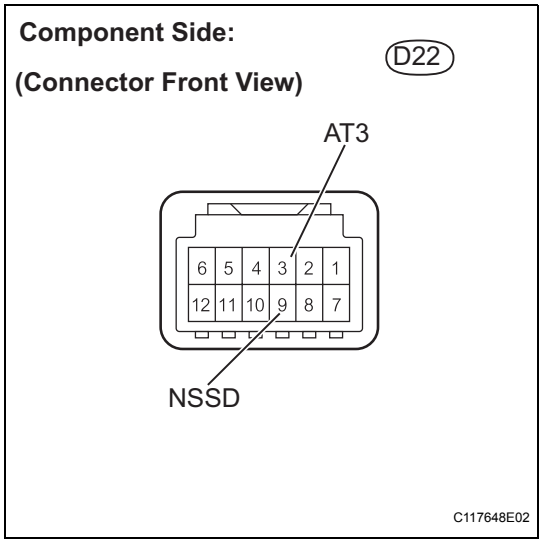
Shift Position	Tester Connection	Specified Condition
D or 3	9 (NSSD) - 8 (E)	11 to 14 V
Except D and 3	9 (NSSD) - 8 (E)	Below 1 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

AX

7	INSPECT SHIFT LOCK CONTROL ECU SUB-ASSEMBLY



(a) Disconnect the shift lock control ECU connector.
(b) Measure the resistance when the shift lever is moved to each position.

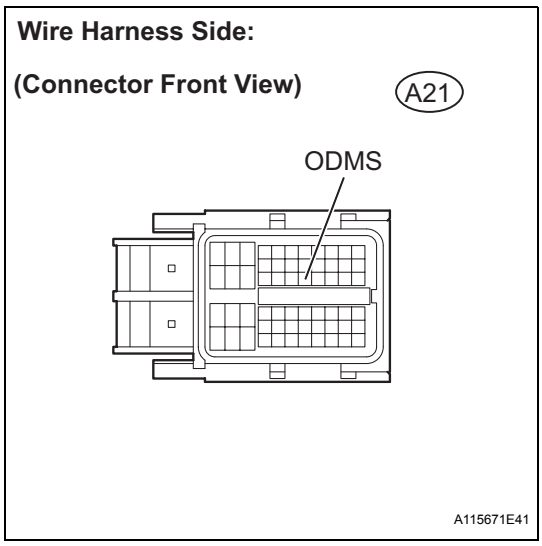
Standard resistance

Shift Position	Tester Connection	Specified Condition
3	3 (AT3) - 9 (NSSD)	Below 1 Ω
D	3 (AT3) - 9 (NSSD)	10 kΩ or higher

NG → **REPLACE SHIFT LOCK CONTROL ECU SUB-ASSEMBLY**

OK

8	CHECK HARNESS AND CONNECTOR (SHIFT LOCK CONTROL ECU - ECM)



(a) Connect the shift lock control ECU connector.
(b) Disconnect the ECM connectors.
(c) Turn the ignition switch to the ON position, and measure the voltage.

Standard voltage

Shift Position	Tester Connection	Specified Condition
3	26 (ODMS) - Body ground	11 to 14 V
Except 3	26 (ODMS) - Body ground	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

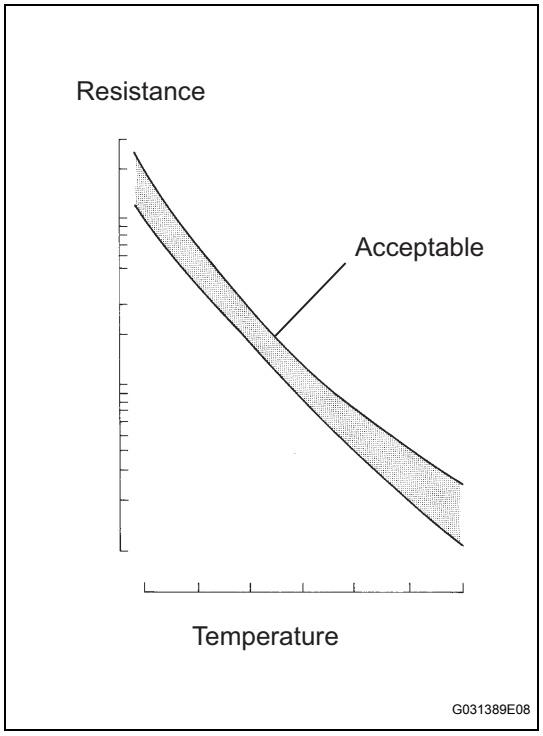
AX

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 ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input to the ECM.
The sensor resistance changes with the transmission fluid temperature. As the temperature rises, the sensor resistance decreases. The ECM applies a voltage to the temperature sensor through ECM terminal THO1, and the ECM calculates the fluid temperature based on the voltage signal.
HINT:

- The ATF temperature is likely to increase under conditions such as towing, climbing hills and in heavy traffic.
- When the ATF temperature sensor is normal, the transmission locks up in 4th gear with the shift lever in the D position and in 3rd gear with the shift lever in the 3rd position.

DTC No.	DTC Detection Condition	Trouble Area
P0710	Both (a) and (b) are detected momentarily within 0.5 seconds when neither P0712 nor P0713 is detected. (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 seconds, malfunction switches from (a) to (b) or from (b) to (a).	• Open or short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • ECM

DTC No.	DTC Detection Condition	Trouble Area
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 seconds or more. (1-trip detection logic)	• Short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • ECM
P0713	Following condition continues for 0.5 seconds or more. (1-trip detection logic) ATF temperature sensor resistance is more than 156 kΩ after 15 minutes or more after starting engine.	• Open in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM turns on the MIL and stores the DTC.

*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.

HINT:

The ATF temperature can be checked on the intelligent tester display.

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Fluttering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT*1 sensor)
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence of operation	None

AX

*1: Transmission Fluid Temperature

TYPICAL ENABLING CONDITIONS

P0710: Range check (Fluttering)

The monitor runs whenever the following DTCs are not present.	None
The typical enabling conditions are not available.	-

P0712: Range check (Low resistance)

The monitor runs whenever the following DTCs are not present.	None
The typical enabling conditions are not available.	-

P0713: Range check (High resistance)

The monitor runs whenever the following DTCs are not present.	None
Time after engine start	15 minutes or more

TYPICAL MALFUNCTION THRESHOLDS

P0710: Range check (Fluttering)

ATF temperature sensor (TFT sensor) resistance	Less than 79 Ω or More than 156 kΩ

P0712: Range check (Low resistance)

ATF temperature sensor (TFT sensor) resistance	Less than 79 Ω

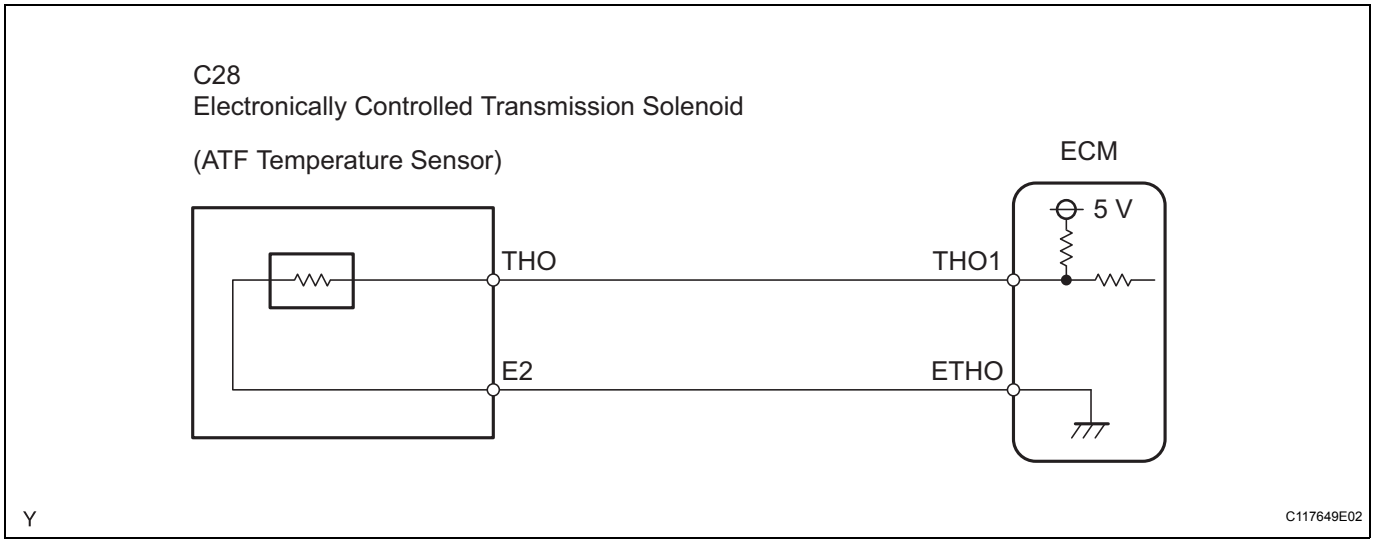
P0713: Range check (High resistance)

ATF temperature sensor (TFT sensor) resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

ATF temperature sensor (TFT sensor) resistance	Resistance: 79 Ω to 156 kΩ

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

HINT:

Using the DATA LIST displayed by the intelligent tester, you can read the values of the switches, sensors, actuators and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method of shortening labor 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 together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the following items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) In accordance with the display on the tester, 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 when cold soak	If value is -40°C (-40°F) or 150°C (302°F) or more, ATF temperature sensor circuit is open or short.

HINT:

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

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

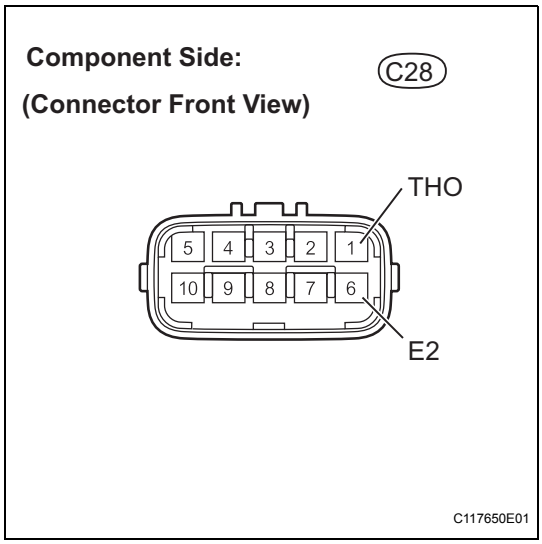
AX

Measure the resistance between terminal THO1 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 (Automatic Transmission Fluid) temperature sensor becomes open, P0713 is immediately set (within 0.5 seconds).

1 INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
1 (THO) - 6 (E2)	79 Ω to 156 kΩ
1 (THO) - Body ground	10 kΩ or higher
6 (E2) - Body ground	10 kΩ or higher

HINT:
If the resistance is outside the specified range at either of the ATF temperatures shown in the table below, the driveability of the vehicle may be affected.
Standard resistance

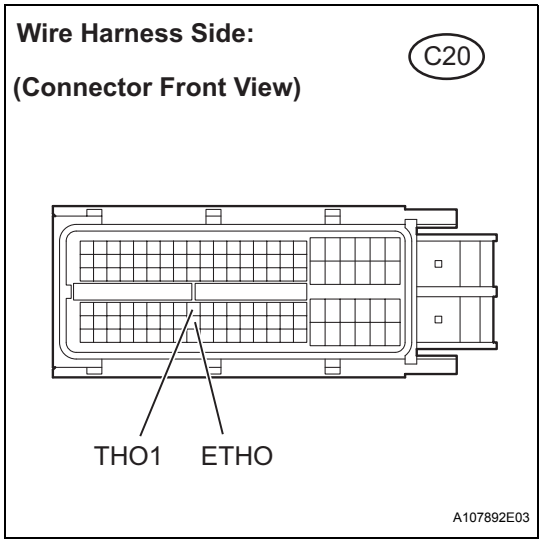
ATF Temperature	Specified Condition
20°C (68°F)	3 to 4 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

AX

NG → **REPAIR OR REPLACE TRANSMISSION WIRE**

OK

2 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
72 (THO1) - 95 (ETHO)	79 Ω to 156 kΩ
72 (THO1) - Body ground	10 kΩ or higher
95 (ETHO) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance

DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input to the ECM.
The sensor resistance changes with the transmission fluid temperature. As the temperature rises, the sensor resistance decreases. The ECM applies a voltage to the temperature sensor through ECM terminal THO1, and the ECM calculates the fluid temperature based on the voltage signal.
HINT:

- The ATF temperature is likely to increase under conditions such as towing, climbing hills and in traffic.
- When the ATF temperature sensor is normal, the transmission locks up in 4th gear with the shift lever in the D position and in 3rd gear with the shift lever in the 3rd position.

DTC No.	DTC Detection Condition	Trouble Area
P0711	Either of the following Condition (A) or (B) is met: Condition (A): All of (a), (b) and (c) are detected (2-trip detection logic): (a) Intake air and engine coolant temperatures are more than -10°C (14°F) at engine start. (b) After normal driving for over 9 minutes and 5.6 miles (9 km) or more, ATF temperature is less than 20°C (68°F). (c) 19 minutes or more have elapsed after engine start. Condition (B): Both (a) and (b) are detected (2-trip detection logic) (a) Engine coolant temperature is less than 35°C (95°F) at engine start. (b) ATF temperature is 100°C (212°F) or more when engine coolant temperature reaches 60°C (140°F).	• ATF level • Transmission wire (ATF temperature sensor) • ECM

AX

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects opens or shorts in the ATF temperature circuit or a fault of the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 20°C (68°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.
When the ATF temperature is 100°C (212°F) or more and engine coolant temperature reaches 60°C (140°F) after cold start, the ECM also determines this as a fault, turns on the MIL, and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor (TFT* sensor)
Frequency of operation	Continuous
Duration	Condition (A): 3 seconds Condition (B): 10 seconds
MIL operation	2 driving cycles
Sequence of operation	None

*: Transmission Fluid Temperature

TYPICAL ENABLING CONDITIONS

The following conditions are common to Condition (A) and (B).

The monitor runs whenever the following DTCs are not present.	None
ATF temperature sensor (TFT sensor) circuit	No circuit malfunction
ECT (Engine Coolant Temperature) sensor circuit	No circuit malfunction
IAT (Intake Air Temperature) sensor circuit	No circuit malfunction
Electronic Throttle Control System (if applicable)	No circuit malfunction

Condition (A):

Time after engine start	18 minutes and 20 seconds or more
Driving distance after engine start	5.6 mile (9 km) or more
Accumulated driving time	9 minutes and 10 seconds or more
ECT	-15°C (5°F) or more
IAT (12 seconds after engine start)	-10°C (14°F) or more
ECT (12 seconds after engine start)	-10°C (14°F) or more

Condition (B):

ECT (Current temperature)	60°C (140°F) or more
ECT (12 seconds after engine start)	Less than 35°C (95°F)
ATF temperature (12 seconds after engine start)	100°C (212°F) or more

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: Condition (A) or (B)

Condition (A):

ATF temperature	Less than 20°C (68°F)

Condition (B):

ATF temperature	100°C (212°F) or more

COMPONENT OPERATING RANGE

ATF temperature	20°C (68°F) or more and less than 100°C (212°F) under specific condition

INSPECTION PROCEDURE

1. DATA LIST

HINT:

Using the DATA LIST displayed by the intelligent tester, you can read the values of the switches, sensors, actuators and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method of shortening labor 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 together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the following items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.

(g) In accordance with the display on the tester, read the DATA LIST.

Item	Measurement Item/ Range (display)	Normal Condition
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 when cold soak

HINT:
When DTC P0712 is output and intelligent tester reading is 150°C (302°F) or more, there is a short circuit.
When DTC P0713 is output and intelligent tester reading is -40°C (-40°F), there is an open circuit.
Measure the resistance between terminal THO1 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 (Automatic Transmission Fluid) temperature sensor becomes open, P0713 is immediately set (within 0.5 seconds).
It is not necessary to inspect the circuit when P0711 is set.

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

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn on the tester.
(d) Select the following items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs using the tester.

AX

Result

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

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

B → **GO TO DTC CHART**

A

2 CHECK TRANSMISSION FLUID LEVEL

OK:
Automatic transmission fluid level is correct.

NG → **ADD FLUID**

OK

REPLACE TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)

DTC	P0717	Turbine Speed Sensor Circuit No Signal

DESCRIPTION

This sensor detects the rotation speed of the input turbine. By comparing the input turbine speed signal (NT) with the speed sensor signal (SPD), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus performing smooth gear shifting.

DTC No.	DTC Detection Condition	Trouble Area
P0717	All conditions below are detected for 5 seconds or more. (1-trip detection logic) (a) Gear change is not being performed. (b) Gear position: 3rd or 4th (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 1,000 rpm or more (e) Park/neutral position switch (NSW, R and L) is OFF. (f) Shift solenoid valves, park/neutral position switch and vehicle speed sensor are in normal operation.	• Open or short in transmission revolution sensor (Speed sensor (NT)) circuit • Transmission revolution sensor • Automatic transaxle (clutch, brake or gear etc.) • ECM

MONITOR DESCRIPTION

The ECM detects the revolving signal from the transmission revolution sensor (input RPM). The ECM outputs a gearshift signal by comparing the transmission revolution sensor signal with the speed sensor signal (SPD). While the vehicle is operating in the 3rd or 4th gear position in the shift position of D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is more than 1,000 rpm*2, the ECM detects the malfunction, illuminates the MIL and stores the DTC.

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

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

MONITOR STRATEGY

Related DTCs	P0717: Turbine speed sensor/Verify pulse input
Required sensors/Components	Transmission revolution sensor (Speed sensor (NT))
Frequency of operation	Continuous
Duration	5 seconds
MIL operation	Immediate
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

The monitor runs whenever the following DTCs are not present.	P0500 (VSS) P0748 - P0798 (Trans solenoid (range))
Shift change	After shift change is completed and before starting next shift change operation
ECM selected gear	3rd or 4th
Output shaft rpm	1,000 rpm or more
Park/neutral position switch	OFF
R switch	OFF
L switch	OFF
Transmission range switch fail	Not detected
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF
Engine	Running

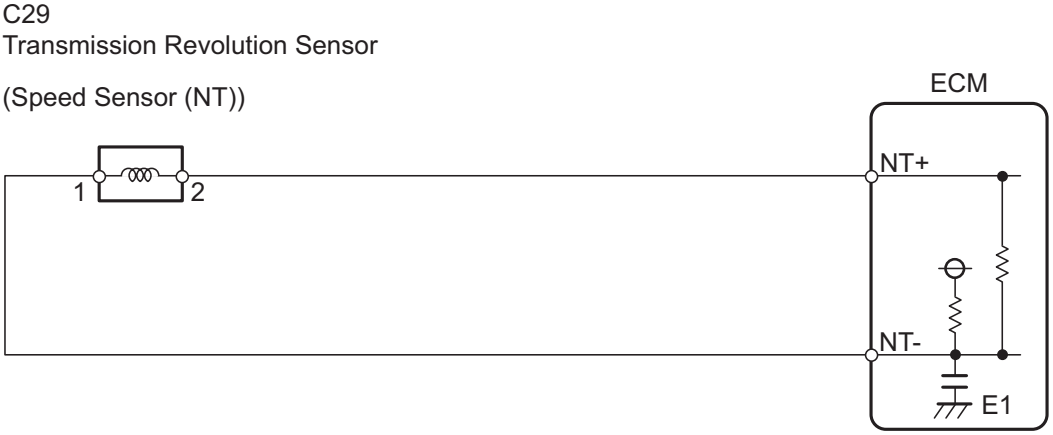
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

Transmission revolution sensor (speed sensor (NT))	Input turbine speed is equal to engine speed when lock-up ON

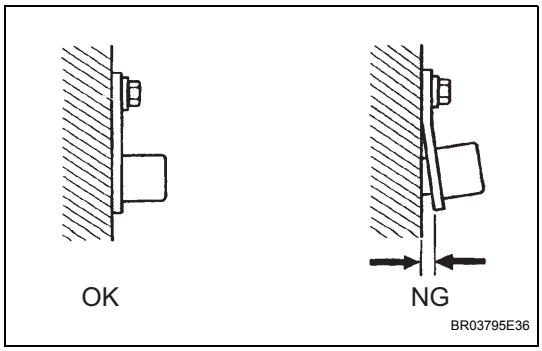
WIRING DIAGRAM



INSPECTION PROCEDURE

AX

1	INSPECT TRANSMISSION REVOLUTION SENSOR (NT) INSTALLATION



(a) Check the transmission revolution sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transmission case.

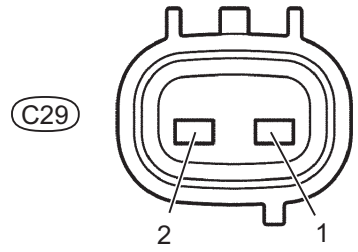
NG → **SECURELY INSTALL OR REPLACE TRANSMISSION REVOLUTION SENSOR**

OK

2	INSPECT TRANSMISSION REVOLUTION SENSOR

Sensor Side:

(Connector Front View):



C110343E29

(a) Disconnect the transmission revolution sensor connector from the transaxle.
(b) Measure the resistance.
Standard resistance

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

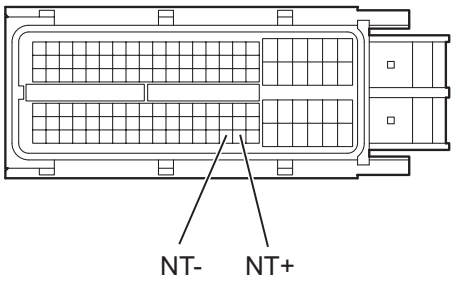
NG → **SECURELY INSTALL OR REPLACE TRANSMISSION REVOLUTION SENSOR**

OK

3	CHECK HARNESS AND CONNECTOR (TRANSMISSION REVOLUTION SENSOR - ECM)

Wire Harness Side:

(Connector Front View)



A107892E04

(a) Connect the transmission revolution sensor connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance.
Standard resistance

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

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

AX

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

DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P0751	S1 stuck OFF malfunction*1: ECM determines there is malfunction when both of following conditions are met: (2-trip detection logic) (a) When ECM directs gearshift to switch to 1st gear, actual gear is shifted to 4th. (b) When ECM directs gearshift to switch to 4th gear, actual gear is shifted to 4th.	• Shift solenoid valve S1 remains closed • Valve body is blocked • Shift solenoid valve S1 • Automatic transaxle (clutch, brake or gear etc.) • ECM
P0751	S1 stuck ON malfunction*2: ECM determines that there is malfunction when both of following conditions are met: (2-trip detection logic) (a) When ECM directs gearshift to switch from 3rd to 4th gear, actual gear is not shifted as above. (b) When ECM directs gearshift to switch to 4th gear, engine speed surges 1,100 rpm or more.	• Shift solenoid valve S1 remains open • Valve body is blocked • Shift solenoid valve S1 • Automatic transaxle (clutch, brake or gear etc.) • ECM

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

Gearshift controlled by ECM	1st	2nd	3rd	4th
*1: Actual gear position under S1 stuck OFF malfunction	4th	3rd	3rd	4th
*2: Actual gear position under S1 stuck ON malfunction	1st	2nd	2nd	1st

AX

MONITOR DESCRIPTION

This DTC indicates "stuck ON malfunction" or "stuck OFF malfunction" of shift solenoid valve S1.
The ECM controls the gearshifts by turning the shift solenoid valves ON/OFF. When the gear position directed by the ECM and the actual gear position do not match, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0751: Shift solenoid valve S1/OFF malfunction Shift solenoid valve S1/ON malfunction
Required sensors/Components	Shift solenoid valve S1, Speed sensor (NT), Speed sensor (SPD)
Frequency of operation	Continuous
Duration	OFF malfunction (a): 0.85 seconds OFF malfunction (b): 0.8 seconds ON malfunction (a): 0.8 seconds ON malfunction (b): 0.8 seconds
MIL operation	2 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following conditions are common to all OFF malfunctions and ON malfunctions.

The monitor runs whenever the following DTCs are not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748 - P0798 (Trans solenoid (range))
ECT (Engine Coolant Temperature)	60°C (140°F) or more
Time after shifting N to D	4.5 seconds or more
Transmission shift position	D
Shift solenoid valve S1 circuit	No circuit malfunction
Shift solenoid valve S2 circuit	No circuit malfunction
ECT sensor circuit	No circuit malfunction
Electronic Throttle Control System (if applicable)	No circuit malfunction
Speed sensor (NT) circuit	No circuit malfunction
Speed sensor (SPD) circuit	No circuit malfunction

OFF malfunction (a):

ECM gearshift command	1st
Vehicle speed	5.6 mph (9 km/h) or more and Less than 24.9 mph (40 km/h)
Throttle valve opening angle	25 % or more and 7.0 % or more at engine speed of 1,900 rpm (Conditions vary with engine speed)

OFF malfunction (b):

ECM gearshift command	4th
Last ECM selected gear	3rd

ON malfunction (a):

ECM gearshift command	4th
Last ECM selected gear	3rd

ON malfunction (b):

ECM gearshift command	4th
V current - V last V current: Vehicle speed at current ECM selected gear V last: Vehicle speed at last ECM selected gear	Less than 9.3 mph (15 km/h)
TH current - TH last TH current: Throttle valve opening angle at current ECM selected gear TH last: Throttle valve opening angle at last ECM selected gear	Less than 30 %
Vehicle speed (current)	Less than 52.8 mph (85 km/h)
Throttle valve opening angle (current)	Less than 45 %
Engine speed (current)	3,200 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

[OFF malfunction]

Both of the following conditions met: OFF malfunctions (a) and (b)
2 detections are necessary per driving cycle.
1st detection: Temporary flag ON
2nd detection: Pending fault code ON

OFF malfunction (a):

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.64 or more and less than 0.78 (Current) (This means actual gear is 4th)

OFF malfunction (b):

Input speed/Output speed (NT/NO)	Changes as follows 0.95 or more and less than 1.09 (Last) (This means actual gear is 3rd) to 0.64 or more and less than 0.78 (Current) (This means actual gear is 4th)

[ON malfunction]

Both of the following conditions met: ON malfunctions (a) and (b)

ON malfunction (a):

Input speed/Output speed (NT/NO)	No change as follows 0.95 or more and less than 1.09 (Last) (This means actual gear is 3rd) to 0.64 or more and less than 0.78 (Current) (This means actual gear is 4th)

ON malfunction (b):

NE change HINT: NE current - NE last NE current: Engine speed at current ECM selected gear NE last: Engine speed at last ECM selected gear	1,100 rpm or more

INSPECTION PROCEDURE

1. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows components, such as the relay, VSV, and actuator, to be operated without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one method of shortening labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.

(d) Turn the ignition switch to the ON position.

(e) Turn on the tester.

(f) Select the following items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / SHIFT.

(g) In accordance with the display on the tester, perform the ACTIVE TEST.

HINT:

While driving, the shift position can be forcibly changed using the intelligent tester. Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-27).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate shift solenoid valve and set each shift position. [Vehicle Condition] • IDL: ON • 30 mph (50 km/h) or less [Others] • 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 30 mph (50 km/h) or less.
- The 3rd to 4th up-shifting must be performed with the accelerator pedal released.
- The 4th to 3rd down-shifting must be performed with the accelerator pedal released.
- Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift more than once in succession.
- The shift position directed by the ECM is shown in the DATA LIST / SHIFT display on the intelligent tester.
- Shift solenoid valve S1 is turned on/off normally when the shift lever is in the D position:

Gearshift controlled by ECM	1st	2nd	3rd	4th
Shift solenoid valve S1	ON	ON	OFF	OFF

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0751)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn on the tester.
(d) Select the following items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs using the tester.

Result

Display (DTC output)	Proceed to
P0751	A
P0751 and other DTCs	B

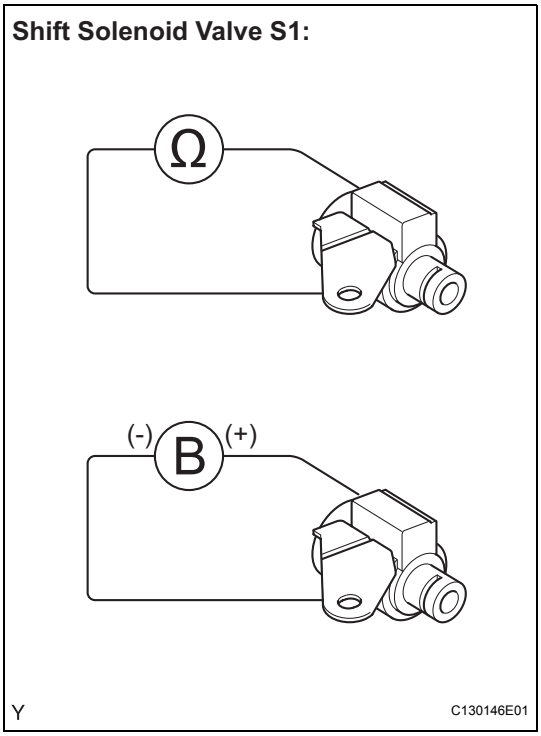
HINT:
If any DTCs besides P0751 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2	INSPECT SHIFT SOLENOID VALVE S1

Shift Solenoid Valve S1:



(a) Remove shift solenoid valve S1.
(b) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
Solenoid Connector (S1) - Solenoid Body (S1)	11 to 15 Ω at 20°C (68°F)

(c) Connect the positive (+) lead to the terminal of the solenoid connector and the negative (-) lead to the solenoid body to check the solenoid valve operation.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE S1**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

AX

OK:
There are no foreign objects on any valves and they operate smoothly.

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

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

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

DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P0756	S2 stuck OFF malfunction*1: Shifting to 1st and 4th gears is impossible. ECM determines that there is malfunction when all of following conditions are met: (2-trip detection logic) (a) When ECM directs gearshift to switch to 1st gear, actual gear is shifted to 2nd. (b) When ECM directs gearshift to switch to 3rd gear, actual gear is shifted to 3rd. (c) When ECM directs gearshift to switch to 4th gear, actual gear is shifted to 3rd.	• Shift solenoid valve S2 remains closed • Valve body is blocked • Shift solenoid valve S2 • Automatic transaxle (clutch, brake or gear etc.) • ECM
P0756	S2 stuck ON malfunction*2: Shifting to 2nd gear and 3rd gear is impossible. ECM determines that there is malfunction when all of following conditions are met: (2-trip detection logic) (a) When ECM directs gearshift to switch to 2nd gear, actual gear is shifted to 1st. (b) When ECM directs gearshift to switch to 3rd gear, actual gear is shifted to 4th. (c) When ECM directs gearshift to switch to 4th gear, actual gear is shifted to 4th.	• Shift solenoid valve S2 remains open • Valve body is blocked • Shift solenoid valve S2 • Automatic transaxle (clutch, brake or gear etc.) • ECM

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

Gearshift controlled by ECM	1st	2nd	3rd	4th
*1: Actual gear position under S2 stuck OFF malfunction	2nd	2nd	3rd	3rd
*2: Actual gear position under S2 stuck ON malfunction	1st	1st	4th	4th

AX

MONITOR DESCRIPTION

This DTC indicates "stuck ON malfunction" or "stuck OFF malfunction" of shift solenoid valve S2.
The ECM controls the gearshifts by turning the shift solenoid valves ON/OFF. When the gear position directed by the ECM and the actual gear position do not match, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0756: Shift solenoid valve S2/OFF malfunction Shift solenoid valve S2/ON malfunction
Required sensors/Components	Shift solenoid valve S2, Speed sensor (NT), Speed sensor (SPD)
Frequency of operation	Continuous
Duration	0.85 seconds
MIL operation	2 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following conditions are common to all OFF malfunctions and ON malfunctions.

The monitor runs whenever the following DTCs are not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748 - P0798 (Trans solenoid (range))
ECT (Engine Coolant Temperature)	60°C (140°F) or more
Transmission shift position	D
Time after shifting N to D	4.5 seconds or more
Shift solenoid valve S1 circuit	No circuit malfunction
Shift solenoid valve S2 circuit	No circuit malfunction
ECT sensor circuit	No circuit malfunction
Electronic Throttle Control System (if applicable)	No circuit malfunction
Speed sensor (NT) circuit	No circuit malfunction
Speed sensor (SPD) circuit	No circuit malfunction

OFF malfunction (a):

ECM gearshift command	1st
Vehicle speed	5.6 mph (9 km/h) or more and less than 24.9 mph (40 km/h)
Throttle valve opening angle	7.0 % or more at engine speed of 1,900 rpm (Conditions vary with engine speed)

OFF malfunction (b):

ECM gearshift command	3rd
Vehicle speed	5.6 mph (9 km/h) or more
Throttle valve opening angle	7.0 % or more at engine speed of 1,900 rpm (Conditions vary with engine speed)

OFF malfunction (c):

ECM gearshift command	4th
Vehicle speed	5.6 mph (9 km/h) or more
Throttle valve opening angle	7.0 % or more at engine speed of 1,900 rpm (Conditions vary with engine speed)

ON malfunction (a):

ECM gearshift command	2nd
Vehicle speed	5.6 mph (9 km/h) or more
Throttle valve opening angle	7.0 % or more at engine speed of 1,900 rpm (Conditions vary with engine speed)

ON malfunction (b):

ECM gearshift command	3rd
Vehicle speed	5.6 mph (9 km/h) or more
Throttle valve opening angle	7.0 % or more at engine speed of 1,900 rpm (Conditions vary with engine speed)

ON malfunction (c):

ECM gearshift command	4th
Vehicle speed	5.6 mph (9 km/h) or more
Throttle valve opening angle	7.0 % or more at engine speed of 1,900 rpm (Conditions vary with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

[OFF malfunction]

All of the following conditions met: OFF malfunctions (a), (b) and (c)
2 detections are necessary per driving cycle.
1st detection: Temporary flag ON
2nd detection: Pending fault code ON

OFF malfunction (a):

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	1.50 or more and less than 1.80 (This means actual gear is 2nd)

OFF malfunction (b):

Input speed/Output speed (NT/NO)	0.95 or more and less than 1.09 (This means actual gear is 3rd)

OFF malfunction (c):

Input speed/Output speed (NT/NO)	0.95 or more and less than 1.09 (This means actual gear is 3rd)

[ON malfunction]

All of the following conditions met: ON malfunctions (a), (b) and (c)

ON malfunction (a):

Input speed/Output speed (NT/NO)	2.75 or more and less than 3.35 (This means actual gear is 1st)

ON malfunction (b):

Input speed/Output speed (NT/NO)	0.64 or more and less than 0.78 (This means actual gear is 4th)

ON malfunction (c):

Input speed/Output speed (NT/NO)	0.64 or more and less than 0.78 (This means actual gear is 4th)

AX

INSPECTION PROCEDURE

1. ACTIVE TEST

HINT:
Performing the ACTIVE TEST using the intelligent tester allows components, such as the relay, VSV, and actuator, to be operated without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one method of shortening labor time.
It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the following items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / SHIFT.
(g) In accordance with the display on the tester, perform the ACTIVE TEST.
HINT:
While driving, the shift position can be forcibly changed using the intelligent tester.
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-27).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate shift solenoid valve and set each shift position. [Vehicle Condition] • IDL: ON • 30 mph (50 km/h) or less [Others] • 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 30 mph (50 km/h) or less.
- The 3rd to 4th up-shifting must be performed with the accelerator pedal released.
- The 4th to 3rd down-shifting must be performed with the accelerator pedal released.
- Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift more than once in succession.
- The shift position directed by the ECM is shown in the DATA LIST/ SHIFT display on the intelligent tester.
- Shift solenoid valve S2 is turned on/off normally when the shift lever is in the D position:

Gearshift controlled by ECM	1st	2nd	3rd	4th
Shift solenoid valve S2	ON	OFF	OFF	ON

1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0756)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn on the tester.
(d) Select the following items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs using the tester.

AX

Result

Display (DTC output)	Proceed to
P0756	A
P0756 and other DTCs	B

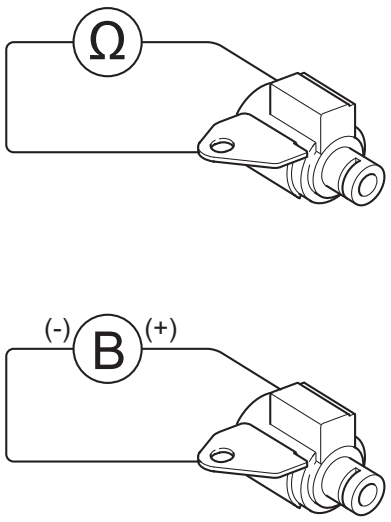
HINT:
If any other DTCs besides P0756 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2	INSPECT SHIFT SOLENOID VALVE S2

Shift Solenoid Valve S2:



(a) Remove shift solenoid valve S2.
(b) Measure the resistance.
Standard resistance

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

(c) Connect the positive (+) lead to the terminal of the solenoid connector and the negative (-) lead to the solenoid body to check the solenoid valve operation.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE S2**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:
There are no foreign objects on any valves and they operate smoothly.

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

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

AX

DTC	P0787	Shift / Timing Solenoid Low (Shift Solenoid Valve ST)

DTC	P0788	Shift / Timing Solenoid High (Shift Solenoid Valve ST)

DESCRIPTION

Shift solenoid valve ST is switched OFF-ON-OFF in accordance with signals from the ECM when up-shifting and down-shifting between the 3rd and the 4th gears. This reduces the shock of gear shifting between these positions.

DTC No.	DTC Detection Condition	Trouble Area
P0787	ECM detects short in solenoid valve ST circuit 4 times when solenoid valve ST is operated. (1-trip detection logic)	• Short in shift solenoid valve ST circuit • Shift solenoid valve ST • ECM
P0788	ECM detects open in solenoid valve ST circuit 4 times when solenoid valve ST is not operated. (1-trip detection logic)	• Open in shift solenoid valve ST circuit • Shift solenoid valve ST • ECM

MONITOR DESCRIPTION

When there is an open or short circuit in the shift solenoid valve circuit, the ECM detects the problem and the MIL comes on.

MONITOR STRATEGY

Related DTCs	P0787: Shift timing solenoid/Range check (Low resistance) P0788: Shift timing solenoid/Range check (High resistance)
Required sensors/Components	Shift solenoid valve ST
Frequency of operation	Continuous
Duration	0.128 seconds
MIL operation	Immediate
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

P0787: Range check (Low resistance)

The monitor runs whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 seconds
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0788: Range check (High resistance)

The monitor runs whenever the following DTCs are not present	None
Solenoid	OFF
Time after solenoid ON to OFF	More than 0.008 seconds
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0787: Range check (Low resistance)

Shift solenoid valve ST resistance	8 Ω or less

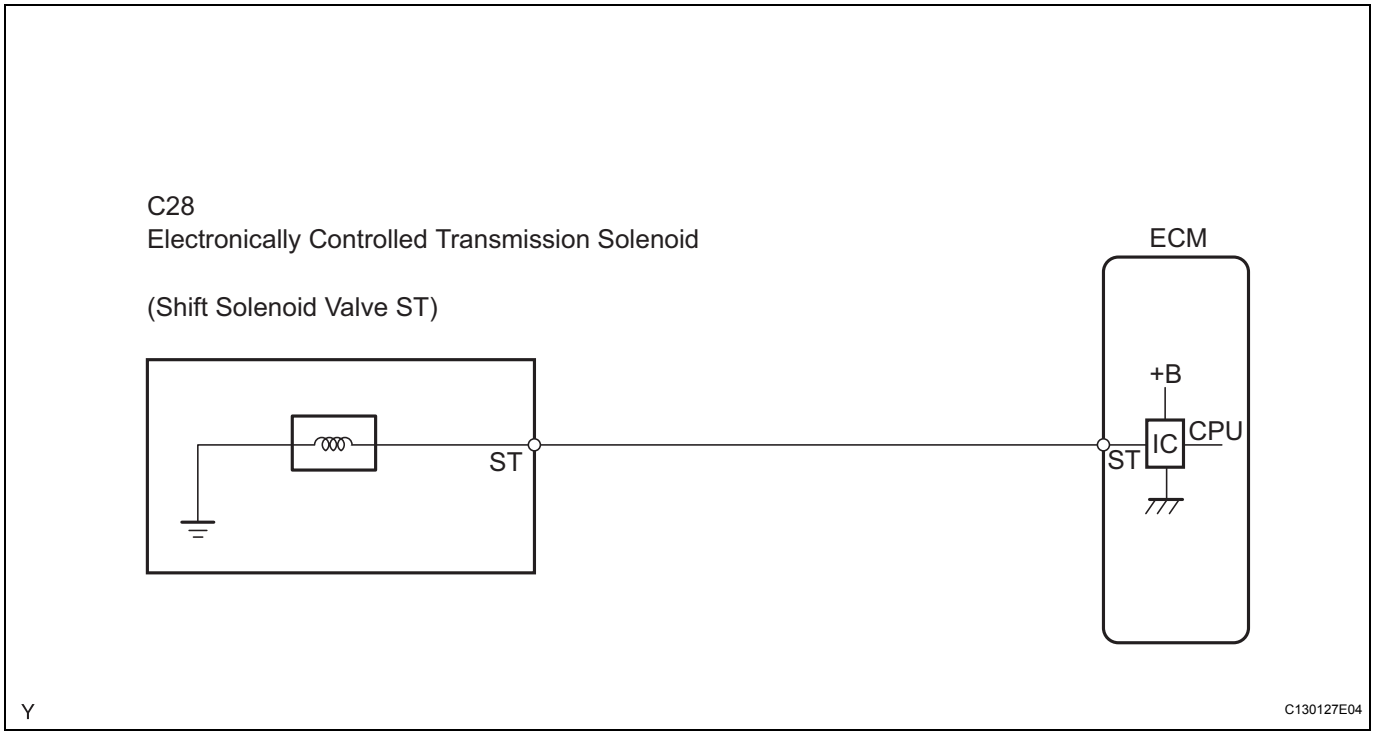
P0788: Range check (High resistance)

Shift solenoid valve ST resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve ST resistance	11 to 15 Ω at 20°C (68°F)

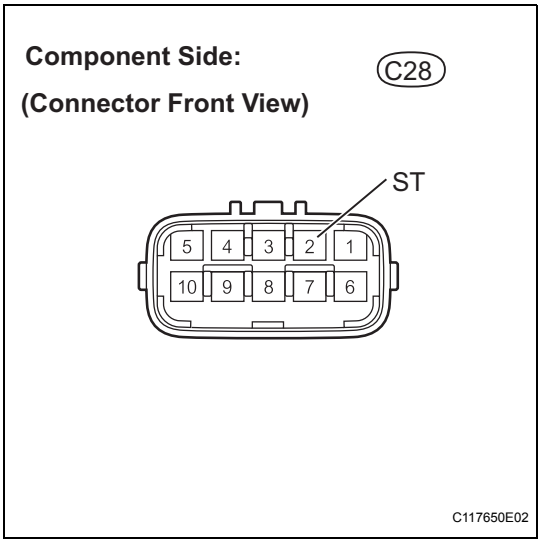
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE ST)



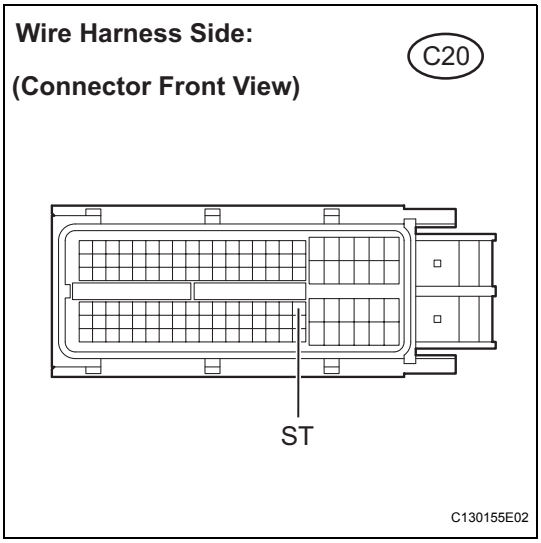
(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance.
Standard resistance

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

NG → **Go to step 3**

OK

2	CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance.
Standard resistance

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

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

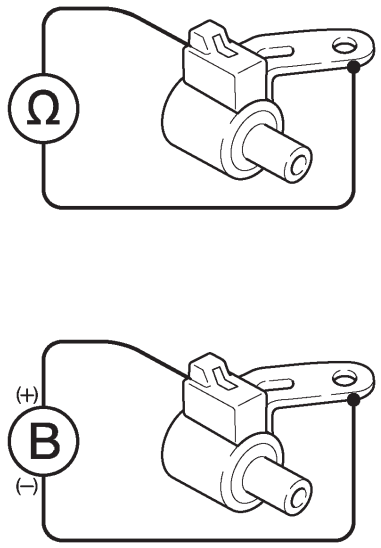
OK

REPLACE ECM

AX

3	INSPECT SHIFT SOLENOID VALVE ST

Shift Solenoid Valve ST:



(a) Remove shift solenoid valve ST.
(b) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
Solenoid Connector (ST) - Solenoid Body (ST)	11 to 15 Ω at 20 °C (68 °F)

(c) Connect the positive (+) lead to the terminal of the solenoid connector and the negative (-) lead to the solenoid body to check the solenoid valve operation.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE ST**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

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

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

DESCRIPTION

Shifting from 1st to 4th is performed in combination with the ON and OFF operations of shift solenoid valves S1 and S2 which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be driven smoothly.
(If an open or short circuit occurs, the ECM stops sending currents to the affected circuit.)
Fail-safe function (See page AX-27).

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve S1 circuit 4 times when solenoid valve S1 is operated. (1-trip detection logic)	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	ECM detects open in solenoid valve S1 circuit 4 times when solenoid valve S1 is not operated. (1-trip detection logic)	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in the shift solenoid valve S1 circuit, the ECM detects the problem and the MIL comes on. Illuminating the MIL, the ECM performs the fail-safe and turns the other functioning shift solenoid valve ON/OFF.
(If an open or short circuit occurs, the ECM stops sending currents to the affected circuit.)

AX

MONITOR STRATEGY

Related DTCs	P0973: Shift solenoid valve S1/Range check (Low resistance) P0974: Shift solenoid valve S1/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S1
Frequency of operation	Continuous
Duration	0.128 seconds or more
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0973: Range check (Low resistance)

The monitor runs whenever the following DTCs are not present.	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 seconds

P0974: Range check (High resistance)

The monitor runs whenever the following DTCs are not present.	None
Solenoid	OFF
Time after solenoid ON to OFF	More than 0.008 seconds

TYPICAL MALFUNCTION THRESHOLDS

P0973: Range check (Low resistance)

Shift solenoid valve S1 resistance	8 Ω or less

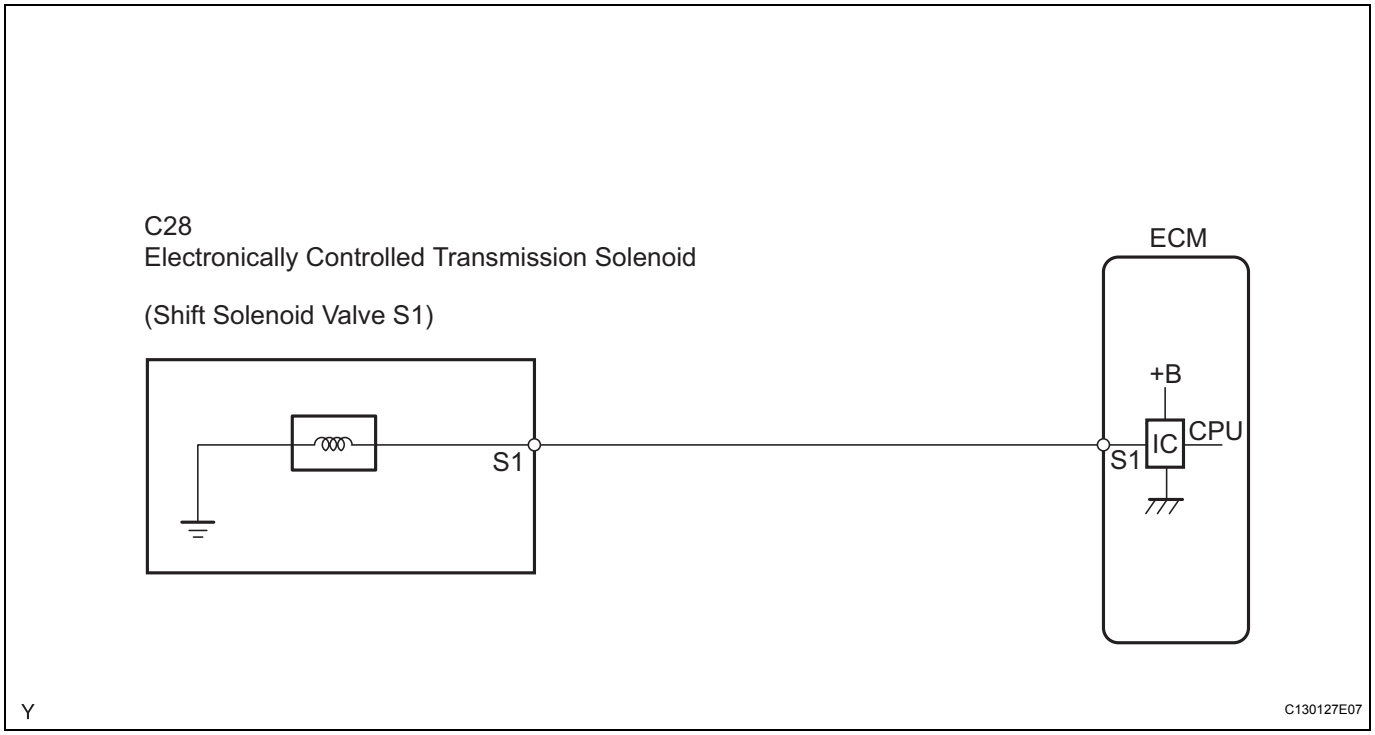
P0974: Range check (High resistance)

Shift solenoid valve S1 resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve S1 resistance	11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM



AX

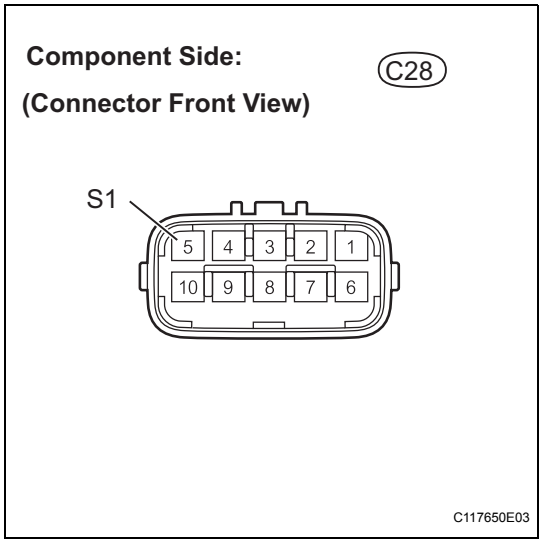
INSPECTION PROCEDURE

HINT:

Shift solenoid valve S1 is turned on/off normally when the shift lever is in the D position:

Gearshift controlled by ECM	1st	2nd	3rd	4th
Shift solenoid valve S1	ON	ON	OFF	OFF

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)



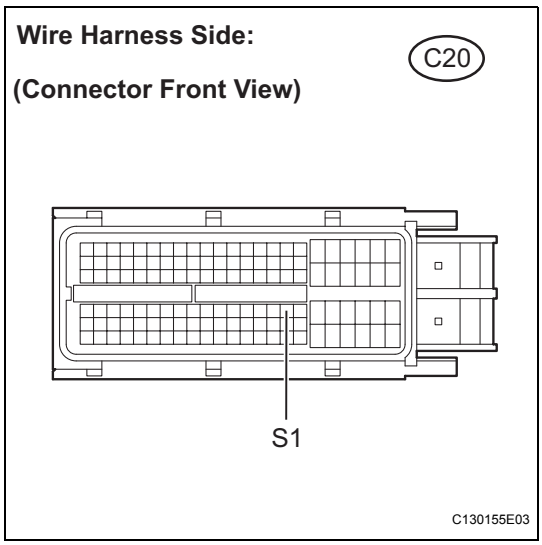
(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance.
Standard resistance

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

NG → **Go to step 3**

OK

2	CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance.
Standard resistance

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

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

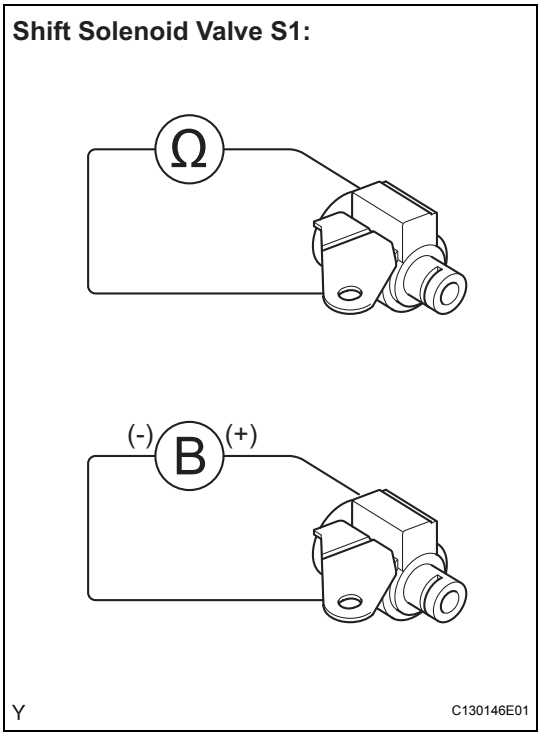
OK

REPLACE ECM

AX

3	INSPECT SHIFT SOLENOID VALVE S1

Shift Solenoid Valve S1:



(a) Remove shift solenoid valve S1.
(b) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
Solenoid Connector (S1) - Solenoid Body (S1)	11 to 15 Ω at 20°C (68°F)

(c) Connect the positive (+) lead to the terminal of the solenoid connector and the negative (-) lead to the solenoid body to check the solenoid valve operation.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE S1**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

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

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

DESCRIPTION

Shifting from 1st to 4th is performed in combination with the ON and OFF operations of shift solenoid valves S1 and S2 which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be driven smoothly.
(If an open or short circuit occurs, the ECM stops sending currents to the affected circuit.)
Fail-safe function (See page AX-27).

DTC No.	DTC Detection Condition	Trouble Area
P0976	ECM detects short in solenoid valve S2 circuit 4 times when solenoid valve S2 is operated. (1-trip detection logic)	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	ECM detects open in solenoid valve S2 circuit 4 times when solenoid valve S2 is not operated. (1-trip detection logic)	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in the shift solenoid valve S2 circuit, the ECM detects the problem and the MIL comes on. Illuminating the MIL, the ECM performs the fail-safe and turns the other functioning shift solenoid valve ON/OFF.
(If an open or short circuit occurs, the ECM stops sending currents to the affected circuit.)

AX

MONITOR STRATEGY

Related DTCs	P0976: Shift solenoid valve S2/Range check (Low resistance) P0977: Shift solenoid valve S2/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S2
Frequency of operation	Continuous
Duration	0.128 seconds or more
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0976: Range check (Low resistance)

The monitor runs whenever the following DTCs are not present.	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 seconds

P0977: Range check (High resistance)

The monitor runs whenever the following DTCs are not present.	None
Solenoid	OFF
Time after solenoid ON to OFF	More than 0.008 seconds

TYPICAL MALFUNCTION THRESHOLDS

P0976: Range check (Low resistance)

Shift solenoid valve S2 resistance	8 Ω or less

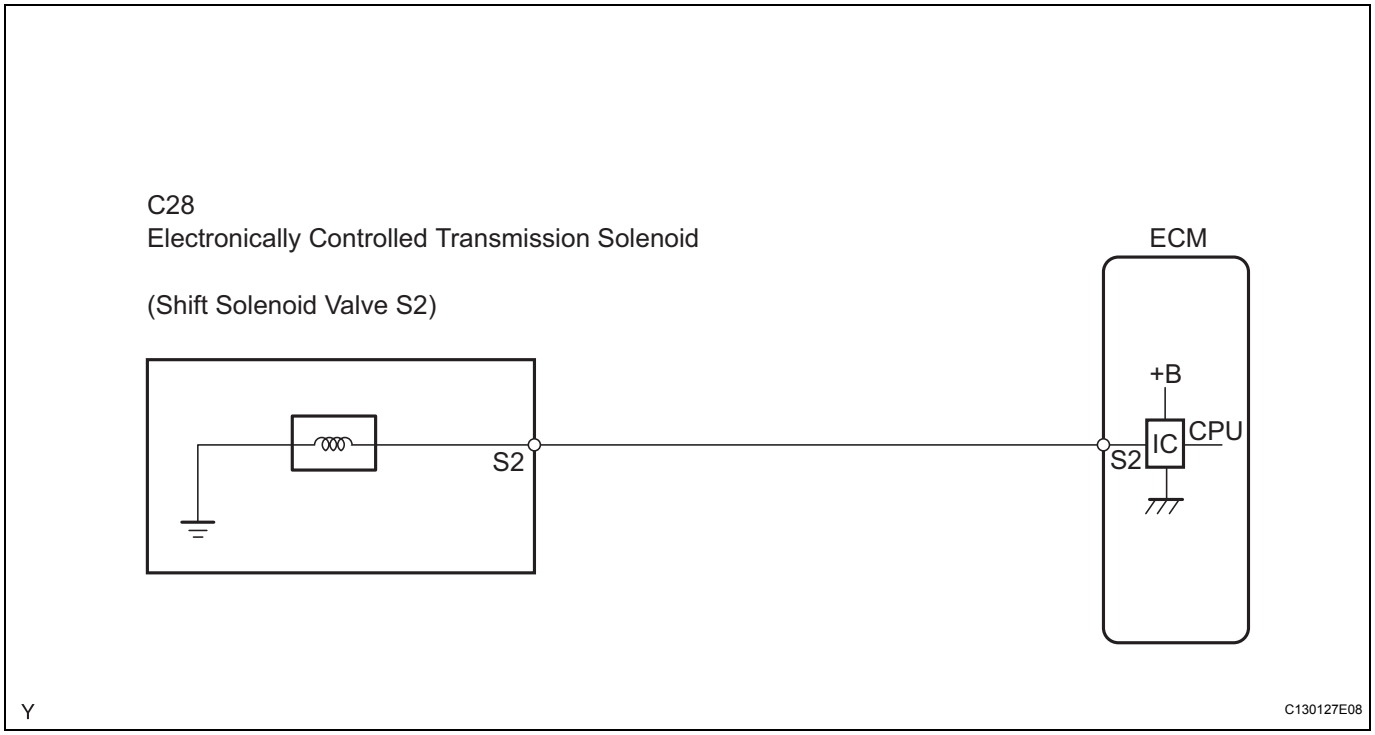
P0977: Range check (High resistance)

Shift solenoid valve S2 resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve S2 resistance	11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM



AX

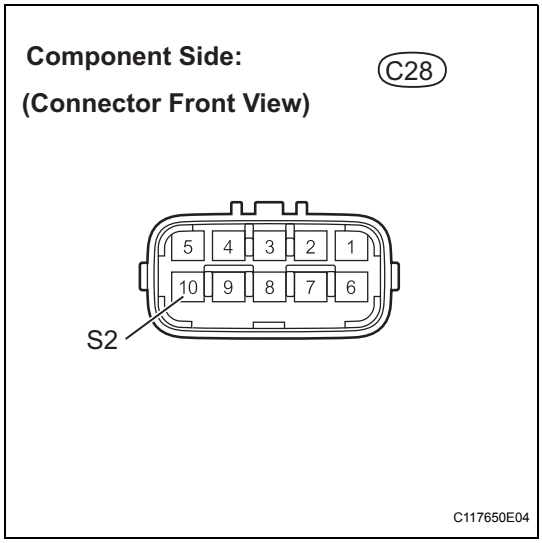
INSPECTION PROCEDURE

HINT:

Shift solenoid valve S2 is turned on/off normally when the shift lever is in the D position:

Gearshift controlled by ECM	1st	2nd	3rd	4th
Shift solenoid valve S2	ON	OFF	OFF	ON

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)



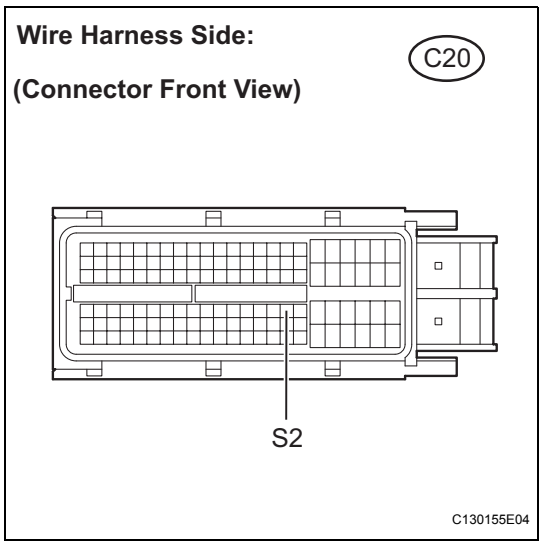
(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance.
Standard resistance

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

NG → **Go to step 3**

OK

2	CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance.
Standard resistance

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

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

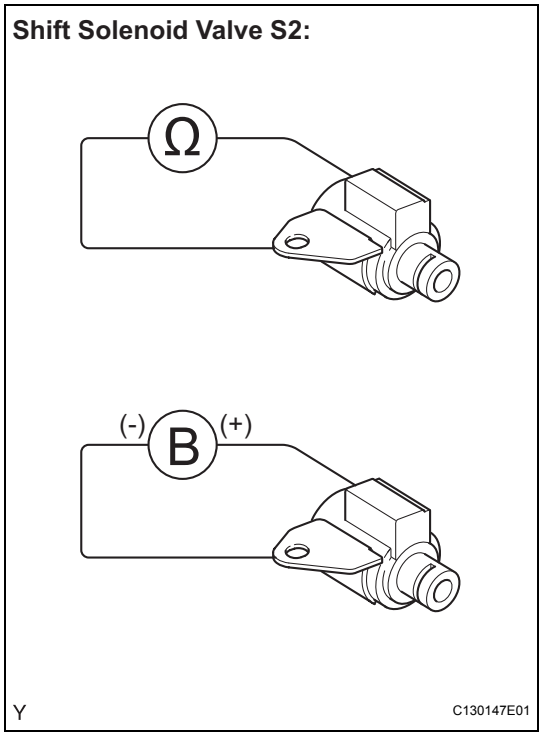
OK

REPLACE ECM

AX

3	INSPECT SHIFT SOLENOID VALVE S2

Shift Solenoid Valve S2:



(a) Remove shift solenoid valve S2.
(b) Measure the resistance.
Standard resistance

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

(c) Connect the positive (+) lead to the terminal of the solenoid connector and the negative (-) lead to the solenoid body to check the solenoid valve operation.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE S2**

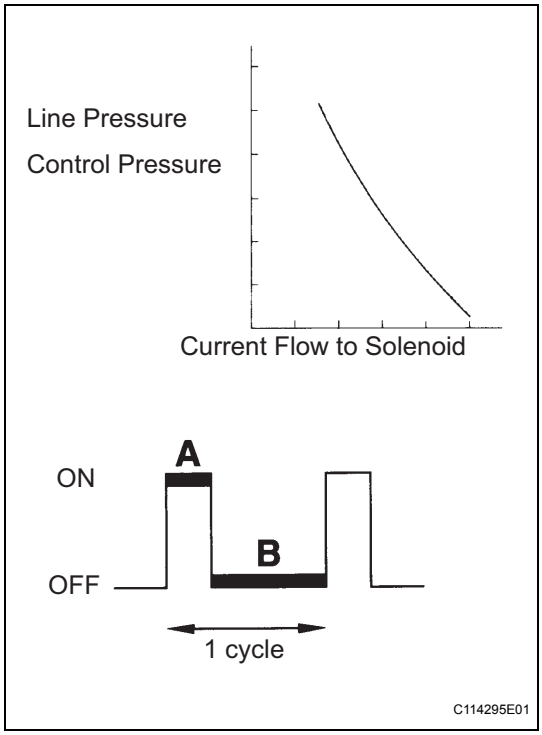
OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

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 shift 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 engine power output. This controls the line pressure and provides smooth shifting characteristics.

AX

Upon receiving a throttle valve opening angle signal, the ECM controls the line pressure by sending a predetermined duty ratio* to the solenoid valve, modulating the line pressure and generating throttle pressure.

*: The duty ratio is the ratio of the current ON time (A) to the total of the current ON and OFF time (A + B).
Duty Ratio (%) = A / (A + B) x 100

DTC 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	1.0 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	200 rpm or more
Output speed	300 rpm or more

ON malfunction (b):

ECM gearshift command	2nd
Input (turbine) speed	200 rpm or more
Output speed	300 rpm or more

ON malfunction (c):

ECM gearshift command	3rd
Input (turbine) speed	200 rpm or more
Output speed	300 rpm or more

ON malfunction (d):

ECM gearshift command	4th
Input (turbine) speed	200 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 - NO x 1st gear ratio NT: Input (turbine) speed NO: Internal counter shaft speed	More than 300 rpm at output speed of 1,000 rpm (Conditions vary with output speed)
Duration	0.85 seconds or more

ON malfunction (b):

NT - NO x 2nd gear ratio	More than 300 rpm at output speed of 1,000 rpm (Conditions vary with output speed)
Duration	0.85 seconds or more

ON malfunction (c):

NT - NO x 3rd gear ratio	More than 300 rpm at output speed of 1,000 rpm (Conditions vary with output speed)
Duration	0.85 seconds or more

ON malfunction (d):

NT - NO x 4th gear ratio	More than 300 rpm at output speed of 1,000 rpm (Conditions vary with output speed)
Duration	0.85 seconds or more

INSPECTION PROCEDURE

1. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows components, such as the relay, VSV, and actuator, to be operated without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one method of shortening labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the following items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / SOLENOID (SLT).
(g) In accordance with the display on the tester, 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 of SOLENOID (SLT) is performed, ECM turns off SLT solenoid) ON: No action (normal operation)	-

*: 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-13) as well.

HINT:

The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.

1	**CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2714)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn on the tester.
(d) Select the following items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs using the tester.

Result

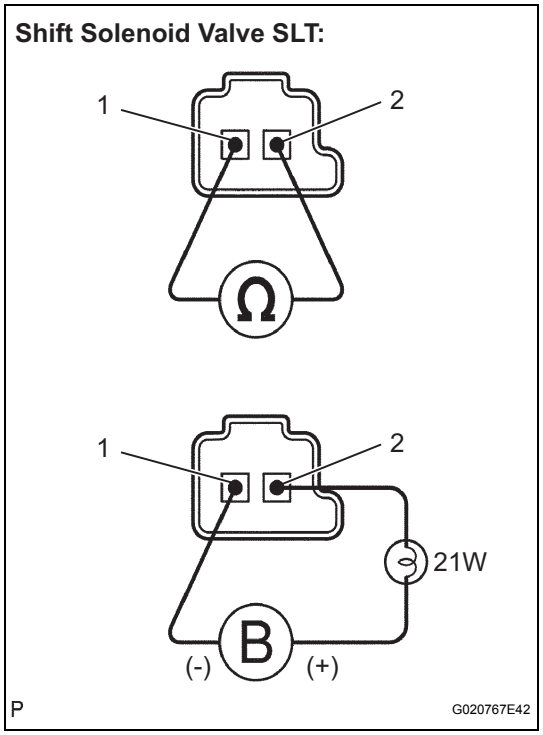
Display (DTC output)	Proceed to
P2714	A
P2714 and other DTCs	B

HINT:
If any other DTCs besides P2714 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART**

A

2 INSPECT SHIFT SOLENOID VALVE SLT



(a) Remove shift solenoid valve SLT.
(b) Measure the resistance.
Standard resistance

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

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE SLT**

AX

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:
There are no foreign objects on any valves and they operate smoothly.

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

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:
The torque converter clutch operates normally.

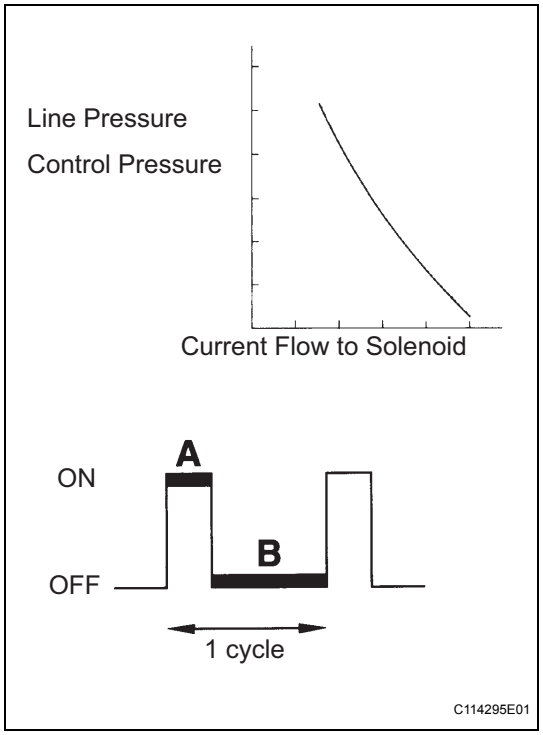
NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)

DESCRIPTION



The throttle pressure that is applied to the primary regulator valve (which modulates the line pressure) causes shift 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 engine power output. This controls the line pressure and provides smooth shifting characteristics.
Upon receiving a throttle valve opening angle signal, the ECM controls the line pressure by sending a predetermined duty ratio* to the solenoid valve, modulating the line pressure and generating throttle pressure.
*: The duty ratio is the ratio of the current ON time (A) to the total of the current ON and OFF time (A + B).
Duty Ratio (%) = A / (A + B) x 100

AX

DTC No.	DTC Detection Condition	Trouble Area
P2716	Open or short is detected in shift solenoid valve SLT circuit for 1 second or more while driving. (1-trip detecting logic)	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM turns on the MIL and stores 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	1.0 second
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor runs whenever the following DTCs are not present	None
Solenoid current cut status	Not cut
Battery voltage	11 V or more
CPU commanded duty ratio	19 % or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Solenoid status (SLT) from MIC	Fail

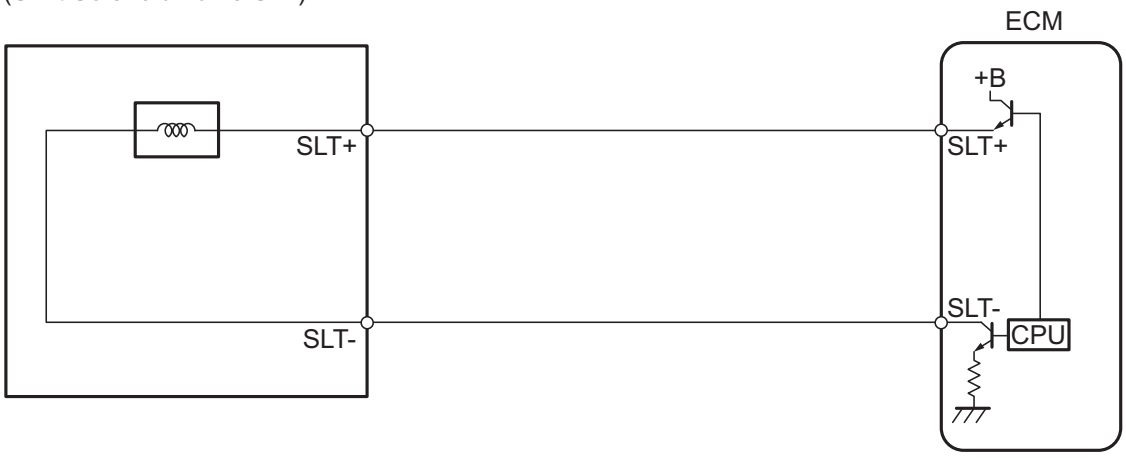
COMPONENT OPERATING RANGE

Shift solenoid valve SLT	Resistance: 5.0 Ω to 5.6 Ω at 20°C (68°F)

WIRING DIAGRAM

C28
Electronically Controlled Transmission Solenoid

(Shift Solenoid Valve SLT)



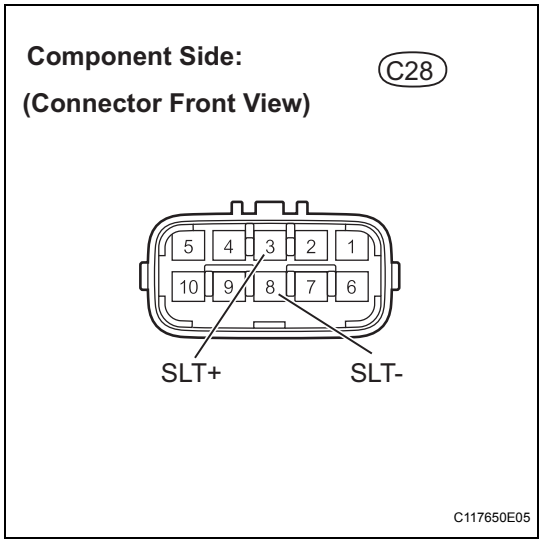
Y

C130128E02

AX

INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLT)



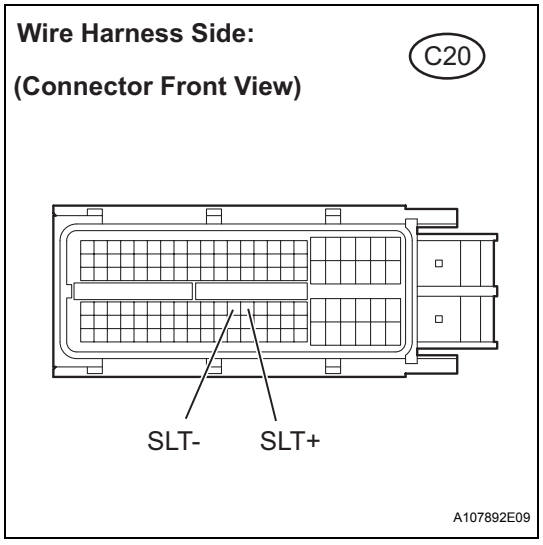
(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance.
Standard resistance

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

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
76 (SLT+) - 75 (SLT-)	5.0 Ω to 5.6 Ω at 20°C (68°F)
76 (SLT+) - Body ground	10 kΩ or higher
75 (SLT-) - Body ground	10 kΩ or higher

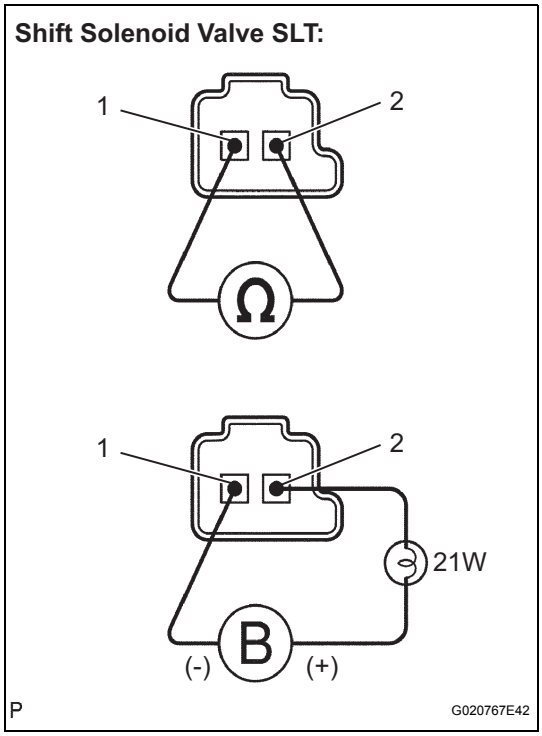
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

AX

3	INSPECT SHIFT SOLENOID VALVE SLT



(a) Remove shift solenoid valve SLT.
(b) Measure the resistance.
Standard resistance

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

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE SLT**

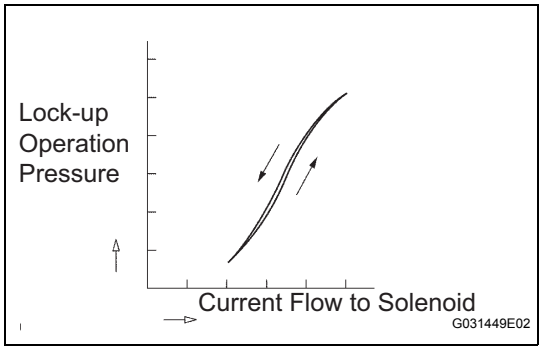
OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

DTC	P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)

DESCRIPTION



The ECM uses the signals from the throttle position sensor, turbine (input) speed sensor, vehicle speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.
Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical problems of shift solenoid valve SLU, valve body and torque converter clutch.

DTC No.	DTC Detection Condition	Trouble Area
P2757	Lock-up does not occur when driving in lock-up range or lock-up remains ON in lock-up OFF range. (2-trip detection logic)	• Shift solenoid valve SLU remains open or closed • Valve body is blocked • Shift solenoid valve SLU • Torque converter clutch • Automatic transaxle (clutch, brake or gear etc.) • Line pressure is too low • ECM

AX

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on the speed sensor (NT), engine rpm (NE), engine load, engine coolant temperature, vehicle speed, transmission fluid 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 (NT) to output shaft speed. When conditions are appropriate, the ECM requests lock-up by applying the control voltage to shift solenoid valve SLU. When SLU is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.
If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in shift solenoid valve SLU or lock-up system performance. The ECM turns on the MIL and stores the DTC.
Example:
When either of the following is met, the system judges it as a malfunction.

- There is a difference in the rotations of 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 the rotations of 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	P2757: Shift solenoid valve SLU/OFF malfunction Shift solenoid valve SLU/ON malfunction
Required sensors/Components	Shift solenoid valve SLU, Speed sensor (NT), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction: 3.5 seconds ON malfunction: 1.8 seconds
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following conditions are common to OFF malfunction and ON malfunction.

The monitor runs whenever the following DTCs are not present.	None
Time after shifting N to D	4.5 seconds or more
ECT (Engine Coolant Temperature)	60°C (140°F) or more
Transmission shift position	D
ECM selected gear	3rd or 4th
Vehicle speed	15.5 mph (25 km/h) or more
Shift solenoid valve S1 circuit	No circuit malfunction
Shift solenoid valve S2 circuit	No circuit malfunction
Shift solenoid valve SLU circuit	No circuit malfunction
ECT sensor circuit	No circuit malfunction
Electronic Throttle Control System (if applicable)	No circuit malfunction
Speed sensor (NT) circuit	No circuit malfunction
Speed sensor (SPD) circuit	No circuit malfunction

AX

OFF malfunction:

ECM lock-up command	ON
Duration time from lock-up on command	3 seconds or more
Actual gear	3rd or 4th

ON malfunction:

ECM lock-up command	OFF
Throttle valve opening angle	8 % or more
Vehicle speed	Less than 37.3 mph (60 km/h)
Actual gear	3rd
Calculated load value	22 % or more

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction:

Engine speed - Input (turbine) speed (NE - NT)	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 6.2 mph (10 km/h) once before 2nd detection.

ON malfunction:

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

INSPECTION PROCEDURE

1. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows components, such as the relay, VSV, and actuator, to be operated without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one method of shortening labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.

(d) Turn the ignition switch to the ON position.

(e) Turn on the tester.

(f) Select the following items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / LOCK UP.

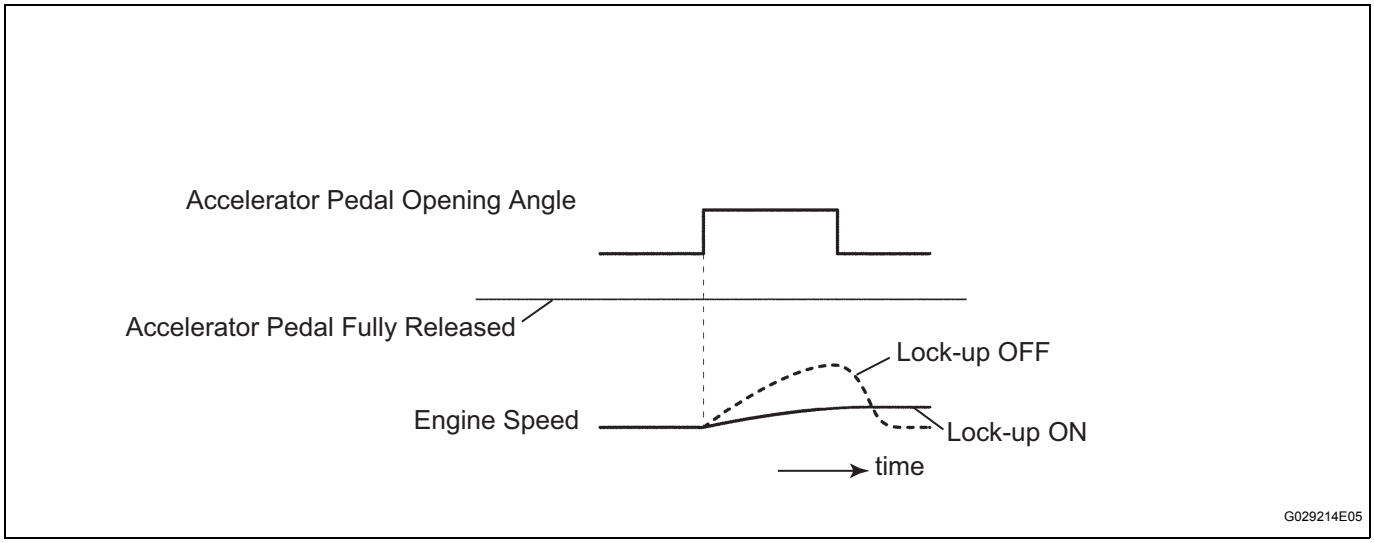
(g) According to the display on the tester, perform the ACTIVE TEST.

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control shift solenoid SLU to set automatic transaxle to lock-up condition. [Vehicle Condition] Vehicle Speed: 36 mph (60 km/h) or more, and 4th gear	Possible to check SLU operation.

HINT:

- This test can be conducted when the vehicle speed is 36 mph (60 km/h) or less.
- This test can be conducted in 4th gear.

(h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.



HINT:

- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
- Slowly, but not fully, release the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off.)

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2757)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch to the ON position.
(c) Turn on the tester.
(d) Select the following items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs using the tester.

Result

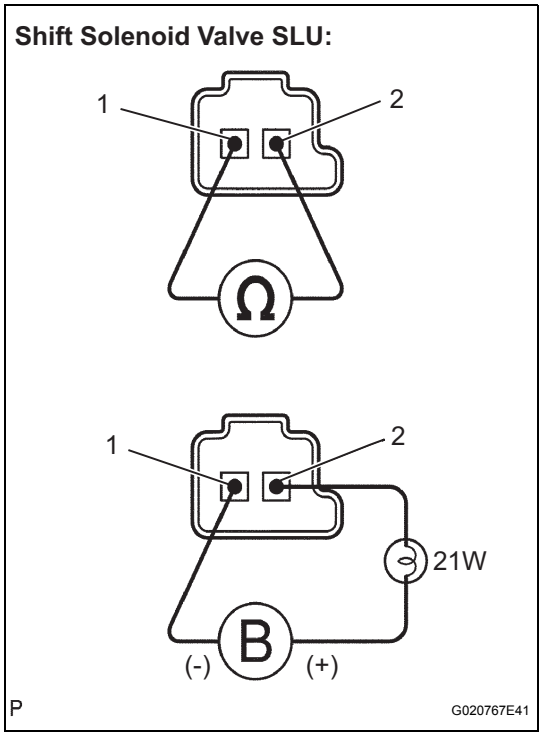
Display (DTC output)	Proceed to
P2757	A
P2757 and other DTCs	B

HINT:
If any other DTCs besides P2757 are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART**

A

2 INSPECT SHIFT SOLENOID VALVE SLU



(a) Remove shift solenoid valve SLU.
(b) Measure the resistance.
Standard resistance

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

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE SLU**

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:
There are no foreign objects on any valves and they operate smoothly.

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

AX

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

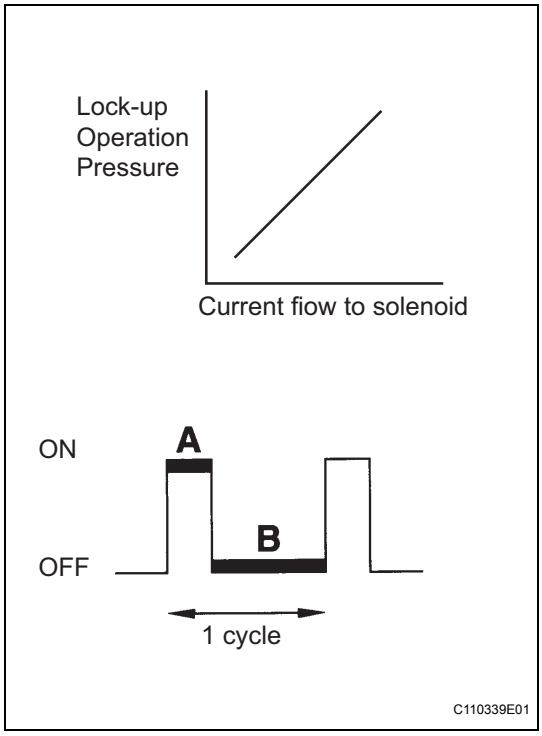
NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)

DESCRIPTION



The amount of current flowing to the solenoid is controlled by the duty ratio* of the ECM output signal. The higher the duty ratio* becomes, the higher the lock-up hydraulic pressure becomes during the lock-up operation.

AX

*: The duty ratio is the ratio of the current ON time (A) to the total of the current ON and OFF times (A + B).
Duty Ratio (%) = A / (A + B) x 100

DTC No.	DTC Detection Condition	Trouble Area
P2759	Open or short is detected in shift solenoid valve SLU circuit for 1 second or more while driving. (1-trip detection logic)	• Open or short in shift solenoid valve SLU circuit • Shift solenoid valve SLU • ECM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLU) circuit is detected, the ECM interprets this as a fault. The ECM turns on the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P2759: Shift solenoid valve SLU/Range check
Required sensors/Components	Shift solenoid valve SLU
Frequency of operation	Continuous
Duration	1.0 second
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor runs whenever the following DTCs are not present.	None
Solenoid current cut status	Not cut
Battery voltage	11 V or more
CPU commanded duty ratio	19 % or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Solenoid status (SLU) from MIC	Fail

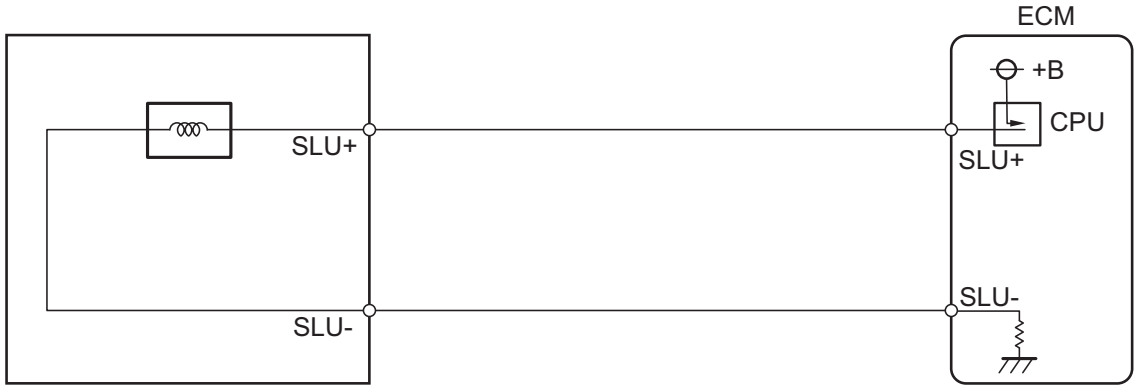
COMPONENT OPERATING RANGE

Solenoid status (SLU)	Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

WIRING DIAGRAM

C28
Electronically Controlled Transmission Solenoid

(Shift Solenoid Valve SLU)



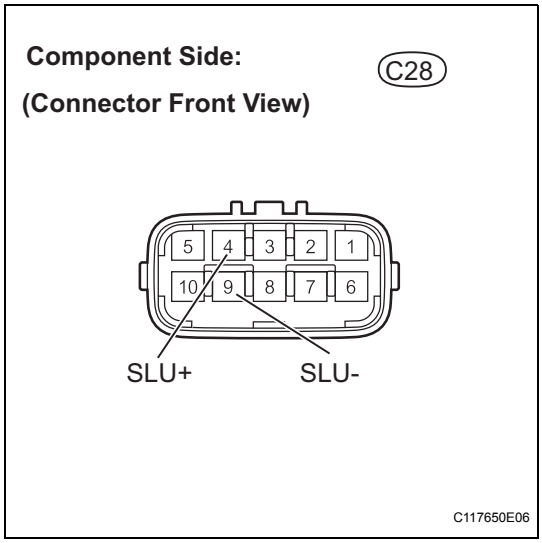
Y

C130126E05

AX

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLU)



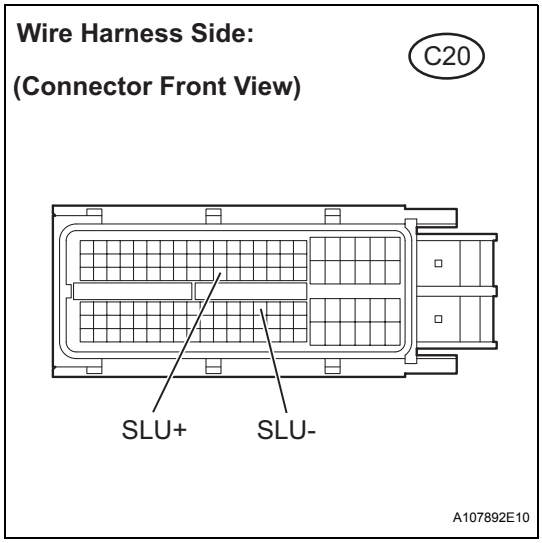
(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
4 (SLU+) - 9 (SLU-)	11 Ω to 15 Ω at 20°C (68°F)
4 (SLU+) - Body ground	10 kΩ or higher
9 (SLU-)- Body ground	10 kΩ or higher

NG → **Go to step 3**

OK

2	CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
77 (SLU+) - 57 (SLU-)	11 Ω to 15 Ω at 20°C (68°F)
57 (SLU+) - Body ground	10 kΩ or higher
77 (SLU-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

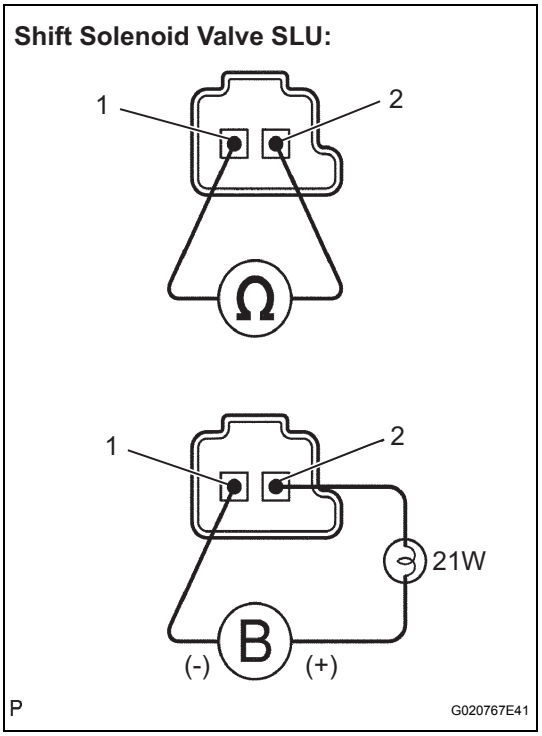
OK

REPLACE ECM

AX

3	INSPECT SHIFT SOLENOID VALVE SLU

Shift Solenoid Valve SLU:



(a) Remove shift solenoid valve SLU.
(b) Measure the resistance.
Standard resistance

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

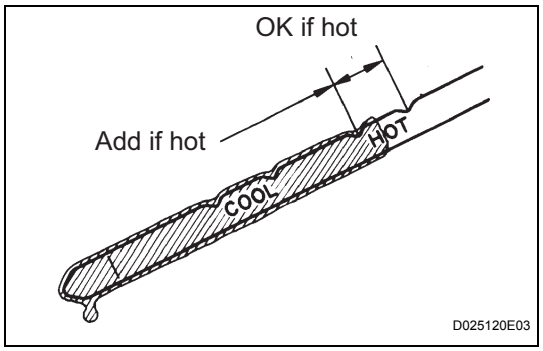
(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE SLU**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX



AUTOMATIC TRANSAXLE FLUID

ON-VEHICLE INSPECTION

1. INSPECT AUTOMATIC TRANSAXLE FLUID

HINT:

Drive the vehicle until the engine and transaxle are at normal operating temperature.

Fluid temperature:

70 to 80 °C (158 to 176 °F)

(a) Park the vehicle on a level surface and engage the parking brake.

(b) With the engine idling and the brake pedal depressed, shift the shift lever into all positions from P to L, and then return it to the P position.

(c) Pull out the oil level gauge and wipe it clean.

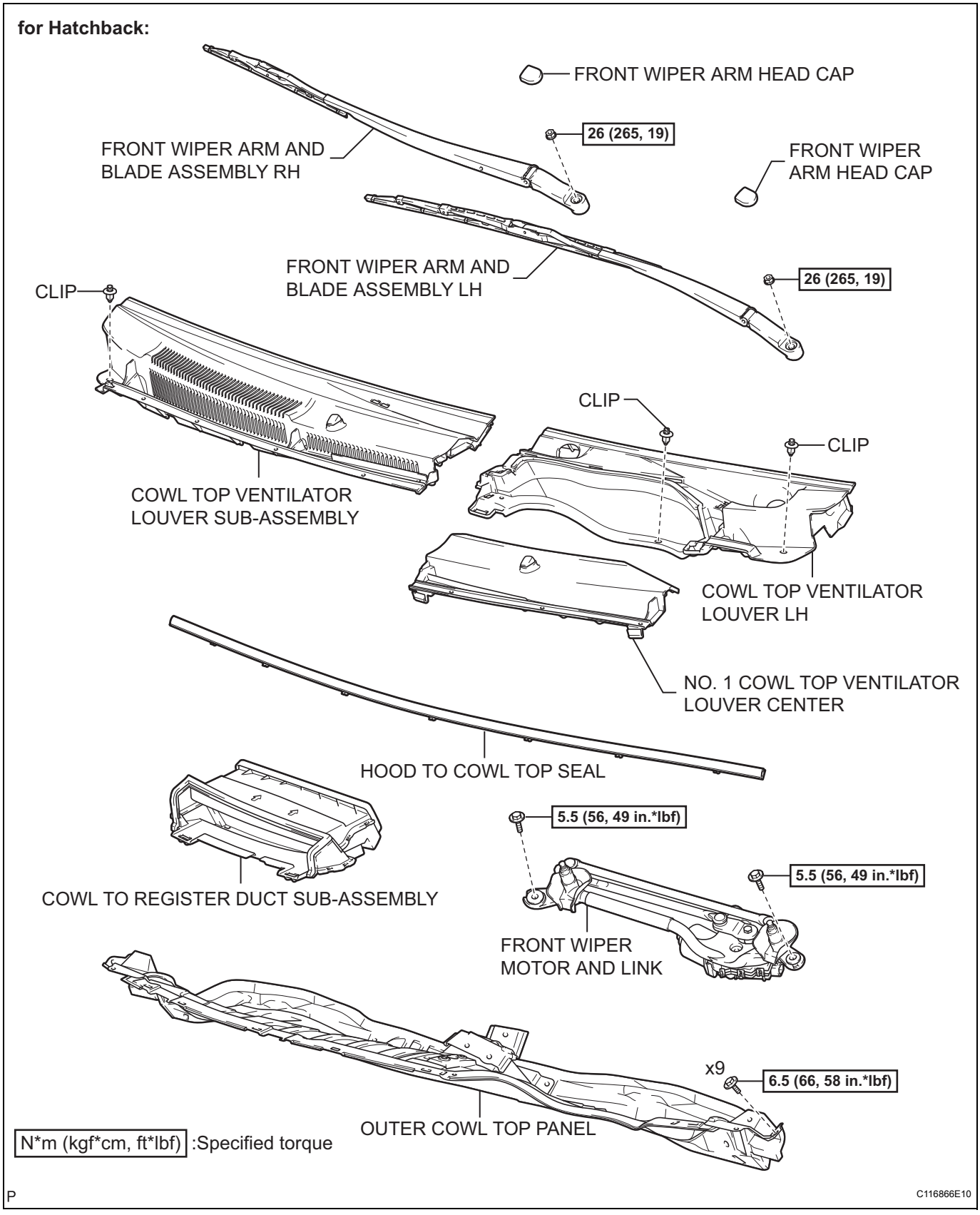
(d) Push it fully back into the pipe.

(e) Pull it out and check that the fluid level is within the HOT range.

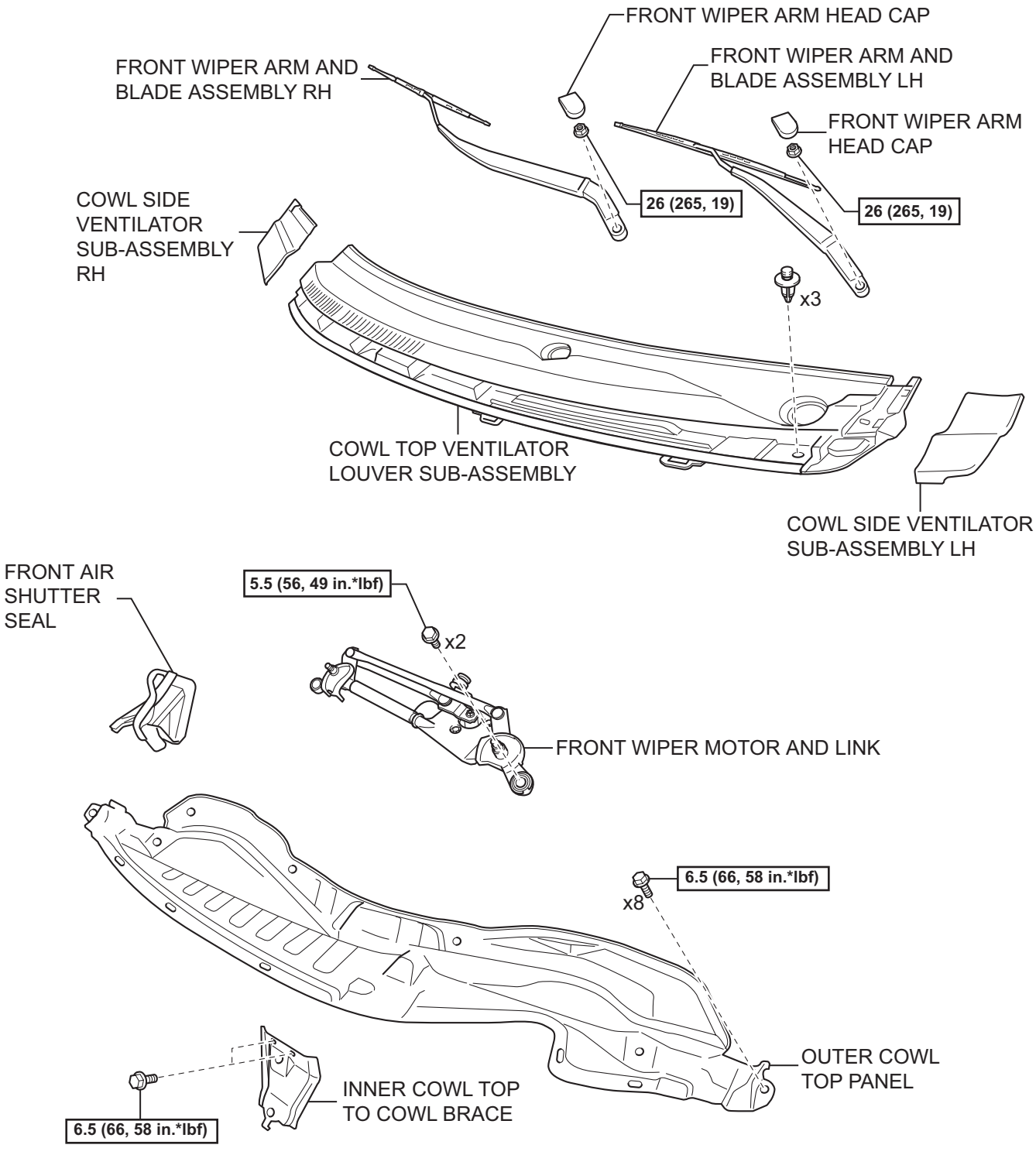
If there is any leakage, repair or replace O-rings, FIPGs, oil seals, plugs or other parts.

SPEED SENSOR

COMPONENTS



for Sedan:



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

Y

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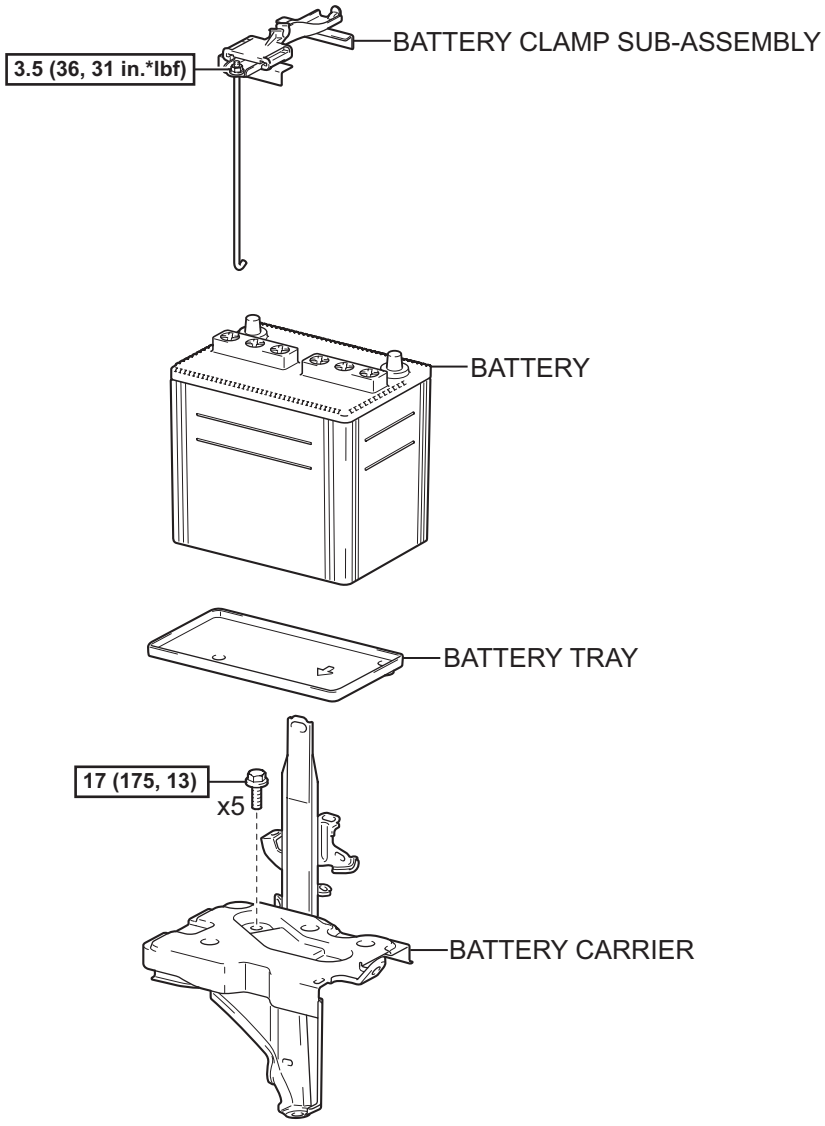
AX

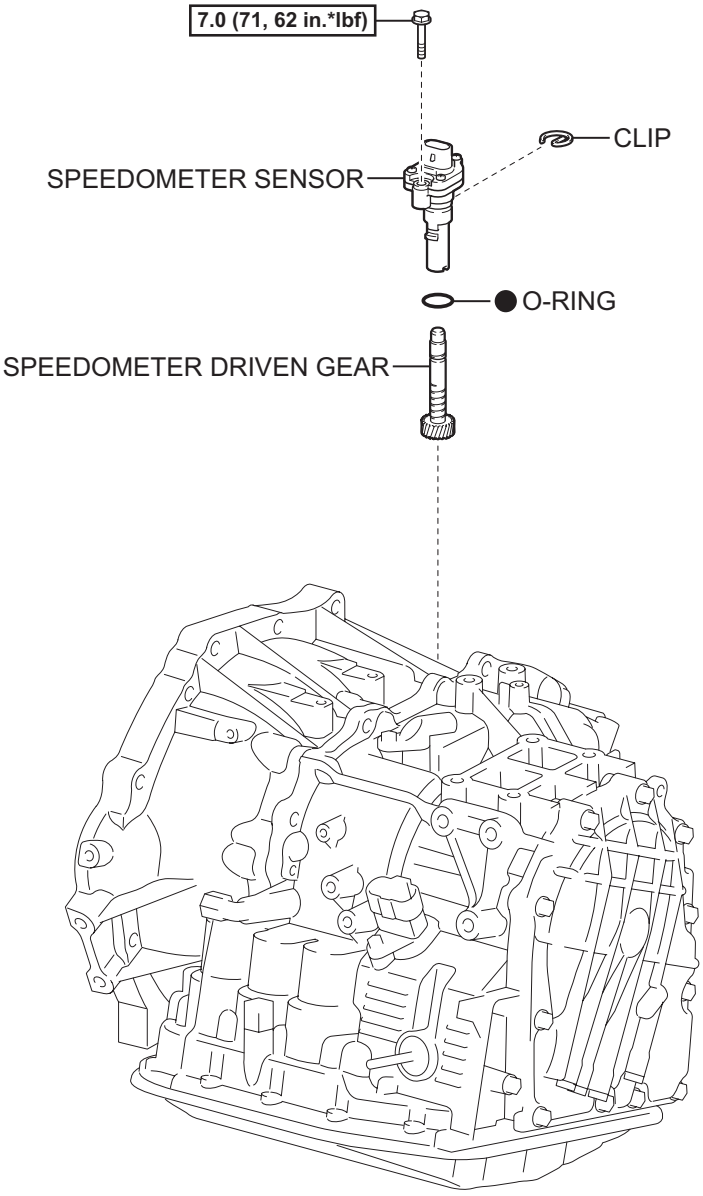


AX

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

P

C117082E01



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

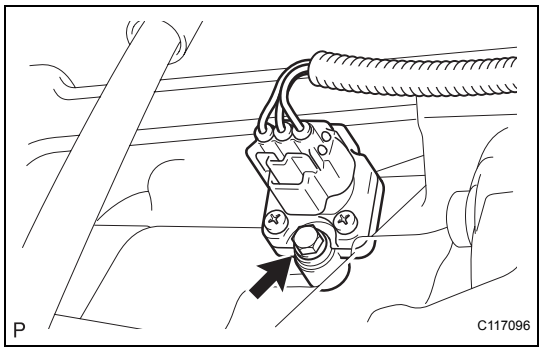
● Non-reusable part

P

C117086E01

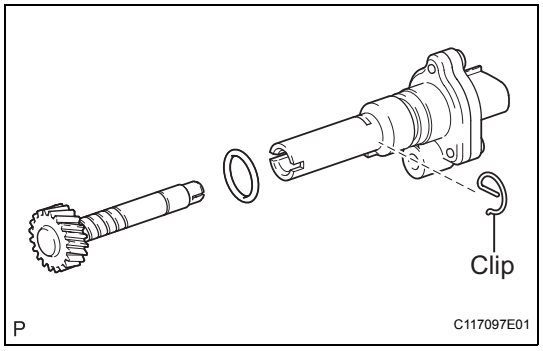
REMOVAL

1. **REMOVE FRONT WIPER ARM HEAD CAP**
   Hatchback: (See page WW-17)
   Sedan: (See page WW-9)
2. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH**
   Hatchback: (See page WW-17)
   Sedan: (See page WW-9)
3. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH**
   Hatchback: (See page WW-17)
   Sedan: (See page WW-9)
4. **REMOVE HOOD TO COWL TOP SEAL (for Hatchback) (See page WW-18)**
5. **REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY LH (for Sedan) (See page WW-10)**
6. **REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY RH (for Sedan) (See page WW-10)**
7. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY**
   Hatchback: (See page WW-18)
   Sedan: (See page WW-10)
8. **REMOVE COWL TOP VENTILATOR LOUVER LH (for Hatchback) (See page WW-18)**
9. **REMOVE FRONT WIPER MOTOR AND LINK**
   Hatchback: (See page WW-19)
   Sedan: (See page WW-10)
10. **REMOVE COWL TO REGISTER DUCT SUB-ASSEMBLY (for Hatchback) (See page EM-122)**
11. **REMOVE FRONT AIR SHUTTER SEAL (for Sedan) (See page EM-123)**
12. **REMOVE OUTER COWL TOP PANEL**
    Hatchback: (See page EM-123)
    Sedan: (See page EM-123)
13. **REMOVE BATTERY (See page EM-122)**
14. **REMOVE BATTERY TRAY**
15. **REMOVE BATTERY CARRIER (See page EM-125)**



16. REMOVE SPEEDOMETER SENSOR

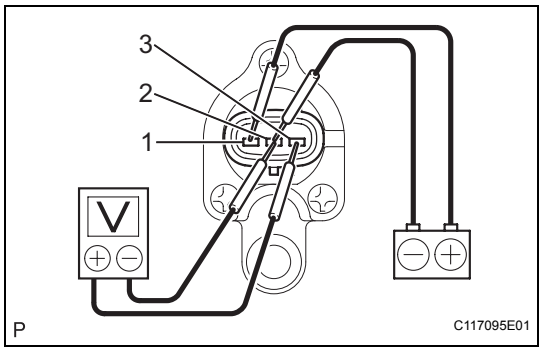
(a) Disconnect speedometer sensor connector.
(b) Remove the bolt and speedometer sensor.



17. REMOVE SPEEDOMETER DRIVEN GEAR

(a) Remove the clip and driven gear from the speedometer sensor.
(b) Remove the O-ring from the speedometer sensor.

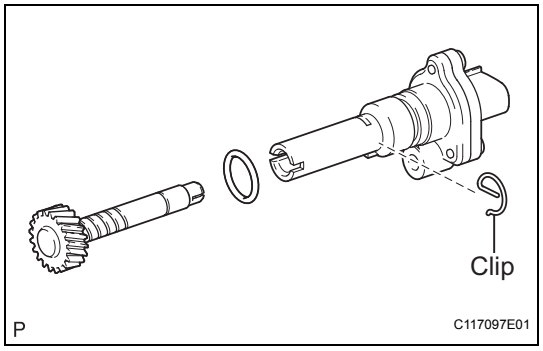
INSPECTION



1. INSPECT SPEEDOMETER SENSOR

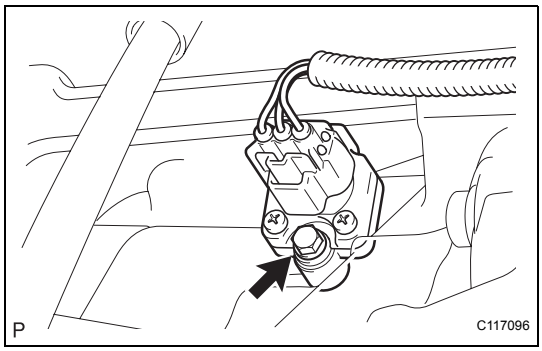
(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2.
(b) Connect the positive (+) lead from the tester to terminal 3 and the negative (-) lead to terminal 2.
(c) Rotate the shaft.
(d) Check that the voltage output varies between 0 V and 11 V between terminals 2 and 3.
HINT:
The voltage output oscillates more than 4 times every revolution of the speed sensor shaft.
If the operation is not as specified, replace the sensor.

INSTALLATION



1. INSTALL SPEEDOMETER DRIVEN GEAR

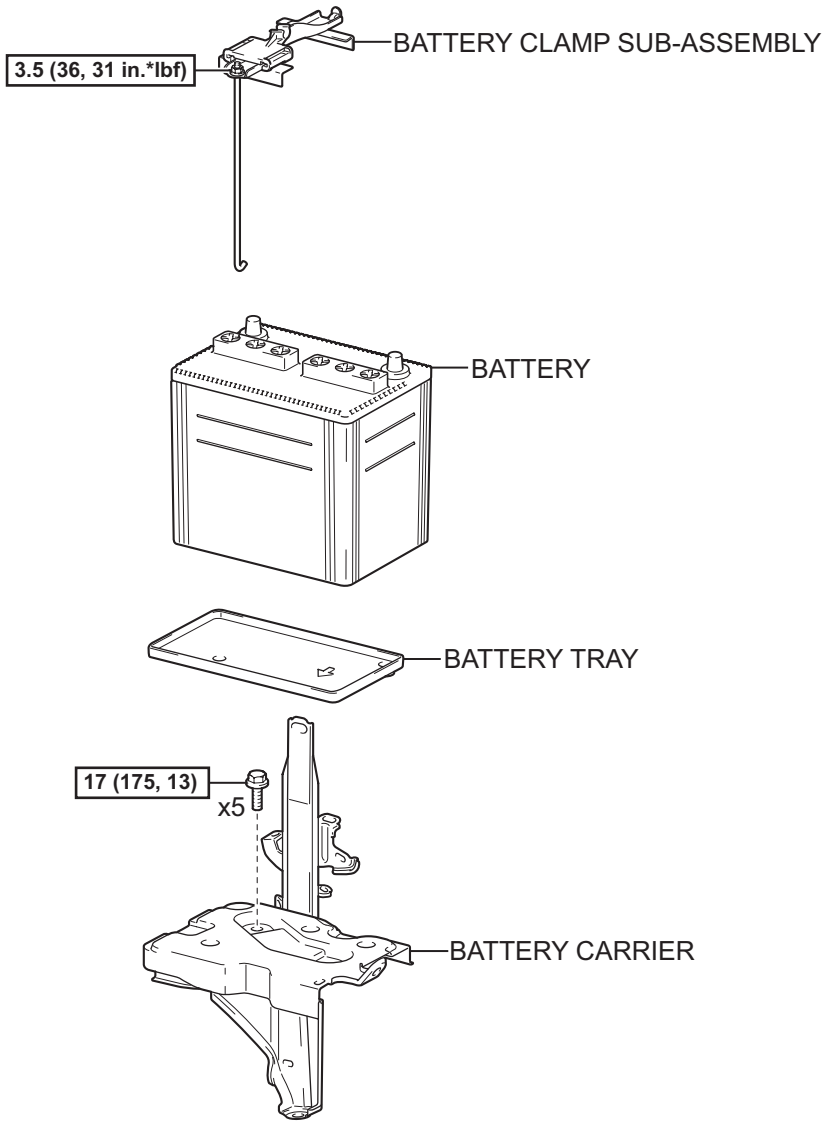
(a) Coat a new O-ring with ATF and install it onto the speedometer sensor.
(b) Install the driven gear into the speedometer sensor with the clip.



2. **INSTALL SPEEDOMETER SENSOR**
   (a) Install the speedometer sensor with the bolt.
   Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)
   (b) Connect the speedometer sensor connector.
3. **INSTALL BATTERY CARRIER (See page EM-145)**
4. **INSTALL BATTERY TRAY**
5. **INSTALL BATTERY (See page EM-148)**
6. **INSTALL OUTER COWL TOP PANEL**
   Hatchback: (See page EM-146)
   Sedan: (See page EM-147)
7. **INSTALL COWL TO REGISTER DUCT SUB-ASSEMBLY (for Hatchback) (See page EM-147)**
8. **INSTALL FRONT AIR SHUTTER SEAL (for Sedan) (See page EM-148)**
9. **INSTALL FRONT WIPER MOTOR AND LINK**
   Hatchback: (See page WW-21)
   Sedan: (See page WW-12)
10. **INSTALL COWL TOP VENTILATOR LOUVER LH (for Hatchback) (See page WW-21)**
11. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY**
    Hatchback: (See page WW-21)
    Sedan: (See page WW-12)
12. **INSTALL HOOD TO COWL TOP SEAL (for Hatchback) (See page WW-22)**
13. **INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY LH (for Sedan) (See page WW-13)**
14. **INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY RH (for Sedan) (See page WW-13)**
15. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH**
    Hatchback: (See page WW-22)
    Sedan: (See page WW-13)
16. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH**
    Hatchback: (See page WW-23)
    Sedan: (See page WW-14)
17. **INSTALL FRONT WIPER ARM HEAD CAP**
    Hatchback: (See page WW-23)
    Sedan: (See page WW-15)

TRANSMISSION REVOLUTION SENSOR

COMPONENTS

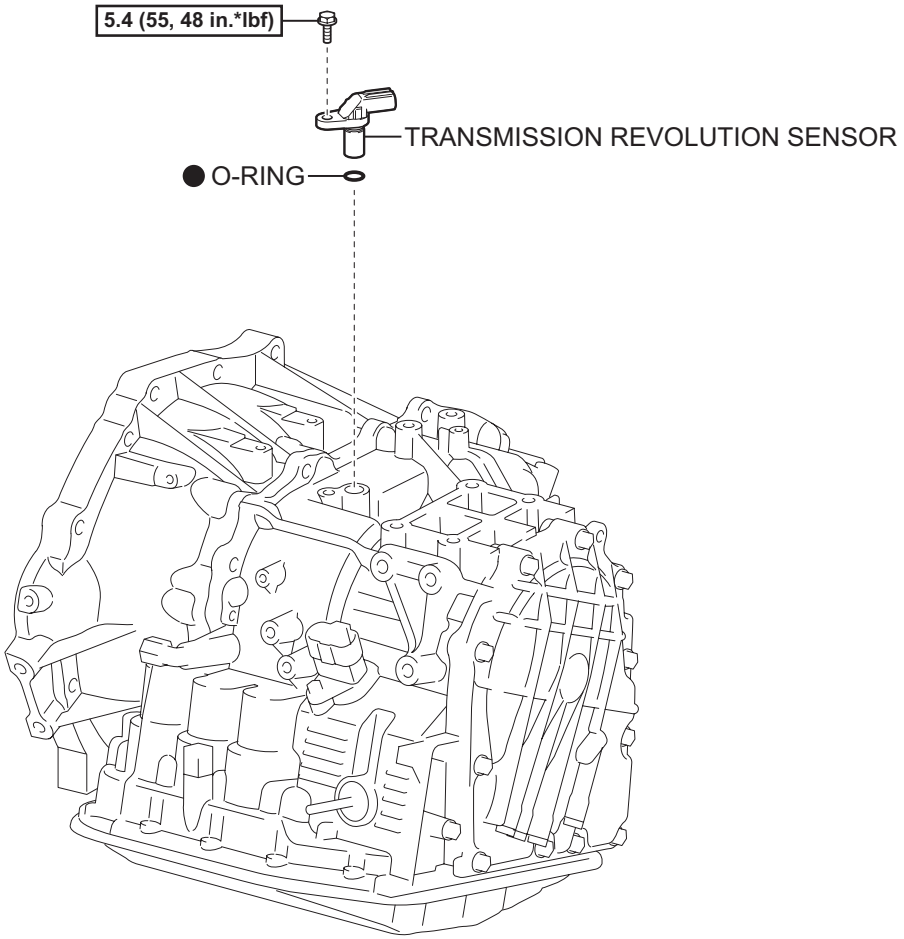


N*m (kgf*cm, ft*lbf) :Specified torque

P

C117082E01

AX



AX

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

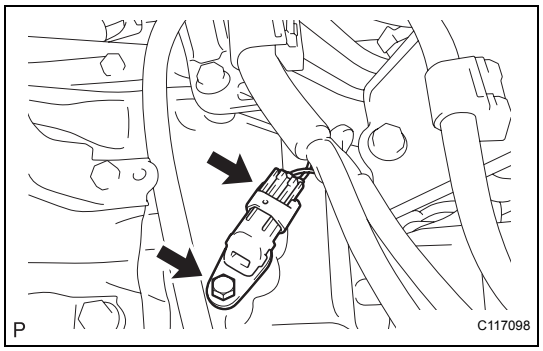
● Non-reusable part

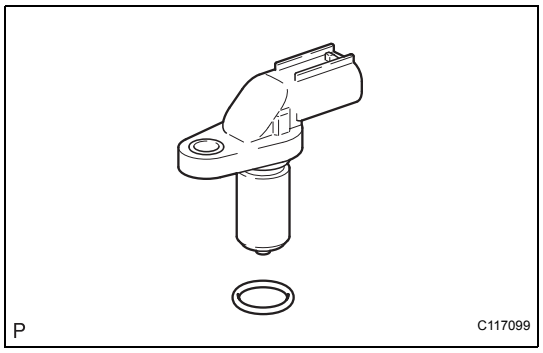
P

C117087E01

REMOVAL

1. **REMOVE BATTERY (See page EM-122)**
2. **REMOVE BATTERY TRAY**
3. **REMOVE BATTERY CARRIER (See page EM-125)**
4. **REMOVE TRANSMISSION REVOLUTION SENSOR**
   (a) Disconnect the transmission revolution sensor connector.
   (b) Remove the bolt and transmission revolution sensor.





   (c) Remove the O-ring from the transmission revolution sensor.

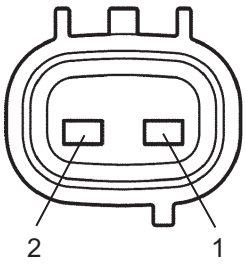
INSPECTION

1. **INSPECT TRANSMISSION REVOLUTION SENSOR**
   (a) Measure the resistance.
   Standard resistance

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

Sensor Side:

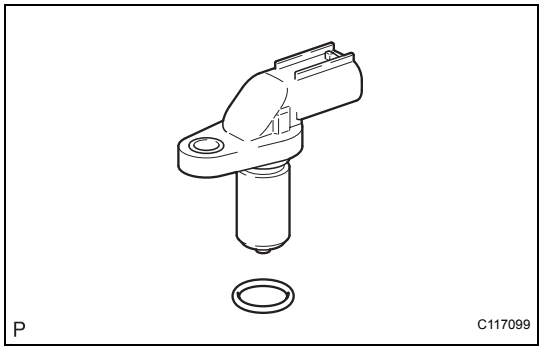
(Connector Front View):

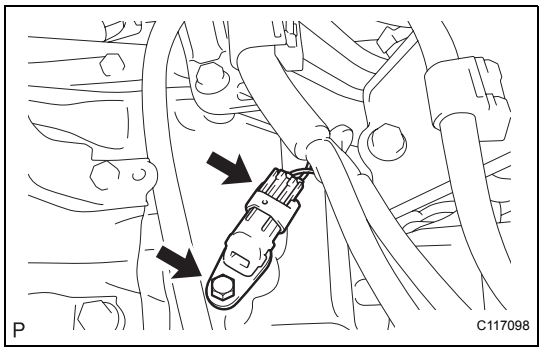


C113863E04

INSTALLATION

1. **INSTALL TRANSMISSION REVOLUTION SENSOR**
   (a) Coat a new O-ring with ATF, and install it onto the transmission revolution sensor.



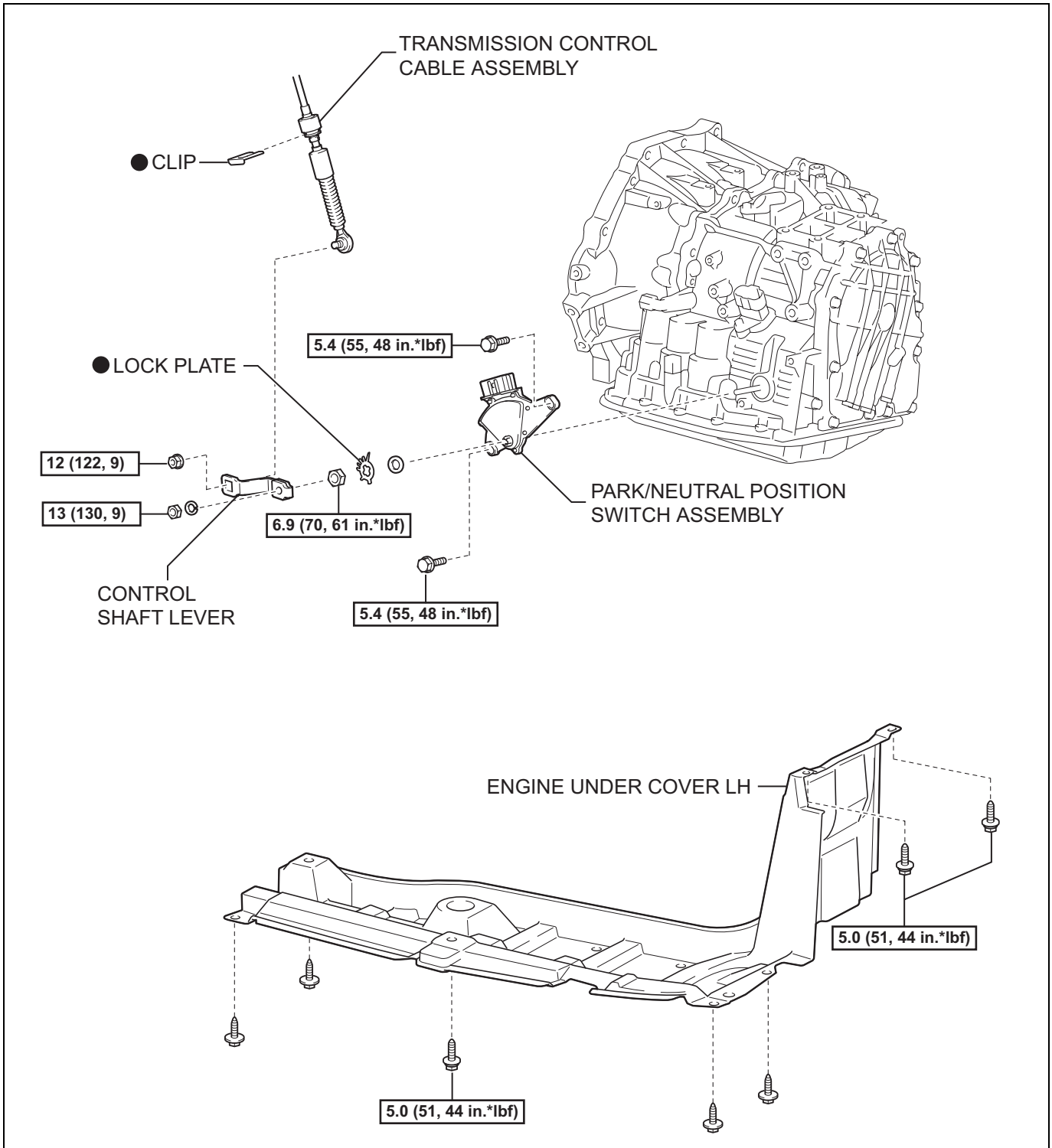


(b) Install the transmission revolution sensor with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
(c) Connect the transmission revolution sensor connector.

2. **INSTALL BATTERY CARRIER (See page EM-145)**
3. **INSTALL BATTERY TRAY**
4. **INSTALL BATTERY (See page EM-148)**

PARK / NEUTRAL POSITION SWITCH

COMPONENTS



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

● Non-reusable part

P

C133143E01

AX

ON-VEHICLE INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Apply the parking brake and turn the ignition switch ON.

(b) Depress the brake pedal and check that the engine starts when the shift lever is set in the N or P position, but does not start in the other positions.

(c) Check that the back-up light illuminates and the reverse warning buzzer sounds when the shift lever is set in the R position, but does not function in the other positions.

If a malfunction failure is found, check the park/neutral position switch for continuity.

REMOVAL

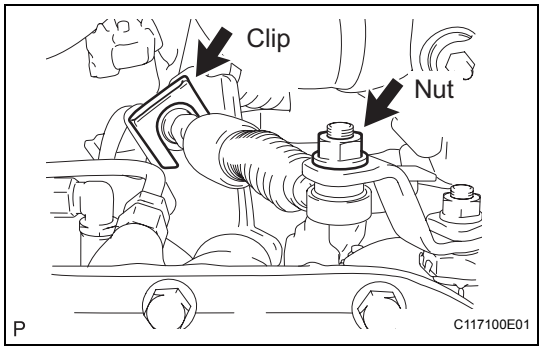
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE ENGINE UNDER COVER LH

3. SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Remove the nut and disconnect the control cable from the control shaft lever.

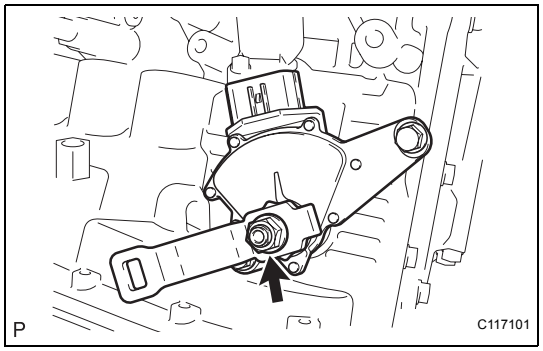
(b) Remove the clip and disconnect the control cable from the control cable bracket.



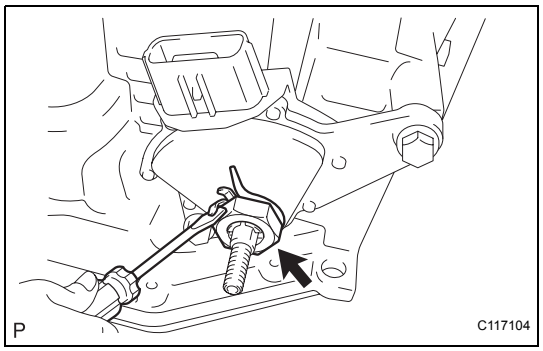
4. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Disconnect the connector from the park/neutral position switch assembly.

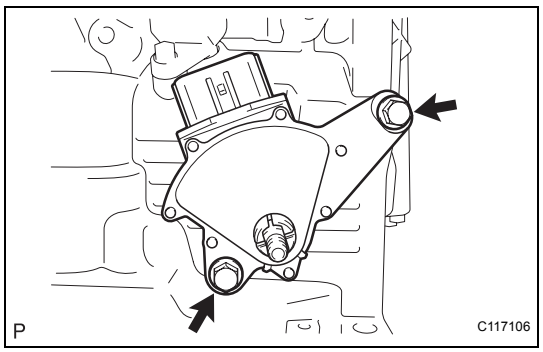
(b) Remove the nut, washer and control shaft lever.



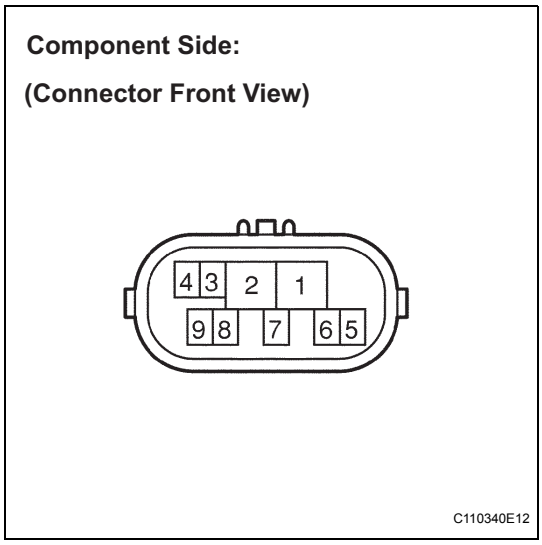
(c) Pry out the lock plate and remove the manual valve shaft nut.



(d) Remove the 2 bolts and pull out the park/neutral position switch assembly.



AX



INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

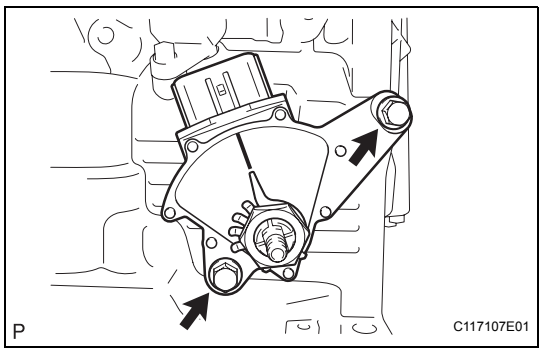
(a) Disconnect the park/neutral position switch connector.

(b) Measure the resistance with the shift lever in each position.

Standard resistance

Shift Position	Tester Connection	Specified Connection
P	2 - 6 and 4 - 5	Below 1 Ω
Except P	↑	10 kΩ or higher
R	2 - 1	Below 1 Ω
Except R	↑	10 kΩ or higher
N	2 - 9 and 4 - 5	Below 1 Ω
Except N	↑	10 kΩ or higher
D and 3	2 - 7	Below 1 Ω
Except D and 3	↑	10 kΩ or higher
2	2 - 3	Below 1 Ω
Except 2	↑	10 kΩ or higher
L	2 - 8	Below 1 Ω
Except L	↑	10 kΩ or higher

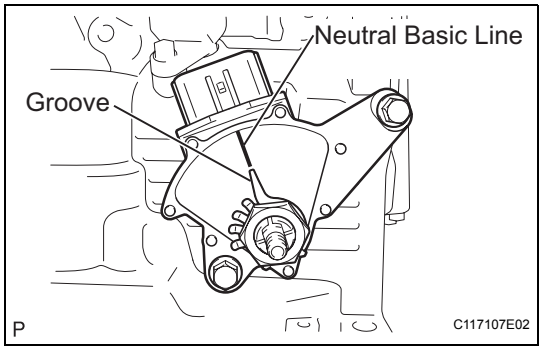
AX



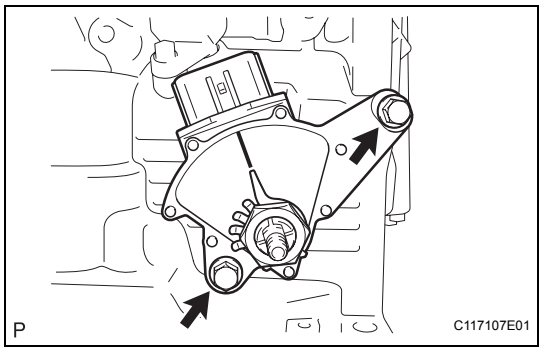
ADJUSTMENT

1. ADJUST PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Loosen the bolt of the park/neutral position switch and move the shift lever to the N position.



(b) Align the groove with the neutral basic line.

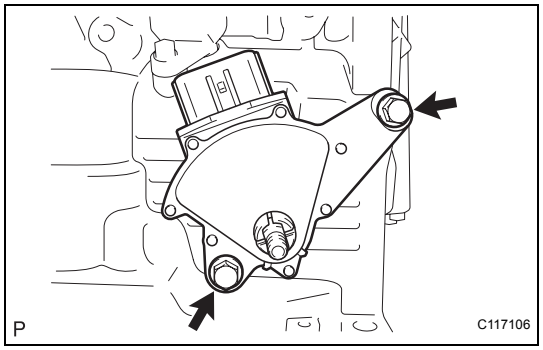


(c) Hold the switch in position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
(d) After the adjustment, perform the switch operation check.

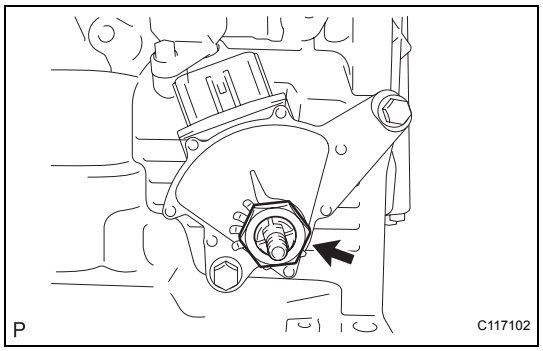
INSTALLATION

1. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Install the park/neutral position switch assembly onto the manual transaxle.
(b) Provisionally install the 2 bolts.

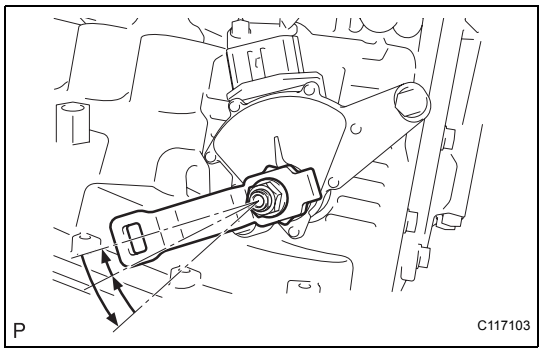


(c) Replace the lock plate with a new one and tighten the manual valve shaft nut.
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)
(d) Provisionally install the control shaft lever.

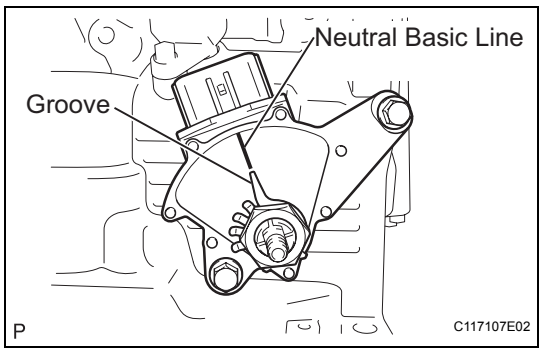


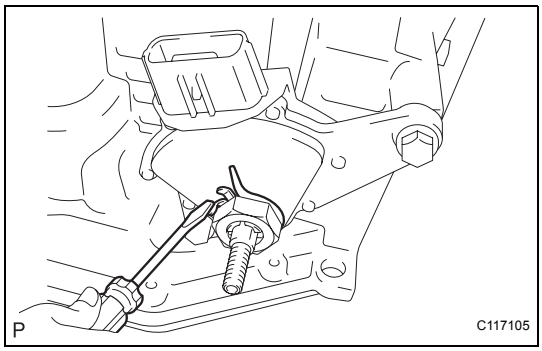
AX

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

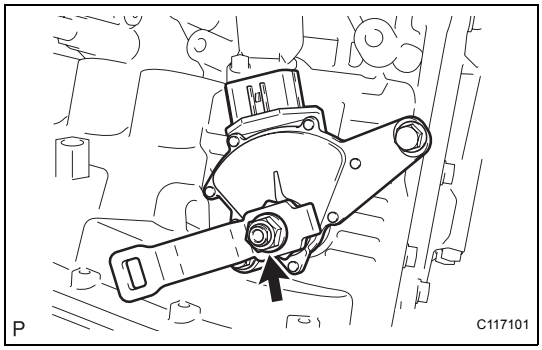


(g) Align the groove with the neutral basic line.
(h) Hold the switch in this position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



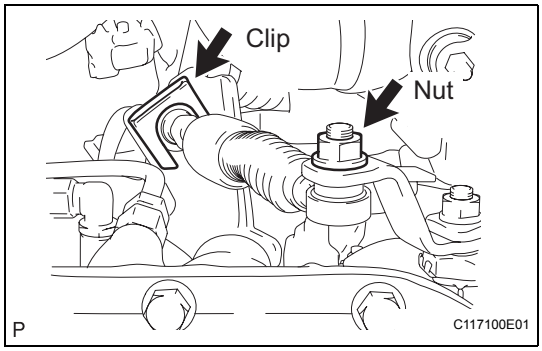


(i) Using a screwdriver, stake the nut with the lock plate.



(j) Install the control shaft lever with the nut and washer.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

(k) Connect the connector to the park/neutral position switch assembly.



2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Install the transmission control cable onto the control shaft lever with the nut.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

(b) Install the transmission control cable into the bracket with the new clip.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

4. ADJUST SHIFT LEVER POSITION (See page AX-137)

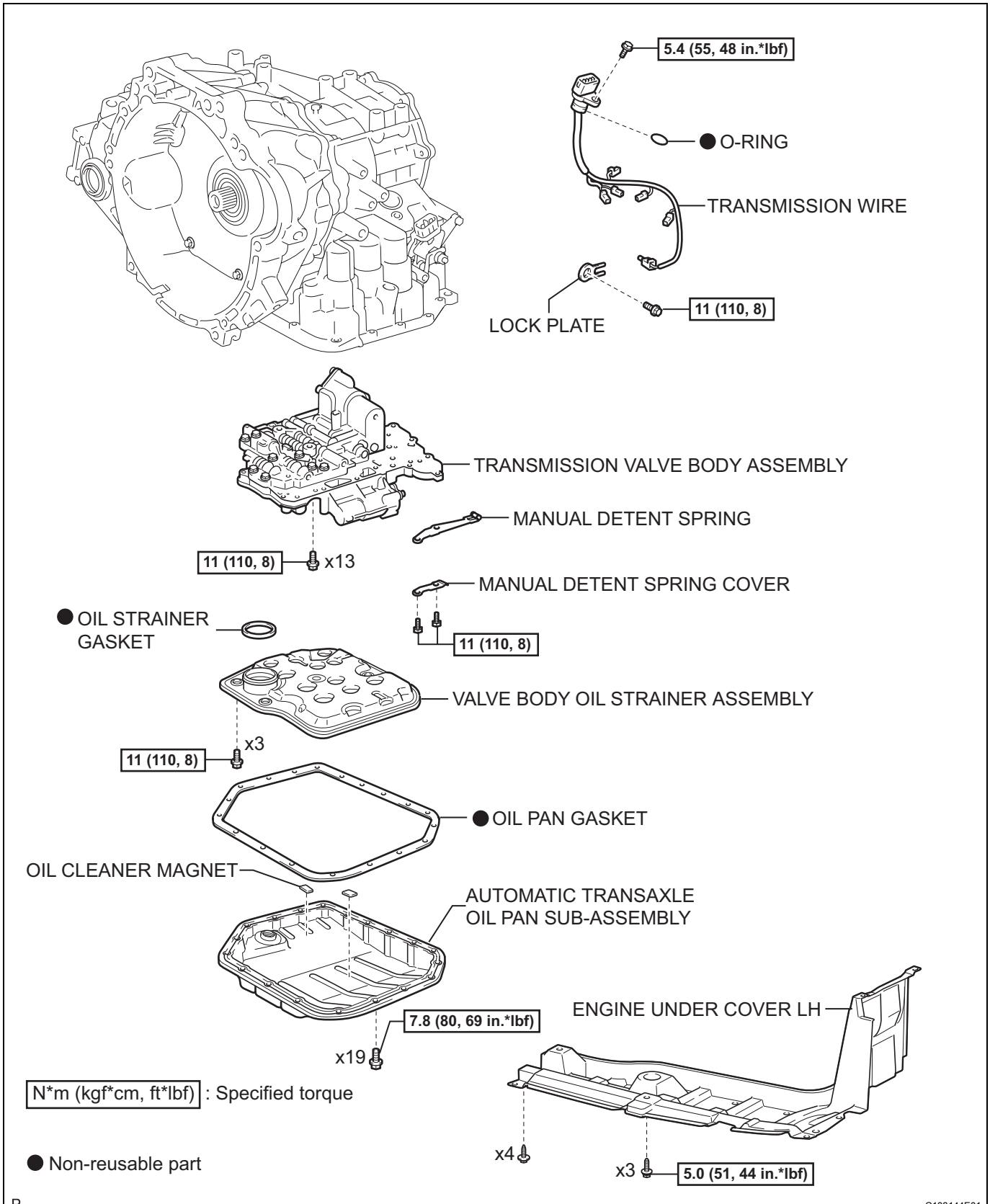
5. INSPECT SHIFT LEVER POSITION (See page AX-134)

6. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY (See page AX-106)

7. INSTALL ENGINE UNDER COVER LH

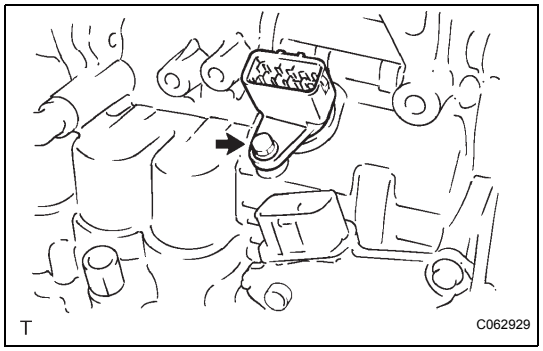
TRANSMISSION WIRE

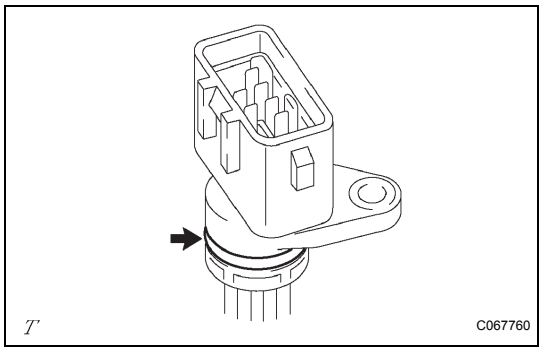
COMPONENTS



REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE ENGINE UNDER COVER LH**
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: 49 N*m (500 kgf*cm, 36 ft.*lbf)
4. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-114)**
5. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-114)**
6. **REMOVE TRANSMISSION VALVE BODY ASSEMBLY (See page AX-115)**
7. **REMOVE TRANSMISSION WIRE**
   (a) Remove the bolt and the transmission wire from the transaxle case.





(b) Remove the O-ring from the transmission wire.

AX

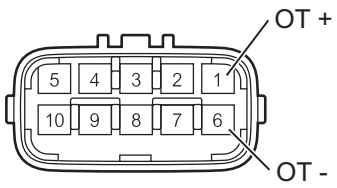
INSPECTION

1. **INSPECT TRANSMISSION WIRE**
   (a) Measure the resistance.
   Standard resistance

Tester Connection	Oil Temperature	Specified Condition
1(OT+) - 6(OT-)	10°C (50°F)	6.4 kΩ
1(OT+) - 6(OT-)	110°C (230°F)	0.2 kΩ

Component Side:

(Connector Front View)



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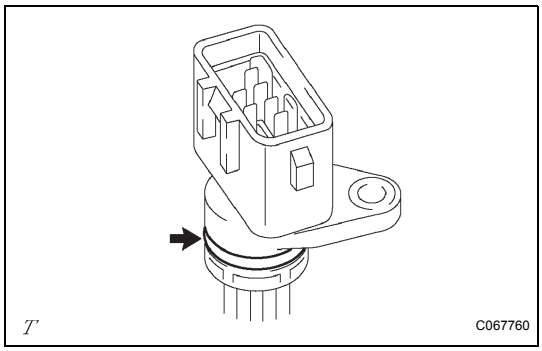
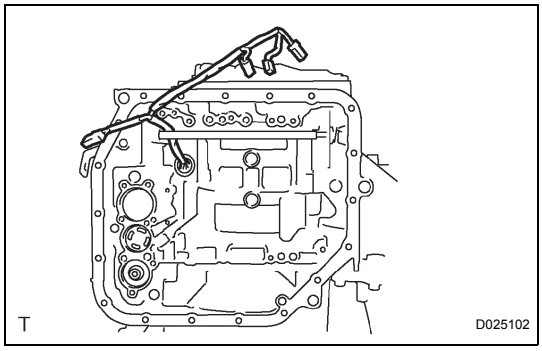
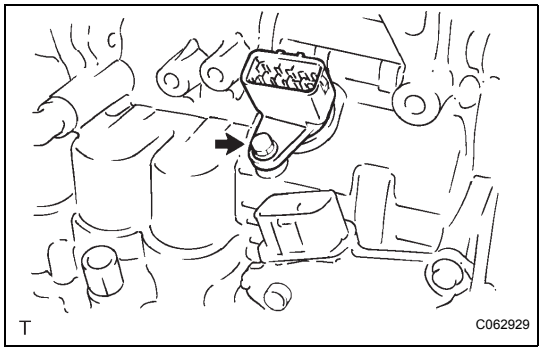






INSTALLATION

1. **INSTALL TRANSMISSION WIRE**
   (a) Coat a new O-ring with ATF and install it into the transmission wire.

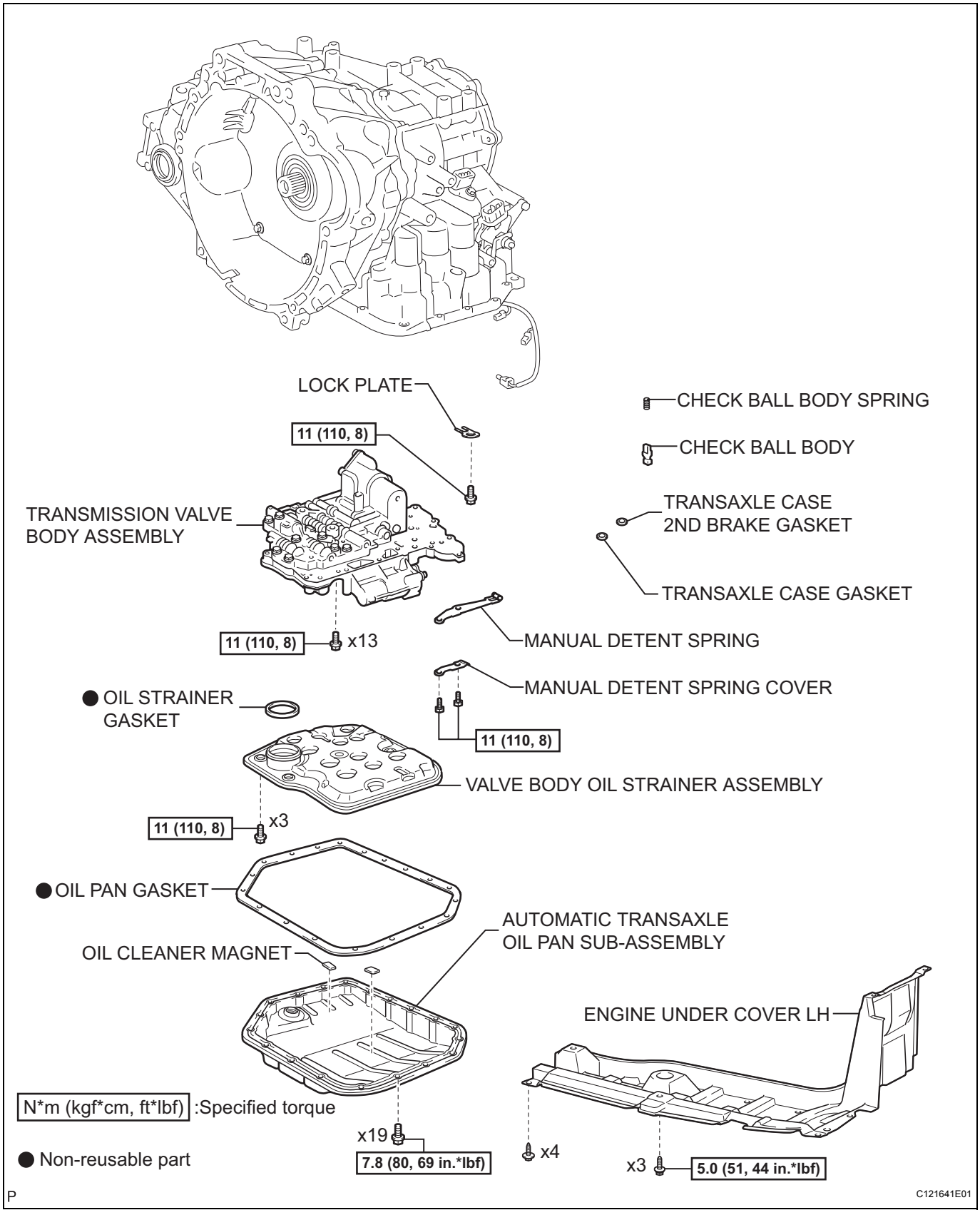
   (b) Pass the transmission wire through the transaxle.

   (c) Install the transmission wire with the bolt.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

2. **INSTALL TRANSMISSION VALVE BODY ASSEMBLY (See page AX-116)**
3. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-117)**
4. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-118)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
6. **ADD AUTOMATIC TRANSAXLE FLUID (See page AX-170)**
7. **INSPECT AUTOMATIC TRANSAXLE FLUID (See page AX-93)**
8. **CHECK FOR AUTOMATIC TRANSAXLE FLUID LEAKAGE**
9. **INSTALL ENGINE UNDER COVER LH**

VALVE BODY ASSEMBLY

COMPONENTS



AX

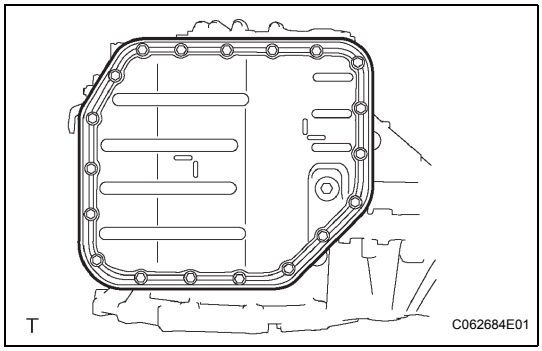
REMOVAL

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

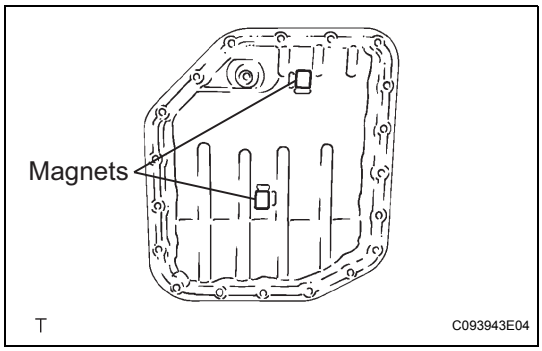
2. **REMOVE ENGINE UNDER COVER LH**

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: 49 N*m (500 kgf*cm, 36 ft.*lbf)

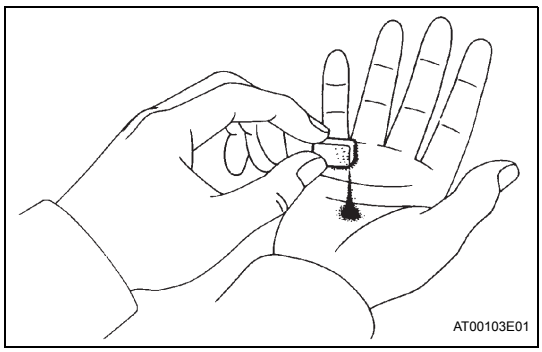
4. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**
   (a) Remove the 19 bolts and remove the oil pan and oil pan gasket.
   NOTICE:
   Some fluid will remain in the oil pan.
   Remove all the oil pan bolts, and carefully remove the oil pan sub-assembly.



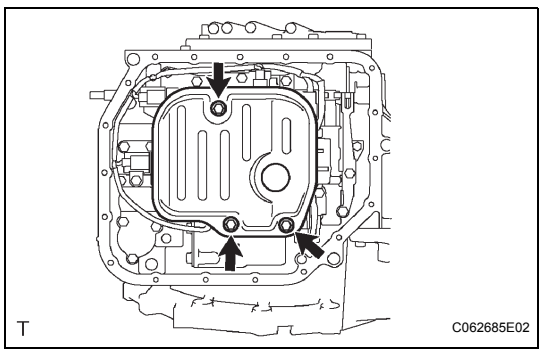
   (b) Remove the 2 magnets from the oil pan.

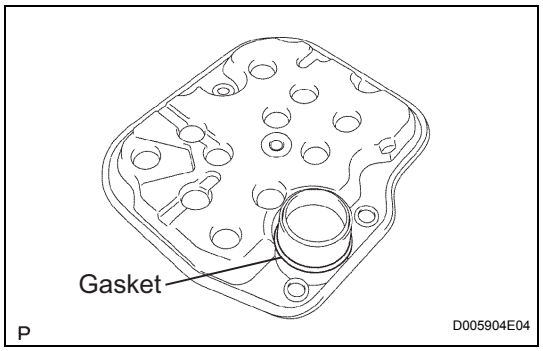


   (c) Examine the particles in the pan.
      (1) Collect any steel chips using the removed magnets.
      Carefully inspect the foreign matter and particles in the pan and on the magnets to guess at the type of wear which might be found in the transaxle.
      Steel (magnetic): bearing, gear and clutch plate wear
      Brass (non-magnetic): bearing wear

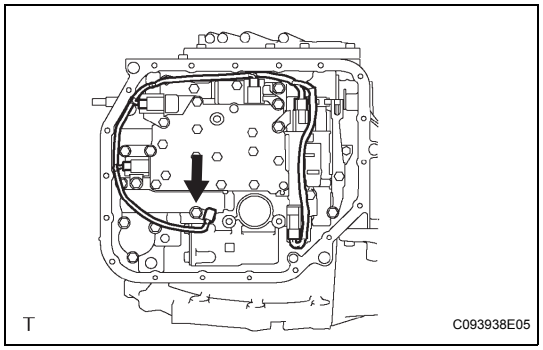


5. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY**
   (a) Remove the 3 bolts and remove the oil strainer.
   NOTICE:
   Perform the operation carefully as some fluid will come out from the oil strainer.





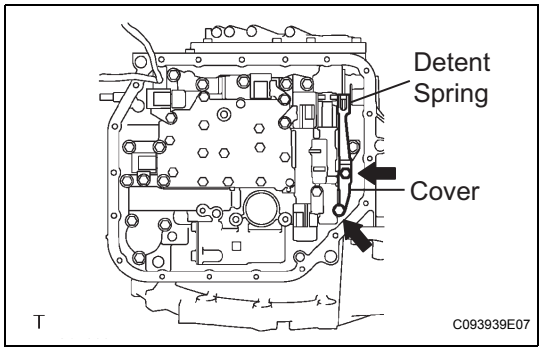
(b) Remove the oil strainer gasket from the oil strainer.



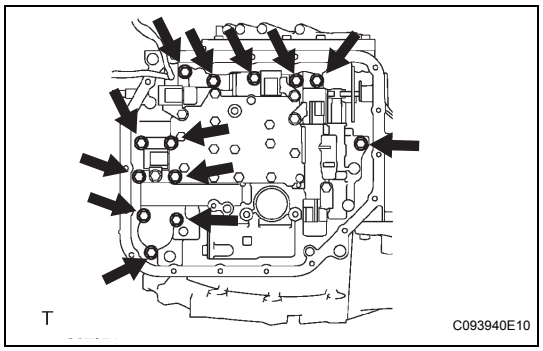
6. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Disconnect the 5 connectors.

(b) Remove the bolt and lock plate and remove the ATF temperature sensor.



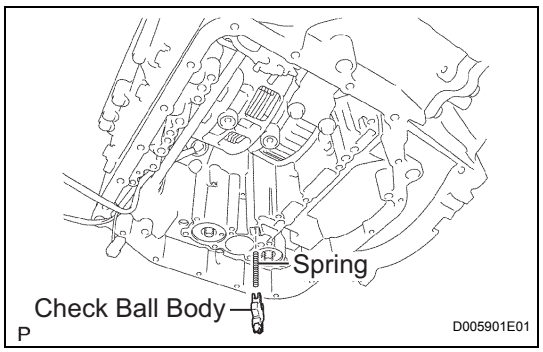
(c) Remove the 2 bolts and remove the detent spring cover and detent spring.



(d) Remove the 13 bolts and remove the valve body assembly.

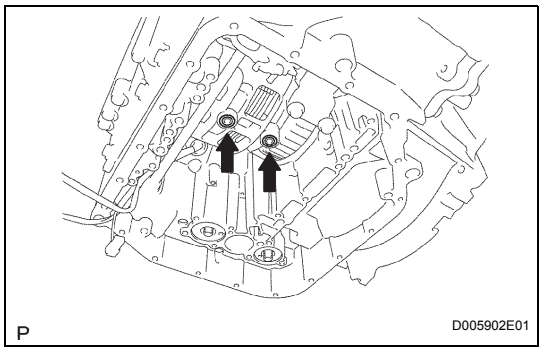
NOTICE:

Do not drop the check ball body, check ball body spring or accumulator piston.



(e) Remove the check ball body and check ball body spring.

AX

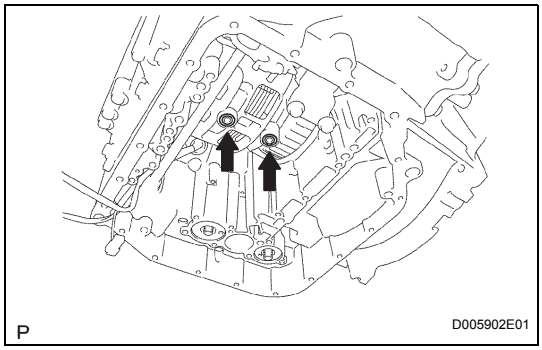


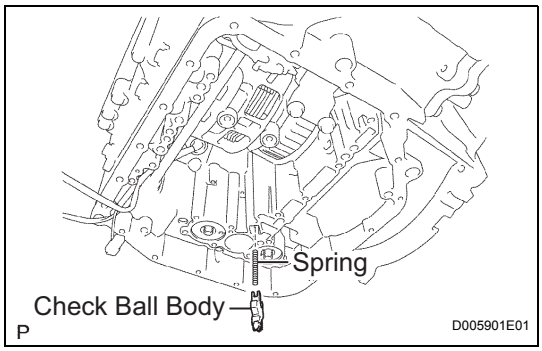
(f) Remove the 2 apply gaskets.

INSTALLATION

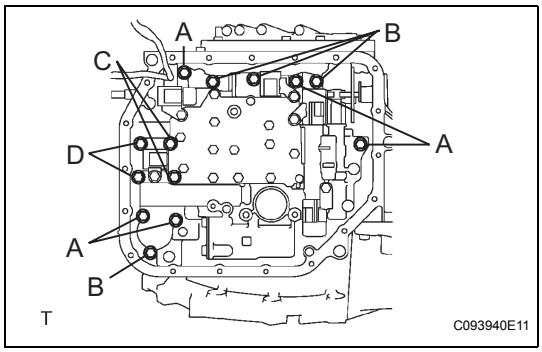
1. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Coat 2 new apply gaskets with ATF and install them into the transaxle case.





(b) Install the check ball body spring and check ball body.



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

(d) Provisionally install the valve body with the 13 bolts.

Bolt length:

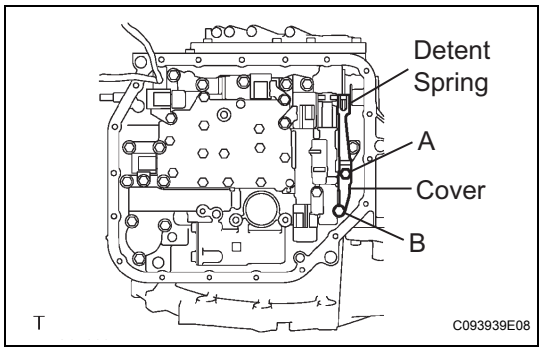
Bolt A:
32 mm (1.26 in.)

Bolt B:
22 mm (0.87 in.)

Bolt C:
55 mm (2.17 in.)

Bolt D:
45 mm (1.77 in.)

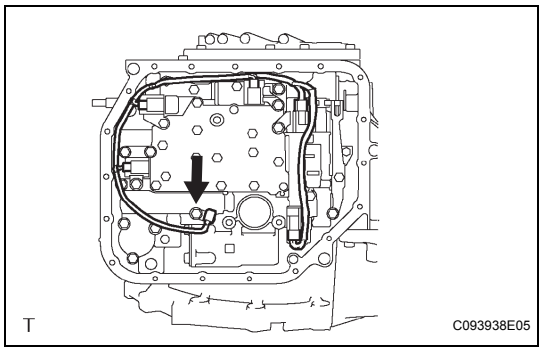
AX



(e) Provisionally install the detent spring and detent spring cover with the 2 bolts.
Bolt length:
Bolt A:
14 mm (0.55 in.)
Bolt B:
45 mm (1.77 in.)

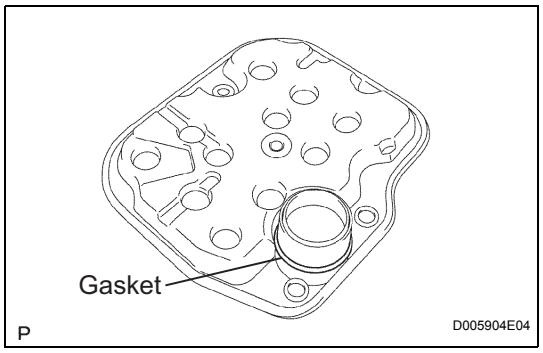
(f) Check that the manual valve lever comes into contact with the center of the roller at the tip of the detente spring.

(g) Tighten the 15 bolts.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)



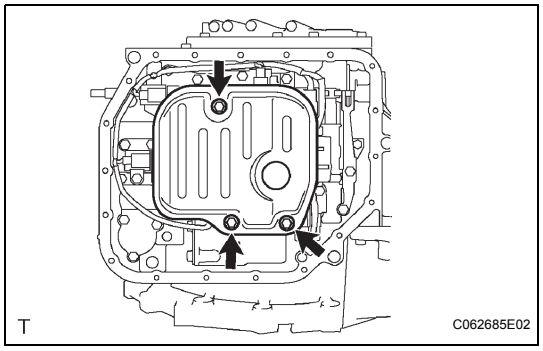
(h) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

(i) Connect the 5 shift solenoid valve connectors.



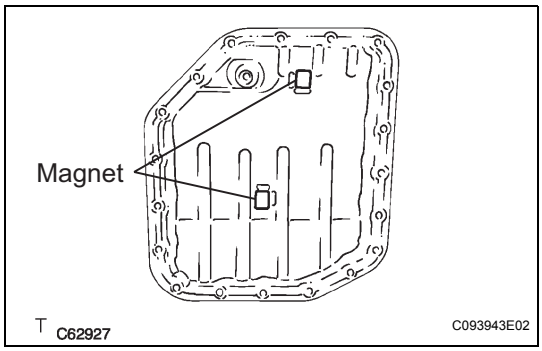
2. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

(a) Coat a new oil strainer gasket with ATF, and install it into the oil strainer.

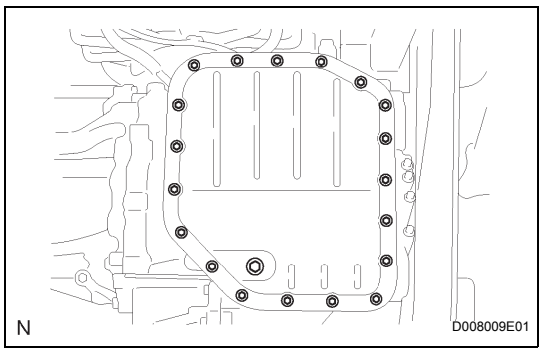


(b) Install the oil strainer with the 3 bolts.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

AX



3. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**
   (a) Install the 2 magnets onto the oil pan, as shown in the illustration.



   (b) Install the oil pan and a new gasket with the 19 bolts.
   Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

5. **ADD AUTOMATIC TRANSAXLE FLUID (See page AX-170)**

6. **INSPECT AUTOMATIC TRANSAXLE FLUID (See page AX-93)**

7. **CHECK AUTOMATIC TRANSAXLE FLUID LEAKAGE**

8. **INSTALL ENGINE UNDER COVER LH**

SHIFT LOCK SYSTEM

ON-VEHICLE INSPECTION

1. INSPECT SHIFT LOCK CONTROL ECU SUB-ASSEMBLY

(a) Check the shift lock operation.
  (1) Move the shift lever to P.
  (2) Turn the ignition switch OFF.
  (3) Check that the shift lever cannot be moved to any position other than P.
  (4) Turn the ignition switch ON, depress the brake pedal and check that the shift lever can be moved to other positions.

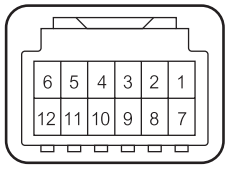
(b) Check the shift lock release button operation.
  (1) When operating the shift lever with the shift lock release button pressed, check that the lever can be moved to any position.
  If the operation cannot be performed as specified, check the shift lever assembly.

(c) Check the key interlock operation.
  (1) Turn the ignition switch ON.
  (2) Depress the brake pedal and move the shift lever to any position other than P.
  (3) Check that the ignition switch cannot be turned OFF.
  (4) 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.

(d) Inspect the shift lock control unit assembly.
  (1) Measure the voltage of the connector.
  HINT:
  Do not disconnect the shift lock control ECU connector.

Component Side:

(Connector Front View)



C117648E03

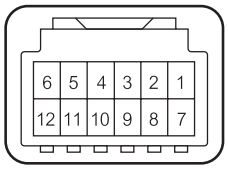
Standard voltage

Condition	Tester Connection	Specified Condition
Ignition switch ACC and shift lever P	12 (KLS+) - 8 (E)	Below 1 V
Ignition switch ACC and shift lever except P	12 (KLS+) - 8 (E)	7.5 to 11 V
Ignition switch ACC and shift lever except P (after approx. 1 second)	12 (KLS+) - 8 (E)	6 to 9 V
Ignition switch ON	6 (ACC) - 8 (E)	10 to 14 V

Condition	Tester Connection	Specified Condition
Ignition switch ACC	6 (ACC) - 8 (E)	10 to 14 V
Ignition switch OFF	6 (ACC) - 8 (E)	Below 1 V
Depress brake pedal	7 (STP) - 8 (E)	10 to 14 V
Release brake pedal	7 (STP) - 8 (E)	Below 1 V
Ignition switch ON	1 (IG) - 8 (E)	10 to 14 V
Ignition switch OFF	1 (IG) - 8 (E)	Below 1 V

Component Side:

(Connector Front View)



C117648E03

(2) Measure the resistance of the connector.
HINT:
Do not disconnect the shift lock control ECU connector.

Standard resistance

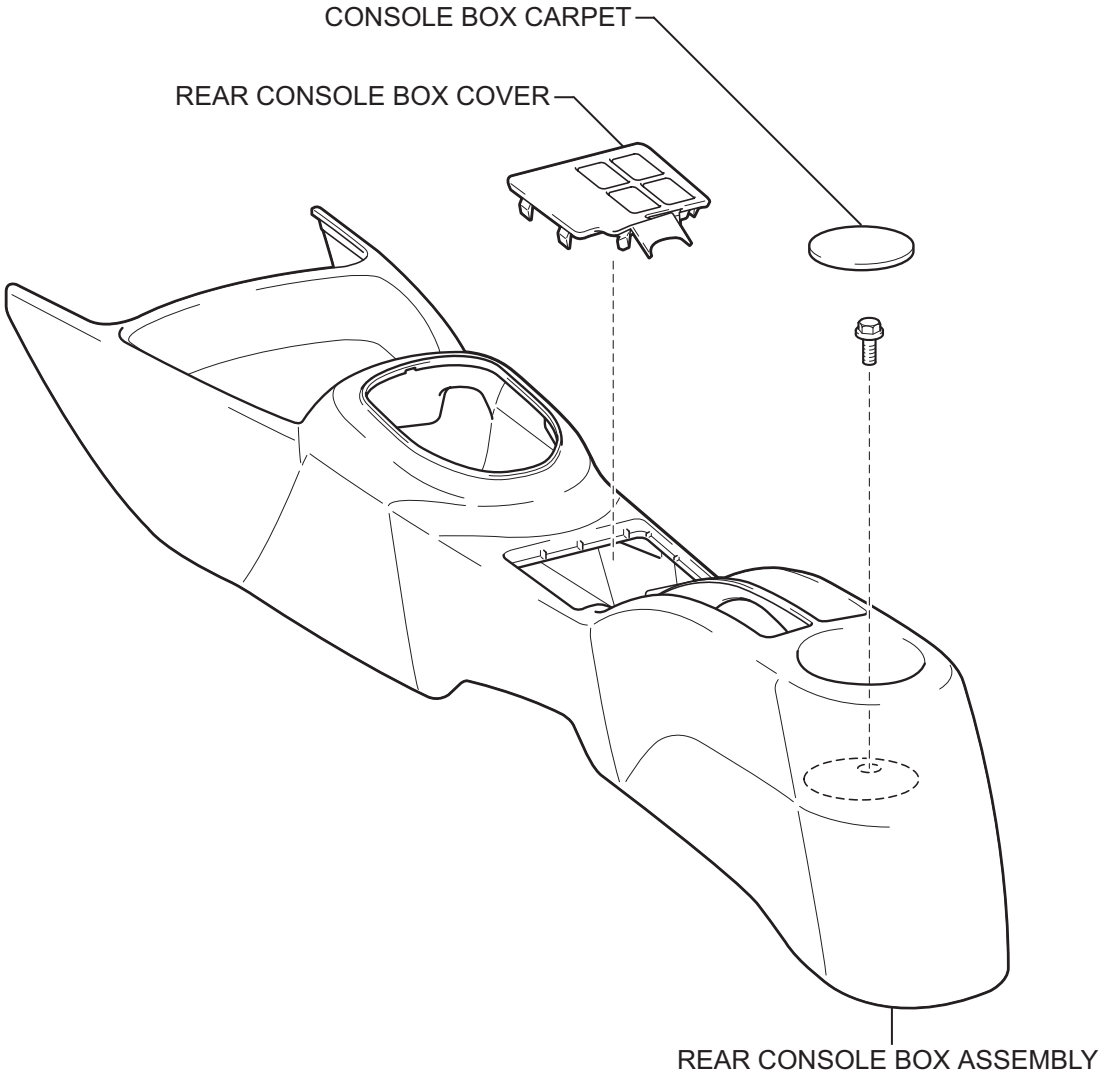
Tester Connection	Specified Condition
8 (E) - Body ground	Below 1 Ω

If the result is not as specified, replace the shift lock control ECU sub-assembly.

TRANSMISSION CONTROL CABLE ASSEMBLY

COMPONENTS

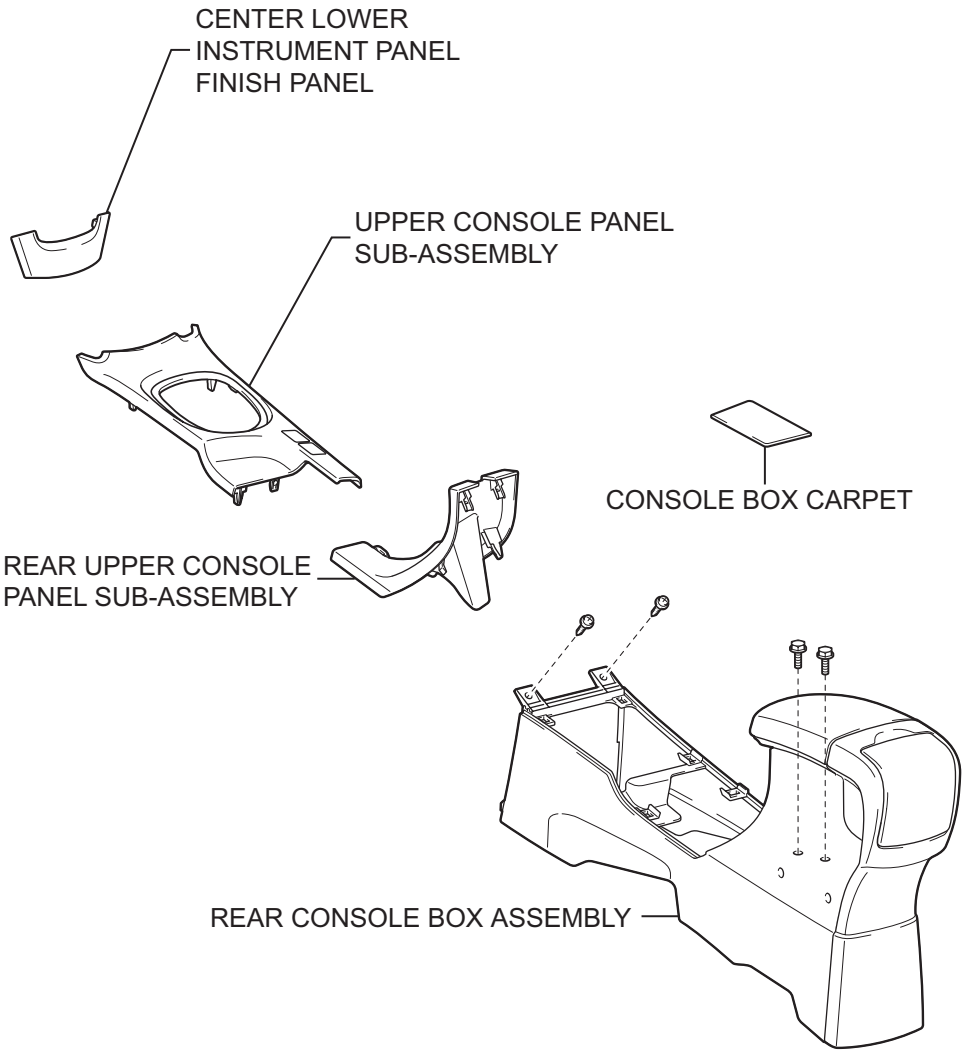
for Hatchback:



P

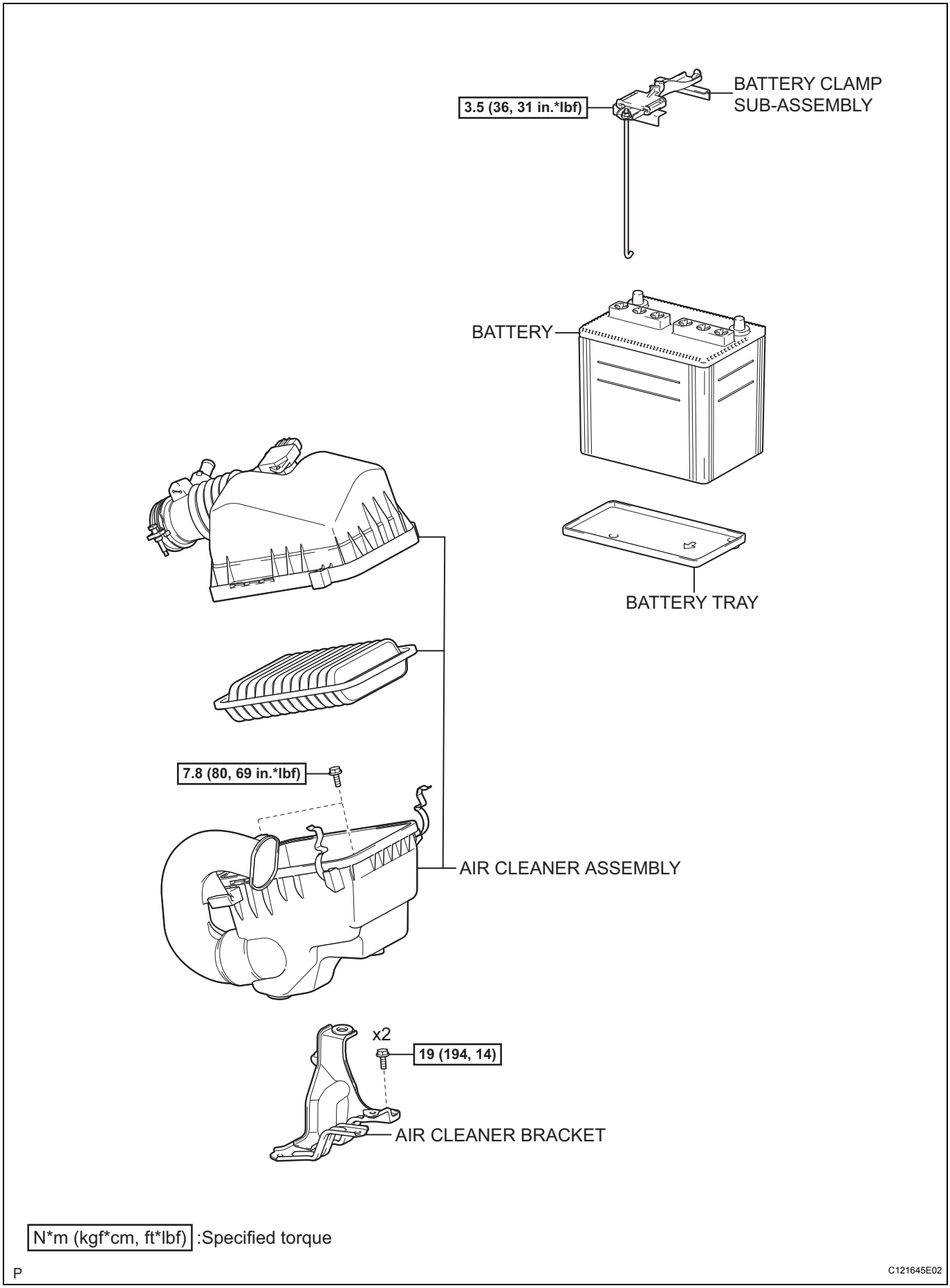
C117078E02

for Sedan:



P

C133134E02

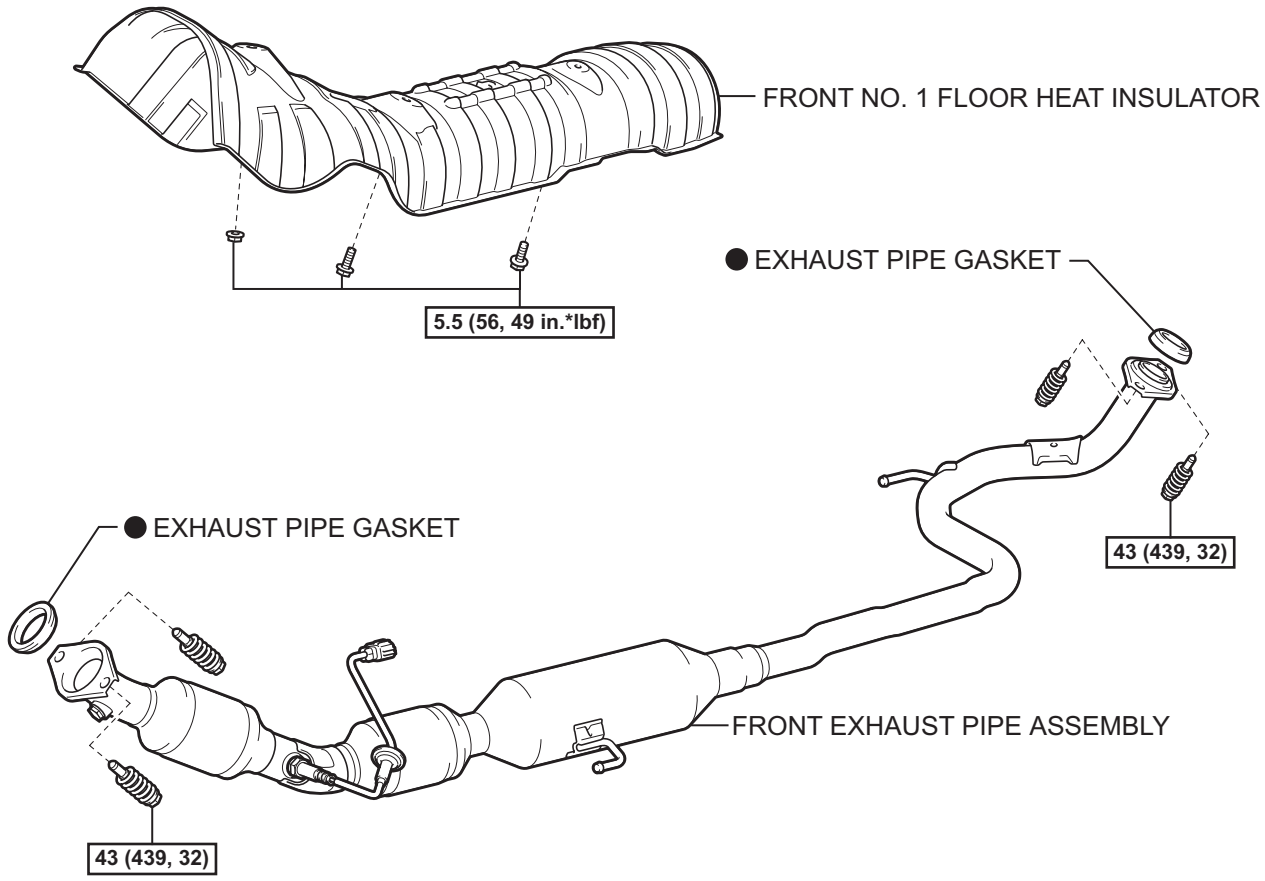


N*m (kgf*cm, ft*lbf) :Specified torque

P

C121645E02

AX



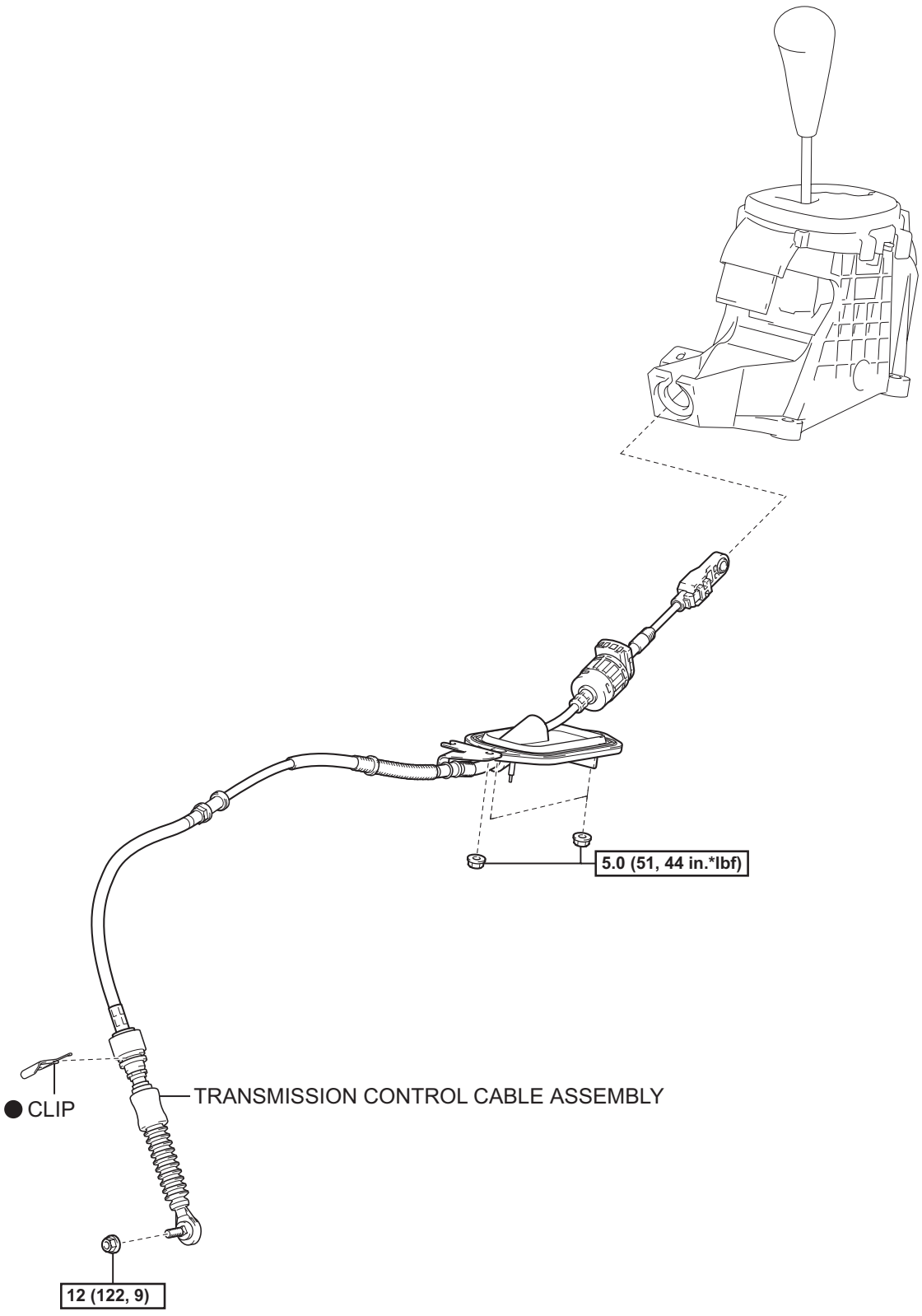
N*m (kgf*cm, ft*lbf) : Specified torque

● Non-reusable part

P

C117081E02

AX



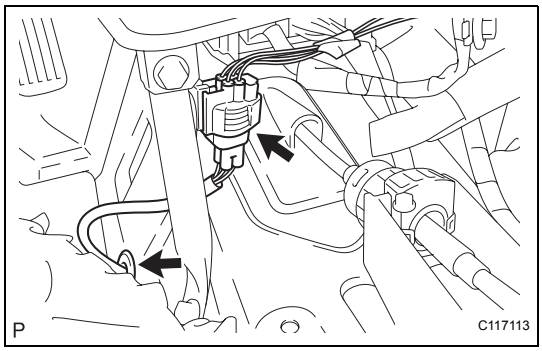
N*m (kgf*cm, ft*lbf) :Specified torque ● Non-reusable part

P

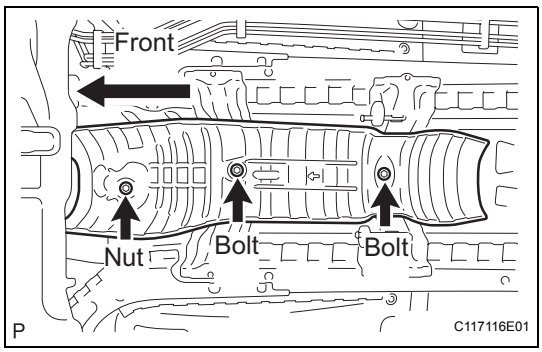
C117083E01

REMOVAL

1. **REMOVE CENTER LOWER INSTRUMENT PANEL FINISH PANEL (for Sedan) (See page PB-6)**
2. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for Sedan) (See page PB-6)**
3. **REMOVE REAR CONSOLE BOX COVER (for Hatchback) (See page PB-6)**
4. **REMOVE REAR UPPER CONSOLE PANEL SUB-ASSEMBLY (for Sedan) (See page PB-7)**
5. **REMOVE CONSOLE BOX CARPET (See page PB-7)**
6. **REMOVE REAR CONSOLE BOX ASSEMBLY (See page PB-8)**
7. **REMOVE BATTERY (See page EM-122)**
8. **REMOVE BATTERY TRAY**
9. **REMOVE AIR CLEANER ASSEMBLY (See page EM-124)**
10. **REMOVE AIR CLEANER BRACKET (See page EM-125)**
11. **SEPARATE OXYGEN SENSOR CONNECTOR**
    (a) Pull back the floor carpet and disconnect the oxygen sensor connector.
    (b) Remove the grommet and put the oxygen sensor connector outside of the vehicle.

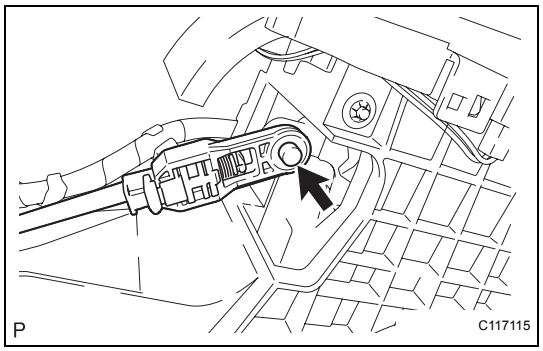


12. **REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page EX-5)**



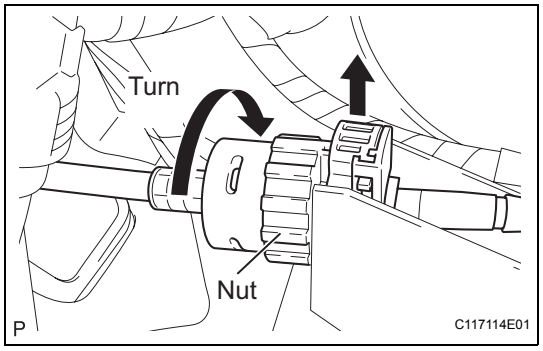
13. **REMOVE FRONT NO. 1 FLOOR HEAT INSULATOR**
    (a) Remove the 2 bolts and the nut and remove floor heat insulator.

AX

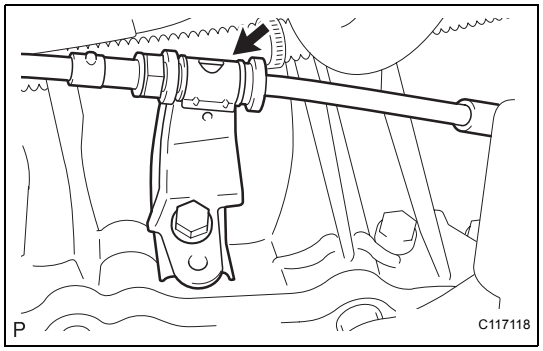


14. REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY

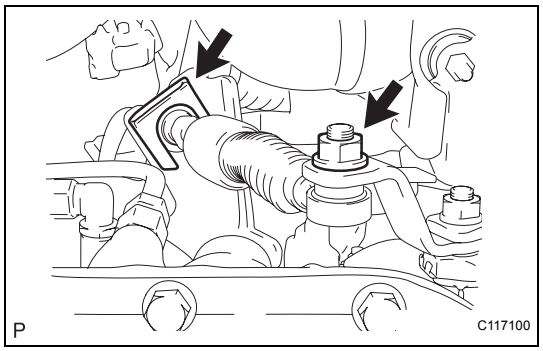
(a) Disconnect the control cable from the shift lever.



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

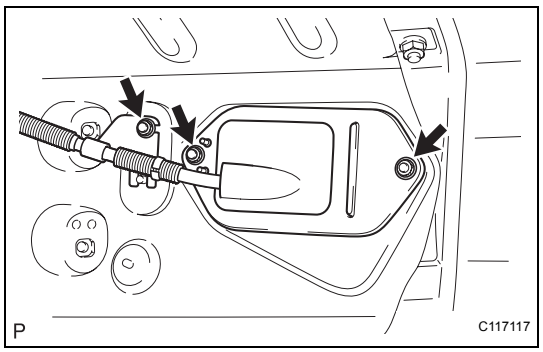


(c) Disconnect the control cable from the control cable support.



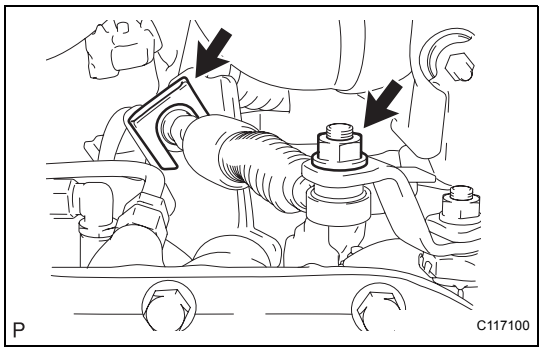
(d) Remove the nut and disconnect the control cable from the control shaft lever.

(e) Remove the clip and separate the control cable from the control cable bracket.



(f) Remove the 3 nuts and remove the control cable.

AX

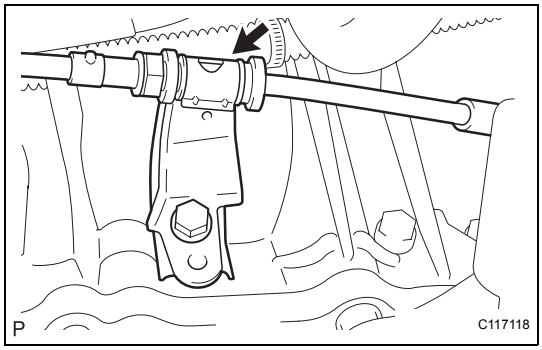


INSTALLATION

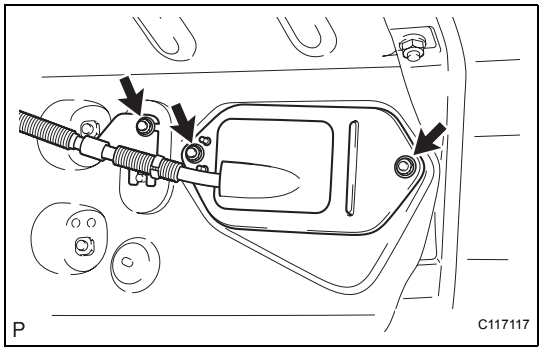
1. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Install the control cable onto the control shaft lever with the nut.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

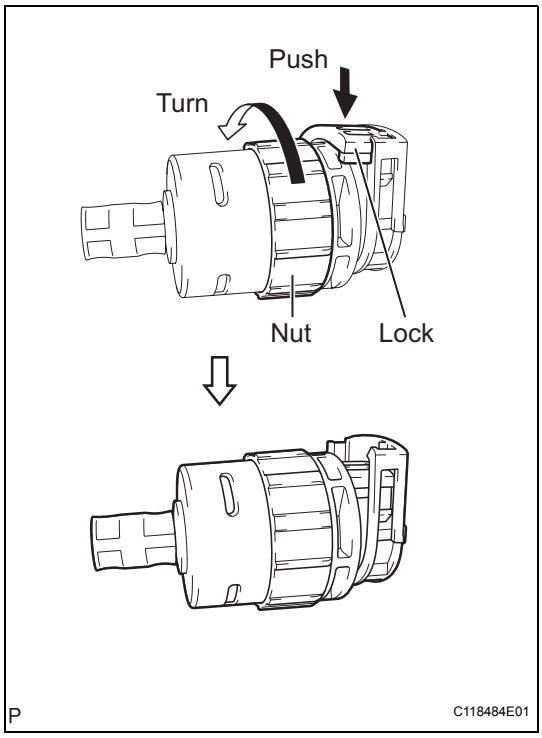
(b) Fix the control cable onto the control cable bracket with a new clip.



(c) Connect the control cable to the clamp.

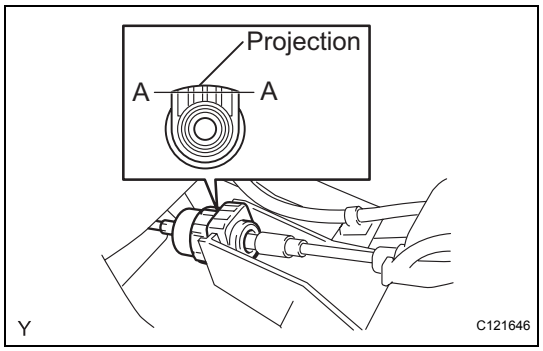


(d) Install the control cable with the 3 nuts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

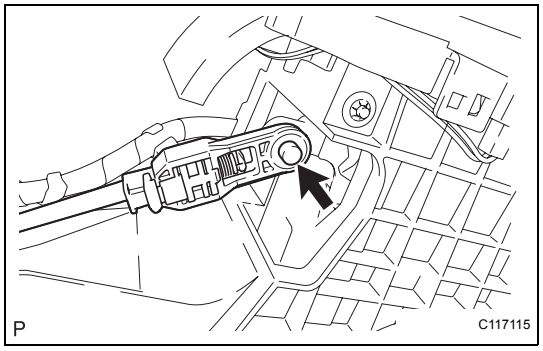


(e) Turn the nut of the control cable and push in the lock.

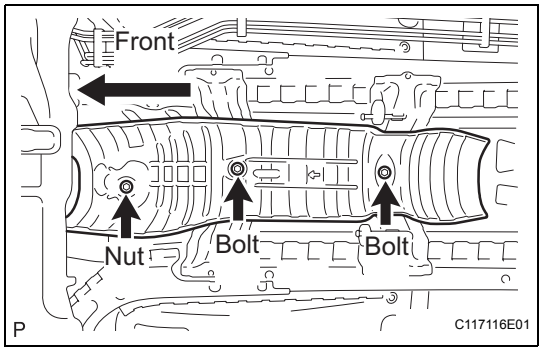
AX



(f) 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.**

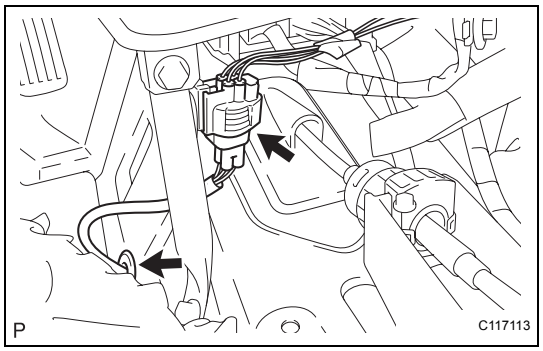


(g) Connect the control cable to the shift lever.
NOTICE:
Connect the control cable so that the adjusting mechanism lock of the control cable is installed on the left side of the vehicle.



2. INSTALL FRONT NO. 1 FLOOR HEAT INSULATOR
(a) Install floor heat insulator with the 2 bolts and the nut.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

3. INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-8)



4. CONNECT OXYGEN SENSOR CONNECTOR
(a) Insert the oxygen sensor connector toward the room side, through the hole in the floor panel, and then install the grommet.
(b) Connect the oxygen sensor connector.

5. INSTALL AIR CLEANER BRACKET (See page EM-145)

6. INSTALL AIR CLEANER ASSEMBLY (See page EM-146)

7. INSTALL BATTERY TRAY

8. INSTALL BATTERY (See page EM-148)

9. INSPECT SHIFT LEVER POSITION (See page AX-134)

10. ADJUST SHIFT LEVER POSITION (See page AX-137)

11. INSTALL REAR CONSOLE BOX ASSEMBLY (See page PB-10)

12. INSTALL CONSOLE BOX CARPET (See page PB-11)

13. INSTALL REAR CONSOLE BOX COVER (for Hatchback) (See page PB-11)

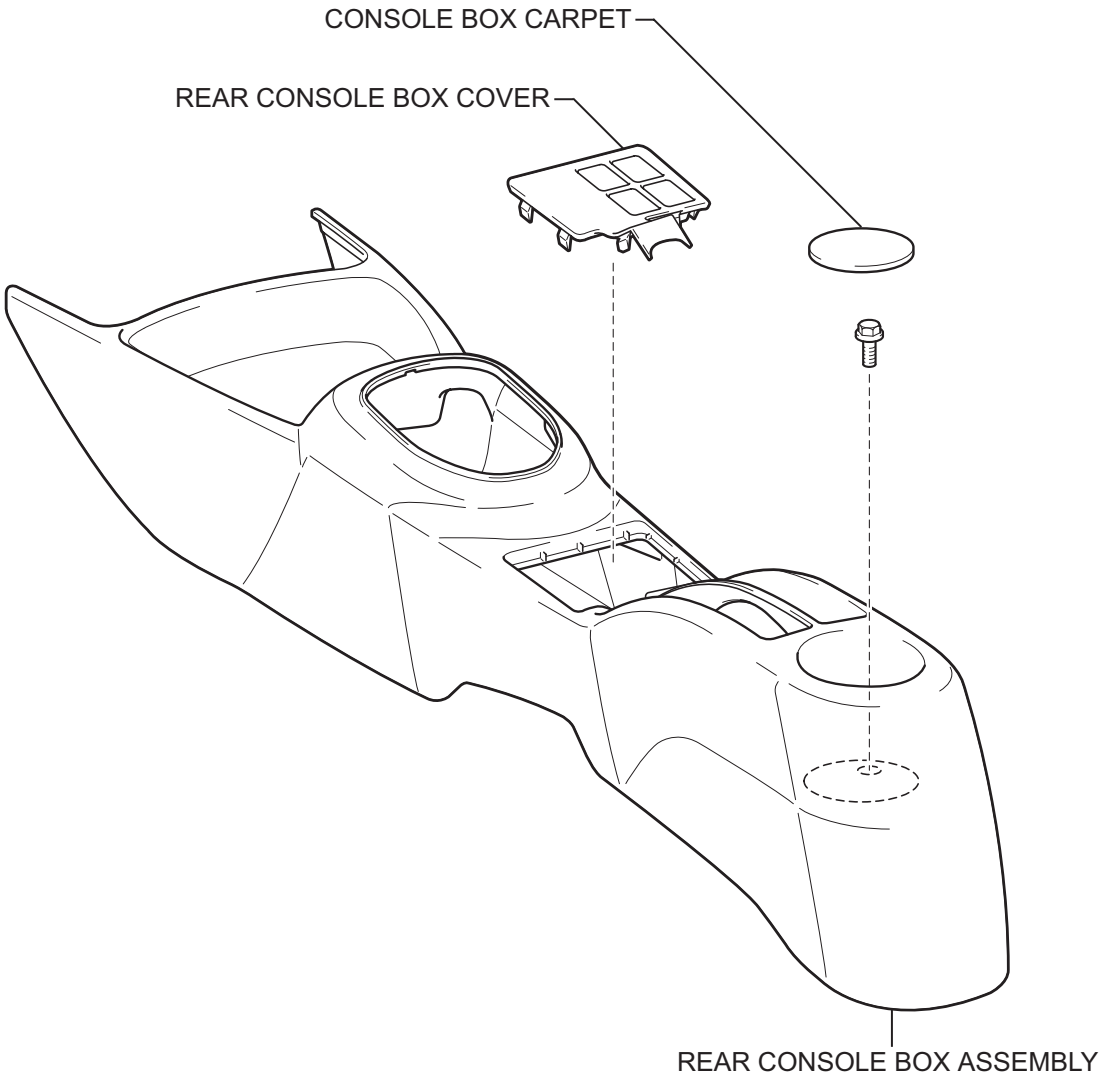
AX

14. **INSTALL REAR UPPER CONSOLE PANEL SUB-ASSEMBLY (for Sedan) (See page PB-11)**
15. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for Sedan) (See page PB-12)**
16. **INSTALL CENTER LOWER INSTRUMENT PANEL FINISH PANEL (for Sedan) (See page PB-12)**
17. **CHECK FOR EXHAUST GAS LEAKAGE**

FLOOR SHIFT ASSEMBLY

COMPONENTS

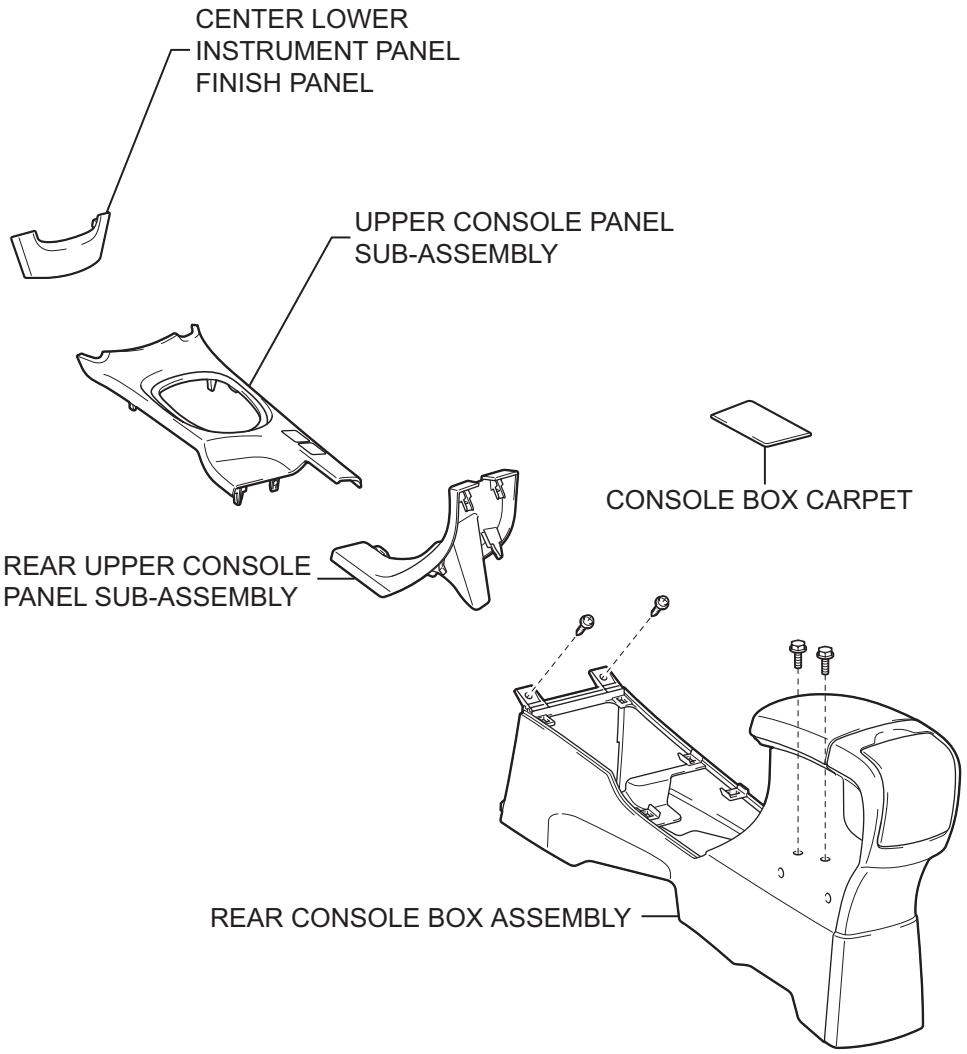
for Hatchback:



P

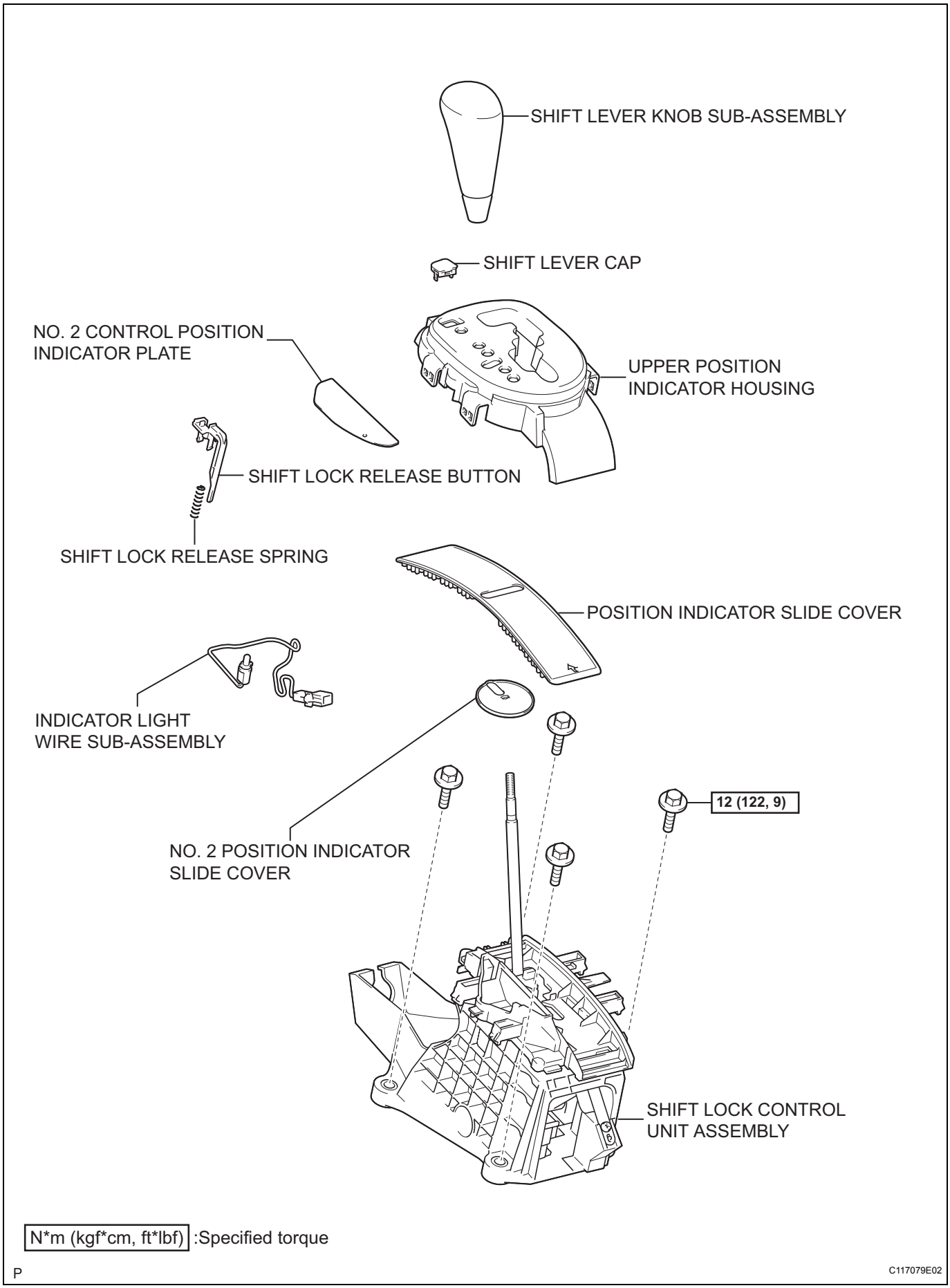
C117078E02

for Sedan:



P

C133134E02


SHIFT LEVER KNOB SUB-ASSEMBLY
SHIFT LEVER CAP
NO. 2 CONTROL POSITION INDICATOR PLATE
UPPER POSITION INDICATOR HOUSING
SHIFT LOCK RELEASE BUTTON
SHIFT LOCK RELEASE SPRING
POSITION INDICATOR SLIDE COVER
INDICATOR LIGHT WIRE SUB-ASSEMBLY
12 (122, 9)
NO. 2 POSITION INDICATOR SLIDE COVER
SHIFT LOCK CONTROL UNIT ASSEMBLY
N*m (kgf*cm, ft*lbf) :Specified torque
P
C117079E02

AX

ON-VEHICLE INSPECTION

1. INSPECT SHIFT LEVER POSITION

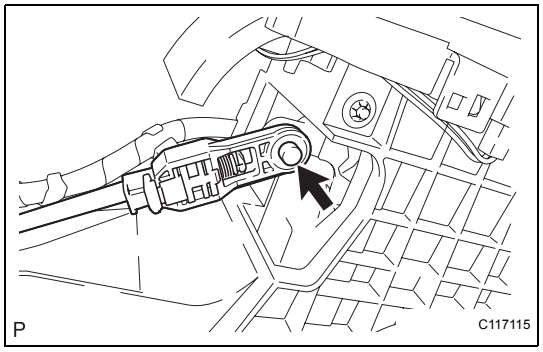
(a) When shifting the lever from P to the R position with the ignition switch ON and the brake pedal depressed, make sure that the shift lever moves smoothly and moves correctly into position.

(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.

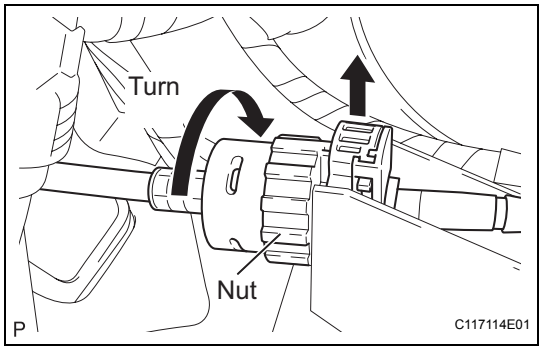
If the operation cannot be performed as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

REMOVAL

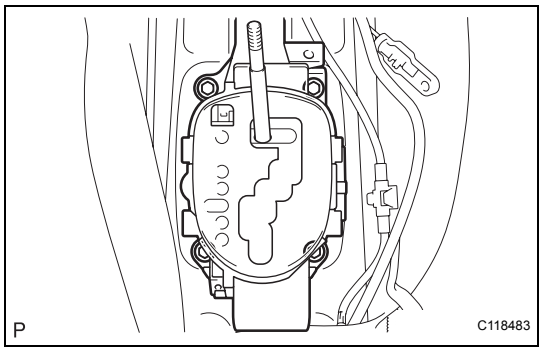
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
   (a) Remove the shift lever knob sub-assembly from the shift lever.
3. **REMOVE CENTER LOWER INSTRUMENT PANEL FINISH PANEL (for Sedan) (See page PB-6)**
4. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for Sedan) (See page PB-6)**
5. **REMOVE REAR CONSOLE BOX COVER (for Hatchback) (See page PB-6)**
6. **REMOVE REAR UPPER CONSOLE PANEL SUB-ASSEMBLY (for Sedan) (See page PB-7)**
7. **REMOVE CONSOLE BOX CARPET (See page PB-7)**
8. **REMOVE REAR CONSOLE BOX ASSEMBLY (See page PB-8)**
9. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Disconnect the control cable from the shift lever.



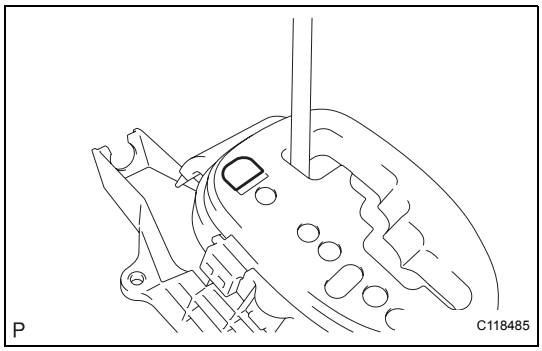
   (b) Turn the nut and separate the control cable from the shift lever retainer.



10. **REMOVE FLOOR SHIFT ASSEMBLY**
    (a) Separate the shift lock control computer connector and indicator wire connector.
    (b) Separate the 2 wire harness clamps from the shift lever.
    (c) Remove the 4 bolts and remove the shift lever.

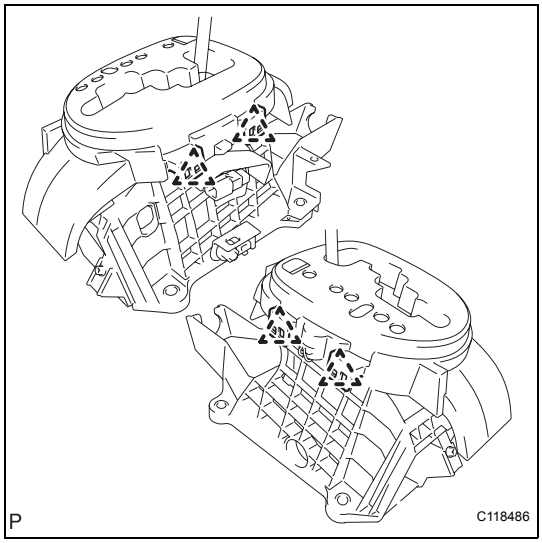


DISASSEMBLY



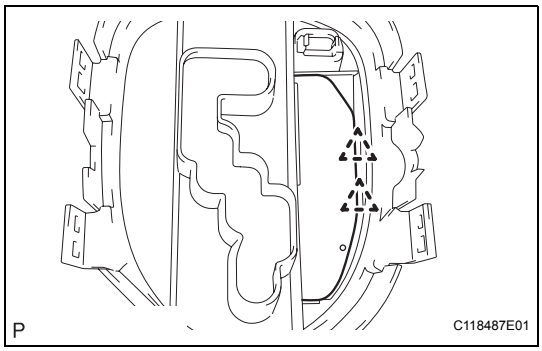
1. REMOVE SHIFT LEVER CAP

(a) Remove the shift lever cap from the position indicator housing upper.



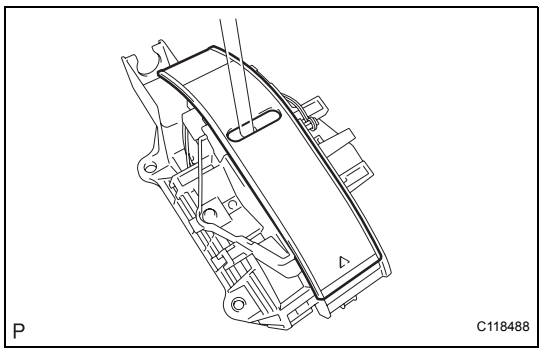
2. REMOVE UPPER POSITION INDICATOR HOUSING

(a) Release the 4 claws using a screwdriver and remove the upper position indicator housing from the shift lock control unit.



3. REMOVE NO. 2 CONTROL POSITION INDICATOR PLATE

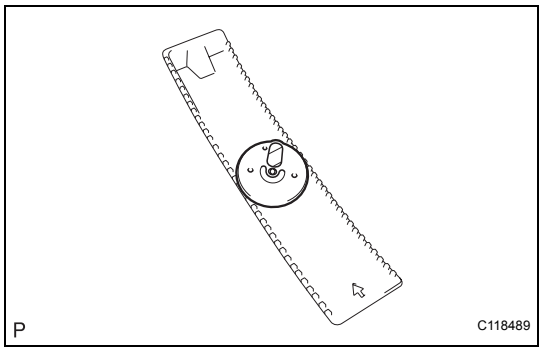
(a) Release the 2 claws using a screwdriver and remove position indicator plate from the upper position indicator housing.



4. REMOVE POSITION INDICATOR SLIDE COVER

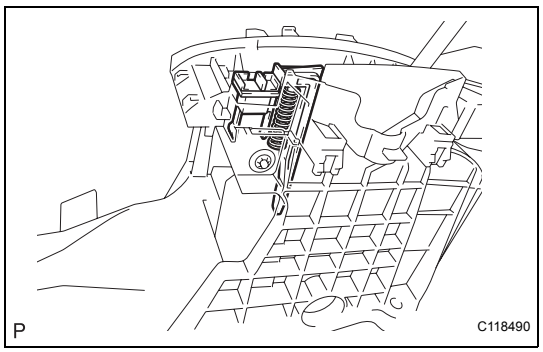
(a) Remove the position indicator slide cover from the shift lock control unit.

AX



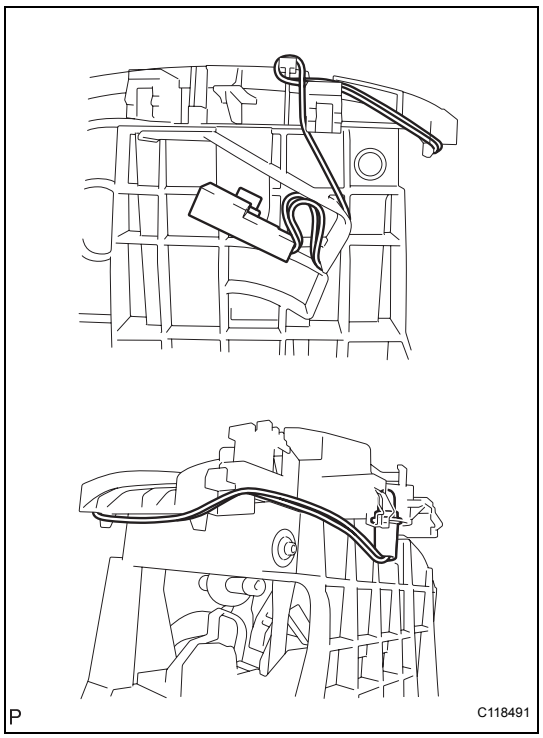
5. REMOVE NO. 2 POSITION INDICATOR SLIDE COVER

(a) Remove No. 2 position indicator slide cover from the position indicator slide cover.



6. REMOVE SHIFT LOCK RELEASE BUTTON

(a) Remove the shift lock release button and shift lock release spring from the shift lock control unit.



7. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Remove the indicator light wire sub-assembly from the shift lock control unit.

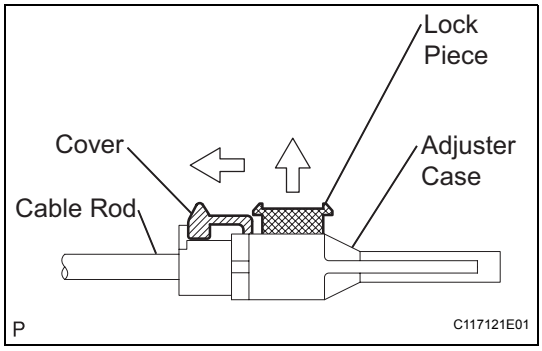
ADJUSTMENT

1. ADJUST SHIFT LEVER POSITION

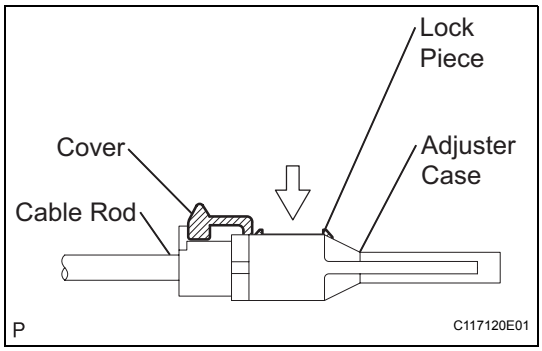
(a) Shift the shift lever to the N position.

(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.

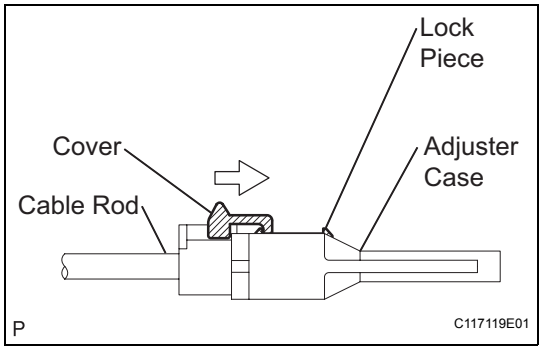


(d) Press the lock piece into the adjuster case and lock it.

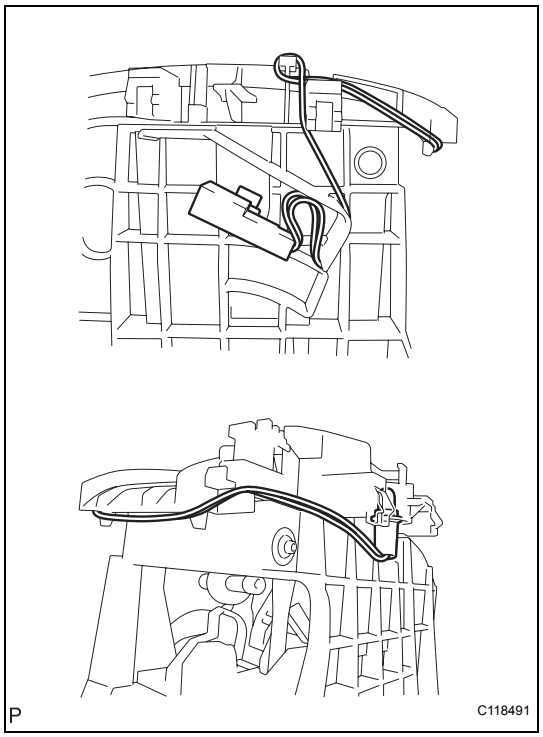


(e) Slide the cover in the direction shown in the illustration.
NOTICE:
Slide the cover past the protrusion of the lock piece.

(f) Inspect the operation after the adjustment.



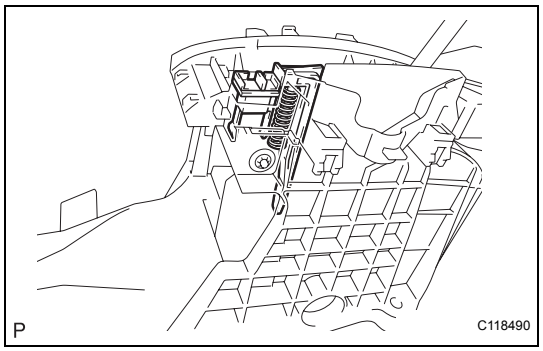
AX



REASSEMBLY

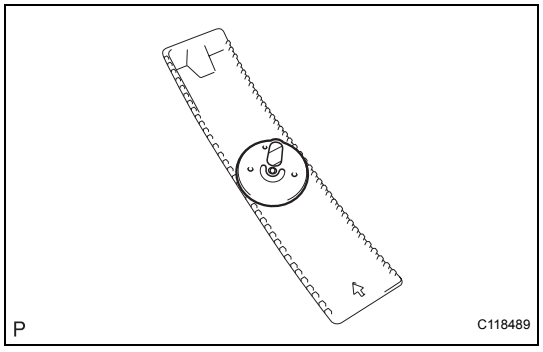
1. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Install the indicator light wire onto the shift lock control unit.



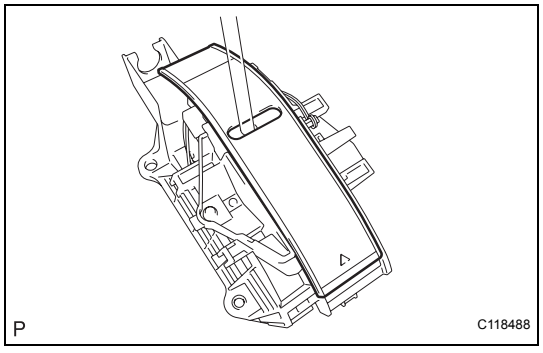
2. INSTALL SHIFT LOCK RELEASE BUTTON

(a) Install the shift lock release button and spring onto the shift lock control unit.



3. INSTALL NO. 2 POSITION INDICATOR SLIDE COVER

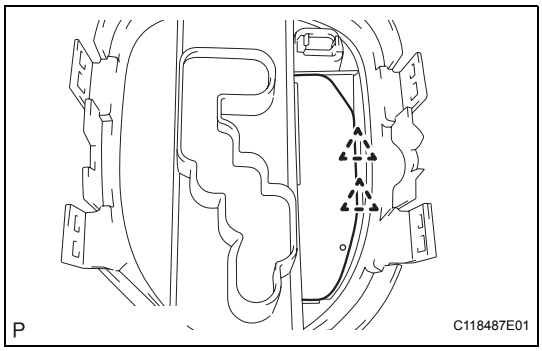
(a) Install No. 2 position indicator slide cover onto the position indicator slide cover.



4. INSTALL POSITION INDICATOR SLIDE COVER

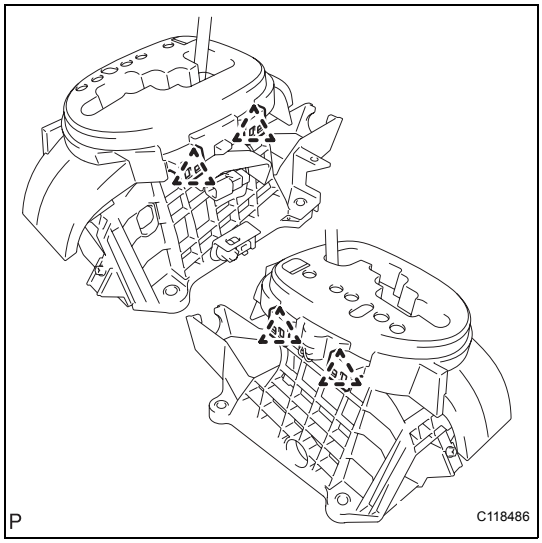
(a) Install the position indicator slide cover onto the shift lock control unit.

AX



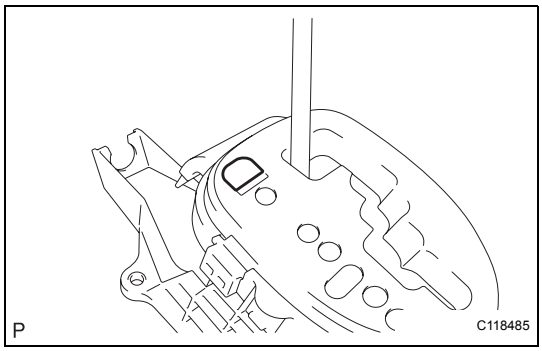
5. INSTALL NO. 2 CONTROL POSITION INDICATOR PLATE

(a) Install position indicator plate onto the upper position indicator housing.



6. INSTALL UPPER POSITION INDICATOR HOUSING

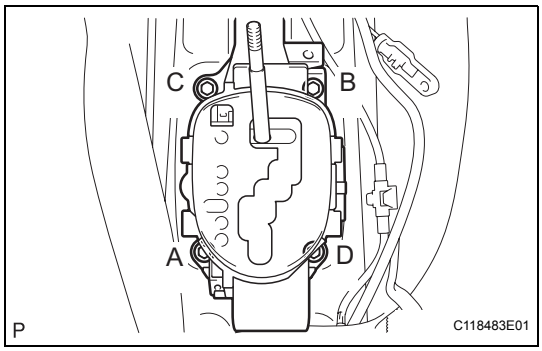
(a) Install the upper position indicator housing onto the shift lock control unit.
NOTICE:
Securely engage the 4 claws.



7. INSTALL SHIFT LEVER CAP

(a) Install the shift lever cap onto the position indicator housing upper.

INSTALLATION

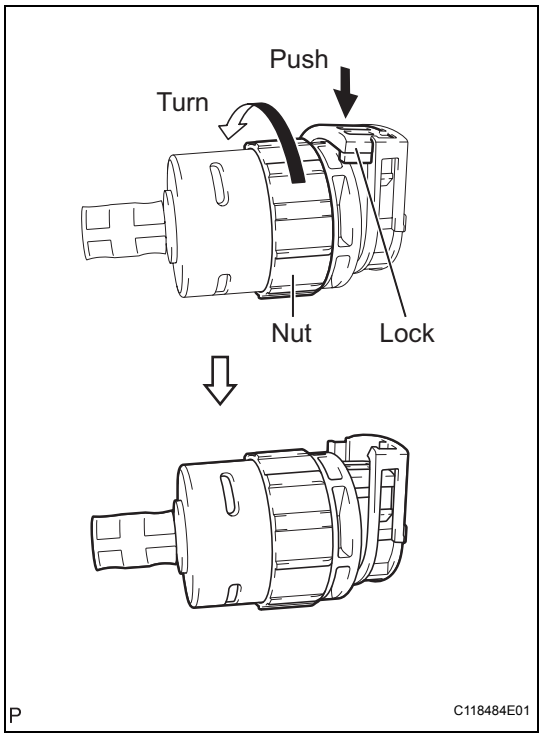


1. INSTALL FLOOR SHIFT ASSEMBLY

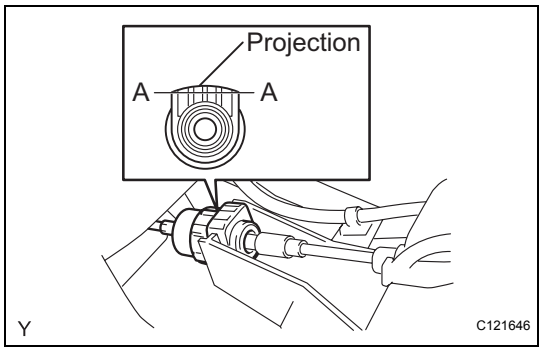
(a) Provisionally install the shift lever with the 4 bolts.
NOTICE:
Do not jam the wiring of the indicator light or shift lock.

(b) Tighten the 4 bolts in order, from A to D.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

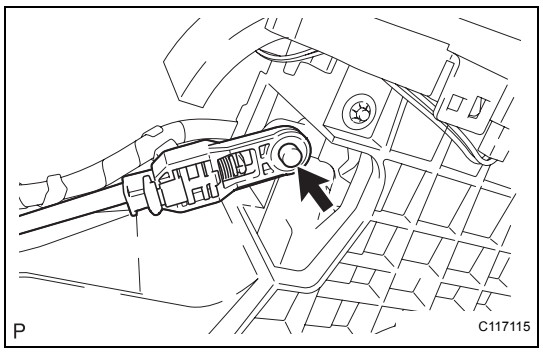
(c) Install the shift lock control computer connector and indicator light connector.



2. **CONNECT TRANSMISSION 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.
   CAUTION:
   - **Install the cable with the projection 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.

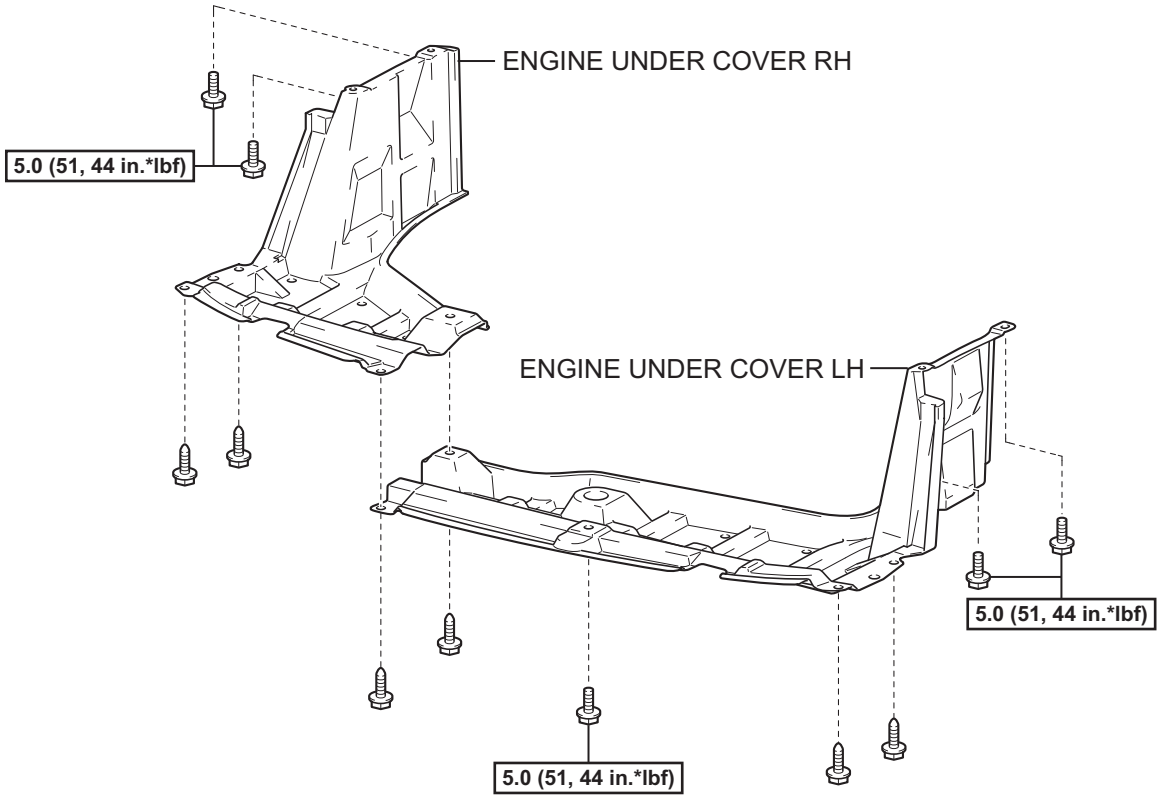
3. **INSPECT SHIFT LEVER POSITION (See page AX-134)**
4. **ADJUST SHIFT LEVER POSITION (See page AX-137)**
5. **INSTALL REAR CONSOLE BOX ASSEMBLY (See page PB-10)**
6. **INSTALL CONSOLE BOX CARPET (See page PB-11)**
7. **INSTALL REAR CONSOLE BOX COVER (for Hatchback) (See page PB-11)**
8. **INSTALL REAR UPPER CONSOLE PANEL SUB-ASSEMBLY (for Sedan) (See page PB-11)**
9. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for Sedan) (See page PB-12)**
10. **INSTALL CENTER LOWER INSTRUMENT PANEL FINISH PANEL (for Sedan) (See page PB-12)**
11. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY**
    (a) Install the shift lever knob sub-assembly onto the shift lever.

AX

12. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

DIFFERENTIAL OIL SEAL

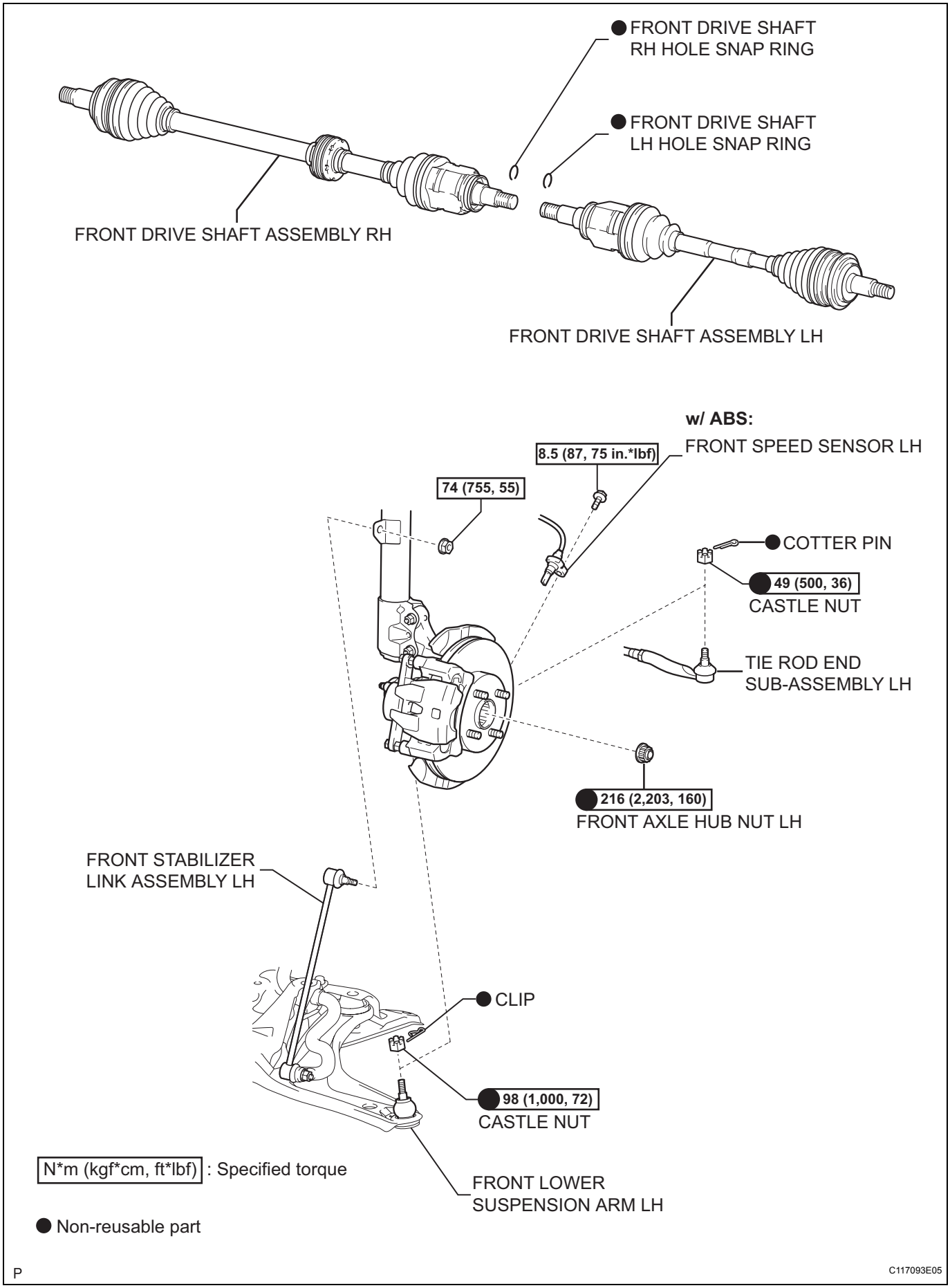
COMPONENTS



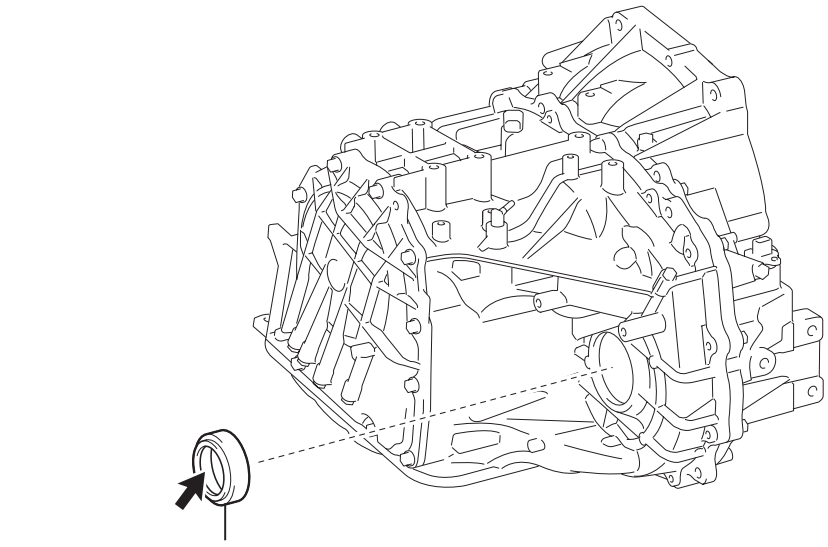
N*m (kgf*cm, ft*lbf) :Specified torque

P

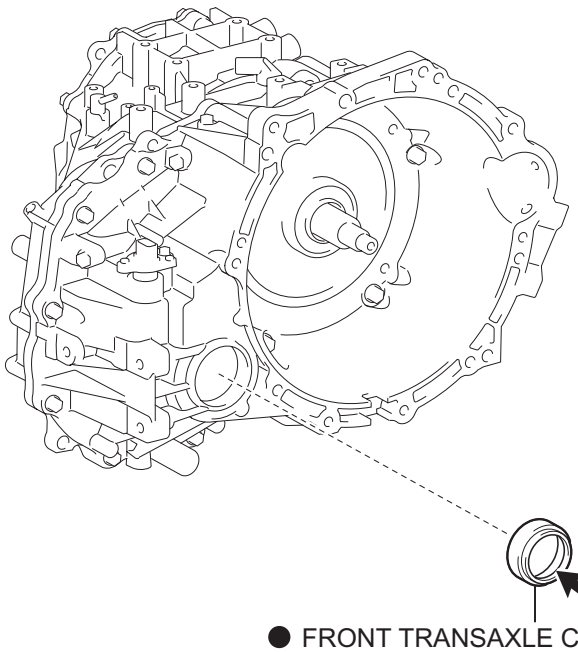
C117094E01


● FRONT DRIVE SHAFT RH HOLE SNAP RING
● FRONT DRIVE SHAFT LH HOLE SNAP RING
FRONT DRIVE SHAFT ASSEMBLY RH
FRONT DRIVE SHAFT ASSEMBLY LH
w/ ABS:
8.5 (87, 75 in.*lbf)
FRONT SPEED SENSOR LH
74 (755, 55)
● COTTER PIN
● 49 (500, 36)
CASTLE NUT
TIE ROD END SUB-ASSEMBLY LH
● 216 (2,203, 160)
FRONT AXLE HUB NUT LH
FRONT STABILIZER LINK ASSEMBLY LH
● CLIP
● 98 (1,000, 72)
CASTLE NUT
FRONT LOWER SUSPENSION ARM LH
N*m (kgf*cm, ft*lbf) : Specified torque
● Non-reusable part
P
C117093E05

AX



● TRANSAXLE CASE OIL SEAL



● Non-reusable part

◀ Apply MP grease

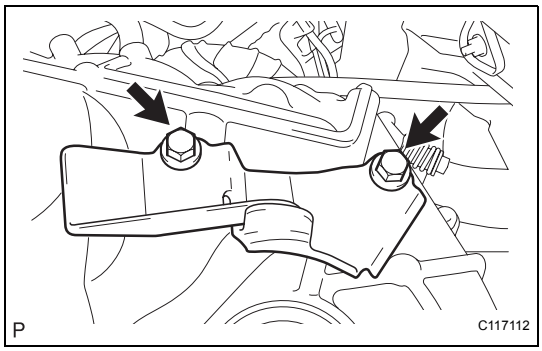
● FRONT TRANSAXLE CASE OIL SEAL

P

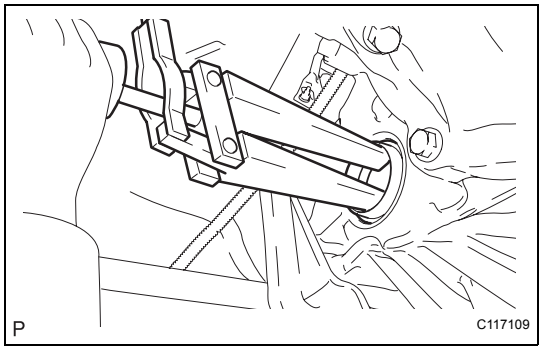
C117084E01

REMOVAL

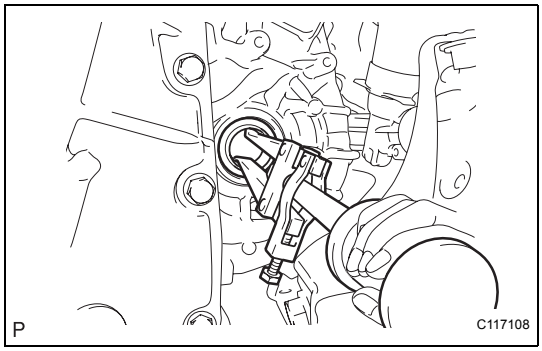
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT WHEELS**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **DRAIN AUTOMATIC TRANSAXLE FLUID**
   (a) Remove the drain plug and gasket, and drain the automatic transaxle fluid.
   (b) Install a new gasket and the drain plug.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
6. **REMOVE FRONT AXLE HUB NUT LH (See page DS-3)**
7. **REMOVE FRONT AXLE HUB NUT RH**
   HINT:
   The removal procedure for the RH side is the same as that for the LH side.
8. **SEPARATE FRONT SPEED SENSOR LH (w/ ABS) (See page DS-3)**
9. **SEPARATE FRONT SPEED SENSOR RH (w/ ABS)**
   HINT:
   The separation procedure for the RH side is the same as that for the LH side.
10. **SEPARATE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-4)**
11. **SEPARATE FRONT STABILIZER LINK ASSEMBLY RH**
    HINT:
    The separation procedure for the RH side is the same as that for the LH side.
12. **SEPARATE TIE ROD END SUB-ASSEMBLY LH (See page DS-3)**
13. **SEPARATE TIE ROD END SUB-ASSEMBLY RH**
    HINT:
    The separation procedure for the RH side is the same as that for the LH side.
14. **SEPARATE FRONT LOWER SUSPENSION ARM LH (See page DS-4)**
15. **SEPARATE FRONT LOWER SUSPENSION ARM RH**
    HINT:
    The separation procedure for the RH side is the same as that for the LH side.



16. **REMOVE TRANSMISSION CASE PROTECTOR (w/o ABS)**
    (a) Remove the 2 bolts and remove the transmission case protector from the automatic transansaxle.
17. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-5)**
18. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-5)**

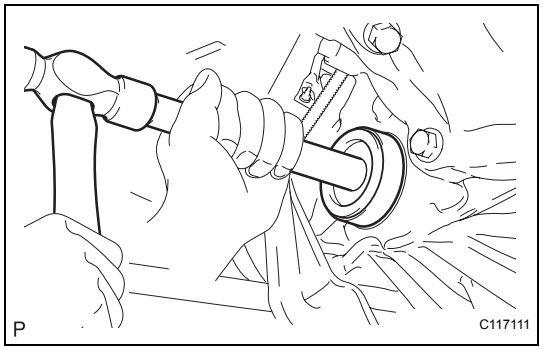


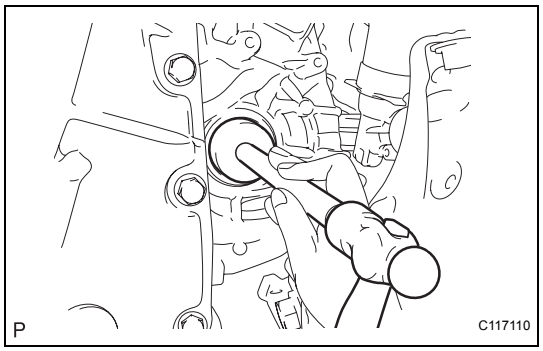
19. **REMOVE FRONT TRANSAXLE CASE OIL SEAL**
    (a) Using SST, remove the front transaxle case oil seal.
    SST 09308-00010

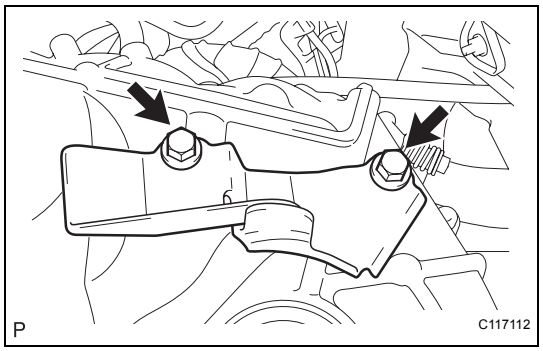


20. **REMOVE TRANSAXLE CASE OIL SEAL**
    (a) Using SST, remove the transaxle case oil seal.
    SST 09308-00010

INSTALLATION







1. **INSTALL FRONT TRANSAXLE CASE OIL SEAL**
   (a) Coat the lip of a new oil seal with MP grease.
   (b) Using SST and a hammer, install the front transaxle case oil seal.
   SST 09554-14010, 09950-70010 (09951-07200)
   Drive in depth:
   1.5 to 2.5 mm (0.059 to 0.098 in.)
   NOTICE:
   Do not damage the oil seal lip.
2. **INSTALL TRANSAXLE CASE OIL SEAL**
   (a) Coat the lip of a new oil seal with MP grease.
   (b) Using SST and a hammer, install the transaxle case oil seal.
   SST 09710-20011 (09710-06071), 09950-70010 (09951-07200)
   Drive in depth:
   5.4 to 6.4 mm (0.213 to 0.252 in.)
   NOTICE:
   Do not damage the oil seal lip.
3. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-13)**
4. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-14)**
5. **INSTALL TRANSMISSION CASE PROTECTOR (w/o ABS)**
   (a) Install the transmission case protector onto the automatic transaxle with the 2 bolts.
6. **INSTALL FRONT LOWER SUSPENSION ARM LH (See page DS-14)**
7. **INSTALL FRONT LOWER SUSPENSION ARM RH**
   HINT:
   The installation procedure for the RH side is the same as that for the LH side.
8. **INSTALL TIE ROD END SUB-ASSEMBLY LH (See page DS-15)**
9. **INSTALL TIE ROD END SUB-ASSEMBLY RH**
   HINT:
   The installation procedure for the RH side is the same as that for the LH side.
10. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-14)**
11. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
    HINT:
    The installation procedure for the RH side is the same as that for the LH side.

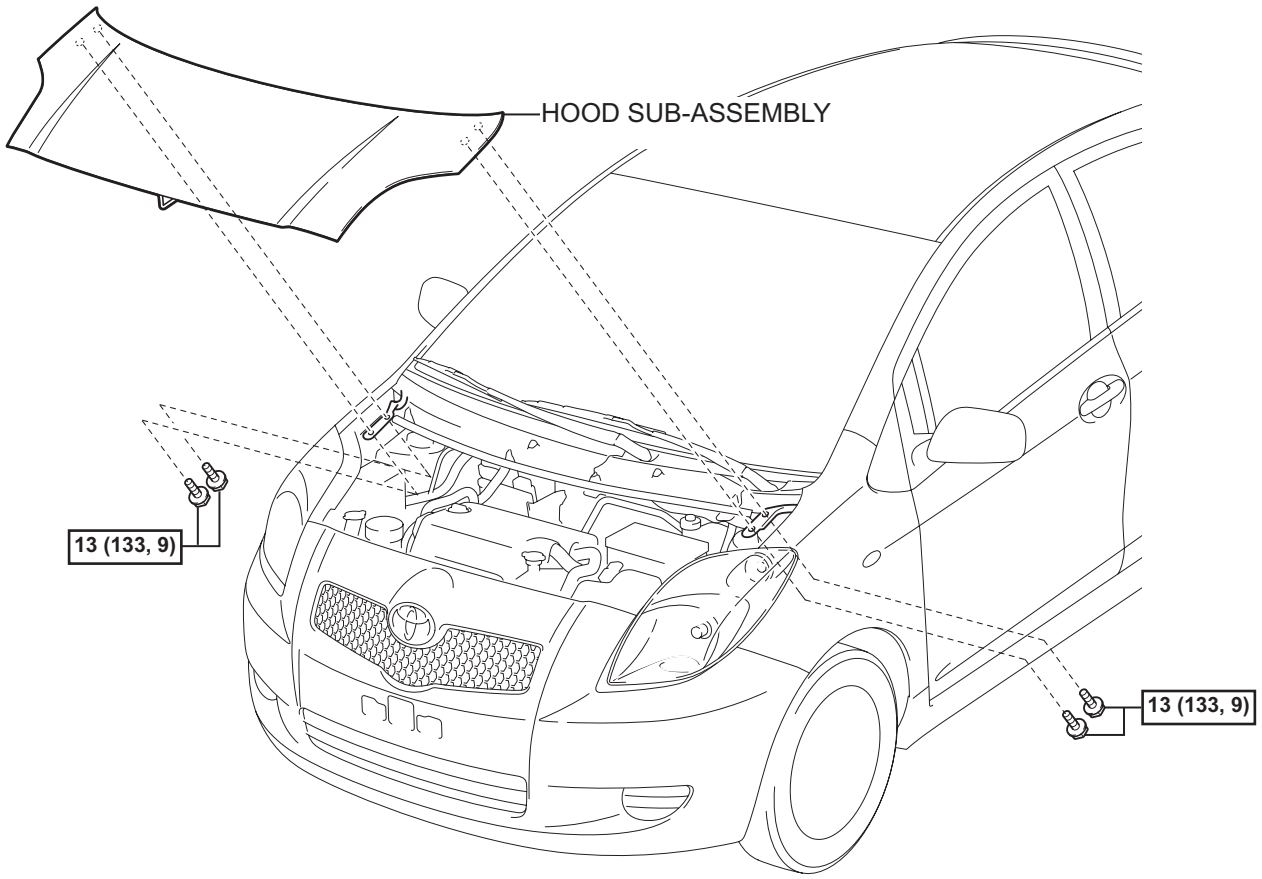
AX

12. **INSTALL FRONT SPEED SENSOR LH (w/ ABS) (See page DS-15)**
13. **INSTALL FRONT SPEED SENSOR RH (w/ ABS)**
    HINT:
    The installation procedure for the RH side is the same as that for the LH side.
14. **INSTALL FRONT AXLE HUB NUT LH (See page DS-15)**
15. **INSTALL FRONT AXLE HUB NUT RH**
    HINT:
    The installation procedure for the RH side is the same as that for the LH side.
16. **INSTALL FRONT WHEELS**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
17. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
    Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
18. **ADD AUTOMATIC TRANSAXLE FLUID (See page AX-170)**
19. **INSPECT AUTOMATIC TRANSAXLE FLUID (See page AX-93)**
20. **CHECK AUTOMATIC TRANSAXLE FLUID LEAKAGE**
21. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT** (See page SP-2)
22. **INSTALL ENGINE UNDER COVER RH**
23. **INSTALL ENGINE UNDER COVER LH**

AUTOMATIC TRANSAXLE ASSEMBLY

COMPONENTS

for Hatchback:



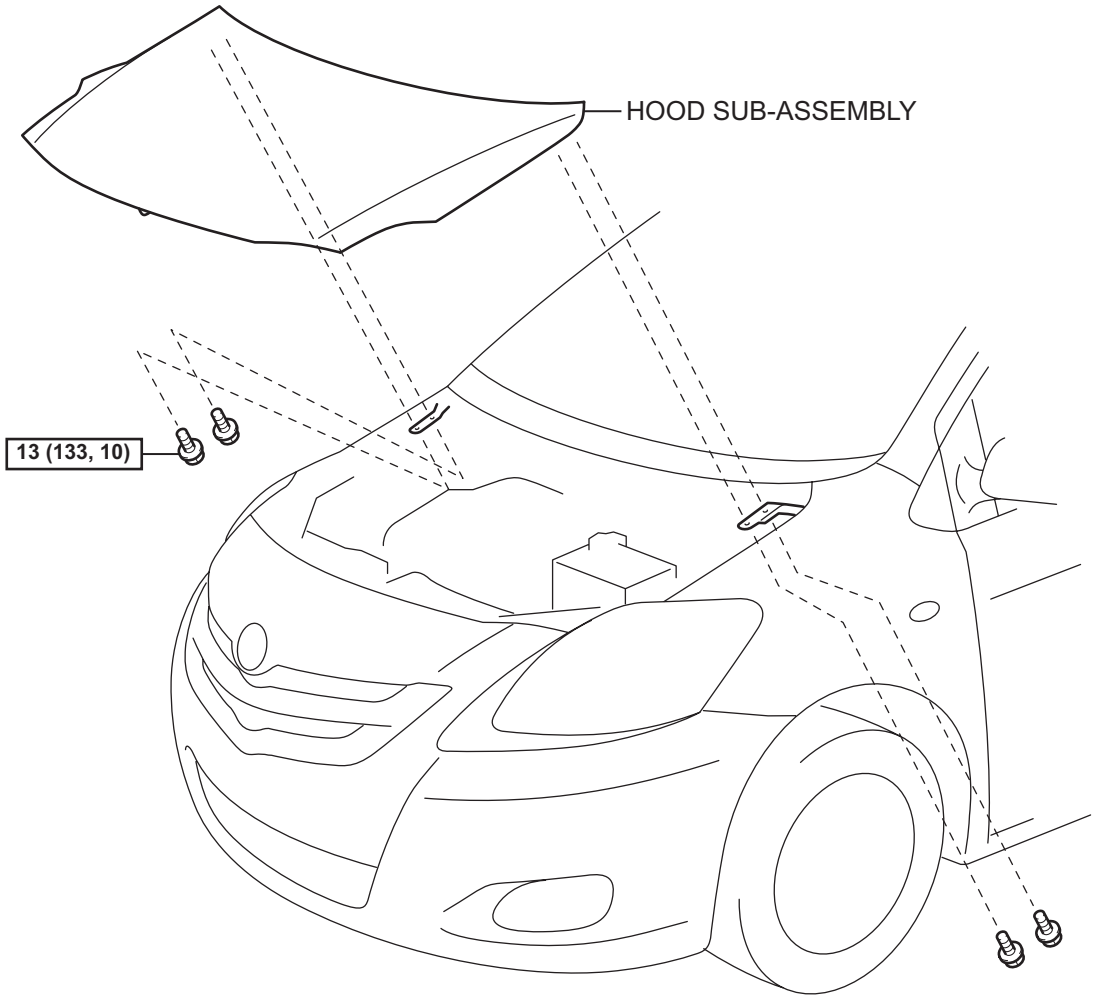
N*m (kgf*cm, ft.*lbf) : Specified torque

P

C117202E02

AX

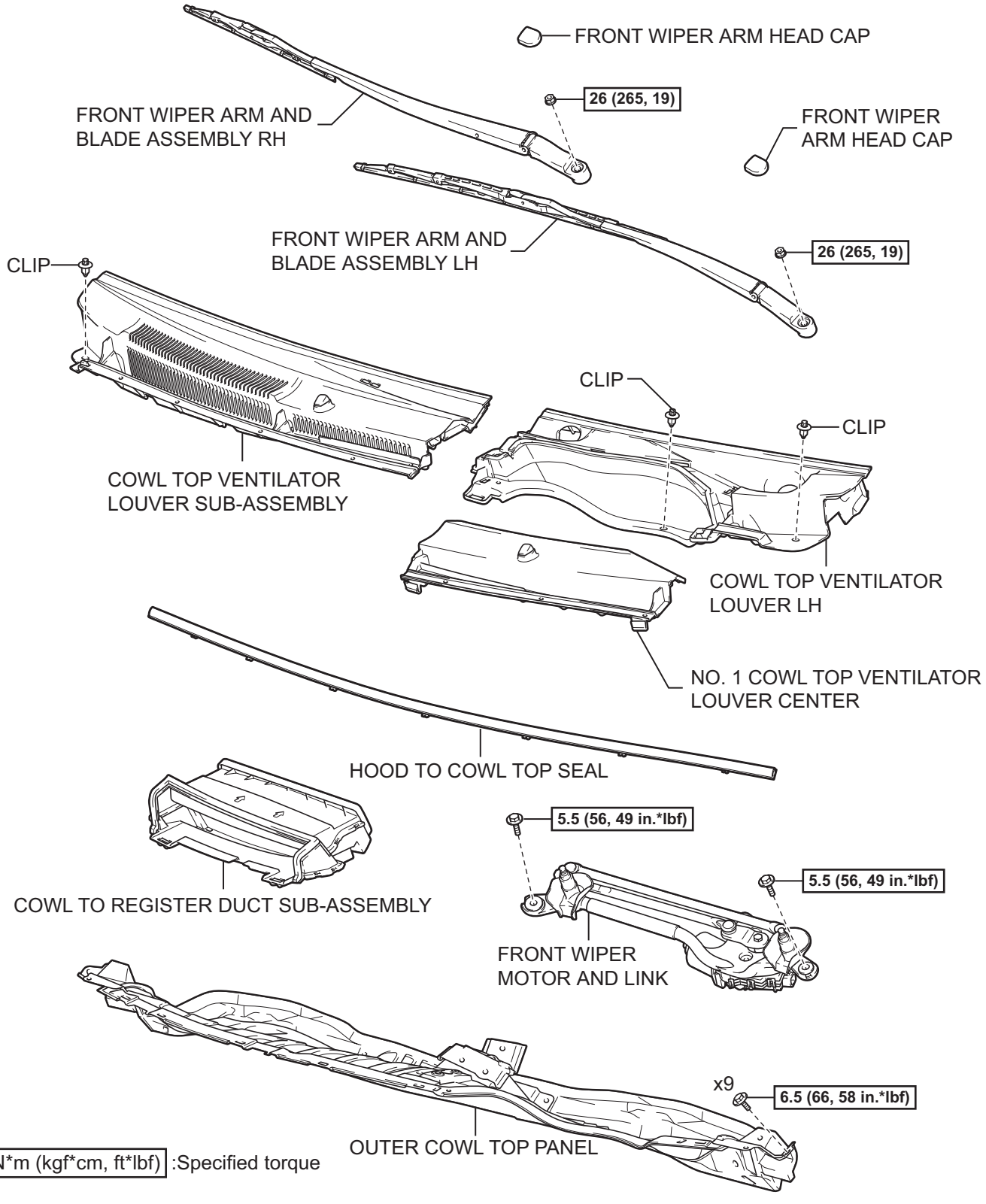
for Sedan:



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

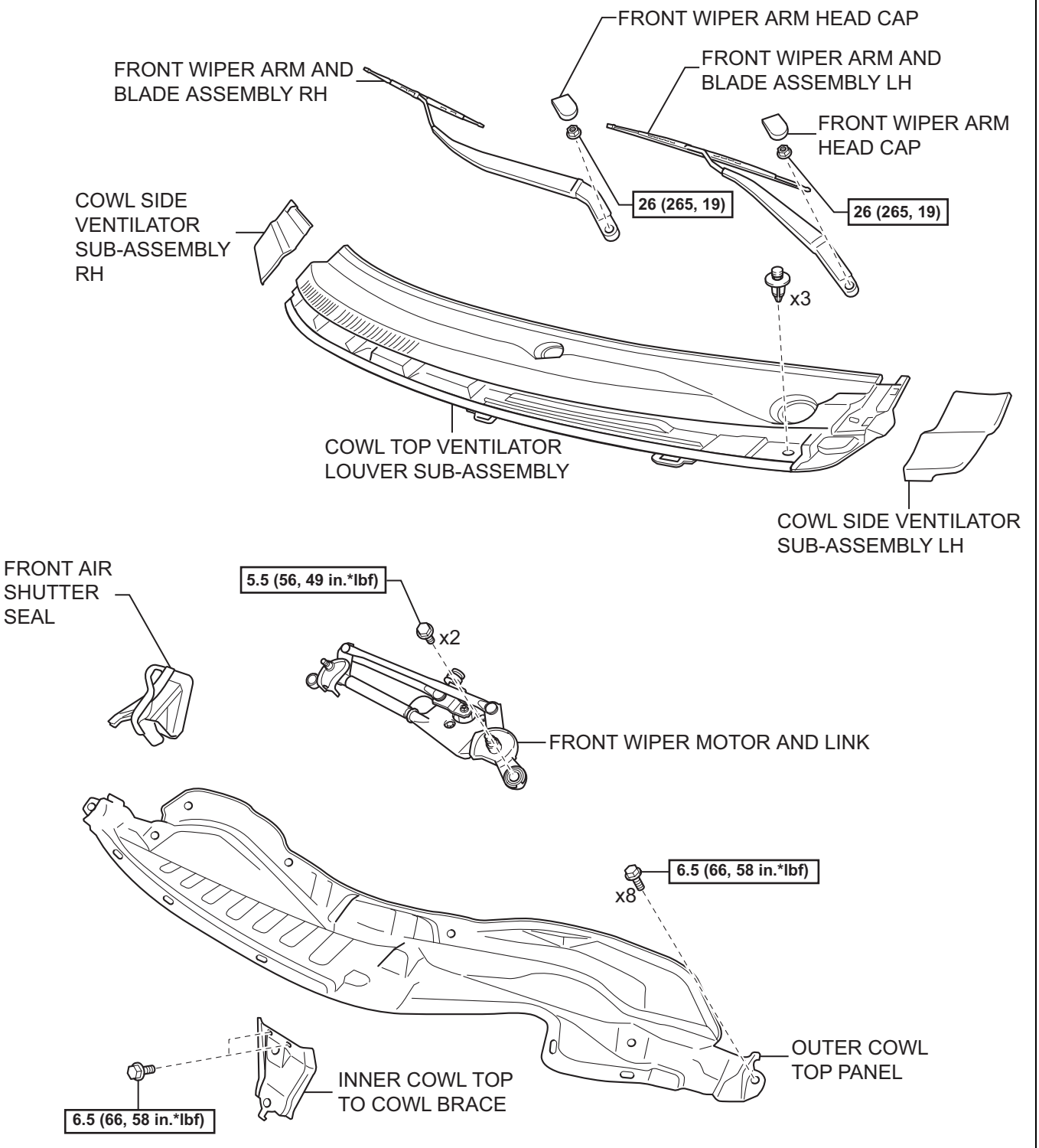
B135922E02

for Hatchback:



AX

for Sedan:

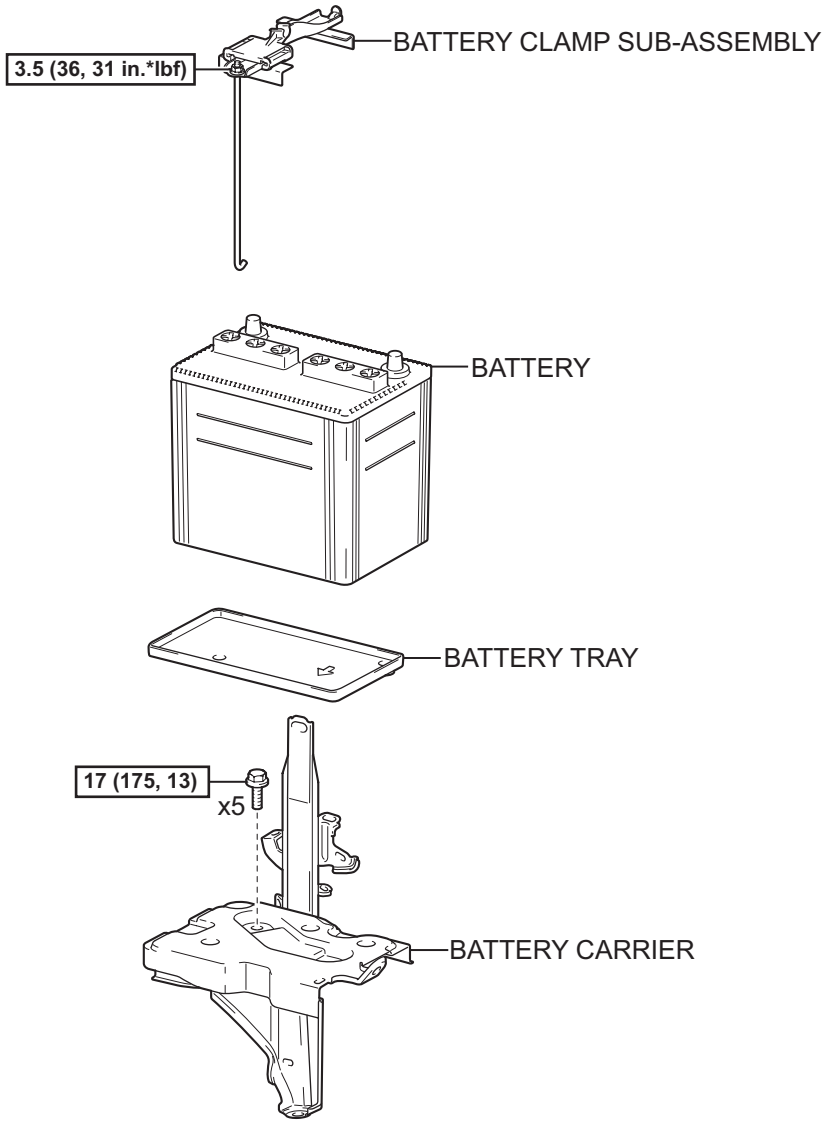


AX

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

Y

A133320E07

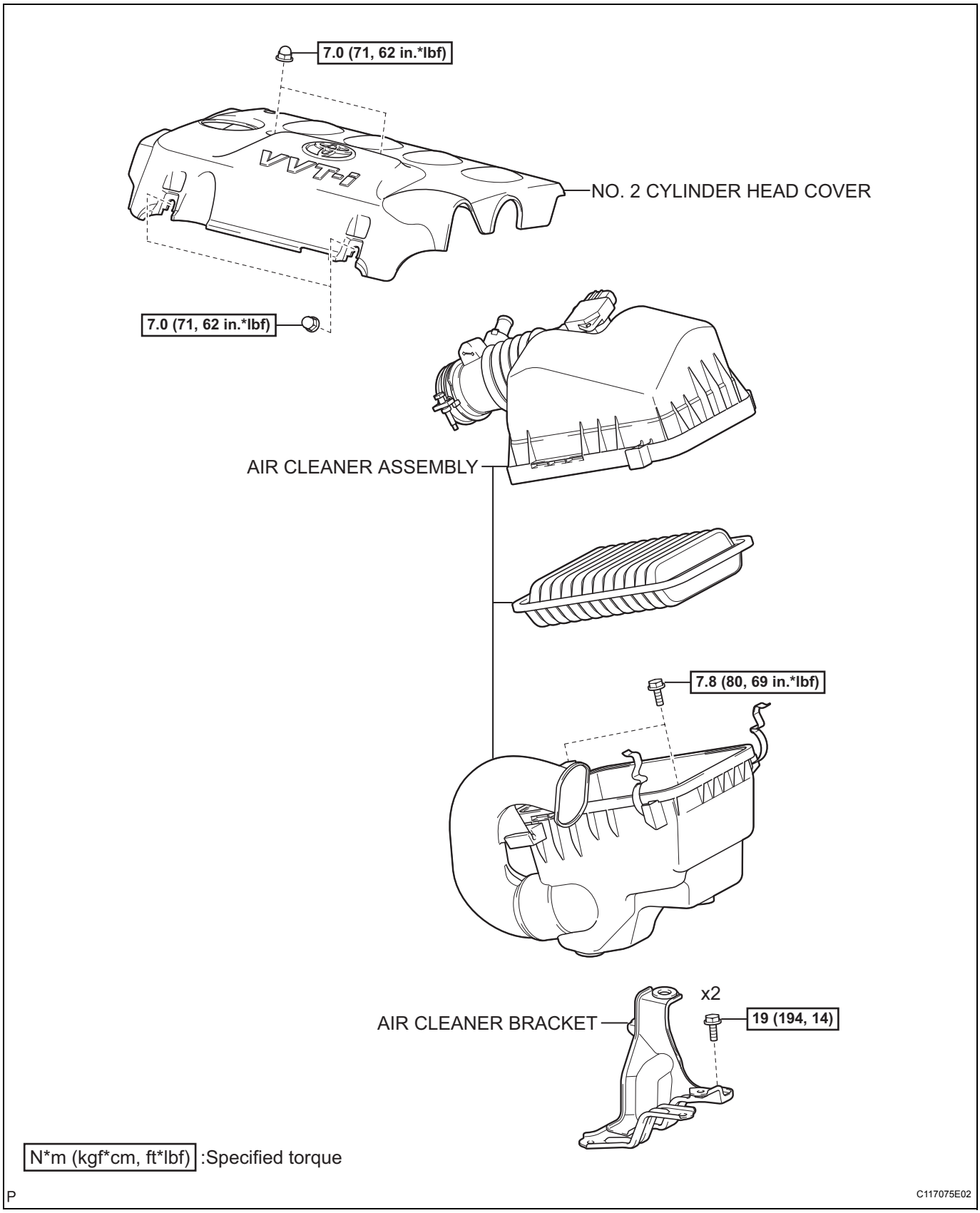


N*m (kgf*cm, ft*lbf) :Specified torque

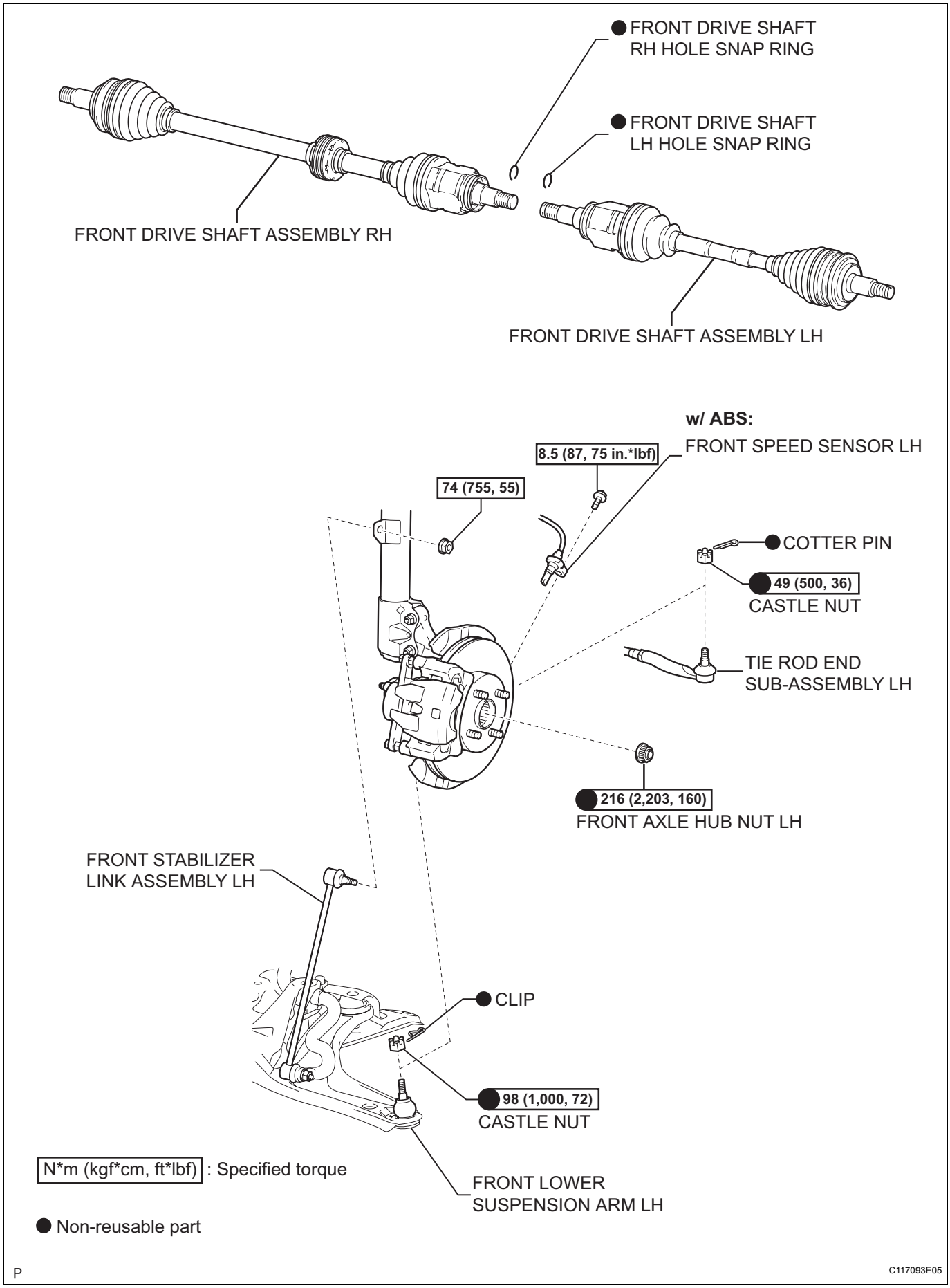
P

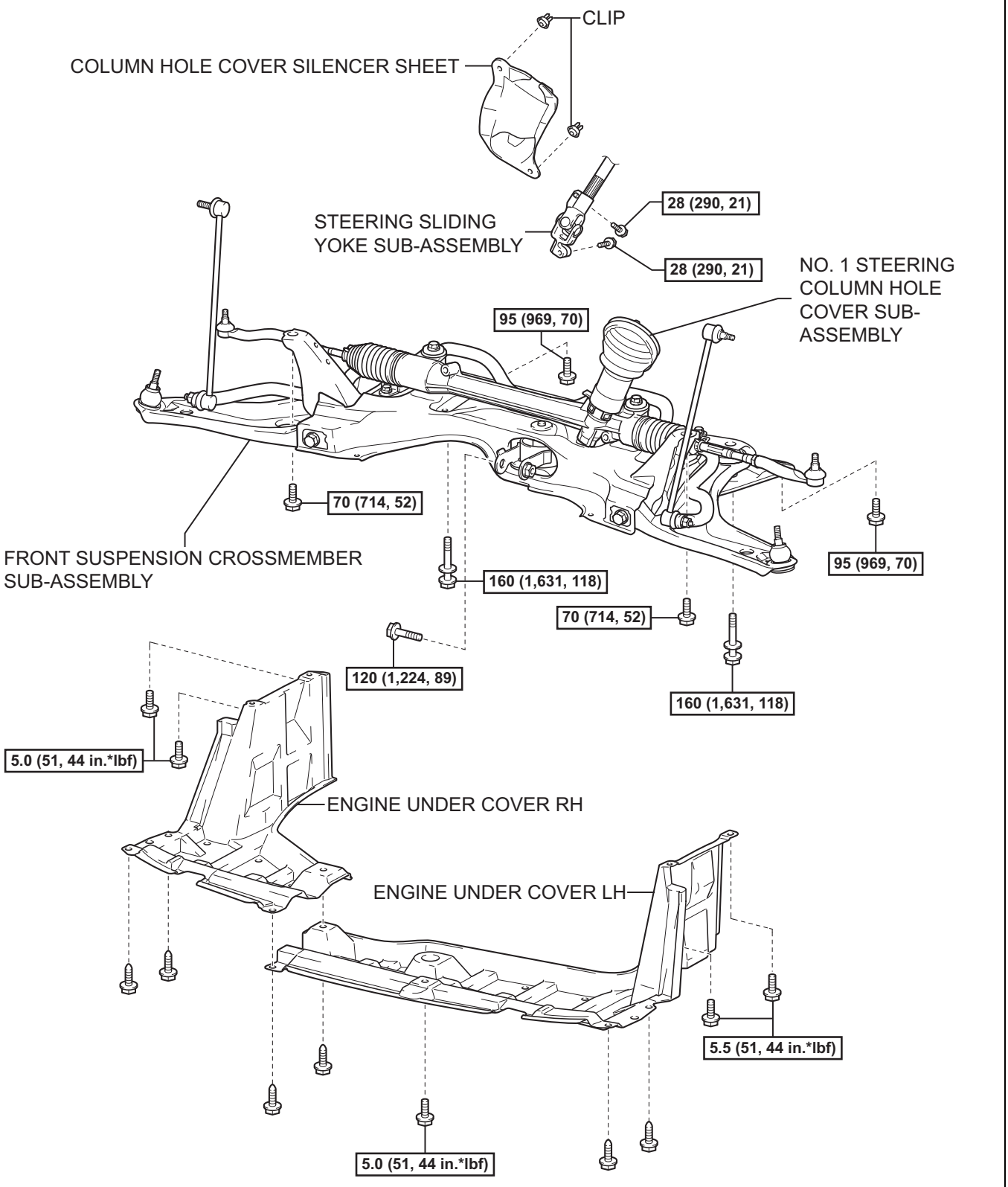
C117082E01

AX


7.0 (71, 62 in.*lbf)
NO. 2 CYLINDER HEAD COVER
7.0 (71, 62 in.*lbf)
AIR CLEANER ASSEMBLY
7.8 (80, 69 in.*lbf)
x2
AIR CLEANER BRACKET
19 (194, 14)
N*m (kgf*cm, ft*lbf) :Specified torque
P
C117075E02

AX


● FRONT DRIVE SHAFT RH HOLE SNAP RING
● FRONT DRIVE SHAFT LH HOLE SNAP RING
FRONT DRIVE SHAFT ASSEMBLY RH
FRONT DRIVE SHAFT ASSEMBLY LH
w/ ABS:
8.5 (87, 75 in.*lbf)
FRONT SPEED SENSOR LH
74 (755, 55)
● COTTER PIN
● 49 (500, 36)
CASTLE NUT
TIE ROD END SUB-ASSEMBLY LH
● 216 (2,203, 160)
FRONT AXLE HUB NUT LH
FRONT STABILIZER LINK ASSEMBLY LH
● CLIP
● 98 (1,000, 72)
CASTLE NUT
FRONT LOWER SUSPENSION ARM LH
N*m (kgf*cm, ft*lbf) : Specified torque
● Non-reusable part
P
C117093E05

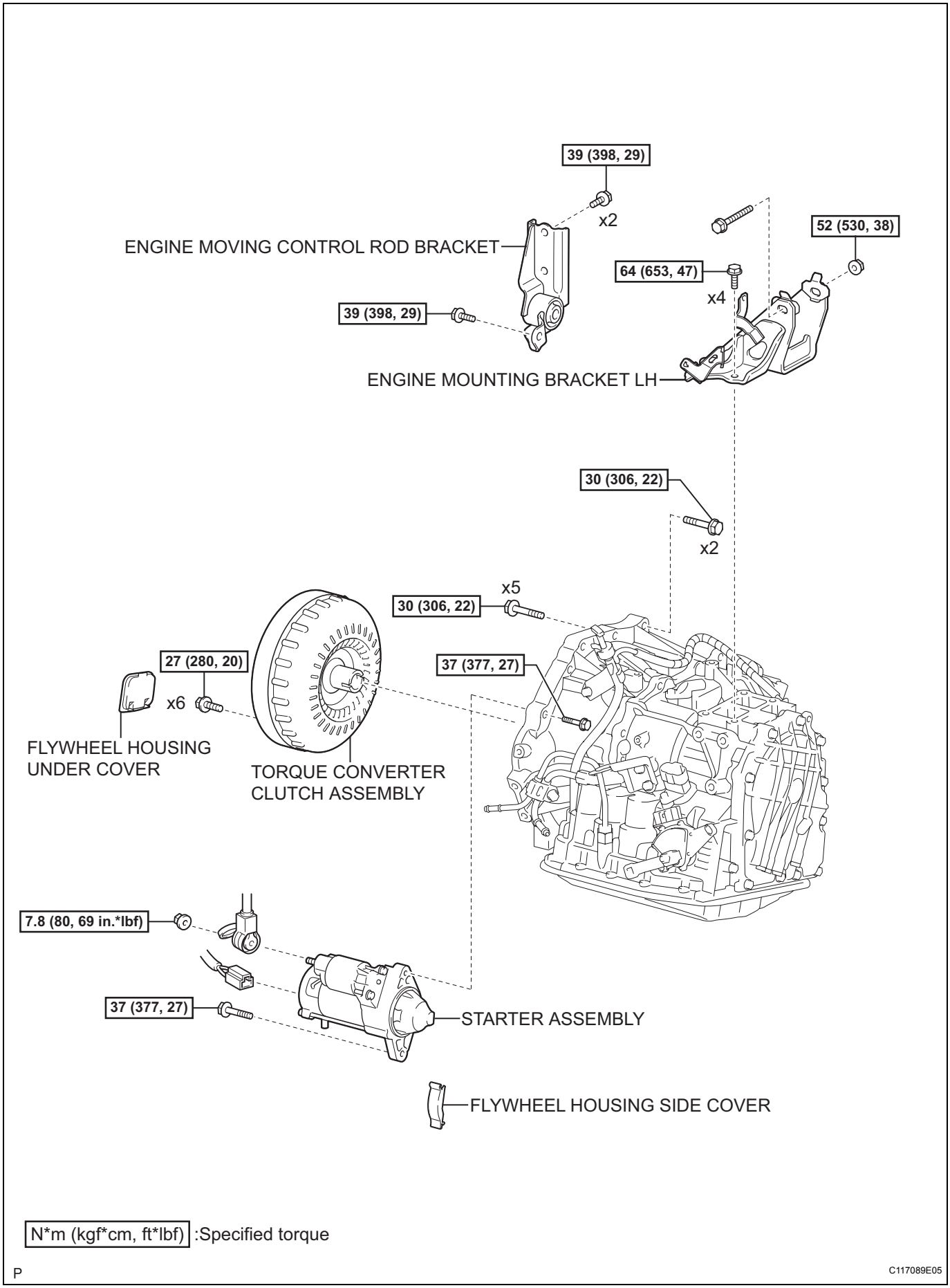


AX

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

P

C117092E02

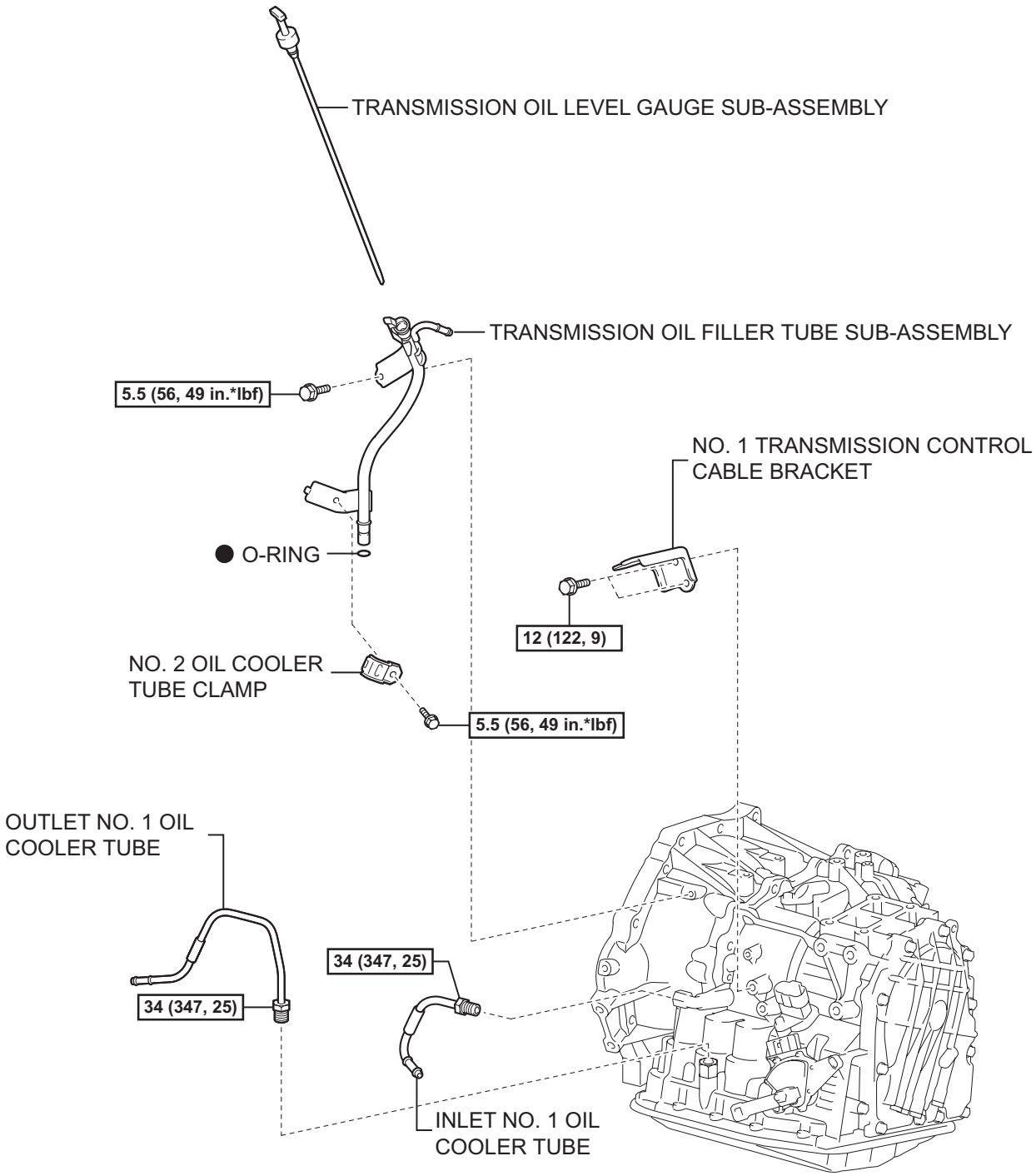


AX

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

P

C117089E05



AX

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

● Non-reusable part

P

C117090E02

REMOVAL

1. **REMOVE HOOD SUB-ASSEMBLY**
   Hatchback: (See page PS-74)
   Sedan: (See page PS-63)
2. **REMOVE FRONT WHEELS**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **DRAIN AUTOMATIC TRANSAXLE FLUID**
   (a) Remove the drain plug and gasket, and drain the ATF.
   (b) Install a new gasket and the drain plug.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
6. **REMOVE FRONT WIPER ARM HEAD CAP**
   Hatchback: (See page WW-17)
   Sedan: (See page WW-9)
7. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH**
   Hatchback: (See page WW-17)
   Sedan: (See page WW-9)
8. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH**
   Hatchback: (See page WW-17)
   Sedan: (See page WW-9)
9. **REMOVE HOOD TO COWL TOP SEAL (for Hatchback) (See page WW-18)**
10. **REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY LH (for Sedan) (See page WW-10)**
11. **REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY RH (for Sedan) (See page WW-10)**
12. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY**
    Hatchback: (See page WW-18)
    Sedan: (See page WW-10)
13. **REMOVE COWL TOP VENTILATOR LOUVER LH (for Hatchback) (See page WW-18)**
14. **REMOVE FRONT WIPER MOTOR AND LINK**
    Hatchback: (See page WW-19)
    Sedan: (See page WW-10)
15. **REMOVE COWL TO REGISTER DUCT SUB-ASSEMBLY (for Hatchback) (See page EM-122)**
16. **REMOVE FRONT AIR SHUTTER SEAL (for Sedan) (See page EM-123)**
17. **REMOVE OUTER COWL TOP PANEL**
    Hatchback: (See page EM-123)
    Sedan: (See page EM-123)
18. **REMOVE BATTERY (See page EM-122)**

19. **REMOVE BATTERY TRAY**

20. **REMOVE BATTERY CARRIER (See page EM-125)**

21. **REMOVE NO. 2 CYLINDER HEAD COVER (See page IG-9)**

22. **REMOVE AIR CLEANER ASSEMBLY (See page EM-124)**

23. **REMOVE AIR CLEANER BRACKET (See page EM-125)**

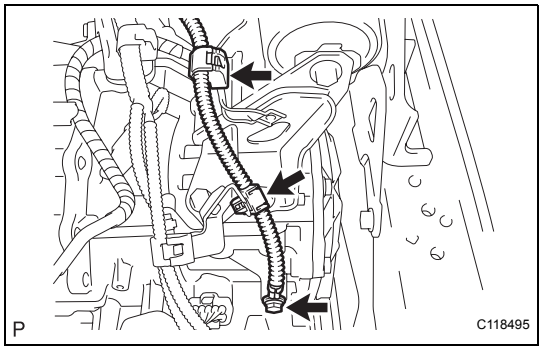
24. **POSITION WHEELS FACING STRAIGHT AHEAD**

25. **REMOVE COLUMN HOLE COVER SILENCER SHEET (See page SR-32)**

26. **SEPARATE STEERING SLIDING YOKE SUB-ASSEMBLY (See page PS-74)**

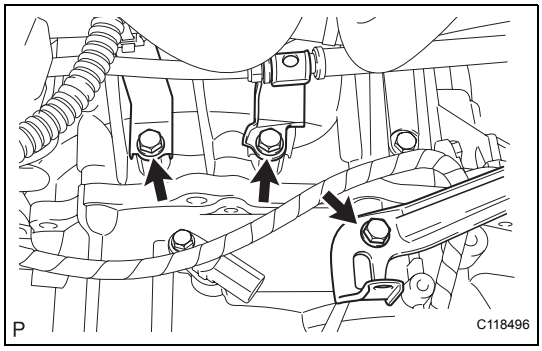
27. **SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY (See page PS-75)**

28. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (See page AX-106)**



29. **SEPARATE NO. 3 ENGINE WIRE**
    (a) Remove the bolt and separate No. 3 engine wire from the automatic transaxle.
    (b) Separate the 2 clamps from the engine mount insulator.

30. **DISCONNECT CONNECTORS**
    (a) Separate the park neutral position switch connector and separate the clamp from the engine mount insulator LH.
    (b) Separate the transmission wire connector and separate the clamp from the engine mount insulator.
    (c) Separate the transmission revolution sensor connector.
    (d) Separate the vehicle speed sensor connector.



31. **DISCONNECT WIRE HARNESS**
    (a) Remove the 3 bolts and separate the 3 wire harness clamp brackets from the automatic transaxle.

32. **REMOVE STARTER ASSEMBLY (See page ST-9)**

33. **REMOVE FRONT AXLE HUB NUT LH (See page DS-3)**

34. **REMOVE FRONT AXLE HUB NUT RH**
    HINT:
    The removal procedure for the RH side is the same as that for the LH side.

35. **SEPARATE FRONT SPEED SENSOR LH (w/ ABS) (See page DS-3)**

36. **SEPARATE FRONT SPEED SENSOR RH (w/ ABS)**
    HINT:
    The separation procedure for the RH side is the same as that for the LH side.

37. **SEPARATE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-4)**

38. **SEPARATE FRONT STABILIZER LINK ASSEMBLY RH**
HINT:
The separation procedure for the RH side is the same as that for the LH side.

39. **SEPARATE TIE ROD END SUB-ASSEMBLY LH (See page DS-3)**

40. **SEPARATE TIE ROD END SUB-ASSEMBLY RH**
HINT:
The separation procedure for the RH side is the same as that for the LH side.

41. **SEPARATE FRONT LOWER SUSPENSION ARM LH (See page DS-4)**

42. **SEPARATE FRONT LOWER SUSPENSION ARM RH**
HINT:
The separation procedure for the RH side is the same as that for the LH side.

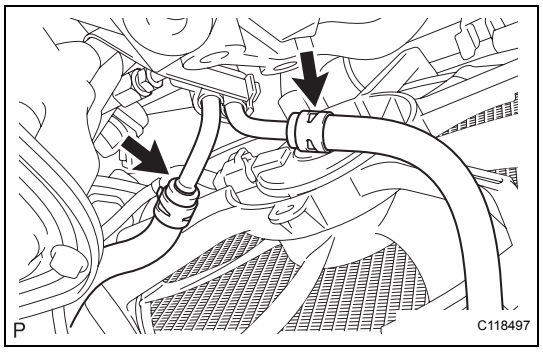
43. **REMOVE TRANSMISSION CASE PROTECTOR (w/o ABS) (See page AX-146)**

44. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-5)**

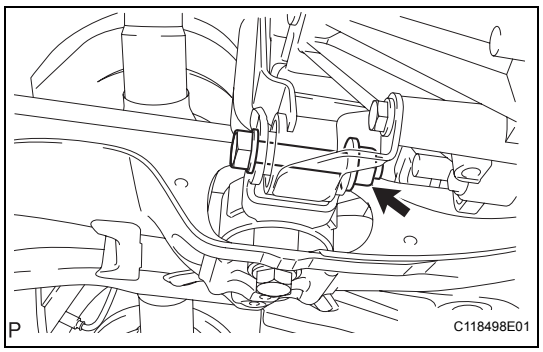
45. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-5)**

46. **SUSPEND ENGINE ASSEMBLY (See page PS-75)**

47. **SEPARATE INLET OIL COOLER HOSE**
(a) Separate the inlet oil cooler hose from inlet No. 1 oil cooler tube.



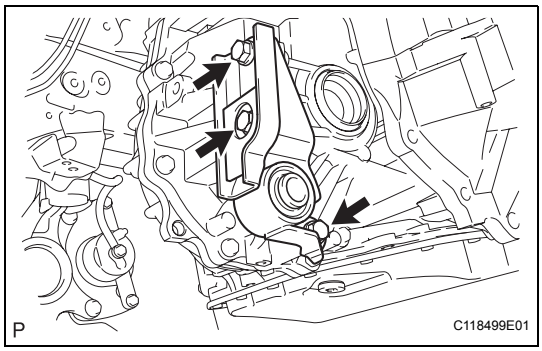
48. **SEPARATE OUTLET OIL COOLER HOSE**
(a) Separate the outlet oil cooler hose from outlet No. 1 oil cooler tube.



49. **SEPARATE ENGINE MOVING CONTROL ROD**
(a) Remove the bolt and nut and separate the engine moving control rod from the bracket.

50. **REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY (See page PS-76)**

AX

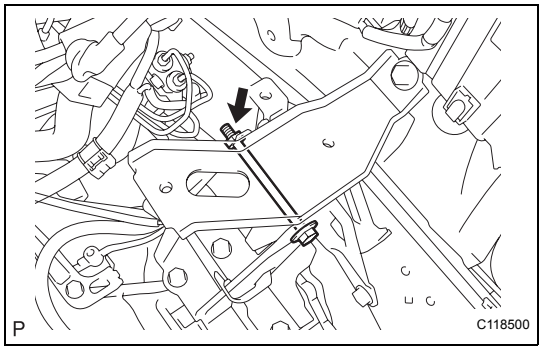


51. REMOVE ENGINE MOVING CONTROL ROD BRACKET

(a) Remove the 3 bolts and remove the engine moving control rod bracket.

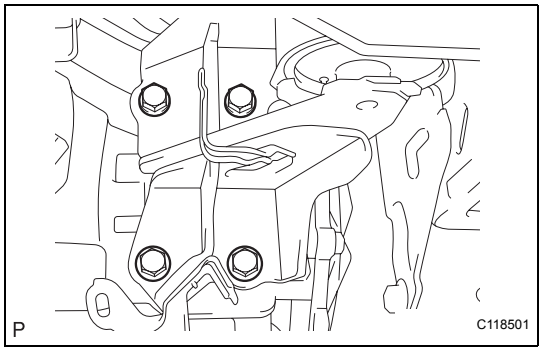
52. SUPPORT AUTOMATIC TRANSAXLE ASSEMBLY

(a) Support the automatic transmission with the transmission jack.



53. SEPARATE ENGINE MOUNTING INSULATOR LH

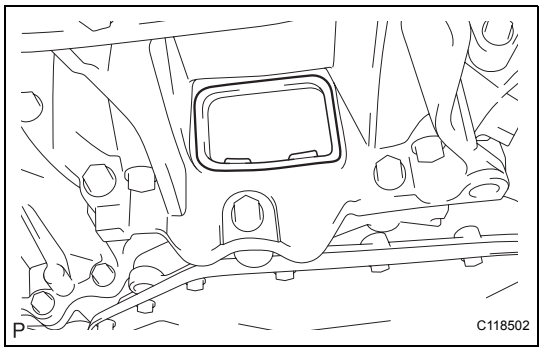
(a) Remove the bolt and nut and separate the engine mounting insulator LH from the bracket.



54. REMOVE ENGINE MOUNTING BRACKET LH

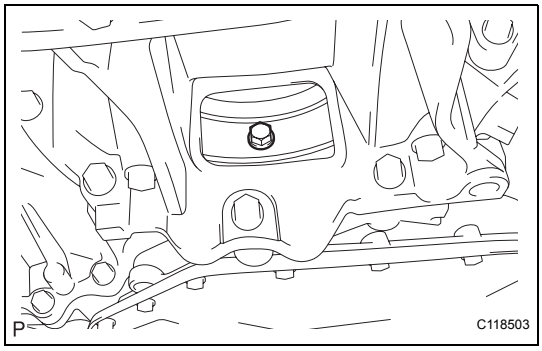
(a) Remove the 4 bolts and remove the engine mounting bracket LH from the automatic transaxle.

AX

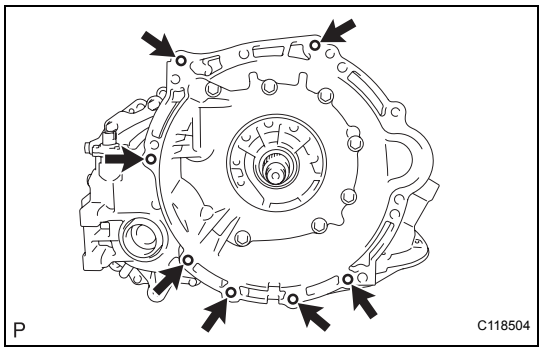


55. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

(a) Remove the flywheel housing under cover.



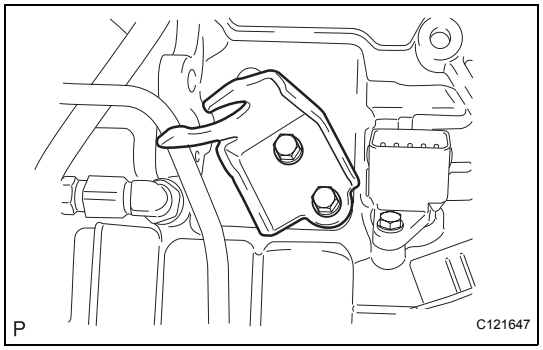
(b) Remove the 6 torque converter set bolts while holding the crankshaft pulley bolt with a wrench.



(c) Remove the 7 bolts and remove the automatic transmission from the engine.

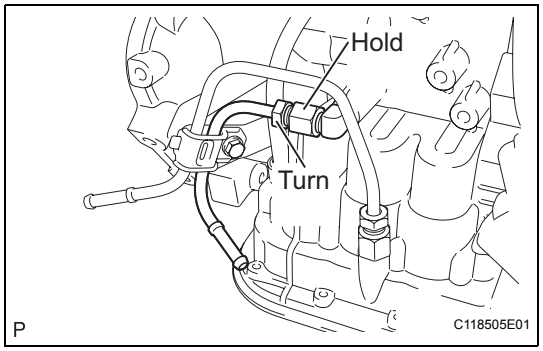
56. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Remove the torque converter clutch from the automatic transaxle.



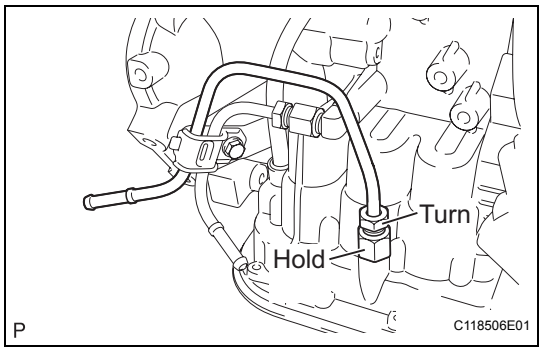
57. REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET

(a) Remove the 2 bolts and remove No. 1 transmission control cable bracket from the automatic transaxle.



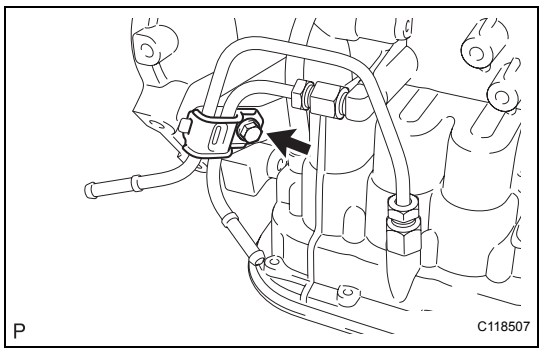
58. SEPARATE INLET NO. 1 OIL COOLER TUBE

(a) Using SST, remove the inlet oil cooler tube while holding the oil cooler tube union with a spanner.
SST 09023-12701



59. SEPARATE OUTLET NO. 1 OIL COOLER TUBE

(a) Using SST, remove the outlet oil cooler tube while holding the oil cooler tube union with a spanner.
SST 09023-12701



60. REMOVE NO. 2 OIL COOLER TUBE CLAMP

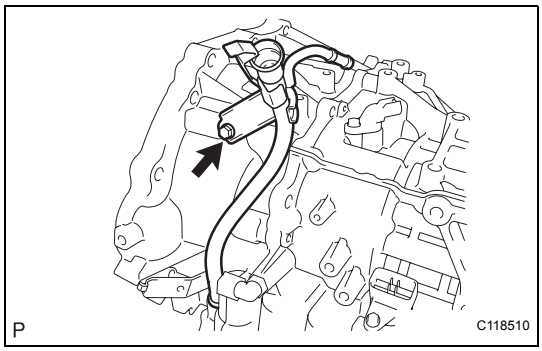
(a) Remove the bolt and remove No. 2 oil cooler tube clamp from the oil filler tube.

(b) Remove the inlet oil cooler tube and the outlet oil cooler tube from the automatic transaxle.

61. REMOVE TRANSMISSION OIL LEVEL GAUGE SUB-ASSEMBLY

(a) Remove the oil level gauge from the oil filler tube.

AX



62. REMOVE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

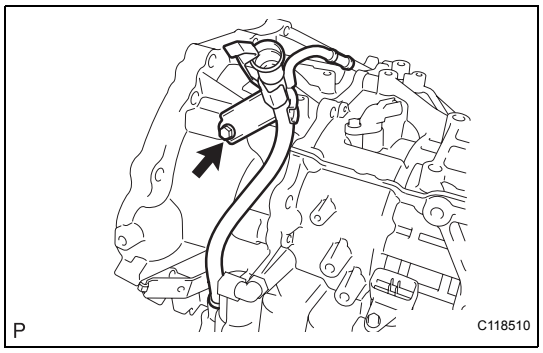
(a) Remove the bolt and remove the oil filler tube.
(b) Remove the O-ring from the oil filler tube.

INSTALLATION

1. INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

(a) Apply ATF to a new O-ring, and install it onto the oil filler tube.

(b) Install the oil filler tube onto the automatic transaxle with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)



2. INSTALL TRANSMISSION OIL LEVEL GAUGE SUB-ASSEMBLY

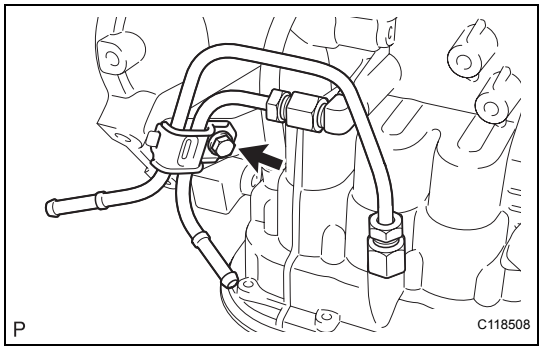
(a) Install the oil level gauge into the oil filler tube.

3. INSTALL NO. 2 OIL COOLER TUBE CLAMP

(a) Provisionally install outlet No. 1 oil cooler tube into the oil cooler tube union.

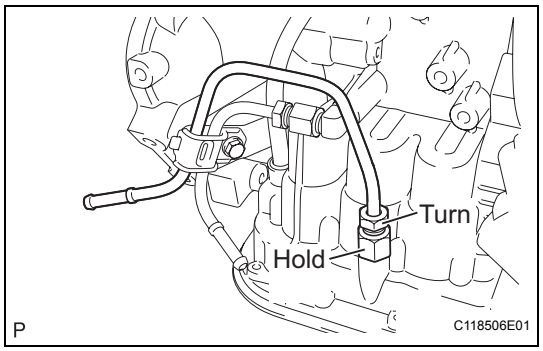
(b) Provisionally install inlet No. 1 oil cooler tube into the oil cooler tube union.

(c) Provisionally install No. 2 oil cooler tube clamp onto the oil level gauge with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)



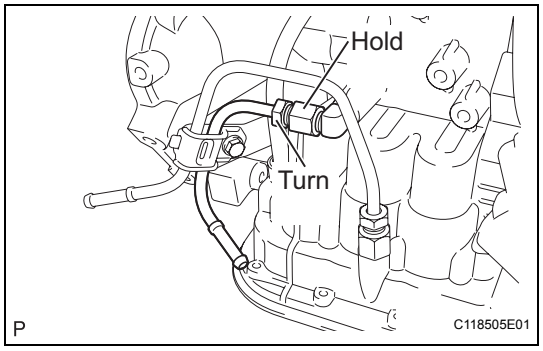
4. INSTALL OUTLET NO. 1 OIL COOLER TUBE

(a) Using SST, install outlet No. 1 oil cooler tube while holding the oil cooler tube union with a spanner.
SST 09023-12701
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)

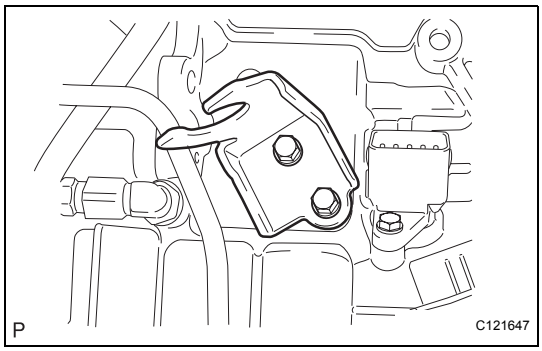


5. INSTALL INLET NO. 1 OIL COOLER TUBE

(a) Using SST, install inlet No. 1 oil cooler tube while holding the oil cooler tube union with a spanner.
SST 09023-12701
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)



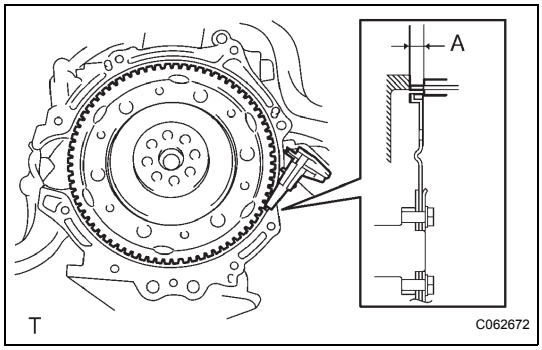
AX



6. INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET

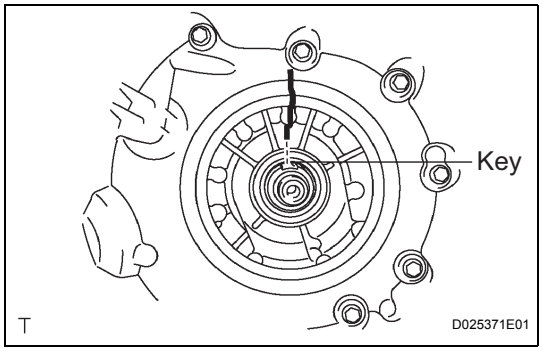
(a) Install No. 1 transmission control cable bracket onto the automatic transaxle with the 2 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

7. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY (See page AX-171)

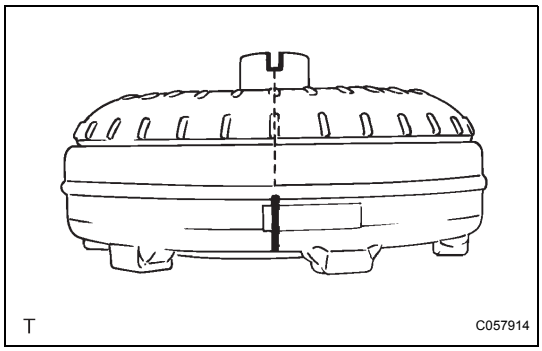


8. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

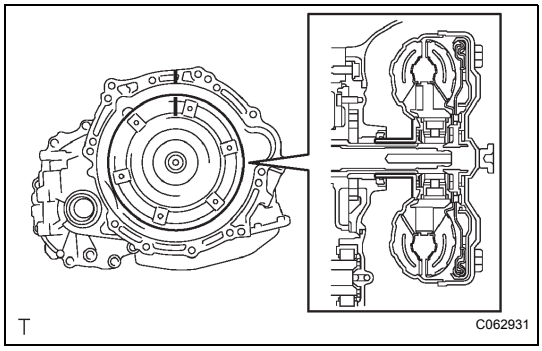
(a) Using vernier calipers, measure dimension A between the transaxle fitting part of the engine and the converter fitting part of the drive plate.



(b) Set the key at the top of the front oil pump drive gear and put a mark on the housing.

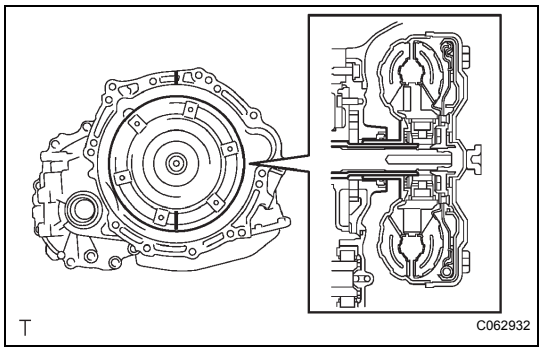


(c) Put a mark on the torque converter so that its groove is clearly indicated.

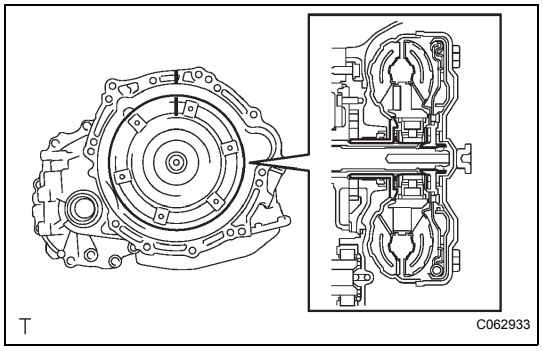


(d) Align the mark on the case with the one on the converter and fit the spline of the input shaft to the spline of the turbine runner.

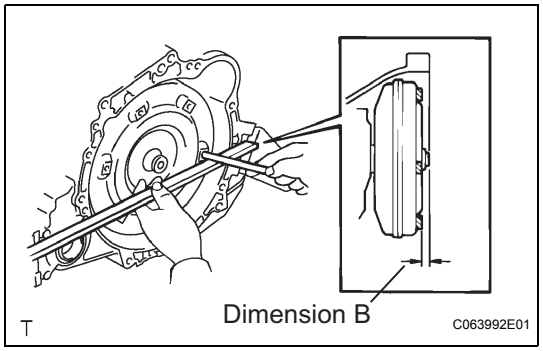
AX



(e) Rotating the converter, fit the spline of the stator shaft with that of the stator.
HINT:
Rotate it approximately 180 degrees.



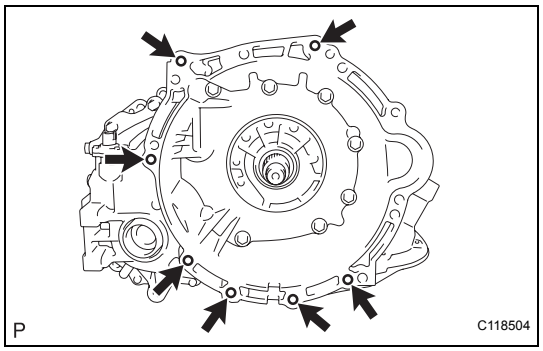
(f) Rotating the converter, align the mark on the case with the one on the converter again and fit the key of the oil pump drive gear into the keyway of the converter.
NOTICE:
Do not push the converter excessively when rotating it.



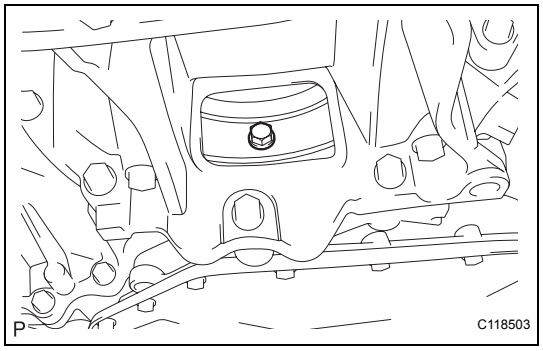
(g) Using vernier calipers and a straight edge, measure dimension B shown in the illustration and check that dimension B is greater than dimension A, which was measured in step (a).
Standard:
A + 1 mm (0.04 in.) or more
NOTICE:
Subtract the thickness of the straight edge from the measured value to gain dimension B.

AX

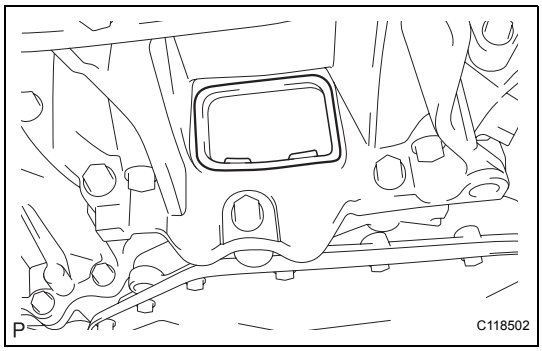
9. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY



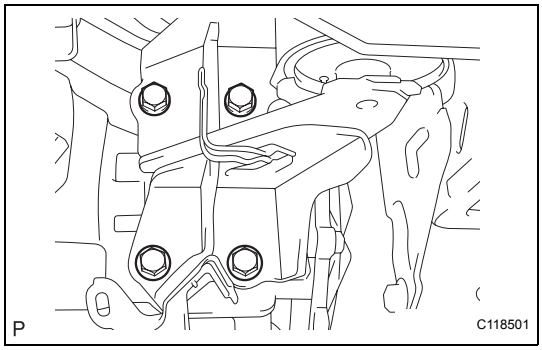
(a) Install the automatic transaxle onto the engine with the 7 bolts.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)



(b) Install the 6 torque converter set bolts while holding the crankshaft pulley bolt with a wrench.
Torque: 27 N*m (280 kgf*cm, 20 ft.*lbf)

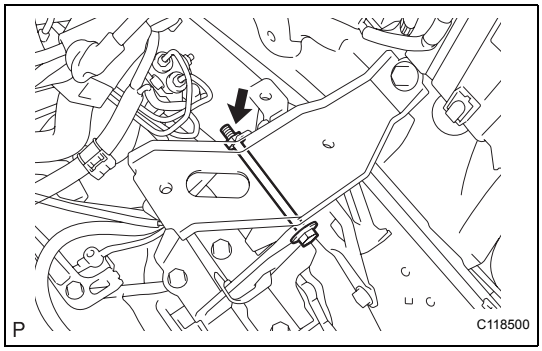


(c) Install the flywheel housing under cover.



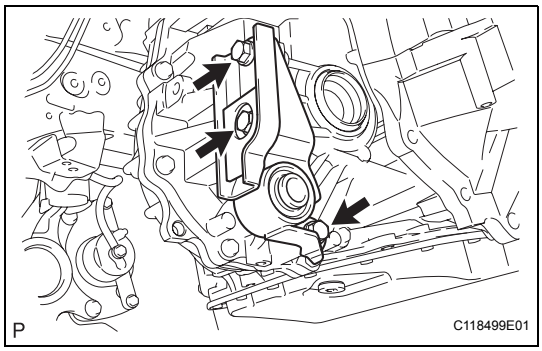
10. INSTALL ENGINE MOUNTING BRACKET LH

(a) Install the engine mounting bracket LH onto the automatic transaxle with the 4 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



11. INSTALL ENGINE MOUNTING INSULATOR LH

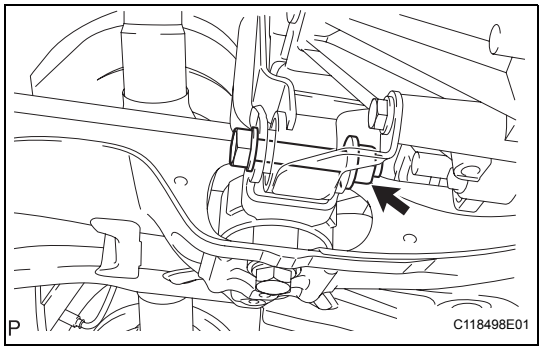
(a) Install the engine mounting insulator LH and the engine mounting bracket LH with the bolt and nut.
Torque: 52 N*m (530 kgf*cm, 38 ft.*lbf)



12. INSTALL ENGINE MOVING CONTROL ROD BRACKET

(a) Install the engine moving control bracket onto the automatic transaxle with the 3 bolts.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)

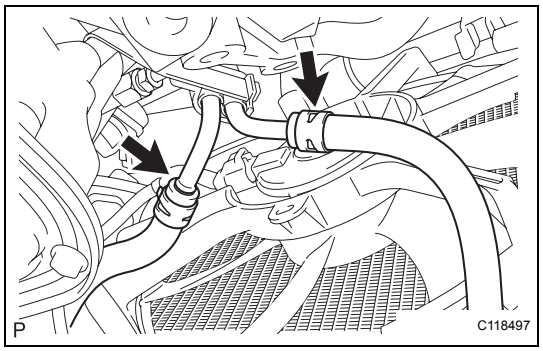
13. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY (See page PS-77)



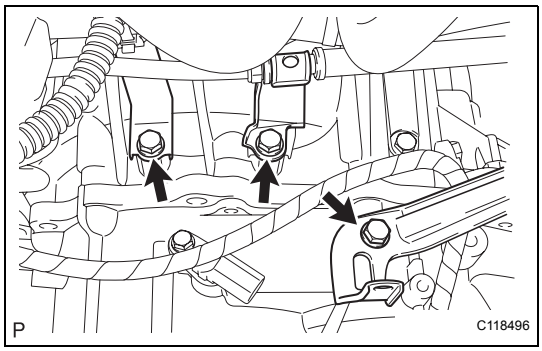
14. INSTALL ENGINE MOVING CONTROL ROD

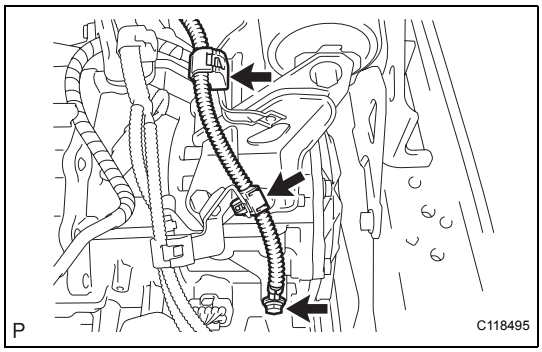
(a) Install the engine moving control rod and the engine moving control bracket with the bolt and nut.
Torque: 120 N*m (1,224 kgf*cm, 89 ft.*lbf)

AX



15. **INSTALL OUTLET OIL COOLER HOSE**
    (a) Install the outlet oil cooler hose onto the outlet oil cooler tube.
16. **INSTALL INLET OIL COOLER HOSE**
    (a) Install the inlet oil cooler hose onto the inlet oil cooler tube.
17. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-13)**
18. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-14)**
19. **REMOVE TRANSMISSION CASE PROTECTOR (w/o ABS) (See page AX-147)**
20. **INSTALL FRONT LOWER SUSPENSION ARM LH (See page DS-14)**
21. **INSTALL FRONT LOWER SUSPENSION ARM RH**
    HINT:
    The installation procedure for the RH side is the same as that for the LH side.
22. **INSTALL TIE ROD END SUB-ASSEMBLY LH (See page DS-15)**
23. **INSTALL TIE ROD END SUB-ASSEMBLY RH**
    HINT:
    The installation procedure for the RH side is the same as that for the LH side.
24. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-14)**
25. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
    HINT:
    The installation procedure for the RH side is the same as that for the LH side.
26. **INSTALL FRONT SPEED SENSOR LH (w/ ABS) (See page DS-15)**
27. **INSTALL FRONT SPEED SENSOR RH (w/ ABS)**
    HINT:
    The installation procedure for the RH side is the same as that for the LH side.
28. **INSTALL FRONT AXLE HUB NUT LH (See page DS-15)**
29. **INSTALL FRONT AXLE HUB NUT RH**
    HINT:
    The installation procedure for the RH side is the same as that for the LH side.
30. **INSTALL STARTER ASSEMBLY (See page ST-17)**





31. **CONNECT WIRE HARNESS**
    (a) Install the 3 wire harness clamp brackets onto the automatic transaxle with the 3 bolts.
    Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

32. **CONNECT CONNECTOR**
    (a) Connect the vehicle speed sensor connector.
    (b) Connect the transmission revolution sensor connector.
    (c) Connect the transmission wire connector and install the clamp onto the engine mount insulator.
    (d) Connect the park neutral position switch connector and install the clamp onto the engine mount insulator.

33. **INSTALL NO. 3 ENGINE WIRE**
    (a) Install No. 3 engine wire onto the automatic transaxle with the bolt.
    Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)
    (b) Install the 2 clamps onto the engine mount insulator.

34. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (See page AX-109)**

35. **INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY (See page PS-79)**

36. **INSTALL STEERING SLIDING YOKE SUB-ASSEMBLY (See page PS-79)**

37. **INSTALL COLUMN HOLE COVER SILENCER SHEET (See page PS-79)**

38. **INSTALL AIR CLEANER BRACKET (See page EM-145)**

39. **INSTALL AIR CLEANER ASSEMBLY (See page EM-146)**

40. **INSTALL NO. 2 CYLINDER HEAD COVER (See page IG-10)**

41. **INSTALL BATTERY CARRIER (See page EM-145)**

42. **INSTALL BATTERY TRAY**

43. **INSTALL BATTERY (See page EM-148)**

44. **INSTALL OUTER COWL TOP PANEL**
    Hatchback: (See page EM-146)
    Sedan: (See page EM-147)

45. **INSTALL COWL TO REGISTER DUCT SUB-ASSEMBLY (for Hatchback) (See page EM-147)**

46. **INSTALL FRONT AIR SHUTTER SEAL (for Sedan) (See page EM-148)**

47. **INSTALL FRONT WIPER MOTOR AND LINK**
    Hatchback: (See page WW-21)
    Sedan: (See page WW-12)

48. **INSTALL COWL TOP VENTILATOR LOUVER LH (for Hatchback) (See page WW-21)**

49. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY**
Hatchback: (See page WW-21)
Sedan: (See page WW-12)

50. **INSTALL HOOD TO COWL TOP SEAL (for Hatchback) (See page WW-22)**

51. **INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY LH (for Sedan) (See page WW-13)**

52. **INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY RH (for Sedan) (See page WW-13)**

53. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH**
Hatchback: (See page WW-22)
Sedan: (See page WW-13)

54. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH**
Hatchback: (See page WW-23)
Sedan: (See page WW-14)

55. **INSTALL FRONT WIPER ARM HEAD CAP**
Hatchback: (See page WW-23)
Sedan: (See page WW-15)

56. **INSPECT HOOD**
Hatchback: (See page ED-3)
Sedan: (See page ED-1)

57. **ADJUST HOOD**
Hatchback: (See page ED-4)
Sedan: (See page ED-2)

58. **ADD AUTOMATIC TRANSAXLE FLUID**
Fluid type:
T-WS
Capacity:
2.9 liters (3.1 US qts, 2.6 Imp. qts)

59. **INSPECT AUTOMATIC TRANSAXLE FLUID (See page AX-93)**

60. **CHECK AUTOMATIC TRANSAXLE FLUID LEAKAGE**

61. **ADJUST SHIFT LEVER POSITION (See page AX-137)**

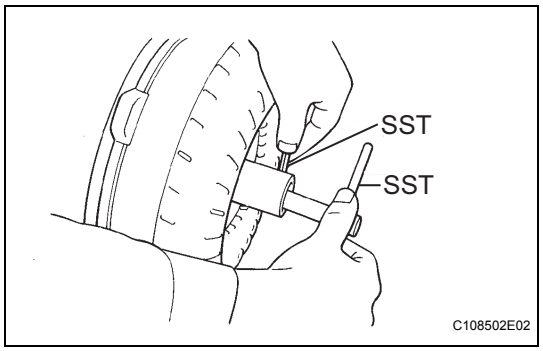
62. **INSPECT SHIFT LEVER POSITION (See page AX-134)**

63. **INSTALL ENGINE UNDER COVER RH**

64. **INSTALL ENGINE UNDER COVER LH**

65. **INSTALL FRONT WHEELS**
Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

66. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
(See page SP-2)



TORQUE CONVERTER CLUTCH AND DRIVE PLATE

INSPECTION

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Inspect the one-way clutch.

(1) Install SST so that it fits into notch of the converter hub and the notch of the outer race of the one-way clutch.

SST 09350-32014 (09351-32010, 09351-32020)

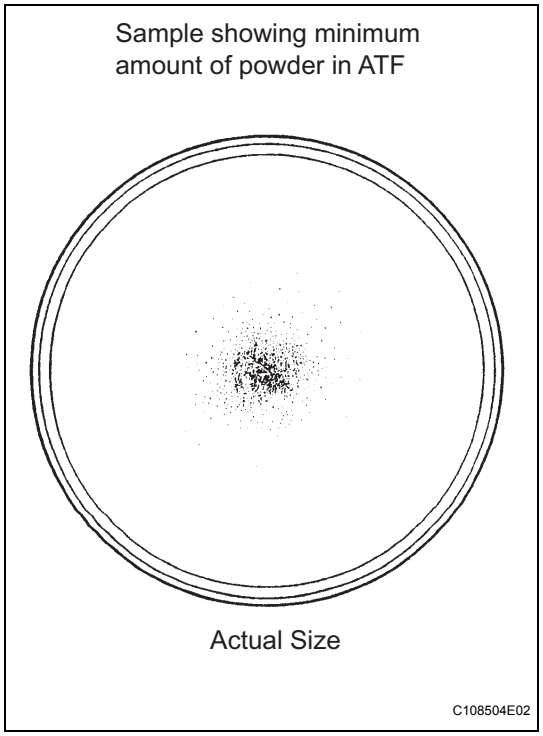
(2) Press on the serrations of the stator with a finger and rotate it.

Check that it rotates smoothly when turned clockwise and locks up when turned counterclockwise.

SST 09350-32014 (09351-32010, 09351-32020)

If necessary, clean the converter and check the one-way clutch.

Replace the converter if the one-way clutch still does not operate as specified.



(b) Check the condition of the torque converter clutch assembly.

(1) If the inspection result of the torque converter clutch assembly meets any of the cases mentioned below, replace the torque converter clutch.

Malfunction Item:

Any metallic sound is heard from the torque converter clutch during stall test or when the shift lever is in the N position.
The one-way clutch is released or locked in both directions.
Fine powder exceeding the sample limit is identified in ATF.
(See the sample.)

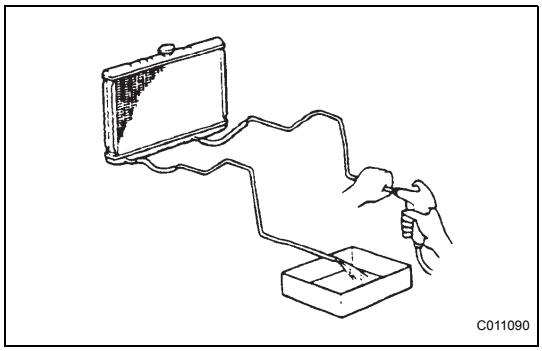
HINT:

The sample shows approximately. 0.25 liters (0.26 US qts, 0.22 Imp. qts) of ATF that is taken out from the removed torque converter clutch.

(c) Replace the ATF in the torque converter clutch.

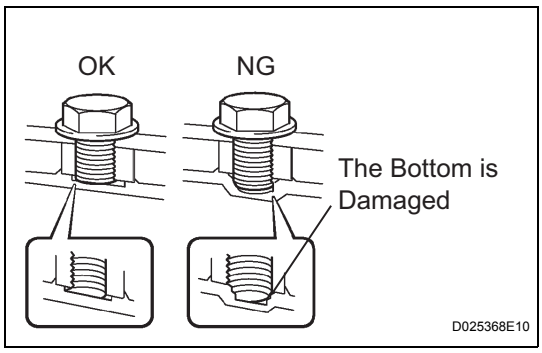
(1) If the ATF is discolored and/or has a foul odor, completely stir the ATF in the torque converter clutch and drain it with the installation surface facing up.

AX



(d) Clean and check the oil cooler and oil pipe line.
(1) If the torque converter clutch is inspected or the ATF is changed, clean the oil cooler and oil pipe line.
HINT:
- Spray compressed air of 196 kpa (2 kgf/cm^2, 28 psi) from the inlet hose.
- If excessive fine powder is found in the ATF, add new ATF using a bucket pump and clean it again.

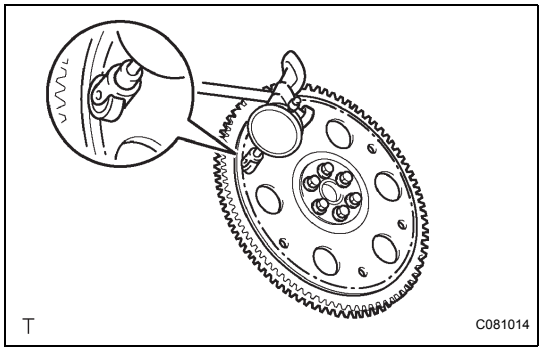
(2) If the ATF is cloudy, inspect the oil cooler (radiator).



2. INSPECT DRIVE PLATE AND RING GEAR

(a) Set up a dial indicator and measure the drive plate runout.
Maximum runout:
0.20 mm (0.0079 in.)
If the runout is not within the specification or the ring gear is damaged, replace the drive plate.

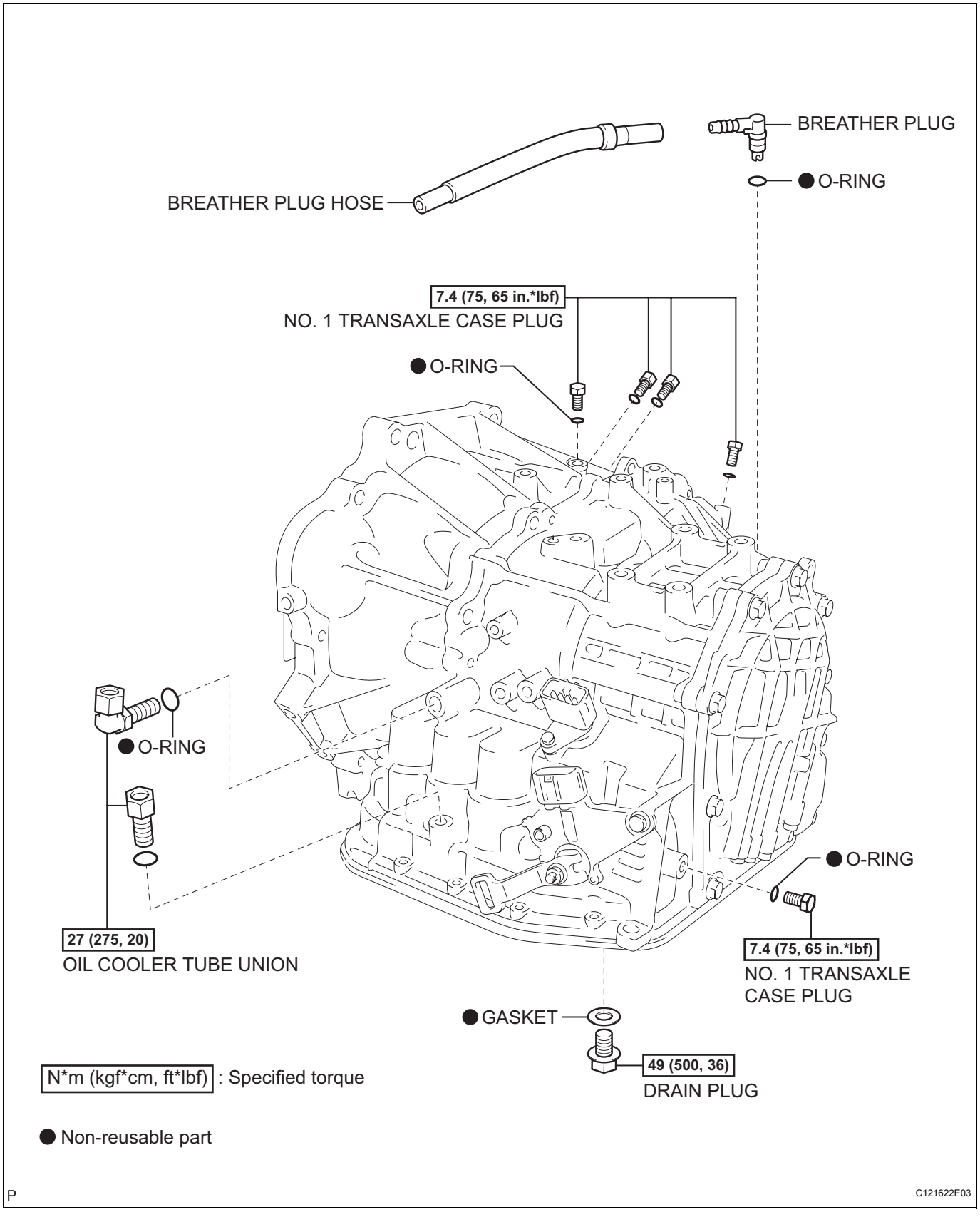
(b) Check the ring gear for damage.



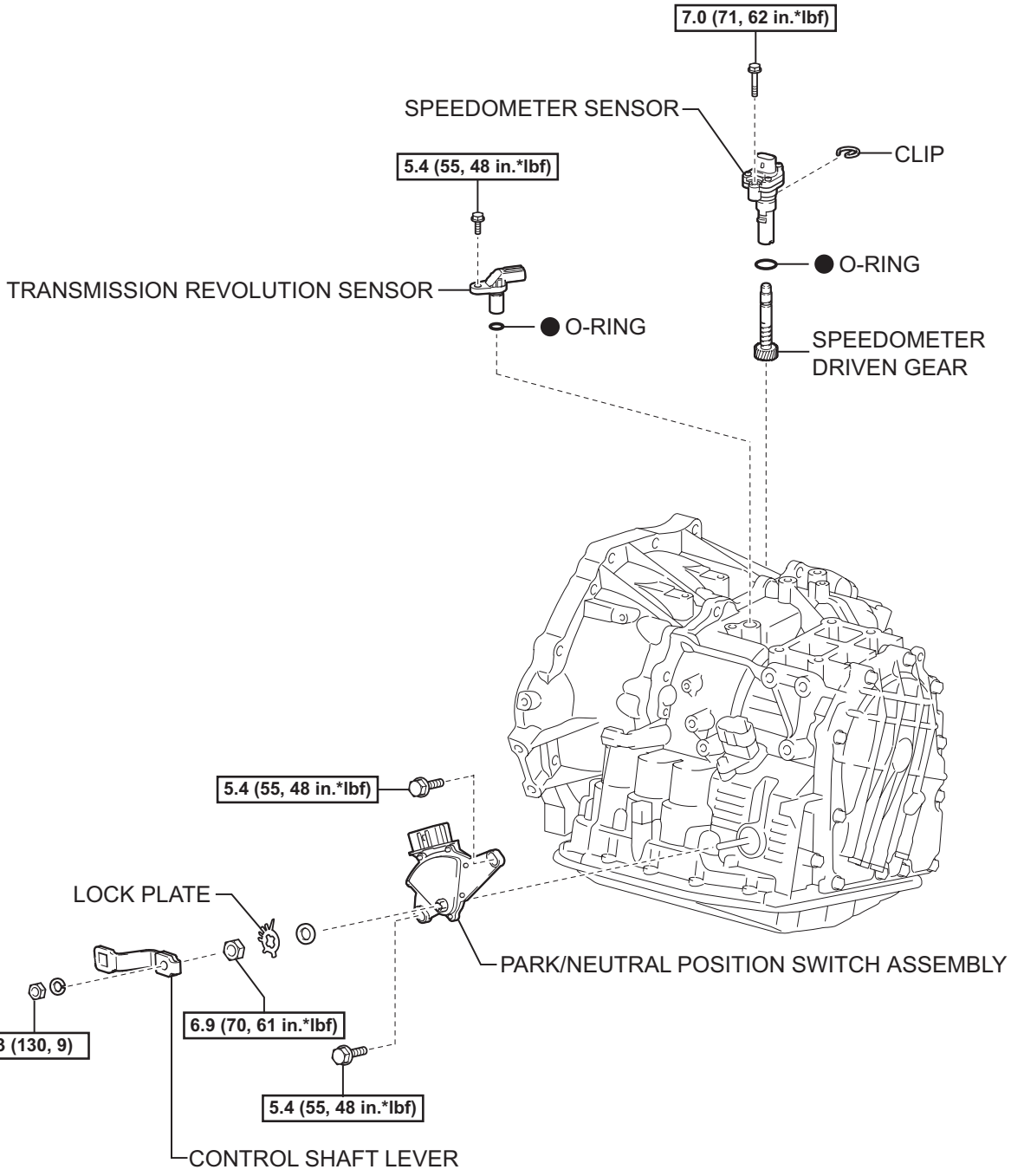
AX

AUTOMATIC TRANSAXLE UNIT

COMPONENTS



AX



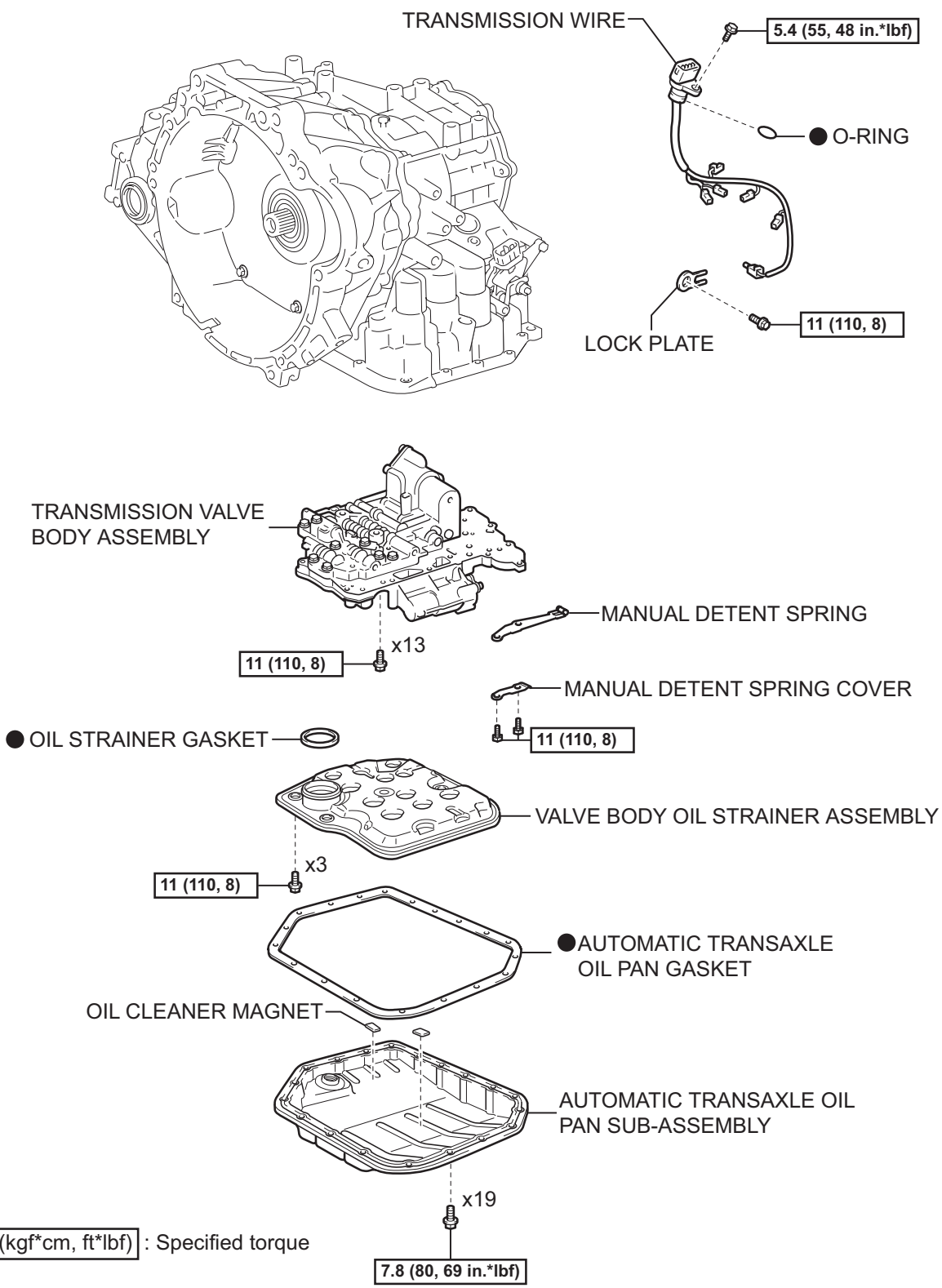
AX

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

● Non-reusable part

P

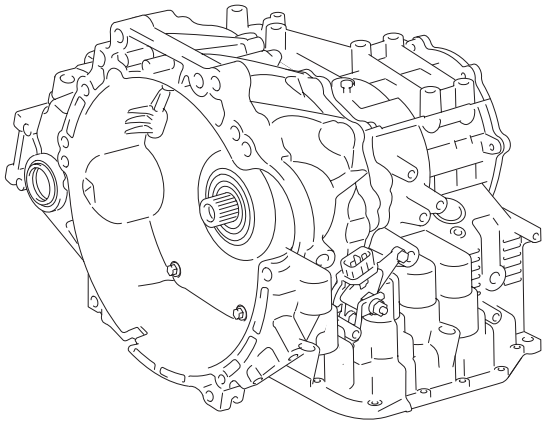
C121623E04



AX

P

C121626E01



● BRAKE DRUM GASKET

● TRANSAXLE CASE GASKET

● TRANSAXLE CASE 2ND BRAKE GASKET

CHECK BALL BODY COMPRESSION SPRING

CHECK BALL BODY

C-2 ACCUMULATOR PISTON COMPRESSION SPRING

C-3 ACCUMULATOR PISTON COMPRESSION SPRING

B-2 ACCUMULATOR PISTON COMPRESSION SPRING

C-2 ACCUMULATOR PISTON

C-3 ACCUMULATOR PISTON

B-2 ACCUMULATOR PISTON

● C-2 ACCUMULATOR PISTON O-RING

● C-3 ACCUMULATOR PISTON O-RING

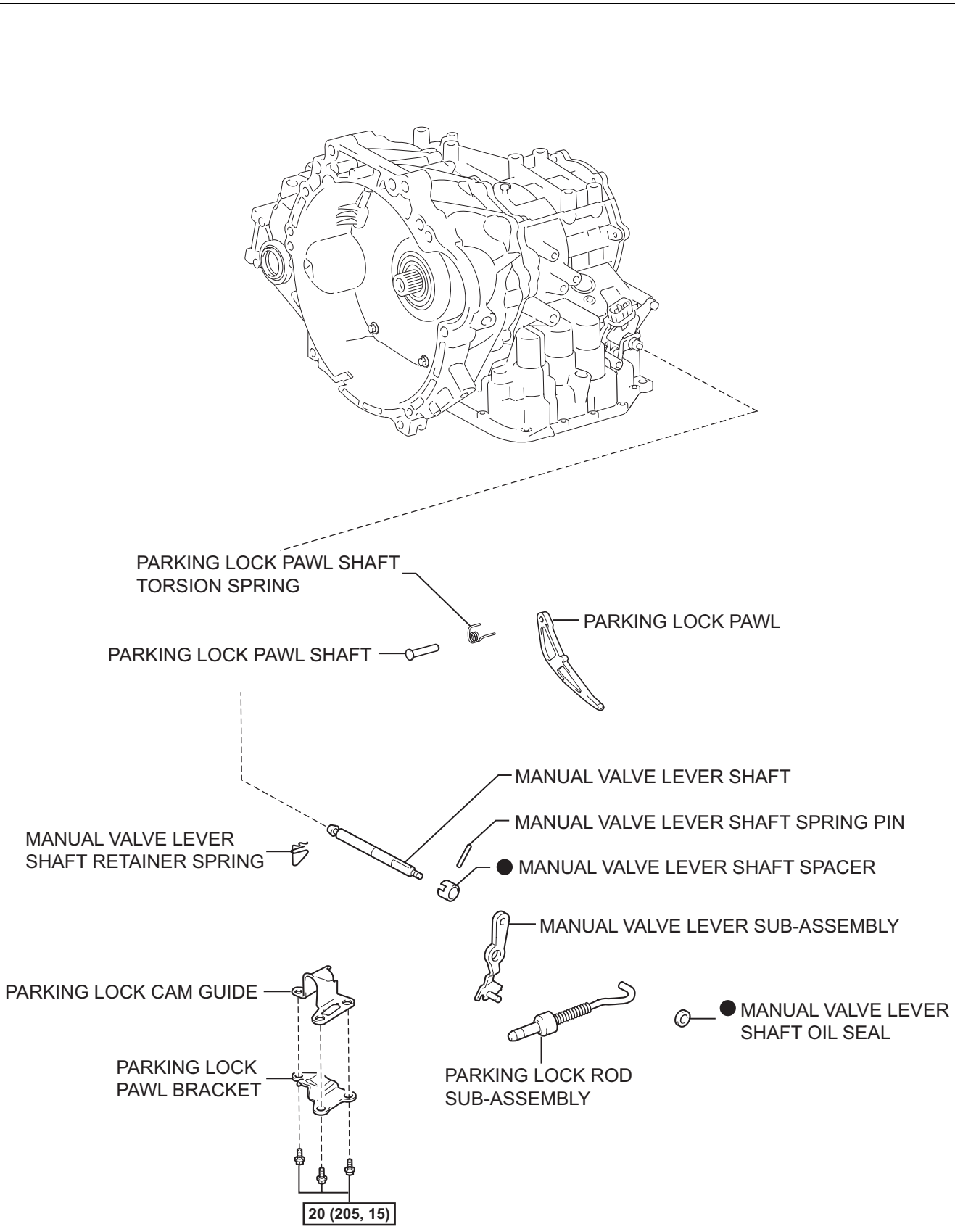
● B-2 ACCUMULATOR PISTON O-RING

● Non-reusable part

P

C121627E03

AX

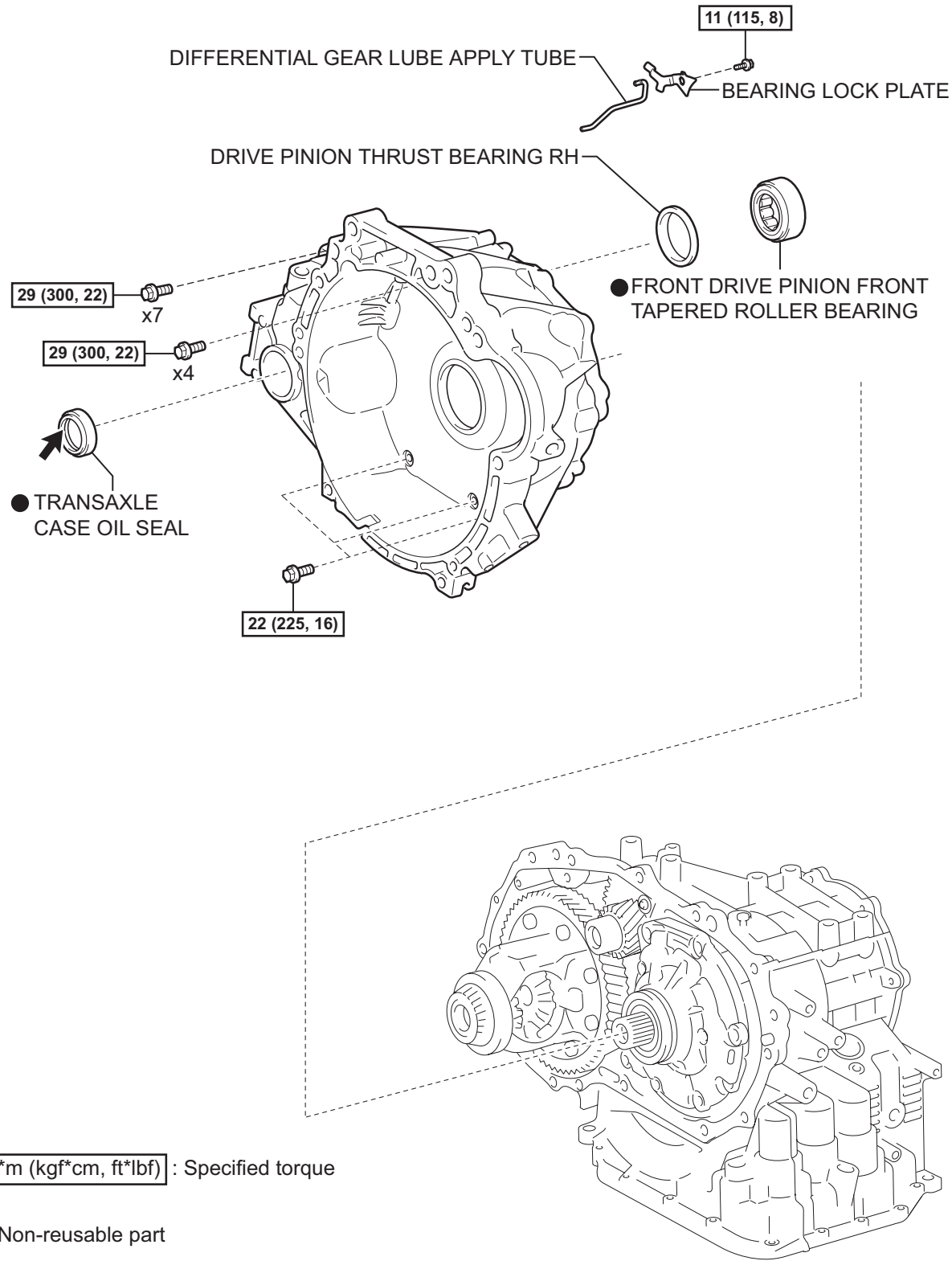


N*m (kgf*cm, ft*lbf) :Specified torque ● Non-reusable part

P

C121628E03

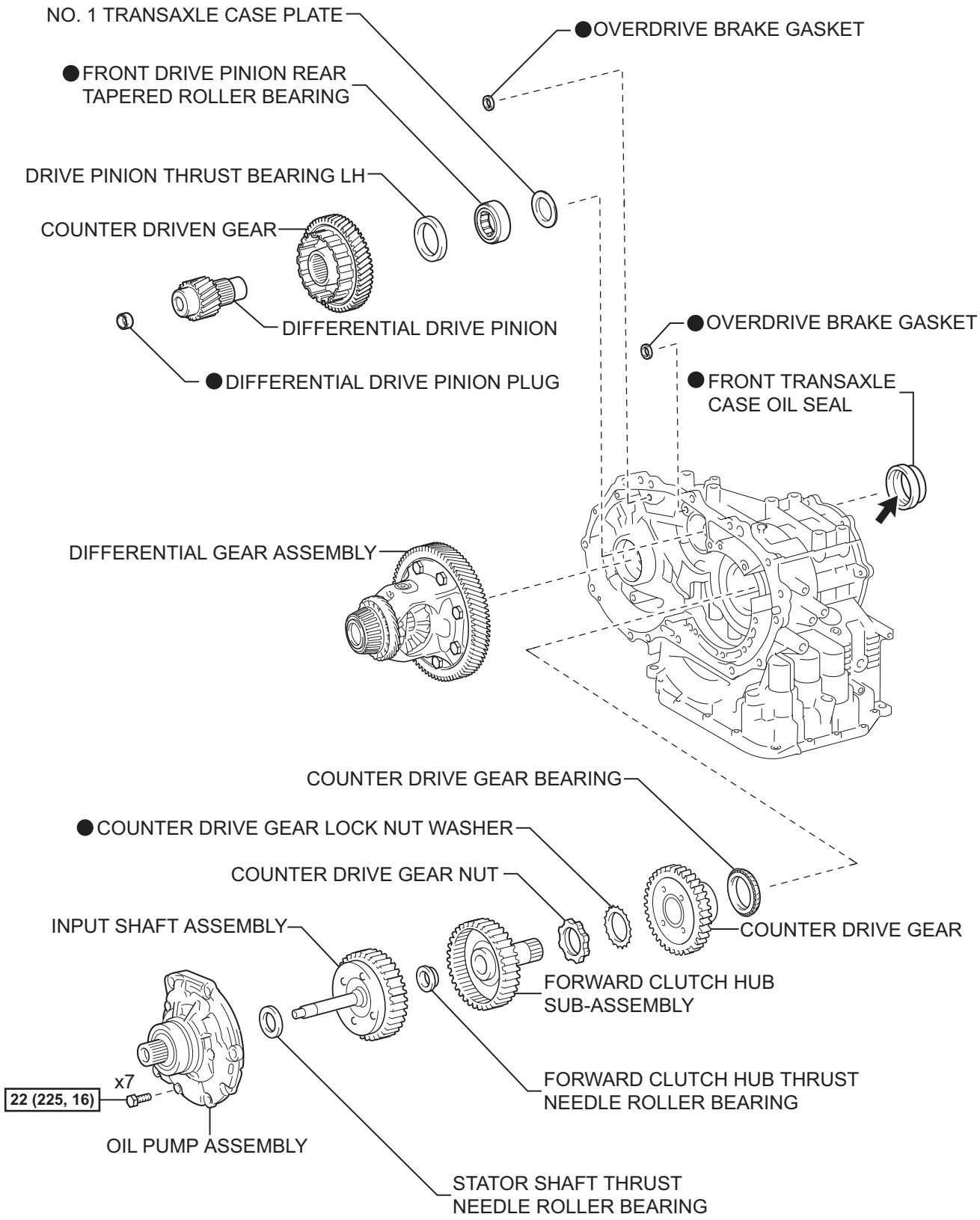
AX



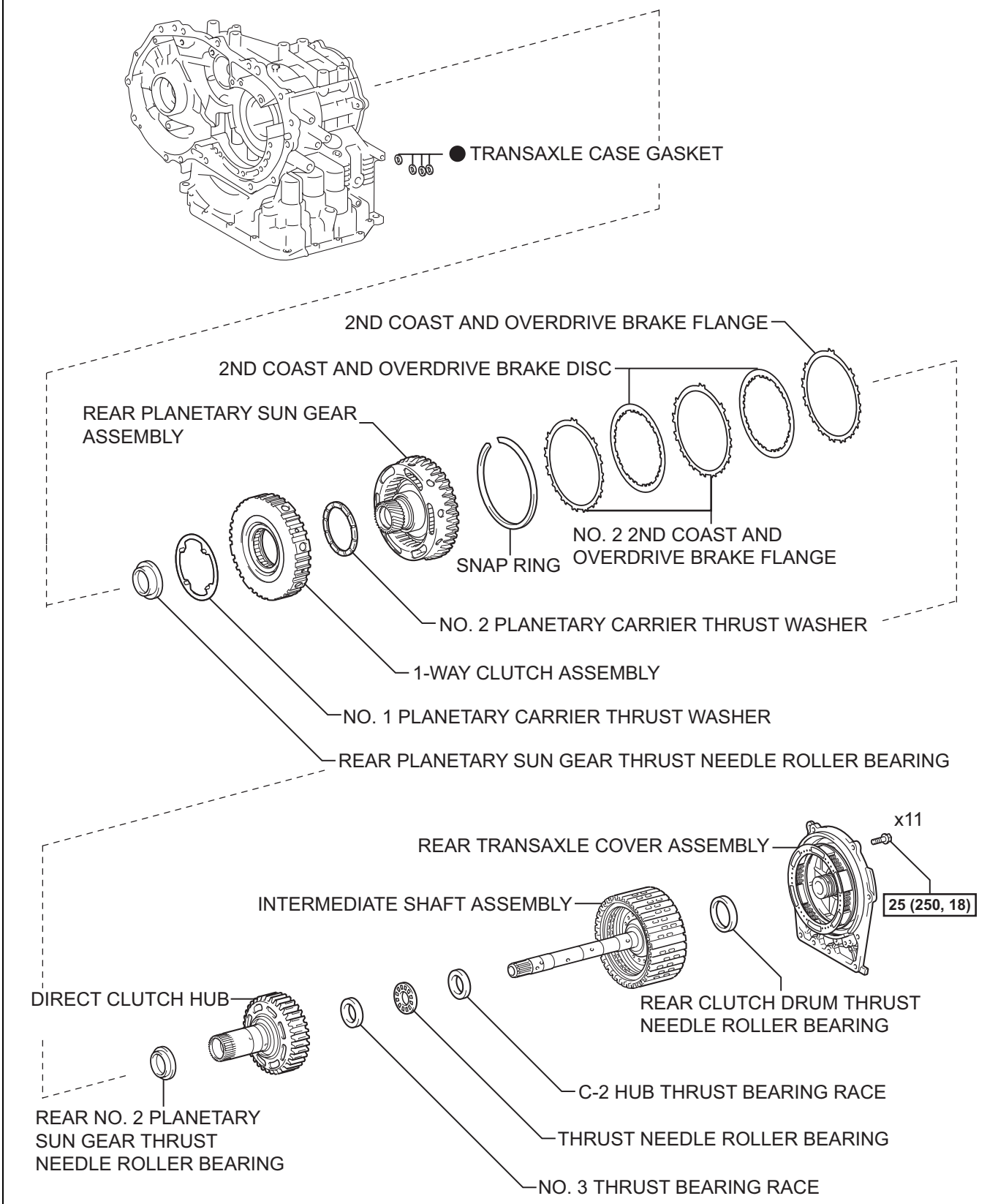
AX

P

C121624E01


NO. 1 TRANSAXLE CASE PLATE
●OVERDRIVE BRAKE GASKET
●FRONT DRIVE PINION REAR TAPERED ROLLER BEARING
DRIVE PINION THRUST BEARING LH
COUNTER DRIVEN GEAR
DIFFERENTIAL DRIVE PINION
●OVERDRIVE BRAKE GASKET
●DIFFERENTIAL DRIVE PINION PLUG
●FRONT TRANSAXLE CASE OIL SEAL
DIFFERENTIAL GEAR ASSEMBLY
COUNTER DRIVE GEAR BEARING
●COUNTER DRIVE GEAR LOCK NUT WASHER
COUNTER DRIVE GEAR NUT
COUNTER DRIVE GEAR
INPUT SHAFT ASSEMBLY
FORWARD CLUTCH HUB SUB-ASSEMBLY
x7
22 (225, 16)
FORWARD CLUTCH HUB THRUST NEEDLE ROLLER BEARING
OIL PUMP ASSEMBLY
STATOR SHAFT THRUST NEEDLE ROLLER BEARING
N*m (kgf*cm, ft*lbf) :Specified torque
● Non-reusable part
Apply MP grease
C121625E03

AX

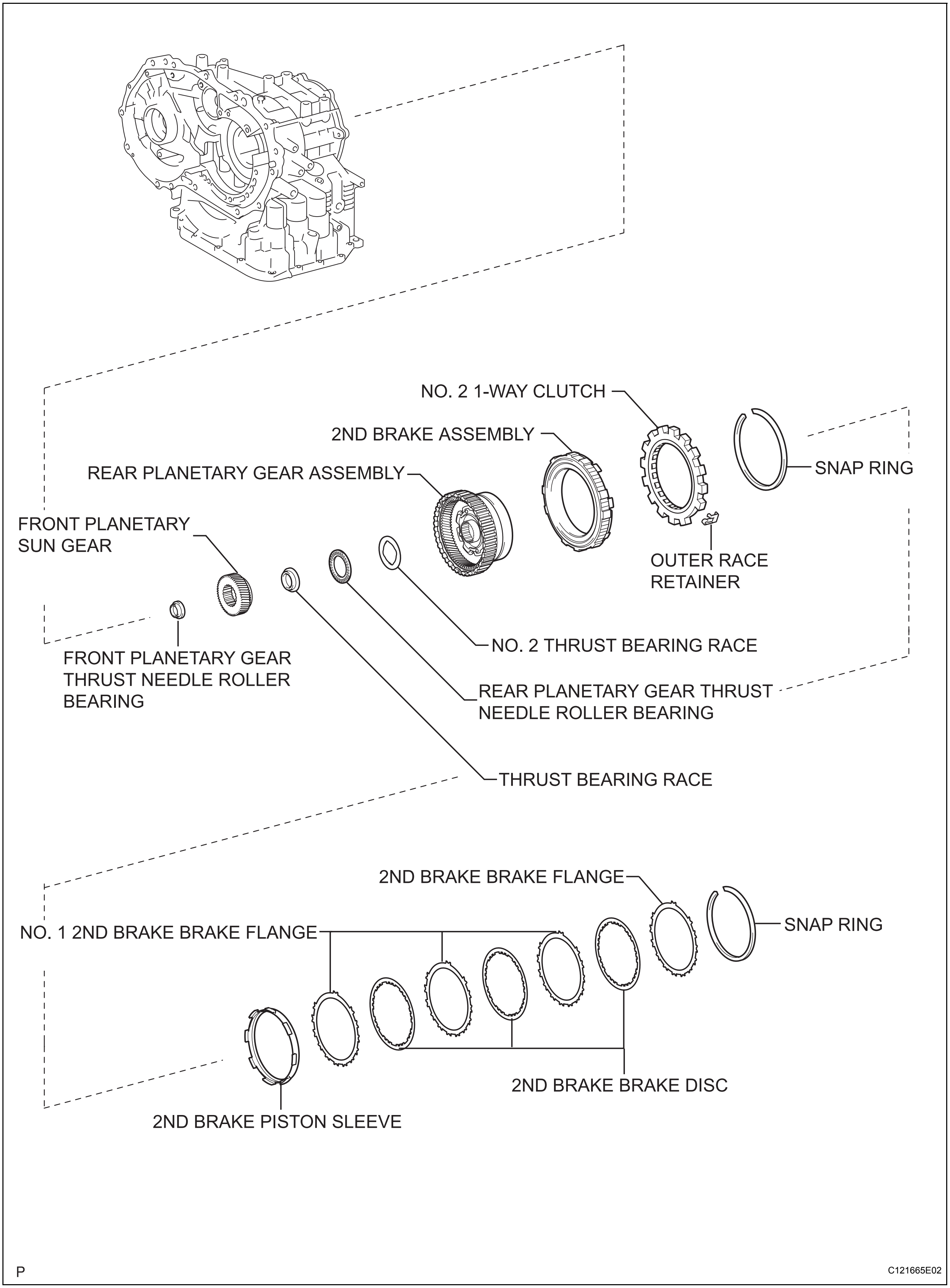


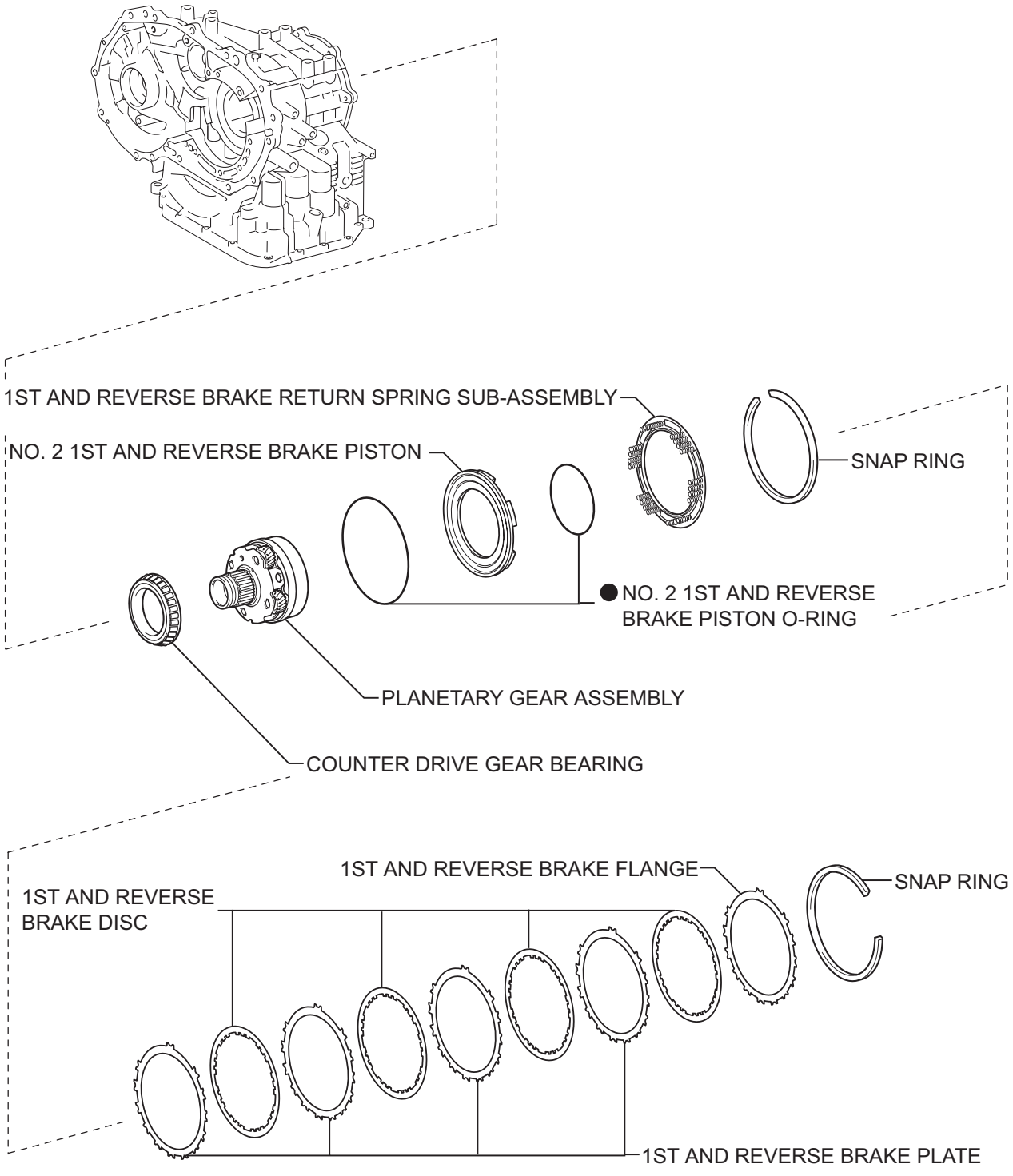
AX

N*m (kgf*cm, ft*lbf) :Specified torque ● Non-reusable part

P

C121664E02


NO. 2 1-WAY CLUTCH
2ND BRAKE ASSEMBLY
REAR PLANETARY GEAR ASSEMBLY
SNAP RING
FRONT PLANETARY SUN GEAR
OUTER RACE RETAINER
NO. 2 THRUST BEARING RACE
FRONT PLANETARY GEAR THRUST NEEDLE ROLLER BEARING
REAR PLANETARY GEAR THRUST NEEDLE ROLLER BEARING
THRUST BEARING RACE
2ND BRAKE BRAKE FLANGE
SNAP RING
NO. 1 2ND BRAKE BRAKE FLANGE
2ND BRAKE BRAKE DISC
2ND BRAKE PISTON SLEEVE
P
C121665E02

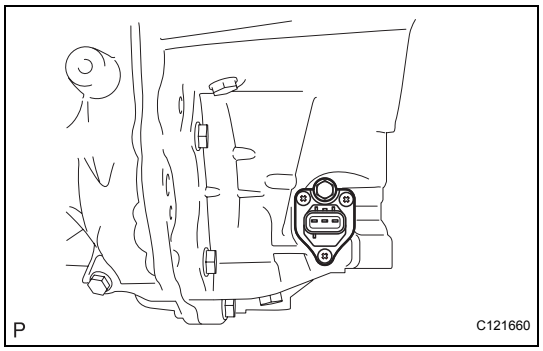


AX

● Non-reusable part

P

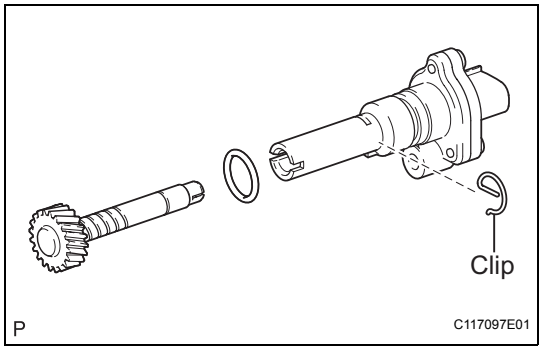
C121666E02



DISASSEMBLY

1. REMOVE SPEEDOMETER SENSOR

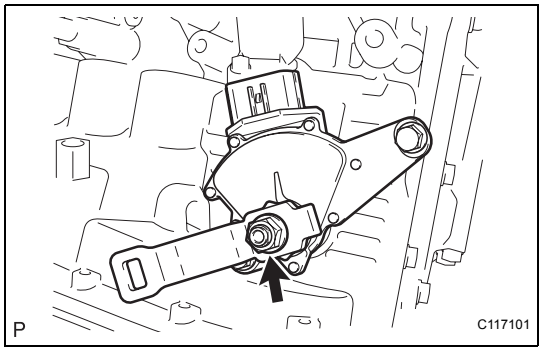
(a) Remove the bolt and remove the speedometer sensor.



2. REMOVE SPEEDOMETER DRIVEN GEAR

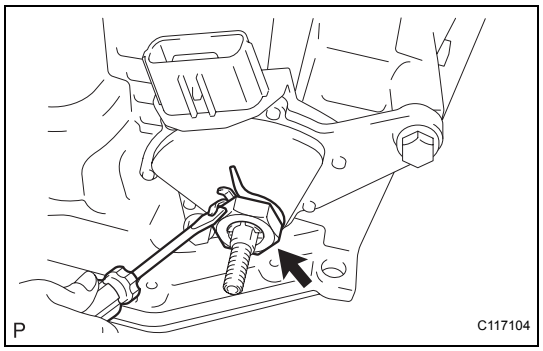
(a) Remove the clip and speedometer driven gear from the speedometer sensor.

(b) Remove the O-ring from the speedometer sensor.

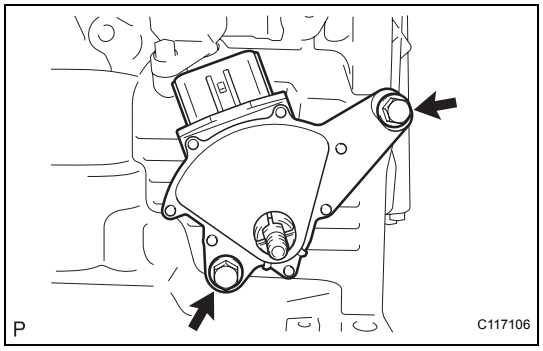


3. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Remove the nut and washer and remove the control lever shaft.

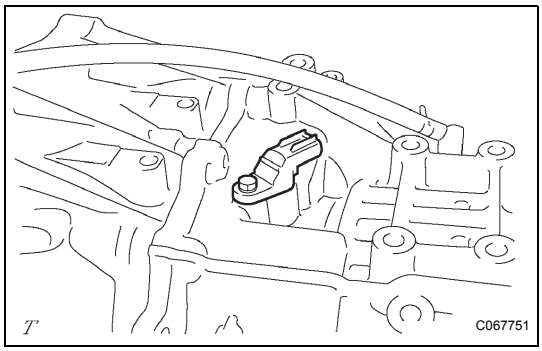


(b) Using a screwdriver, pry out the lock plate and remove the manual valve shaft nut.



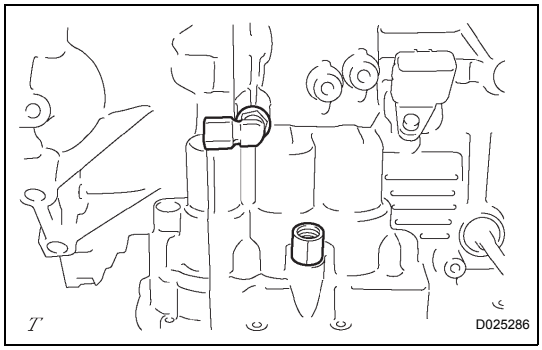
(c) Remove the 2 bolts and pull out the park/neutral position switch assembly.

AX



4. REMOVE TRANSMISSION REVOLUTION SENSOR

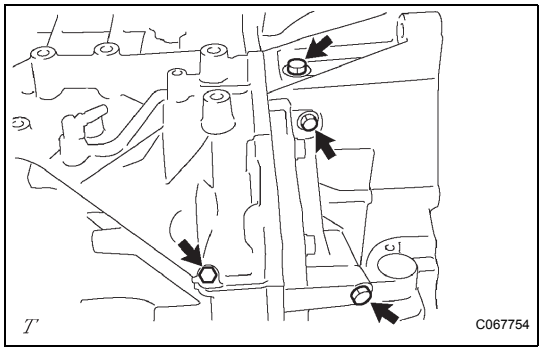
(a) Remove the bolt and remove the transmission revolution sensor.



5. REMOVE OIL COOLER TUBE UNION

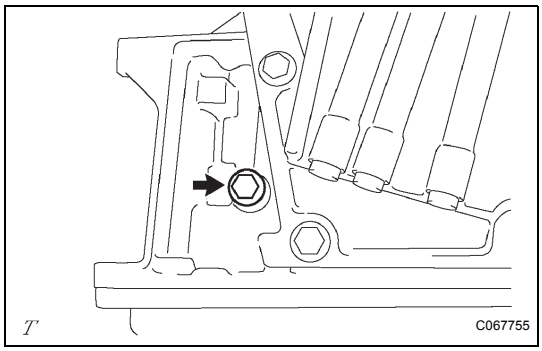
(a) Remove the 2 oil cooler tube unions from the transaxle case.

(b) Remove the 2 O-rings from the 2 oil cooler tube unions.



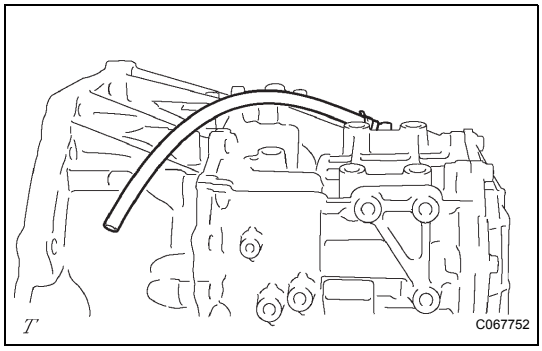
6. REMOVE NO. 1 TRANSAXLE CASE PLUG

(a) Remove the 4 No. 1 transaxle case plugs from the transaxle housing and transaxle case.



(b) Remove the No. 1 transaxle case plug from the transaxle case.

(c) Remove the O-rings from the No. 1 transaxle case plugs.

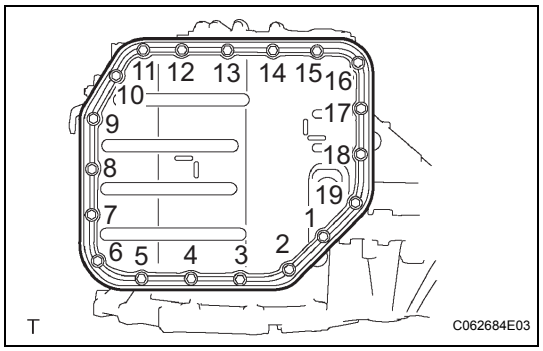


7. REMOVE BREATHER PLUG HOSE

(a) Remove the breather plug hose from the transaxle case.

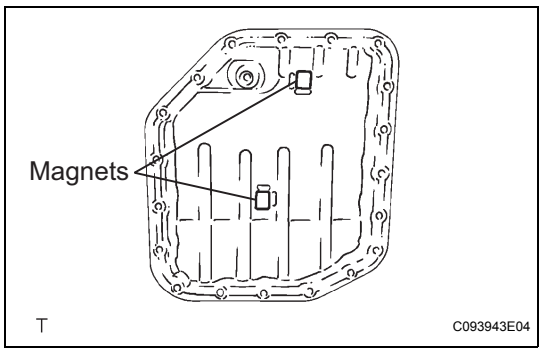
8. FIX AUTOMATIC TRANSAXLE ASSEMBLY

AX



9. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Remove the 19 bolts and remove the oil pan and oil pan gasket.



(b) Remove the 2 oil cleaner magnets from the oil pan.

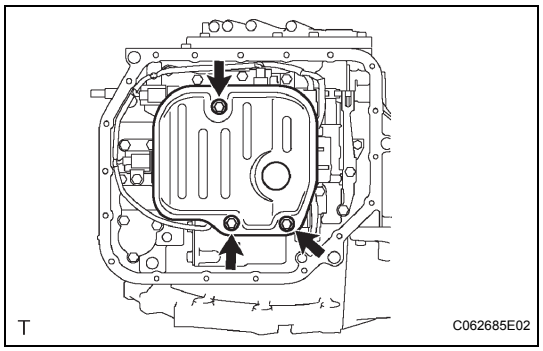
(c) Examine the particles in the pan.

(1) Collect any steel chips with the removed magnets.

Carefully look at the foreign matter and particles in the pan and on the magnets to predict the type of wear which might be found in the transaxle.

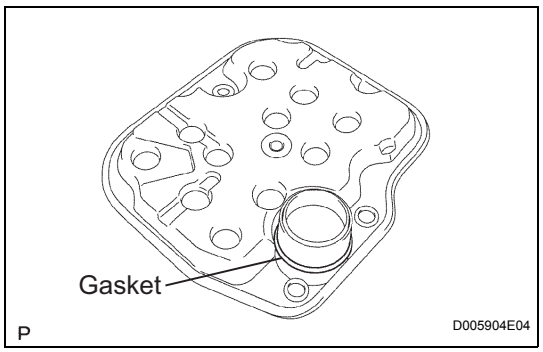
Steel (magnetic): bearing, gear and clutch plate wear

Brass (non-magnetic): bearing wear



10. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

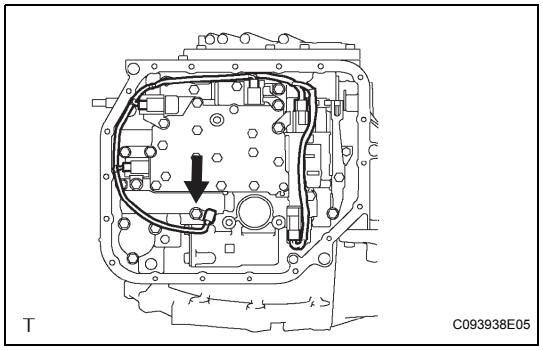
(a) Remove the 3 bolts and remove the oil strainer assembly.



(b) Remove the oil strainer gasket from the oil strainer.

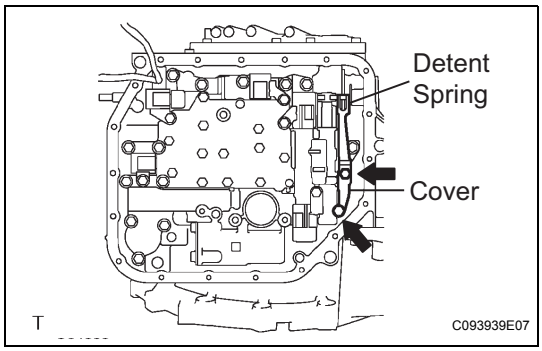
11. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Disconnect the 5 solenoid connectors.

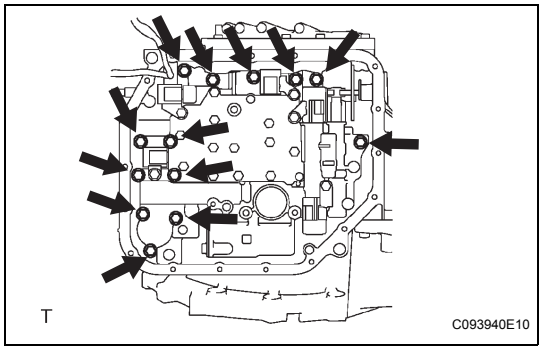


(b) Remove the bolt and lock plate and remove the ATF temperature sensor.

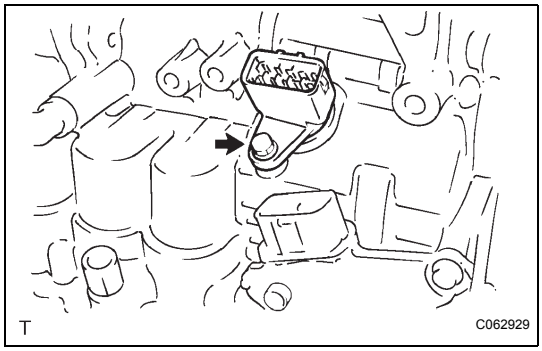
AX



(c) Remove the 2 bolts and remove the detent spring cover and detent spring.

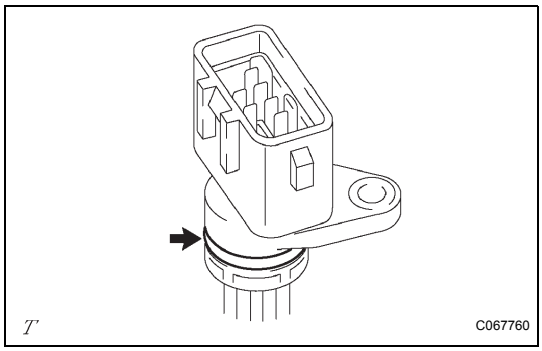


(d) Remove the 13 bolts and the valve body assembly from the transaxle case.

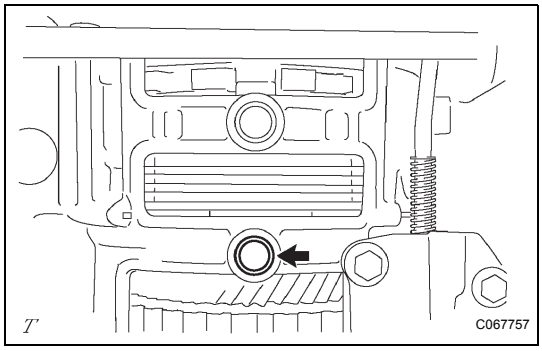


12. REMOVE TRANSMISSION WIRE

(a) Remove the bolt and the transmission wire from the transaxle case.



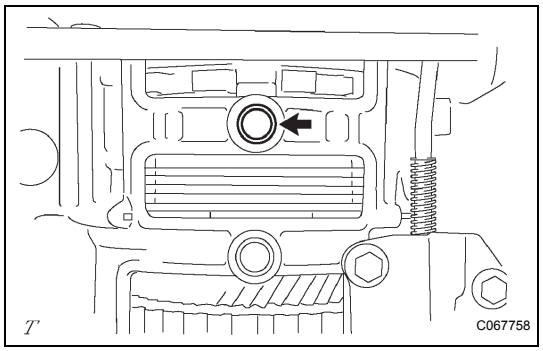
(b) Remove the O-ring from the transmission wire.



13. REMOVE TRANSAXLE CASE 2ND BRAKE GASKET

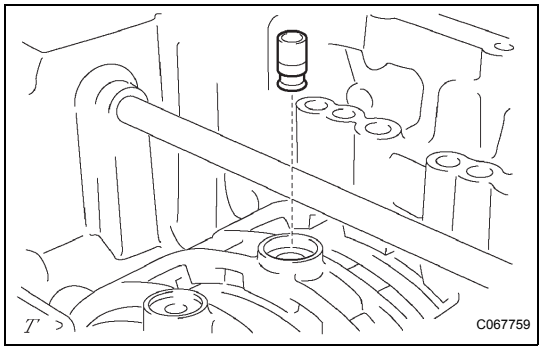
(a) Remove the transaxle case 2nd brake gasket from the transaxle case.

AX



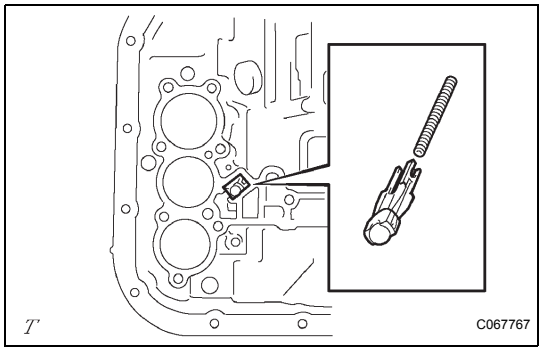
14. REMOVE TRANSAXLE CASE GASKET

(a) Remove the transaxle case gasket from the transaxle case.



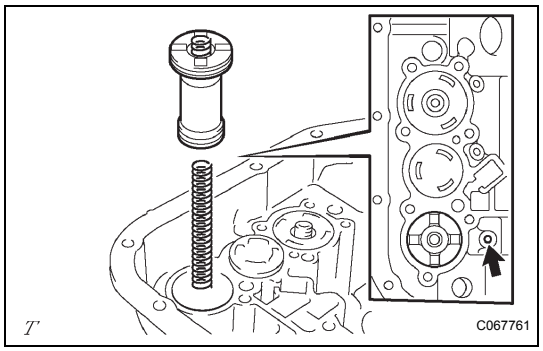
15. REMOVE BRAKE DRUM GASKET

(a) Remove the brake drum gasket from the transaxle case.



16. REMOVE CHECK BALL BODY

(a) Remove the check ball body and spring from the transaxle case.

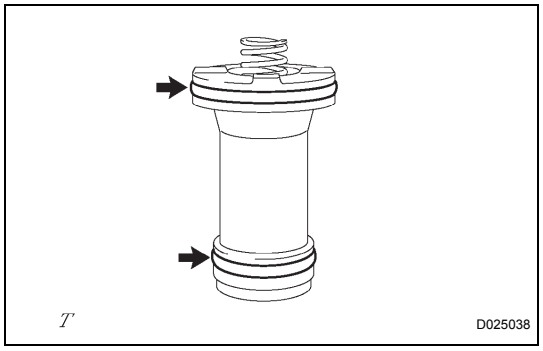


17. REMOVE B-2 ACCUMULATOR PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the B-2 accumulator piston and spring.

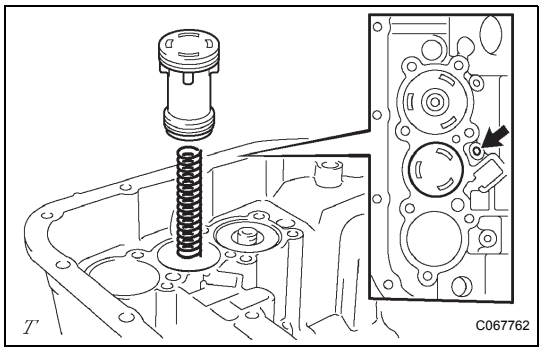
NOTICE:

- **Blowing the air may cause the piston to jump out. When removing the piston, hold it by hand using a shop rag or piece of cloth.**
- **Do not splash ATF with the compressed air.**



(b) Remove the 2 O-rings from the B-2 accumulator piston.

AX

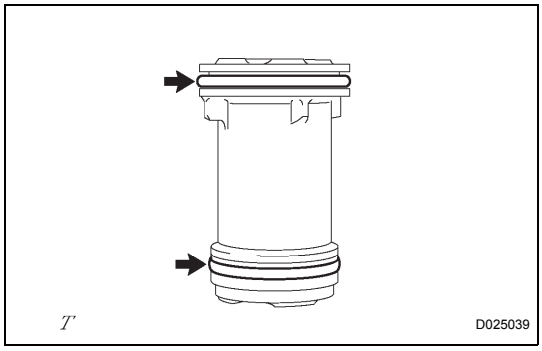


18. REMOVE C-3 ACCUMULATOR PISTON

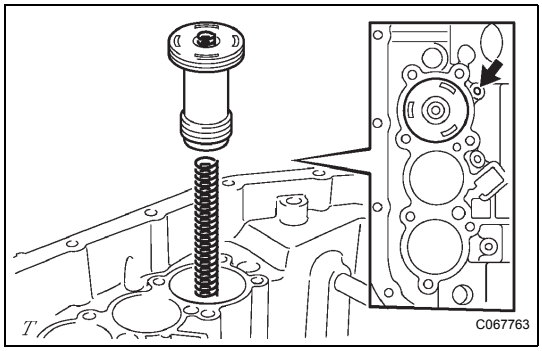
(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the C-3 accumulator piston and spring.

NOTICE:

- **Blowing the air may cause the piston to jump out. When removing the piston, hold it with your hand using a shop rag or piece of cloth.**
- **Do not splash ATF with the compressed air.**



(b) Remove the 2 O-rings from the C-3 accumulator piston.

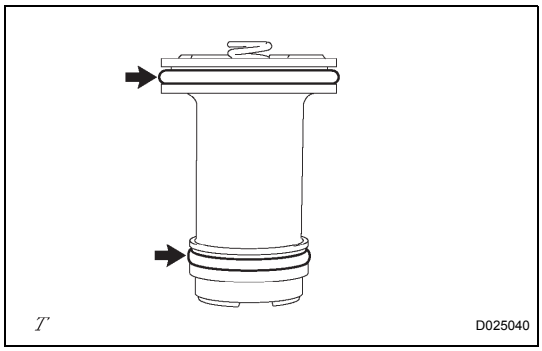


19. REMOVE C-2 ACCUMULATOR PISTON

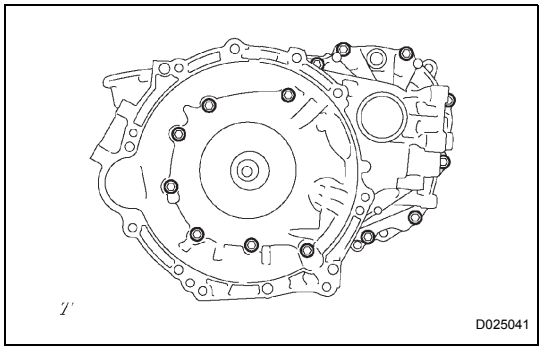
(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the C-2 accumulator piston and the spring.

NOTICE:

- **Blowing the air may cause the piston to jump out. When removing the piston, hold it by hand using a shop rag or piece of cloth.**
- **Do not splash ATF with the compressed air.**



(b) Remove the 2 O-rings from the C-2 accumulator piston.



20. REMOVE TRANSAXLE HOUSING

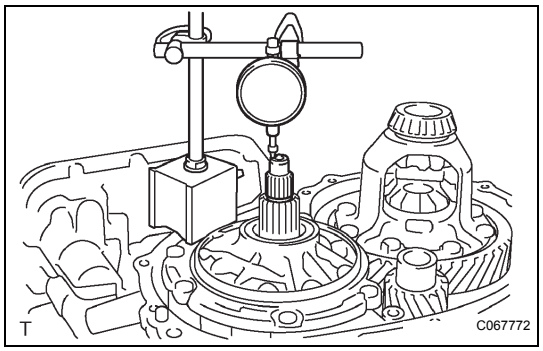
(a) Remove the 14 bolts.

(b) Tap around the circumference of the transaxle housing with a plastic hammer to remove the transaxle housing from the transaxle case.

NOTICE:

The differential gear assembly may be accidentally removed when the transaxle housing is removed.

AX



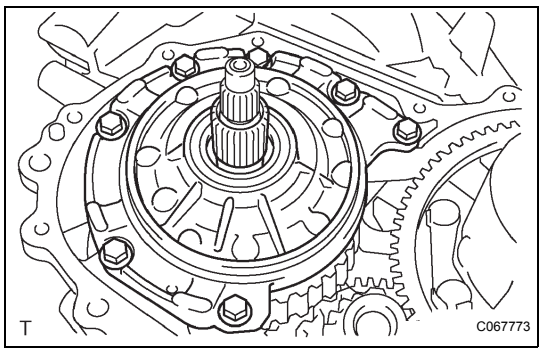
21. INSPECT INPUT SHAFT END PLAY

(a) Measure the end play in the axial direction.

End play:

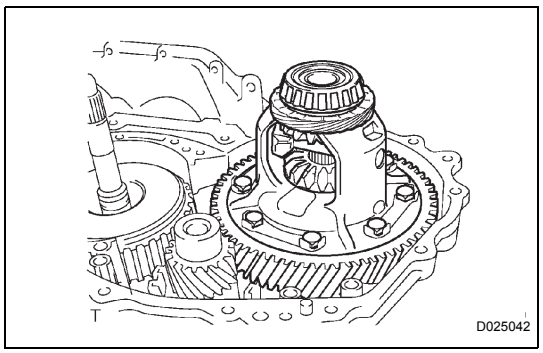
0.37 to 1.29 mm (0.0146 to 0.0508 in.)

If the end play is not as specified, select and replace the thrust needle roller bearing.



22. REMOVE OIL PUMP ASSEMBLY

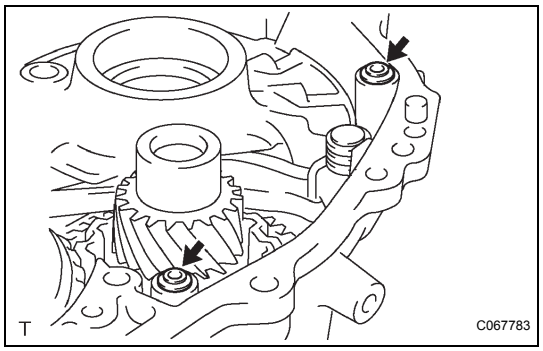
(a) Remove the 7 bolts and the oil pump assembly from the transaxle case.



23. REMOVE DIFFERENTIAL GEAR ASSEMBLY

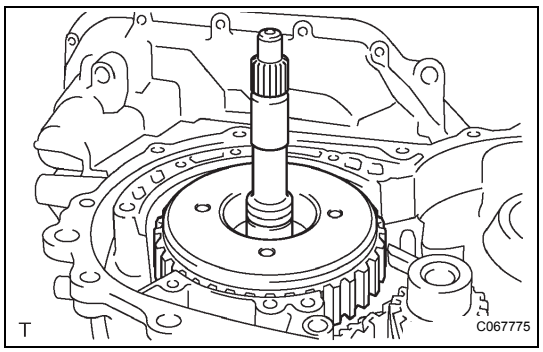
(a) Remove the differential gear assembly from the transaxle case.

AX



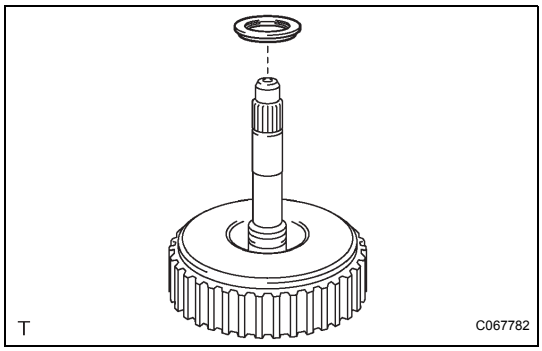
24. REMOVE OVERDRIVE BRAKE GASKET

(a) Using a screwdriver, remove the 2 overdrive brake gaskets from the transaxle case.



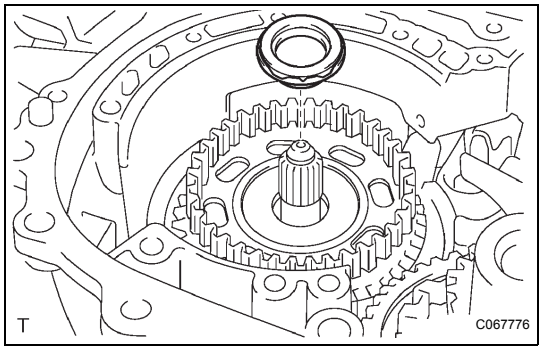
25. REMOVE INPUT SHAFT ASSEMBLY

(a) Remove the input shaft assembly from the transaxle case.



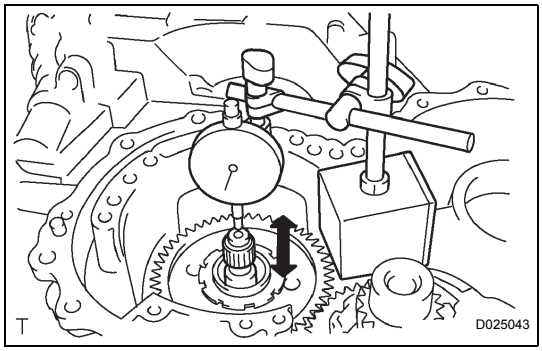
26. REMOVE STATOR SHAFT THRUST NEEDLE ROLLER BEARING

(a) Remove the thrust needle roller bearing from the input shaft.



27. REMOVE FORWARD CLUTCH HUB THRUST NEEDLE ROLLER BEARING

(a) Remove the thrust needle roller bearing from the forward clutch hub.



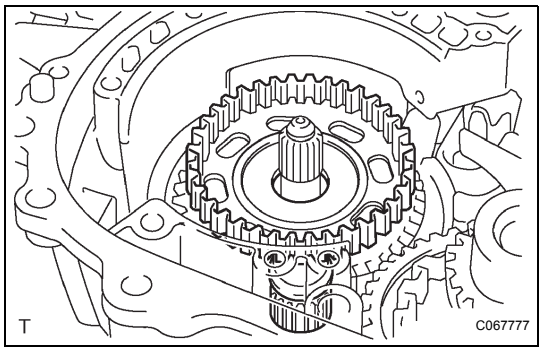
28. INSPECT INTERMEDIATE SHAFT ASSEMBLY

(a) Using a dial indicator, measure the clearance of the intermediate shaft.

Standard clearance:

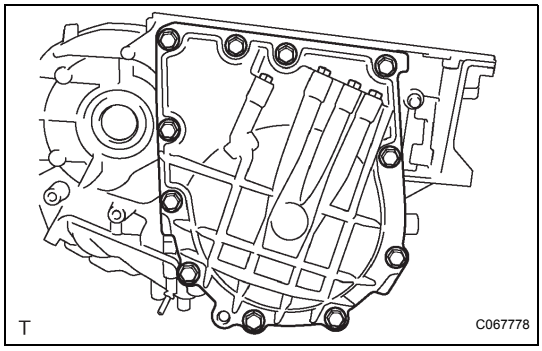
0.204 to 0.966 mm (0.008 to 0.038 in.)

AX



29. REMOVE FORWARD CLUTCH HUB SUB-ASSEMBLY

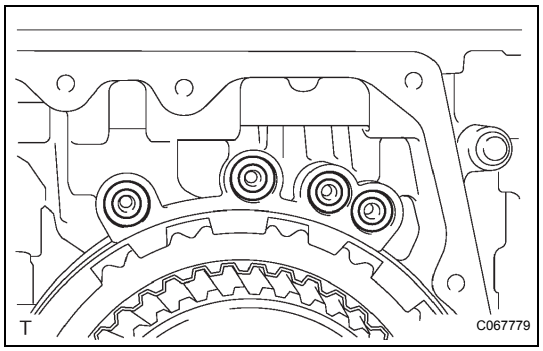
(a) Remove the forward clutch hub from the transaxle case.



30. REMOVE REAR TRANSAXLE COVER ASSEMBLY

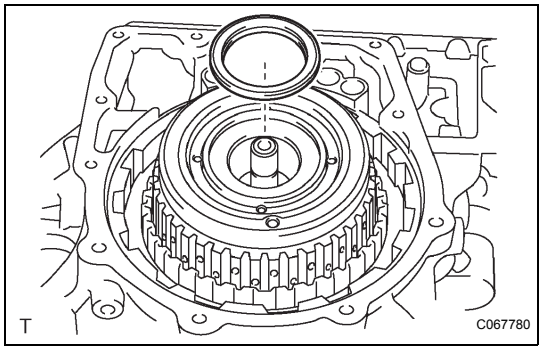
(a) Remove the 11 bolts.

(b) Tap around the circumference of the rear transaxle cover with a plastic hammer to remove the rear transaxle cover from the transaxle case.



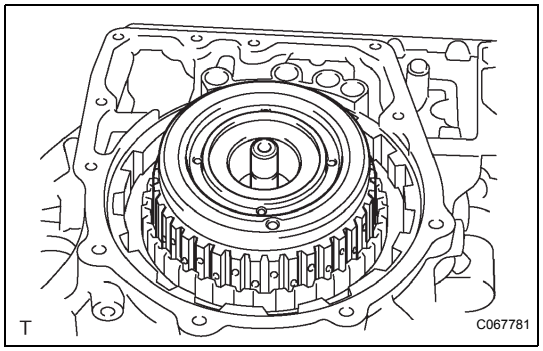
31. REMOVE TRANSAXLE CASE GASKET

(a) Remove the 4 transaxle case gaskets.



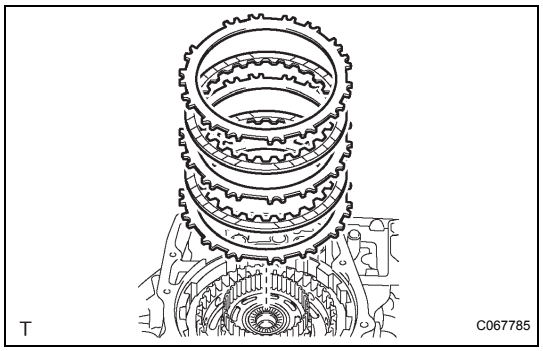
32. REMOVE REAR CLUTCH DRUM THRUST NEEDLE ROLLER BEARING

(a) Using a magnetic finger, remove the thrust needle roller bearing.



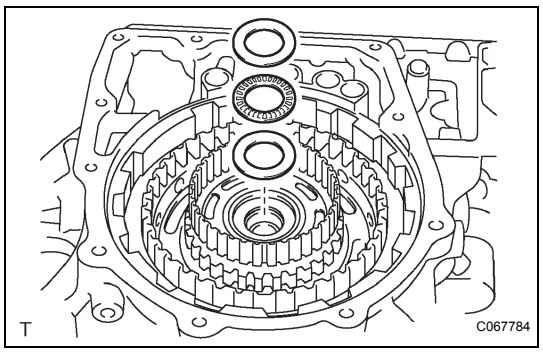
33. REMOVE INTERMEDIATE SHAFT ASSEMBLY

(a) Remove the intermediate shaft assembly from the transaxle case.



34. REMOVE 2ND COAST AND OVERDRIVE BRAKE DISC

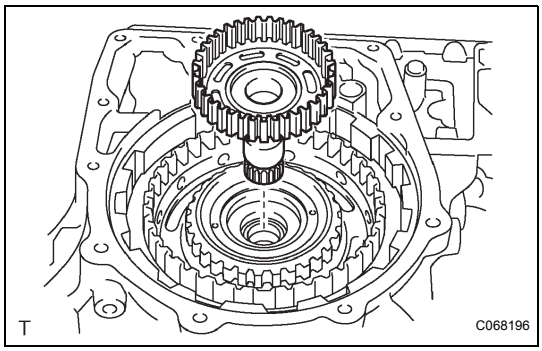
(a) Remove the flange, 2 discs and 2 No. 2 flanges from the transaxle.



35. REMOVE THRUST NEEDLE ROLLER BEARING

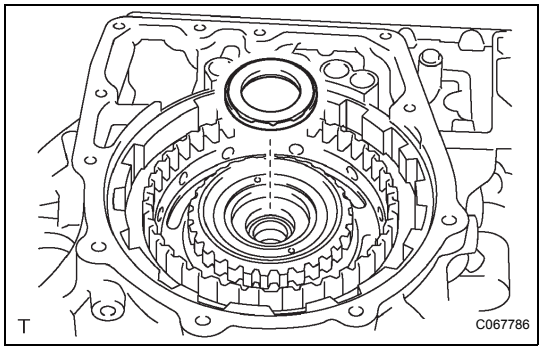
(a) Using a magnetic finger, remove the C-2 hub thrust bearing race, the thrust needle roller bearing and the thrust bearing race from the direct clutch hub.

AX



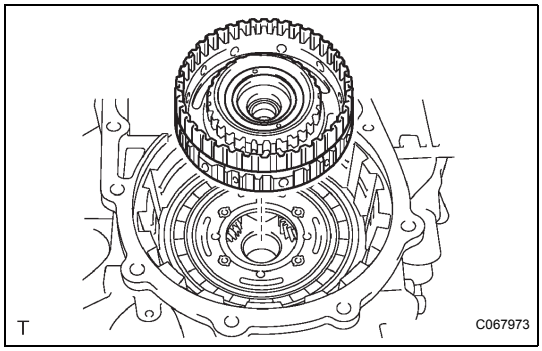
36. REMOVE DIRECT CLUTCH HUB

(a) Remove the direct clutch hub from the transaxle case.



37. REMOVE REAR NO. 2 PLANETARY SUN GEAR THRUST NEEDLE ROLLER BEARING

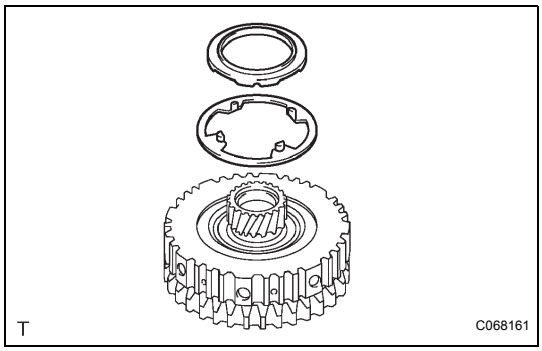
(a) Using a magnetic finger, remove the thrust bearing from the rear thrust needle bearing.



38. REMOVE REAR PLANETARY SUN GEAR ASSEMBLY

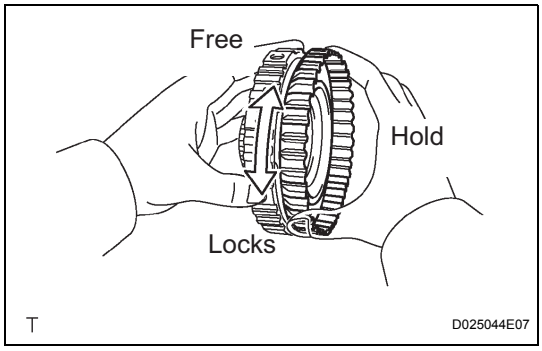
(a) Remove the rear planetary sun gear from the transaxle case.

AX



39. REMOVE REAR PLANETARY SUN GEAR THRUST NEEDLE ROLLER BEARING

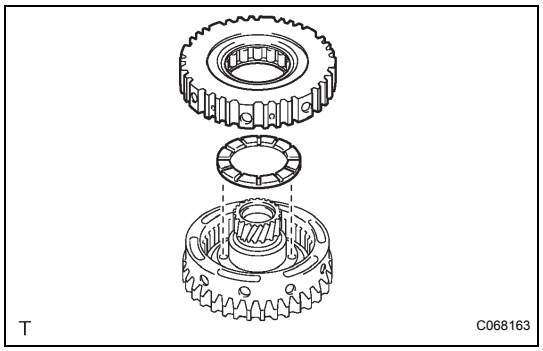
(a) Remove the rear planetary sun gear thrust needle roller bearing and thrust washer No. 1 from the rear planetary sun gear.



40. INSPECT 1-WAY CLUTCH ASSEMBLY

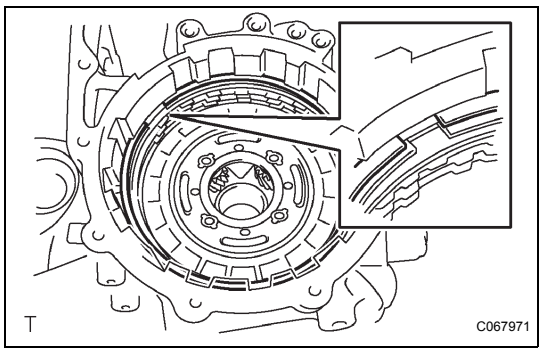
(a) Hold the rear planetary sun gear and turn the 1-way clutch.

(b) Make sure that 1-way clutch turns freely counterclockwise and locks when turned clockwise.



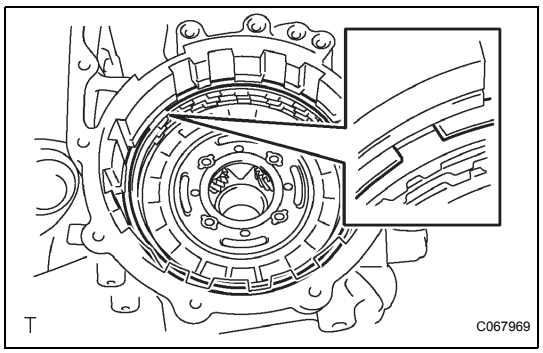
41. REMOVE 1-WAY CLUTCH ASSEMBLY

(a) Remove the 1-way clutch assembly and planetary carrier thrust washer No. 2 from the rear planetary sun gear.



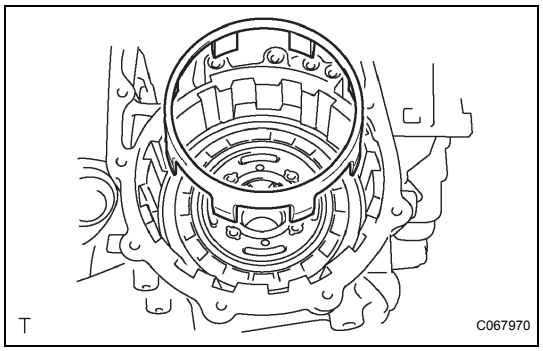
42. REMOVE 2ND COAST AND OVERDRIVE BRAKE FLANGE HOLE SNAP RING

(a) Using a screwdriver, remove the snap ring from the transaxle case.



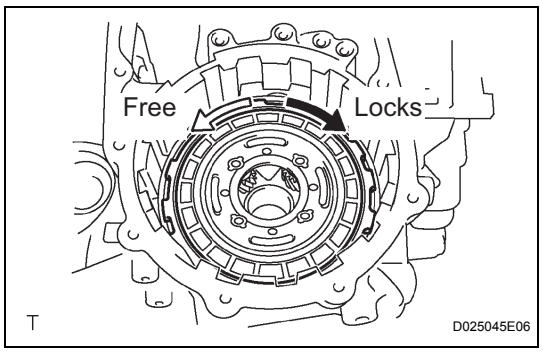
43. REMOVE 2ND BRAKE BRAKE DISC

(a) Using a screwdriver, remove the snap ring.
(b) Remove the flange, 3 discs and 3 plates from the transaxle.



44. REMOVE 2ND BRAKE PISTON SLEEVE

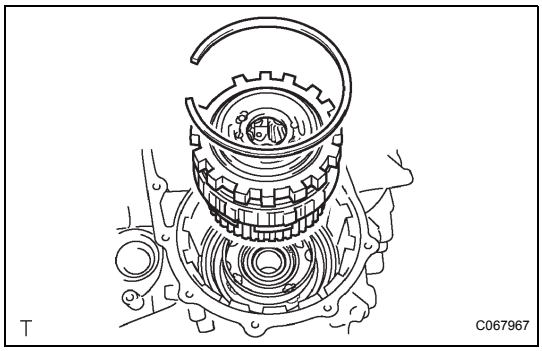
(a) Remove the 2nd brake piston sleeve from the transaxle case.



45. INSPECT NO. 2 1-WAY CLUTCH

(a) Install the 1-way clutch and the thrust washer onto the rear planetary sun gear.
(b) Hold the rear planetary sun gear and turn the 1-way clutch.
(c) Make sure that the 1-way clutch turns freely counterclockwise and locks when turned clockwise.

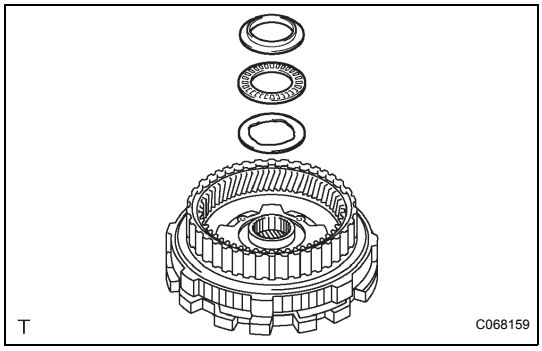
AX



46. REMOVE REAR PLANETARY GEAR ASSEMBLY

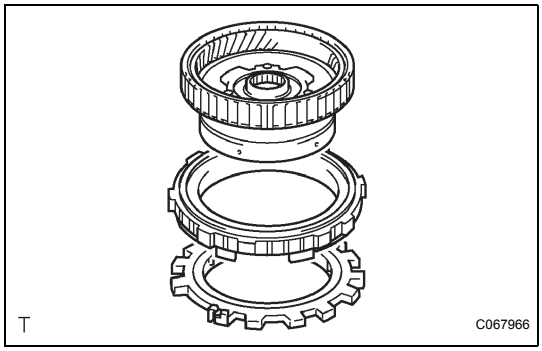
(a) Using a screwdriver, remove the snap ring.

(b) Remove the rear planetary gear assembly from the transaxle case.



47. REMOVE REAR PLANETARY GEAR THRUST NEEDLE ROLLER BEARING

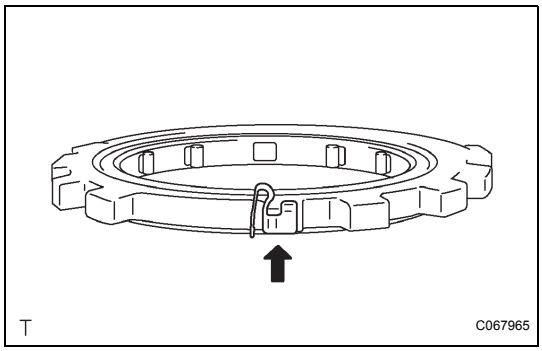
(a) Remove the thrust needle roller bearing and 2 bearing races from the rear planetary gear assembly.



48. REMOVE NO. 2 1-WAY CLUTCH

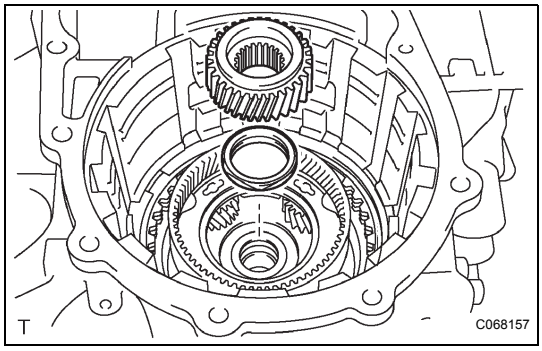
(a) Separate the 2nd brake cylinder, 1-way clutch No. 2 and the rear planetary gear.

AX



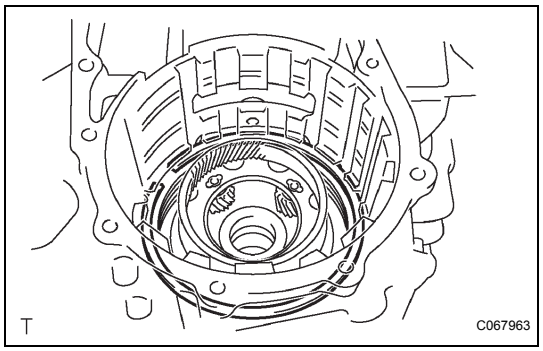
49. REMOVE OUTER RACE RETAINER

(a) Remove the retainer from 1-way clutch No. 2.



50. REMOVE FRONT PLANETARY SUN GEAR

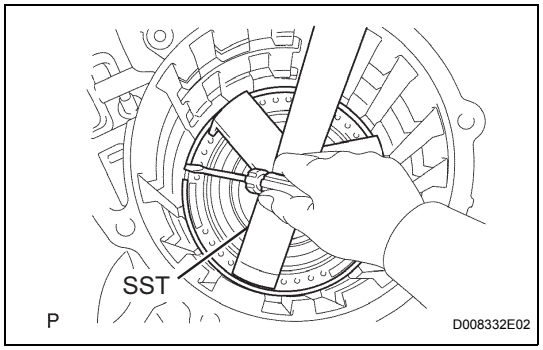
(a) Remove the front planetary sun gear and thrust needle roller bearing from the transaxle case.



51. REMOVE 1ST AND REVERSE BRAKE DISC

(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange, 4 discs and 4 plates from the transaxle case.

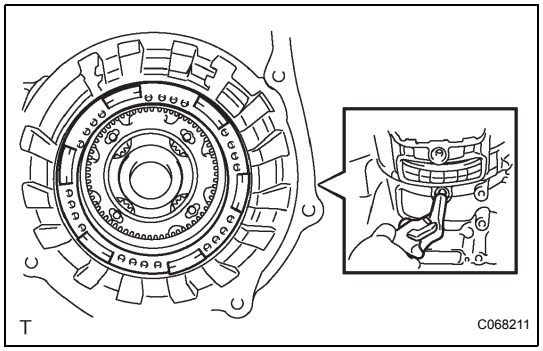


52. REMOVE 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using SST, a press and a screwdriver, remove the snap ring.

SST 09387-00070

(b) Remove the 1st and reverse brake return spring sub-assembly.



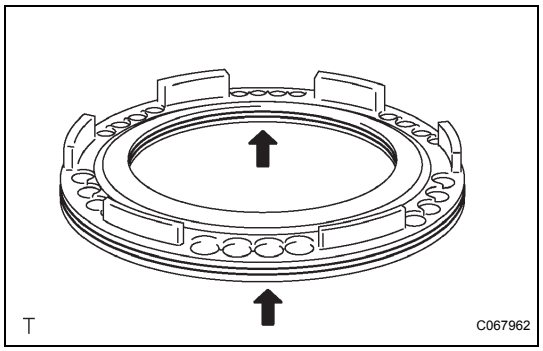
53. REMOVE NO. 2 1ST AND REVERSE BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle case to remove the 1st and reverse brake piston.

NOTICE:

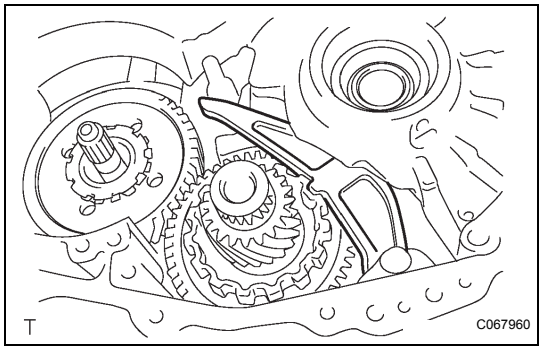
- **Blowing the air may cause the piston to jump out. When removing the piston, hold it by hand using a shop rag or piece of cloth.**
- **Do not splash ATF with the compressed air.**

AX



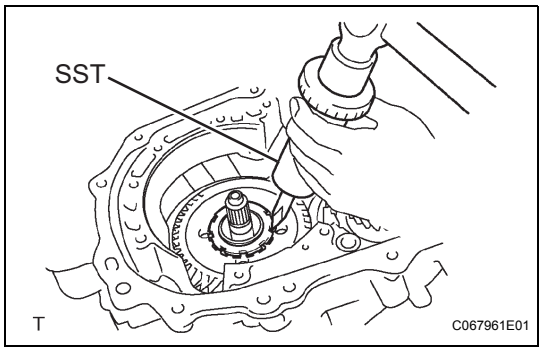
54. REMOVE NO. 2 1ST AND REVERSE BRAKE PISTON O-RING

(a) Remove the 2 O-rings from No. 2 1st and reverse brake piston.

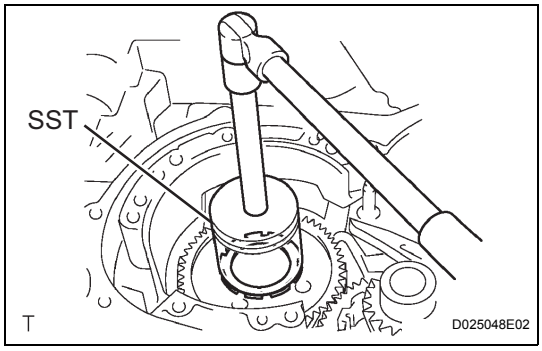


55. REMOVE COUNTER DRIVE GEAR NUT

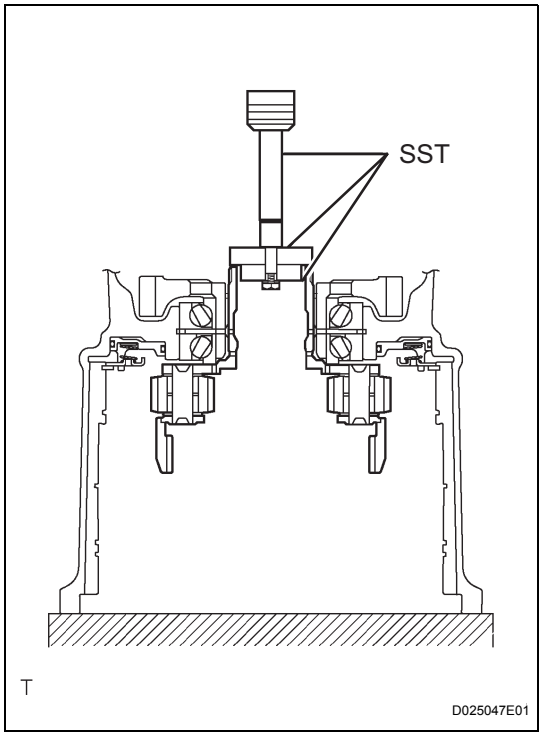
(a) Fix the counter driven gear with the parking lock pawl.



(b) Using SST and a hammer, release the lock washer.
SST 09930-00010



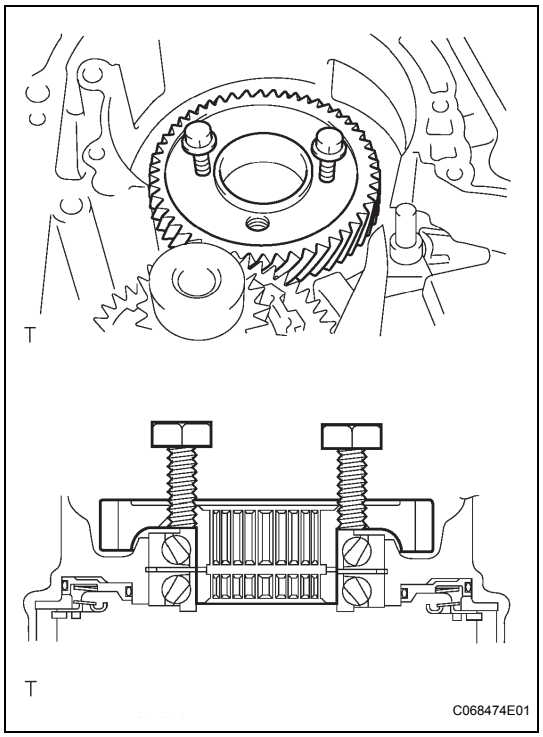
(c) Using SST, remove the nut and lock washer.
SST 09387-00120



56. REMOVE PLANETARY GEAR ASSEMBLY

(a) Using SST and a press, remove the planetary gear assembly from the transaxle case.
SST 09950-60010 (09951-00400, 09951-00320, 09952-06010), 09950-70010 (09951-07100)

AX

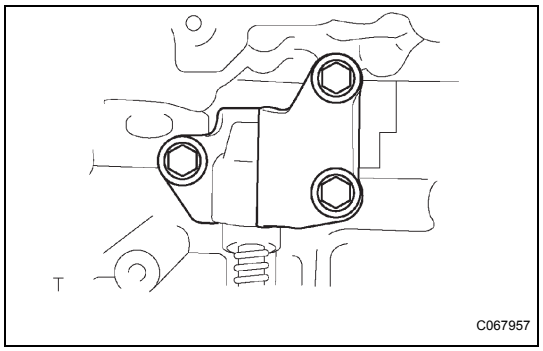


57. REMOVE COUNTER DRIVE GEAR

(a) Install the 2 bolts onto the counter drive gear.
Bolt (M6):
L = 40 to 80 mm
Pitch = 1.0 mm

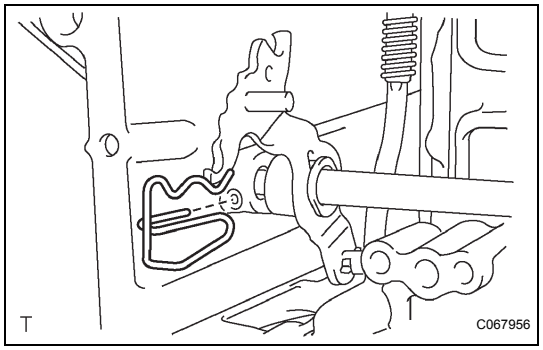
(b) Rotate the 2 bolts and remove the counter drive gear and front planetary sun gear.

(c) Remove the 2 radial ball bearings from the counter drive gear and front planetary sun gear.



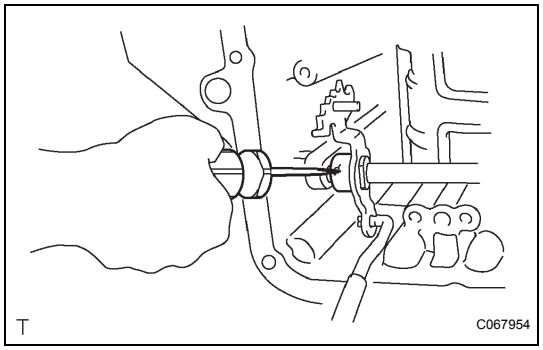
58. REMOVE PARKING LOCK PAWL BRACKET

(a) Remove the 3 bolts, cam guide and bracket from the transaxle case.



59. REMOVE MANUAL VALVE LEVER SHAFT RETAINER SPRING

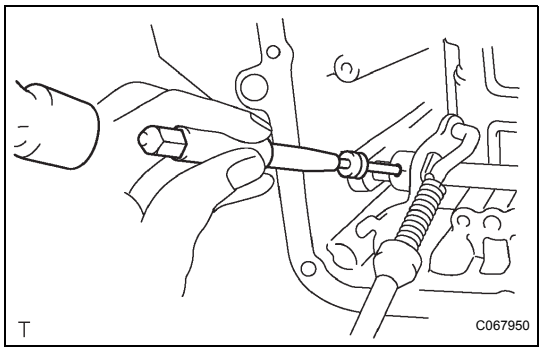
(a) Remove the manual valve lever shaft retainer spring from the manual valve lever shaft.



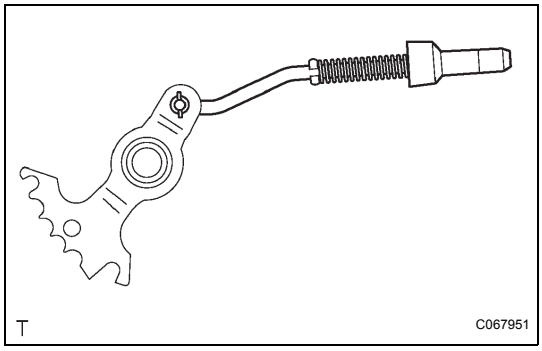
60. REMOVE MANUAL VALVE LEVER SUB-ASSEMBLY

(a) Using a screwdriver, release and remove the spacer.

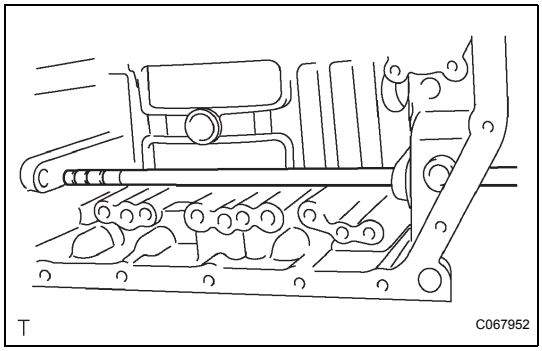
AX



(b) Using a pin punch and hammer, drive out the manual valve lever shaft spring pin.
(c) Remove the manual valve lever shaft and manual valve lever.

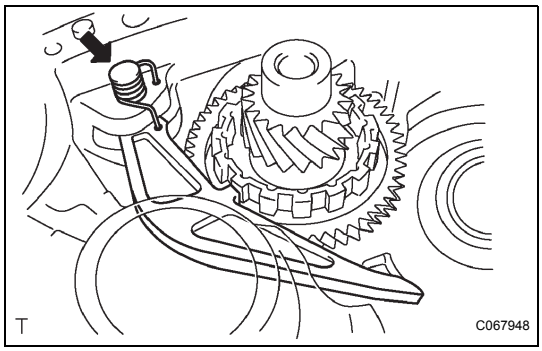


61. REMOVE PARKING LOCK ROD SUB-ASSEMBLY
(a) Remove the parking lock rod from the manual valve lever.

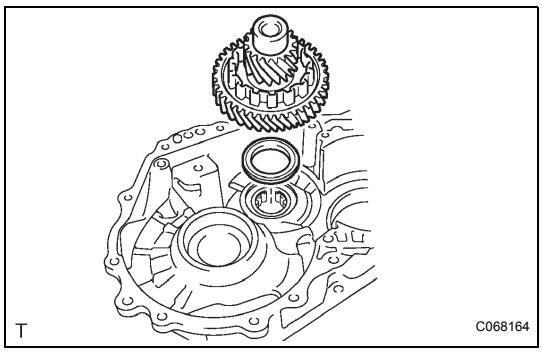


62. REMOVE MANUAL VALVE LEVER SHAFT
(a) Remove the manual valve lever shaft from the transaxle case.

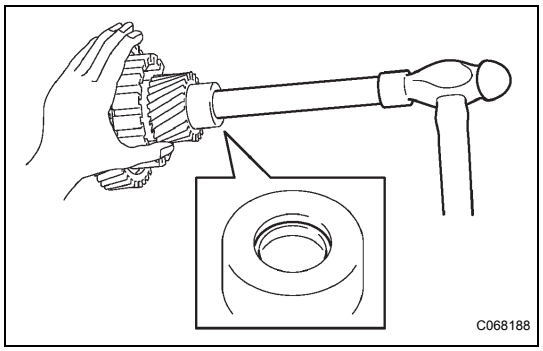
AX



63. REMOVE PARKING LOCK PAWL
(a) Using a screwdriver, remove the parking lock pawl shaft from the transaxle case.
(b) Remove the parking lock pawl torsion spring and parking lock pawl from the transaxle case.

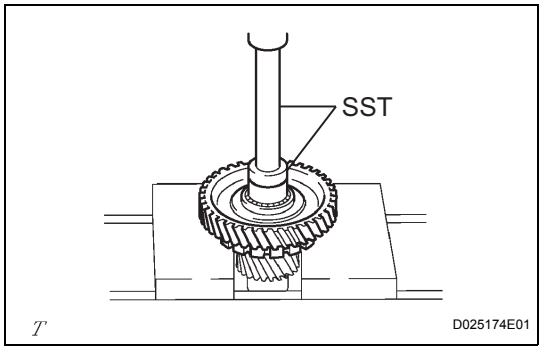


64. REMOVE COUNTER DRIVEN GEAR
(a) Remove the counter driven gear, drive pinion and thrust needle roller bearing from the transaxle case.



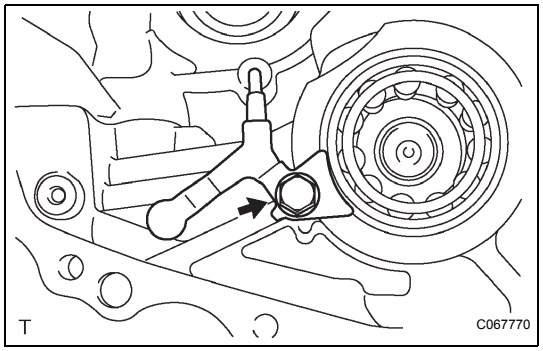
65. REMOVE DIFFERENTIAL DRIVE PINION PLUG

(a) Using a brass bar and a hammer, remove the differential drive pinion plug.



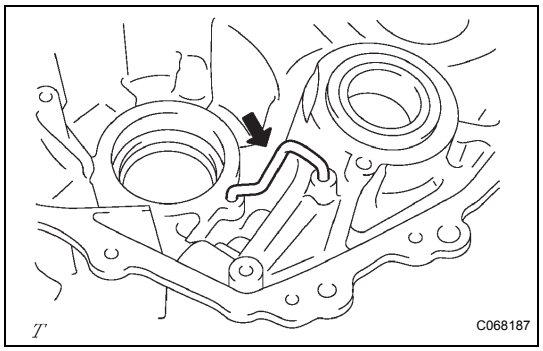
66. REMOVE DIFFERENTIAL DRIVE PINION

(a) Using SST and a press, remove the differential drive pinion from the counter driven gear.
SST 09950-60010 (09951-00350), 09950-70010 (09951-07150)



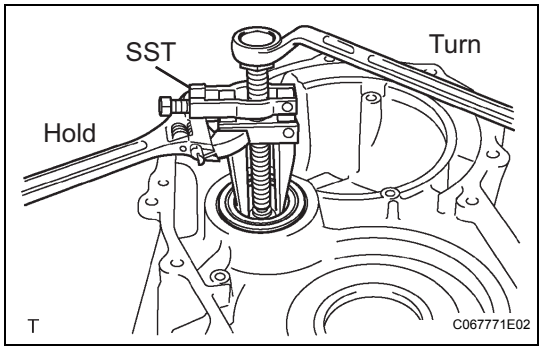
67. REMOVE BEARING LOCK PLATE

(a) Remove the bolt and remove the bearing lock plate.



68. REMOVE DIFFERENTIAL GEAR LUBE APPLY TUBE

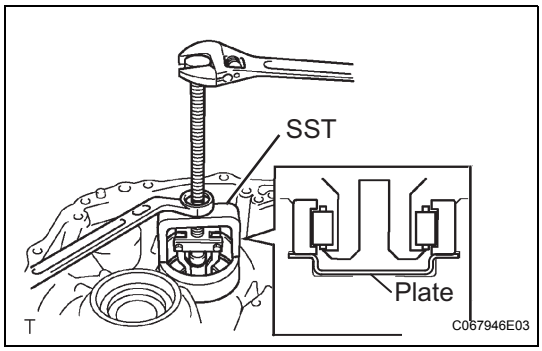
(a) Remove the differential gear lube apply tube from the transaxle housing.



69. REMOVE FRONT DRIVE PINION FRONT TAPERED ROLLER BEARING

(a) Using SST, remove the front drive pinion front tapered roller bearing from the transaxle housing.
SST 09308-10010

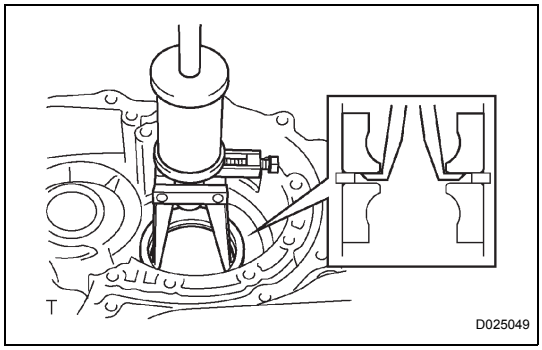
AX



70. REMOVE FRONT DRIVE PINION REAR TAPERED ROLLER BEARING

(a) Using SST, remove the front drive pinion rear tapered roller bearing from the transaxle case.
SST 09612-65014 (09612-01040)

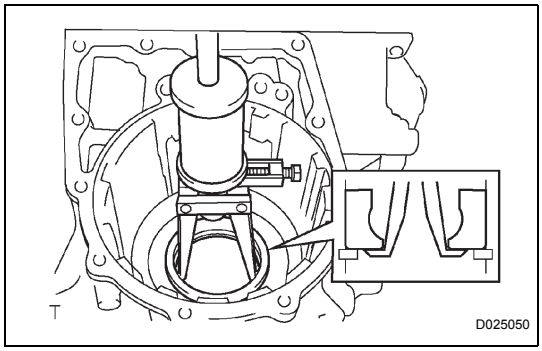
(b) Remove transaxle case plate No. 1 from the transaxle case.



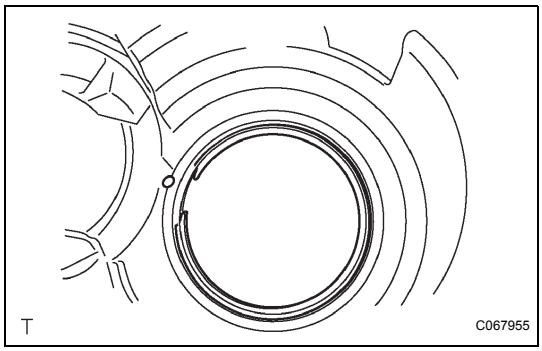
71. REMOVE COUNTER DRIVE GEAR BEARING

(a) Remove the 2 counter drive gear bearing inner races RH from the transaxle case.

(b) Using SST, remove the counter drive gear bearing LH outer race from the transaxle case.
SST 09308-00010

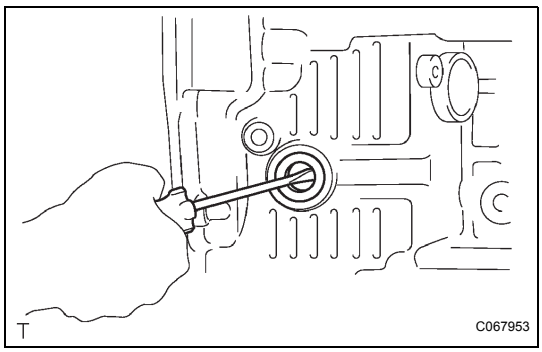


(c) Using SST, remove the counter drive gear bearing rear outer race from the transaxle case.
SST 09308-00010



72. REMOVE COUNTER DRIVE GEAR HOLE SNAP RING

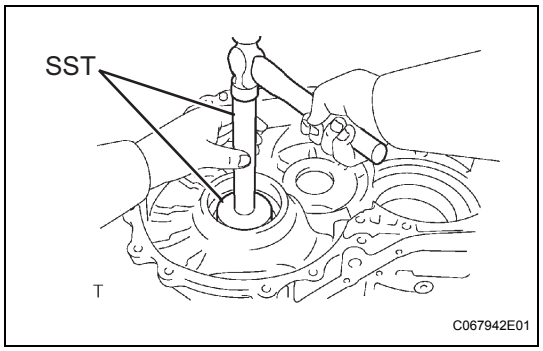
(a) Using a screwdriver, remove the counter drive gear hole snap ring from the transaxle case.



73. REMOVE MANUAL VALVE LEVER SHAFT OIL SEAL

(a) Using a screwdriver, remove the oil seal from the transaxle case.

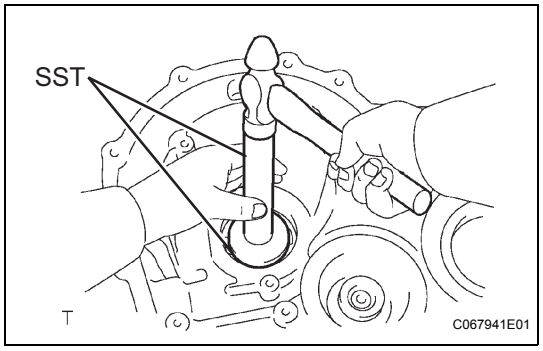
AX



74. REMOVE FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, remove the oil seal from the transaxle case.

SST 09950-60010 (09951-00550), 09950-70010 (09951-07100)

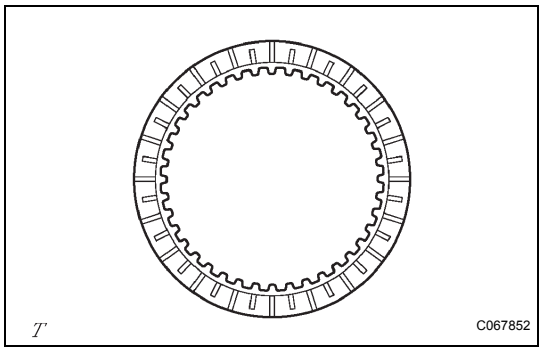


75. REMOVE TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, remove the transaxle case oil seal from the transaxle housing.

SST 09950-60010 (09951-00530), 09950-70010 (09951-07100)

INSPECTION

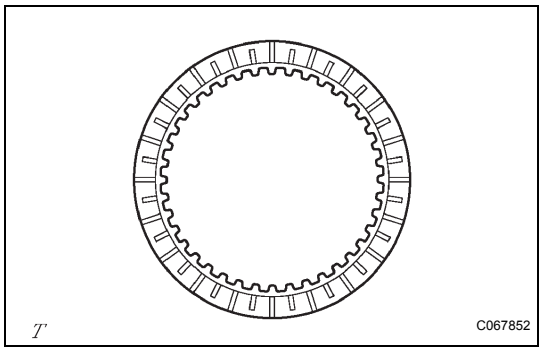


1. INSPECT 2ND COAST AND OVERDRIVE BRAKE DISC

(a) Check whether the sliding surfaces 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 the discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**

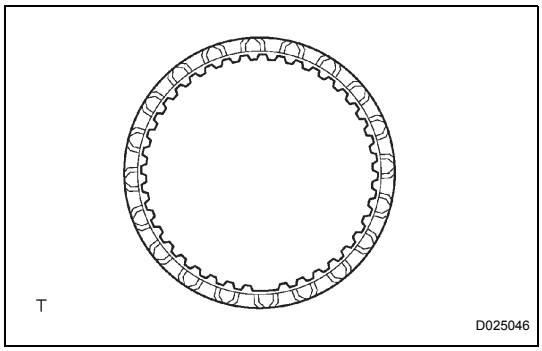


2. INSPECT 2ND BRAKE BRAKE DISC

(a) Check whether the sliding surfaces of the disc, plate and flange are worn or burnt.
If necessary, replace them.

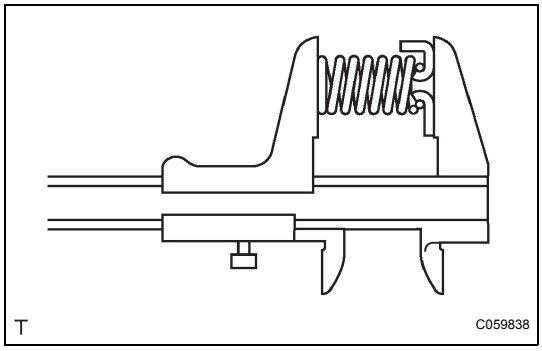
NOTICE:

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



3. INSPECT 1ST AND REVERSE BRAKE 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 mark is defaced, replace all the discs.**
- **Before assembling new discs, soak in ATF for at least 15 minutes.**

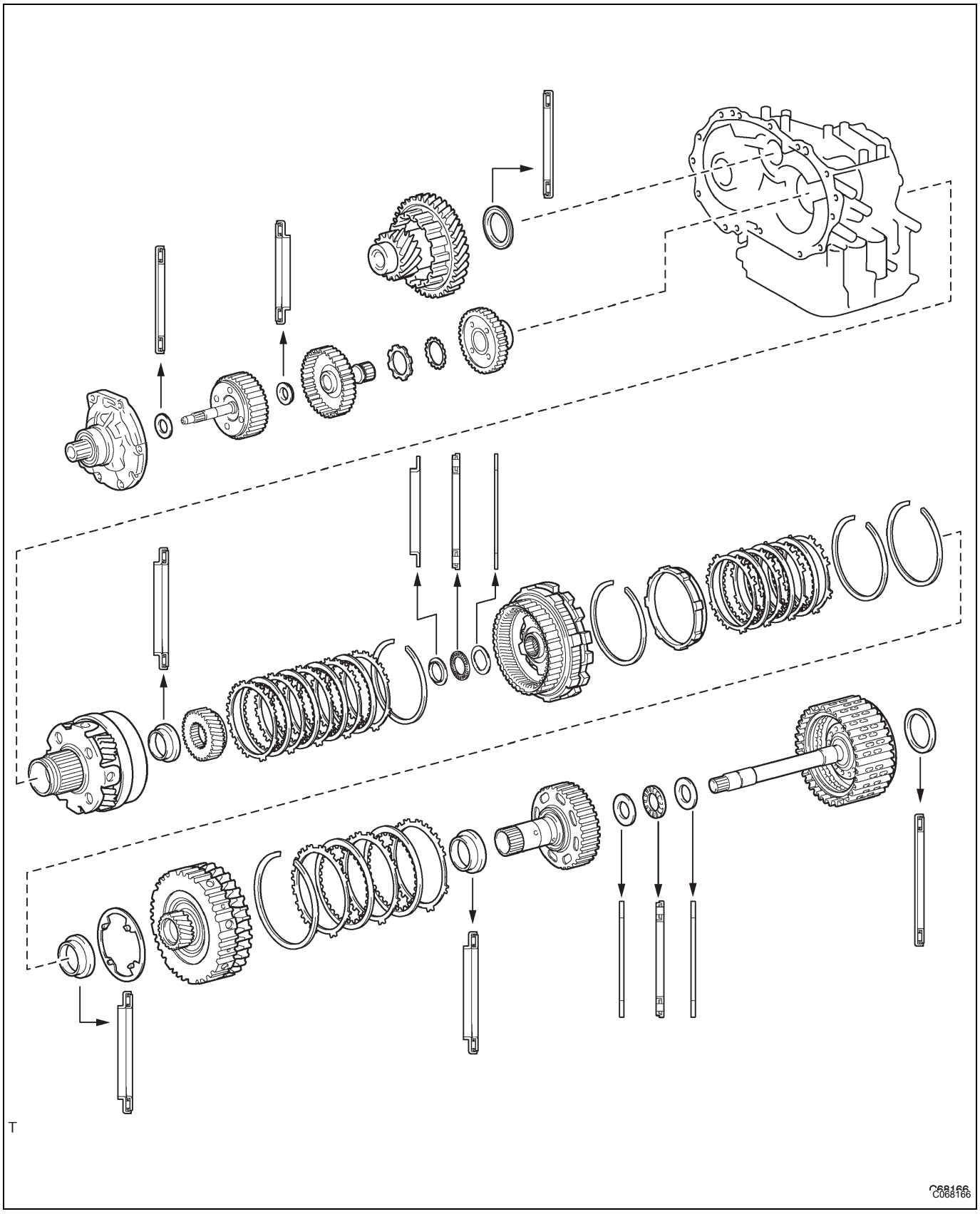


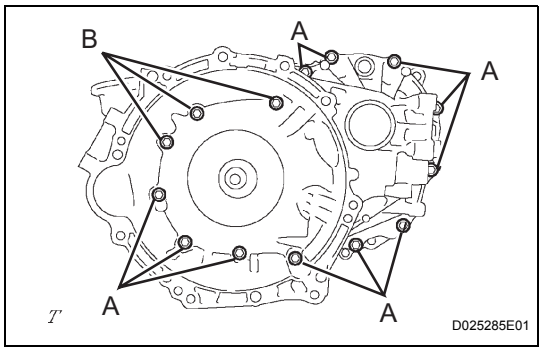
4. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the spring together with the spring seat.
Standard free length:
13.96 mm (0.5496 in.)

REASSEMBLY

1. BEARING POSITION



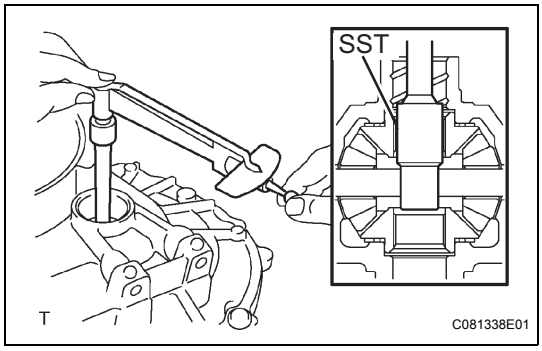


2. INSPECT DIFFERENTIAL CASE TAPERED ROLLER BEARING PRELOAD

(a) Coat the front differential case and bearing with ATF and install them onto the transaxle case.

(b) Install the transaxle housing with the 14 bolts.

Torque: Bolt A
29 N*m (300 kgf*cm, 22 ft.*lbf)
Bolt B
22 N*m (225 kgf*cm, 16 ft.*lbf)



(c) Using SST and a small torque wrench, measure the preload of the differential gear.

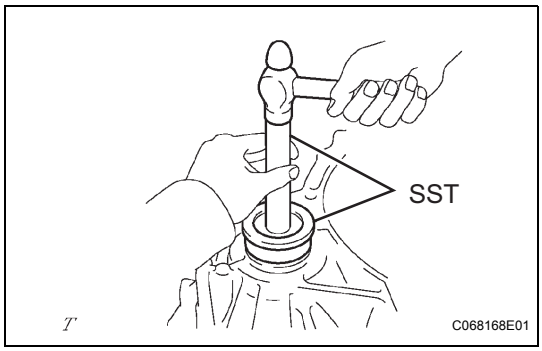
Preload

Bearing	Standard
New	0.98 to 1.57 N*m (10.0 to 16.0 kgf*cm 8.7 to 13.9 in.*lbf)
Used	0.49 to 0.78 N*m (5.0 to 8.0 kgf*cm 4.3 to 6.9 in.*lbf)

If the preload is not within the specifications, remove the differential from the transaxle case.
Select a new transaxle case side adjusting shim in accordance with the following table.

Adjusting shim thickness

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
01	1.90 (0.0748)	11	2.40 (0.0945)
02	1.95 (0.0768)	12	2.45 (0.0965)
03	2.00 (0.0787)	13	2.50 (0.0984)
04	2.05 (0.0807)	14	2.55 (0.1004)
05	2.10 (0.0827)	15	2.60 (0.1024)
06	2.15 (0.0846)	16	2.65 (0.1043)
07	2.20 (0.0866)	17	2.70 (0.1063)
08	2.25 (0.0885)	18	2.75 (0.1082)
09	2.30 (0.0906)	19	2.80 (0.1102)
10	2.35 (0.0925)		



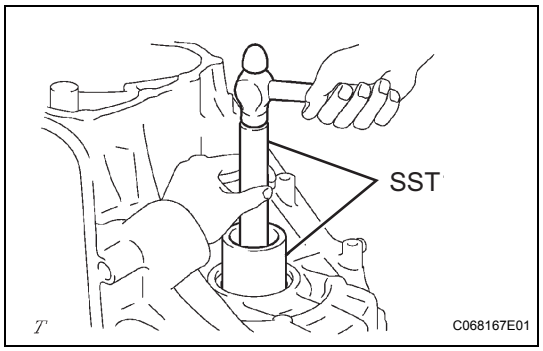
3. INSTALL TRANSAXLE CASE OIL SEAL

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

(b) Using SST and a hammer, drive in a new oil seal.

SST 09554-14010, 09950-70010 (09951-07100)
Oil seal drive in depth:
1.5 to 2.5 mm (0.059 to 0.098 in.)

AX



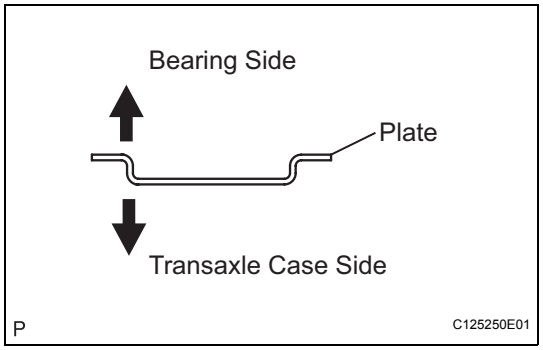
4. INSTALL FRONT TRANSAXLE CASE OIL SEAL

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

(b) Using SST and a hammer, drive in a new oil seal.

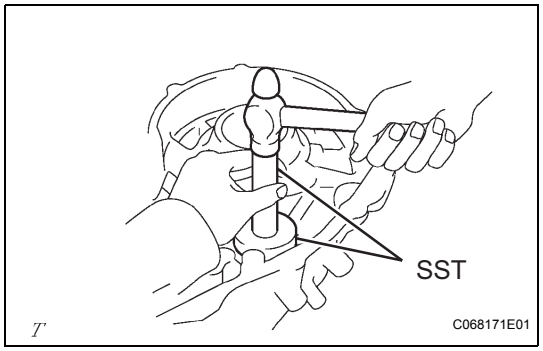
SST 09726-27012 (09726-02041), 09950-70010 (09951-07150)

Oil seal drive in depth:
5.4 to 6.4 mm (0.213 to 0.252 in.)



5. INSTALL FRONT DRIVE PINION REAR TAPERED ROLLER BEARING

(a) Install transaxle case plate No. 1 onto the transaxle case.

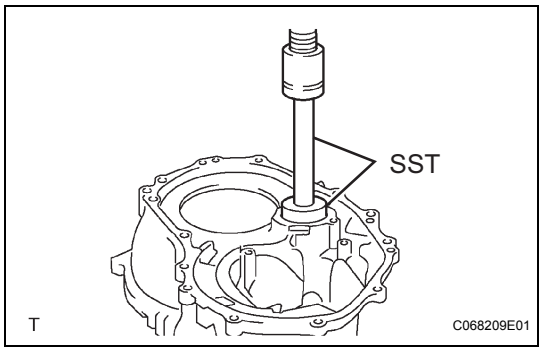


(b) Using SST and a hammer, install the front drive pinion rear tapered roller bearing onto the transaxle case.

SST 09950-60010 (09951-00610), 09950-70010 (09951-07150)

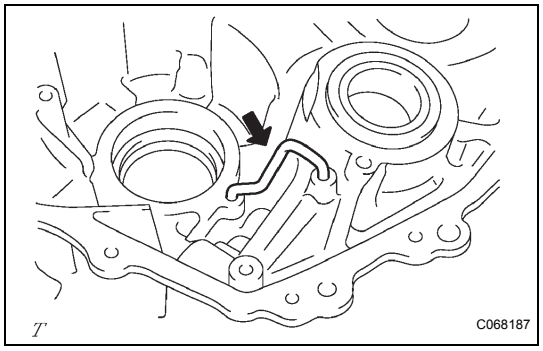
6. INSTALL FRONT DRIVE PINION FRONT TAPERED ROLLER BEARING

(a) Install the thrust bearing onto the transaxle housing.



(b) Using SST and a press, install a new front drive pinion front tapered roller bearing onto the transaxle housing.

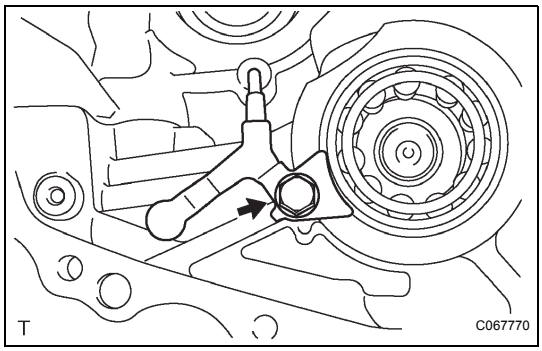
SST 09950-60010 (09951-00650), 09950-70010 (09951-07150)



7. INSTALL DIFFERENTIAL GEAR LUBE APPLY TUBE

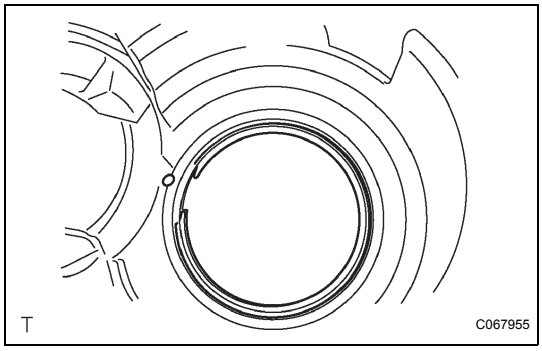
(a) Install the differential gear lube apply tube onto the transaxle housing.

AX



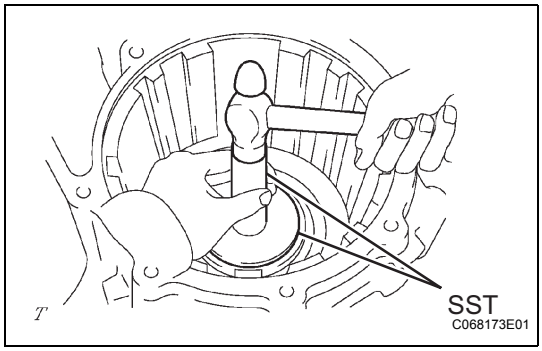
8. INSTALL BEARING LOCK PLATE

(a) Install the bearing lock plate onto the transaxle housing with the bolt.
Torque: 11 N*m (115 kgf*cm, 8 ft.*lbf)



9. INSTALL COUNTER DRIVE GEAR HOLE SNAP RING

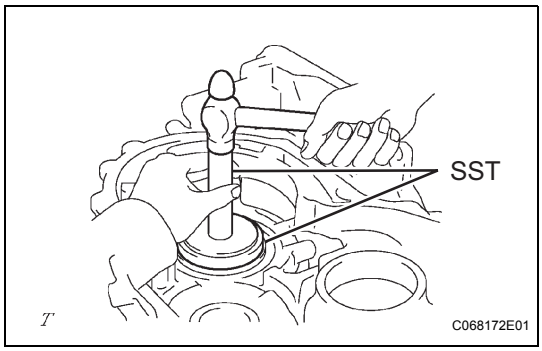
(a) Using a screwdriver, install the counter drive gear hole snap ring onto the transaxle case.



10. INSTALL COUNTER DRIVE GEAR BEARING

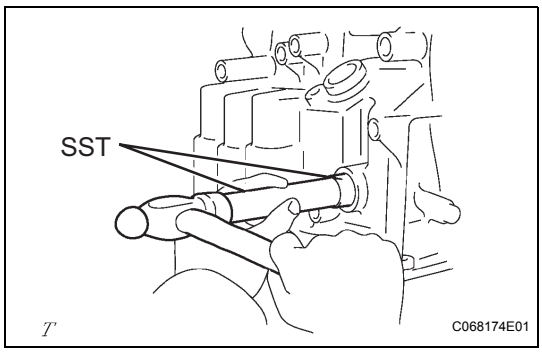
(a) Using SST and a hammer, install the counter drive gear bearing LH outer race onto the transaxle case.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07150)

AX



(b) Using SST and a hammer, install the counter drive gear bearing RH outer race onto the transaxle case.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07150)

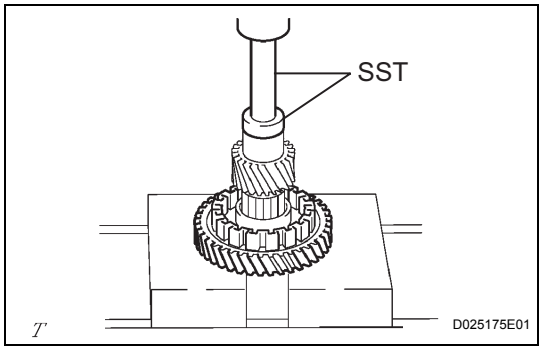
(c) Install the counter drive gear bearing onto the transaxle case.



11. INSTALL MANUAL VALVE LEVER SHAFT OIL SEAL

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

(b) Using SST and a hammer, install a new manual valve lever shaft oil seal.
SST 09950-60010 (09951-00220), 09950-70010 (09951-07100)
Oil seal drive in depth:
-0.5 to 0.5 mm (-0.020 to 0.020 in.)



12. INSTALL DIFFERENTIAL DRIVE PINION

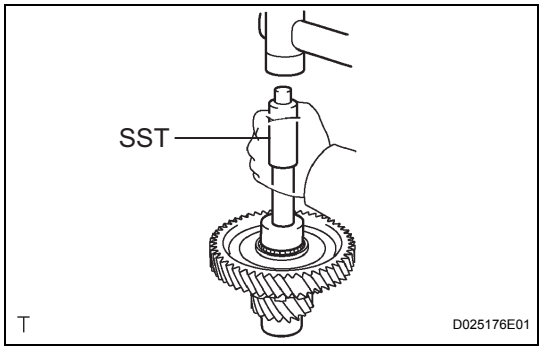
(a) Using SST and a press, install the differential drive pinion onto the counter driven gear.

SST 09950-60010 (09951-00350), 09950-70010 (09951-07150)

NOTICE:

When replacing the counter driven gear, replace the counter drive gear in the transaxle case as well.

Press the differential drive pinion in until it comes into contact with the counter driven gear.



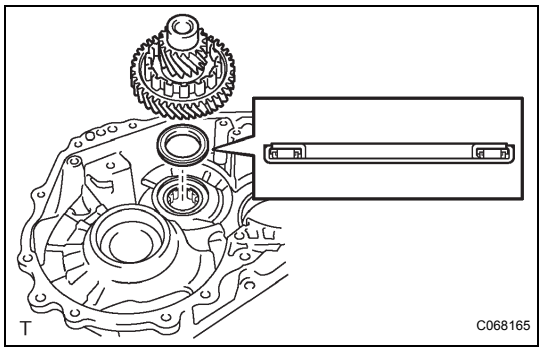
13. INSTALL DIFFERENTIAL DRIVE PINION PLUG

(a) Using SST and a plastic hammer, install a new differential drive pinion plug onto the differential drive pinion.

SST 09221-25026 (09221-00071)

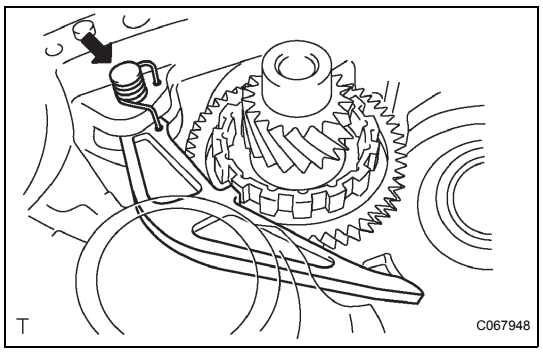
Standard clearance:

2.5 to 2.6 mm (0.0984 to 0.1023 in.)



14. INSTALL COUNTER DRIVEN GEAR

(a) Install the counter driven gear and drive pinion thrust bearing onto the transaxle case.



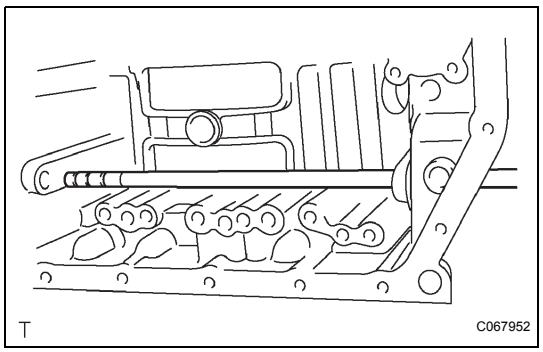
15. INSTALL PARKING LOCK PAWL

(a) Coat the parking lock pawl shaft with ATF.

(b) Install the parking lock pawl, parking lock pawl shaft torsion spring and parking lock pawl shaft onto the transaxle case.

NOTICE:

Check that the parking lock pawl moves smoothly.



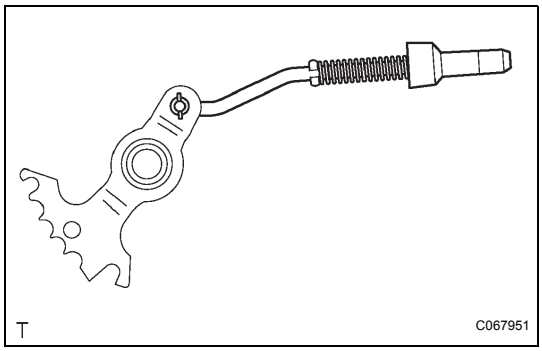
16. INSTALL MANUAL VALVE LEVER SHAFT

(a) Install the manual valve lever shaft onto the transaxle case.

NOTICE:

Do not damage the oil seal lip.

AX



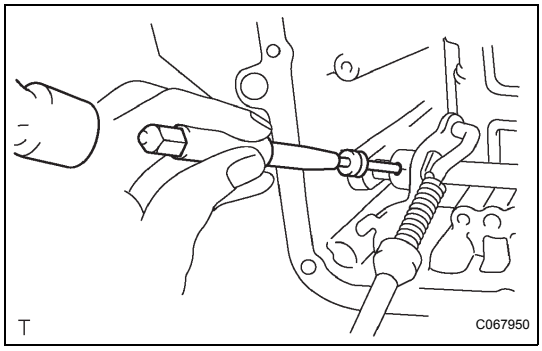
17. INSTALL PARKING LOCK ROD SUB-ASSEMBLY

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

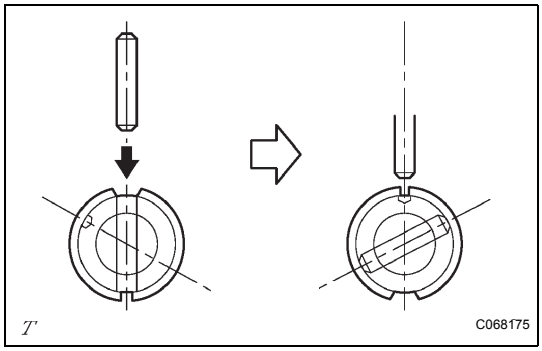
18. INSTALL MANUAL VALVE LEVER SUB-ASSEMBLY

(a) Coat the manual valve lever sub-assembly with ATF.

(b) Install the manual valve lever and a new manual valve lever spacer onto the manual valve lever shaft.



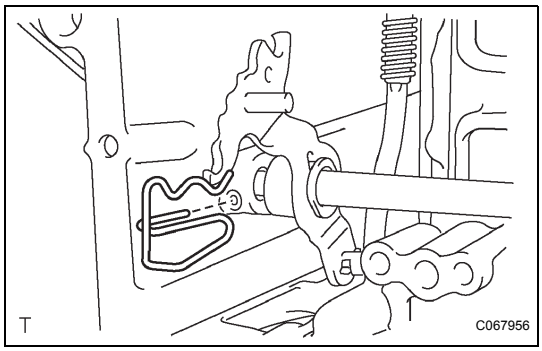
(c) Using a pin punch and hammer, drive in the pin.



(d) Turn the spacer and lever shaft to align the small hole for locating the staking position in the spacer with the staking position mark on the lever shaft.

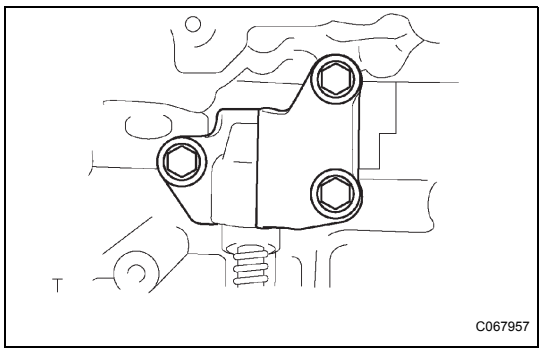
(e) Using a pin punch, stake the spacer through the small hole.

(f) Check that the spacer does not turn.



19. INSTALL MANUAL VALVE LEVER SHAFT RETAINER SPRING

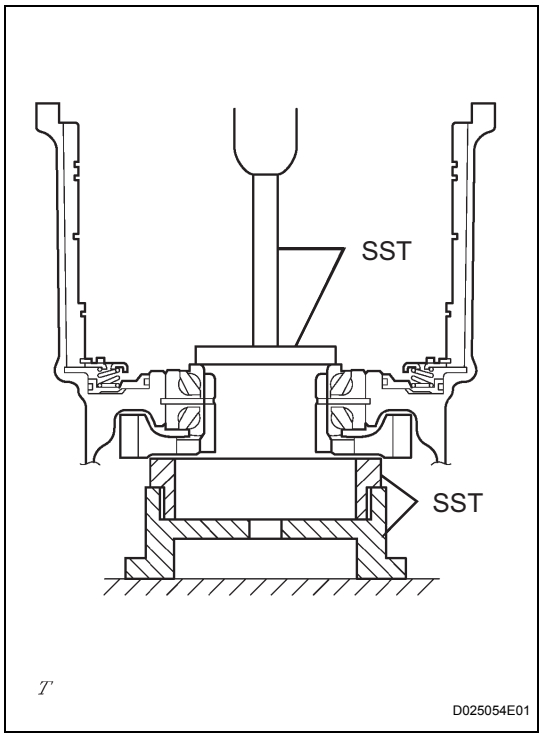
(a) Install the manual valve lever shaft retainer spring onto the manual valve lever shaft.



20. INSTALL PARKING LOCK PAWL BRACKET

(a) Install the parking lock pawl bracket, parking lock rod and cam guide sleeve onto the transaxle case with the 3 bolts.

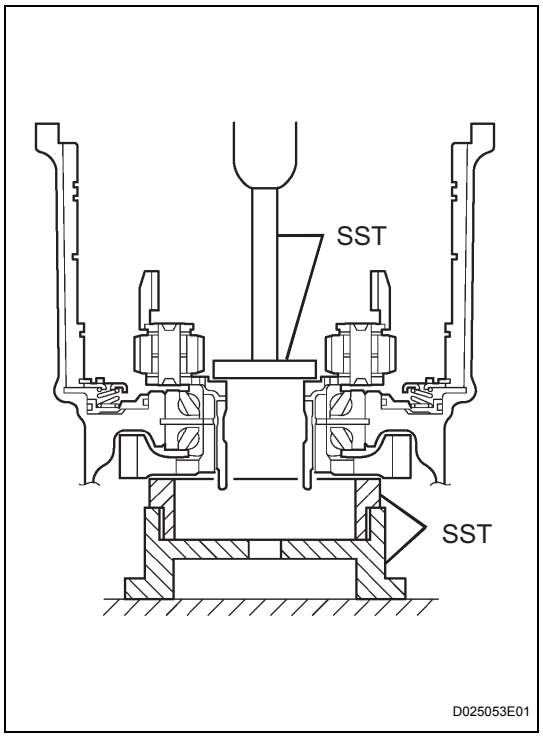
Torque: 20 N*m (205 kgf*cm, 15 ft.*lbf)



21. INSTALL COUNTER DRIVE GEAR

(a) Using SST and a press, install the counter drive gear onto the transaxle case.

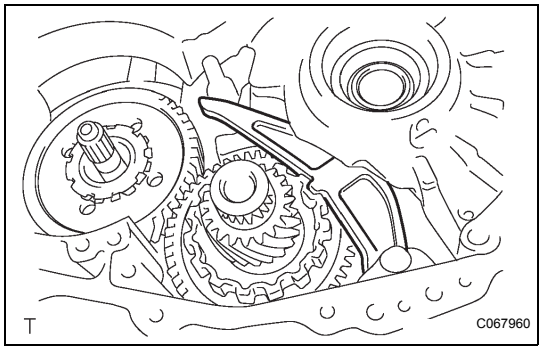
SST 09223-15030, 09527-17011, 09950-60010 (09951-00650), 09950-70010 (09951-07150)



22. INSTALL PLANETARY GEAR ASSEMBLY

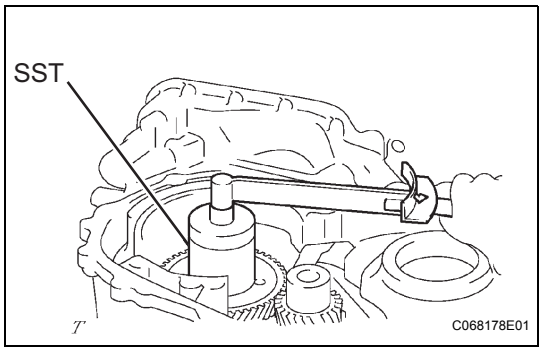
(a) Using SST and a press, install the planetary gear assembly onto the transaxle case.

SST 09950-60010 (09951-00480), 09223-15030, 09527-17011, 09950-70010 (09951-07150)

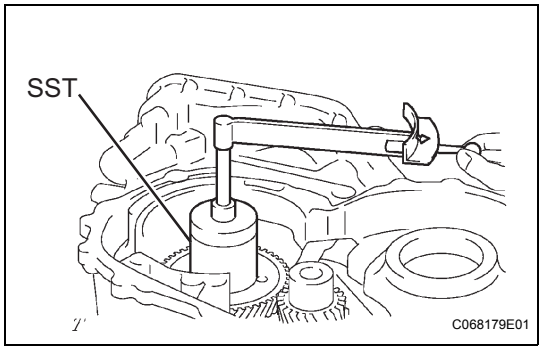


23. INSTALL COUNTER DRIVE GEAR NUT

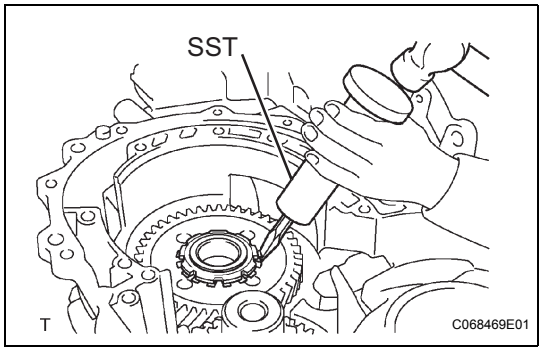
(a) Fix the counter driven gear with the parking lock pawl.



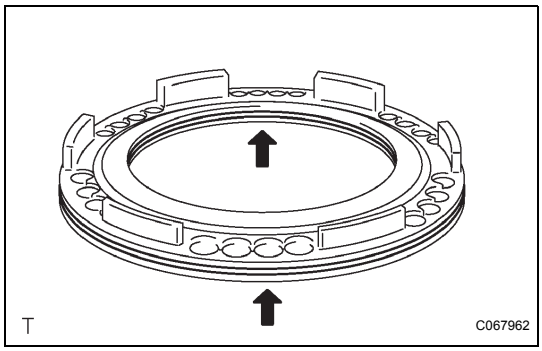
(b) Using SST, install a new lock washer and nut.
SST 09387-00120
Torque: 280 N*m (2,855 kgf*cm, 207 ft.*lbf)



(c) Using SST and a small torque wrench, measure the rotating torque while turning the counter drive gear at 60 turns per minute.
SST 09387-00120
Rotating torque:
0.20 to 0.49 N*m (2 to 5 kgf*cm, 2 to 4 in.*lbf)

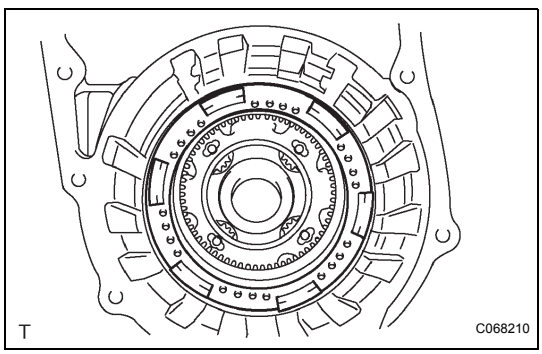


(d) Using SST and a hammer, stake the lock nut washer.
SST 09930-00010



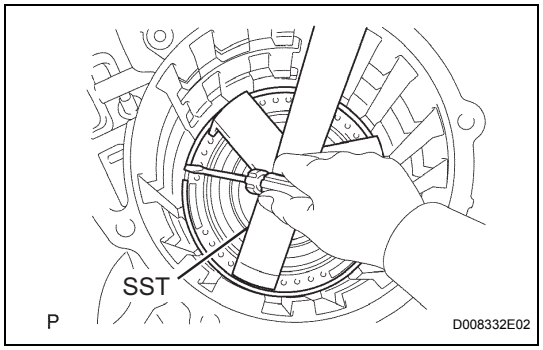
24. INSTALL NO. 2 1ST AND REVERSE BRAKE PISTON O-RING

(a) Coat 2 new O-rings with ATF, and install them onto No. 2 brake piston.



25. INSTALL NO. 2 1ST AND REVERSE BRAKE PISTON

(a) Coat No. 2 1st and reverse brake piston with ATF, and install it into the transaxle case.
NOTICE:
Do not damage the oil seal lip.

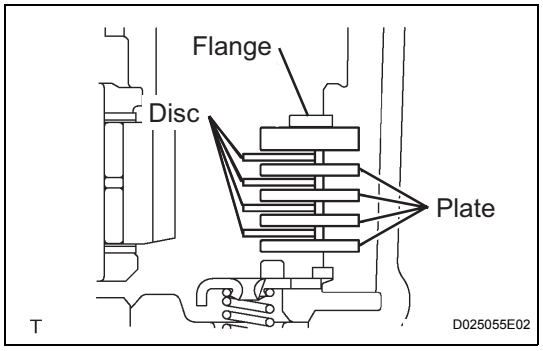


26. INSTALL 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Install the 1st and reverse brake return spring sub-assembly onto the transaxle case.

(b) Using SST, a press and a screwdriver, install the snap ring.

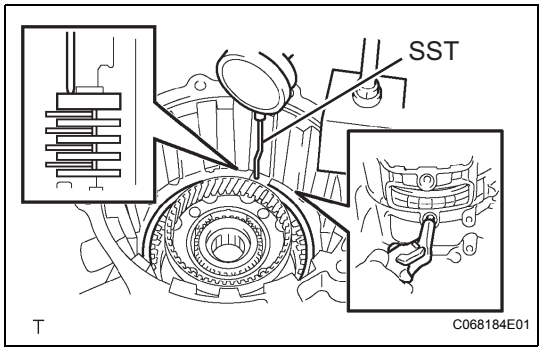
SST 09387-00070



27. INSTALL 1ST AND REVERSE BRAKE DISC

(a) Install the 4 plates, 4 discs and flange onto the transaxle case.

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



28. INSPECT PACK CLEARANCE OF FIRST AND REVERSE BRAKE

(a) Using SST and a dial indicator, measure the first and reverse brake clearance while pressing the disc and plate from the rear side.

SST 09350-36010 (09350-06110)

Pack clearance:

0.806 to 1.206 mm (0.0317 to 0.0475 in.)

NOTICE:

If the clearance is outside the specifications, select a new brake flange.

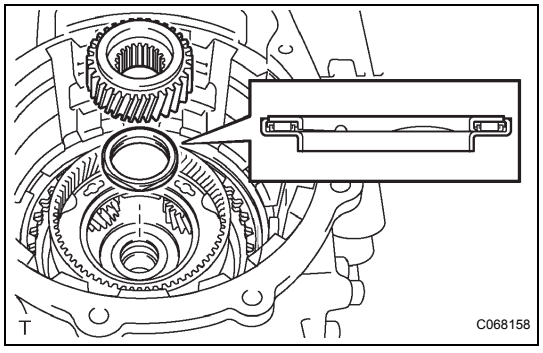
HINT:

There are 4 different flange thicknesses.

Flange thickness

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
-	3.4 (0.134)	2	3.8 (0.150)
1	3.6 (0.142)	3	4.0 (0.157)

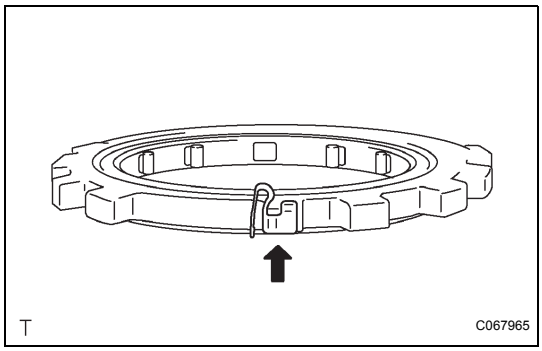
(b) Check that the 1st and reverse brake piston moves when compressed air is applied (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole.



29. INSTALL FRONT PLANETARY SUN GEAR

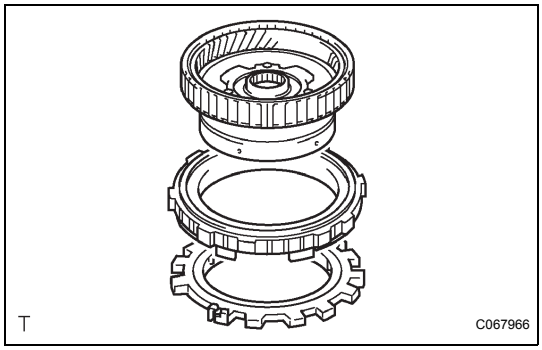
(a) Install the planetary sun gear and needle roller bearing onto the planetary gear assembly.

AX



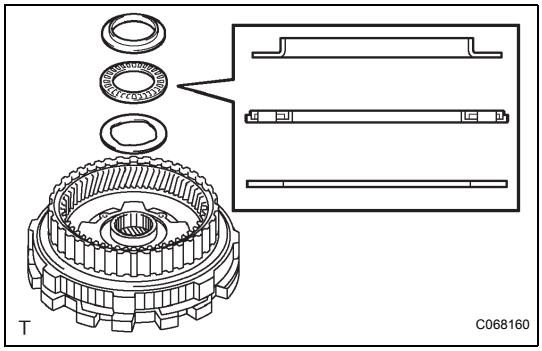
30. INSTALL OUTER RACE RETAINER

(a) Install the outer retainer onto No. 2 1-way clutch.



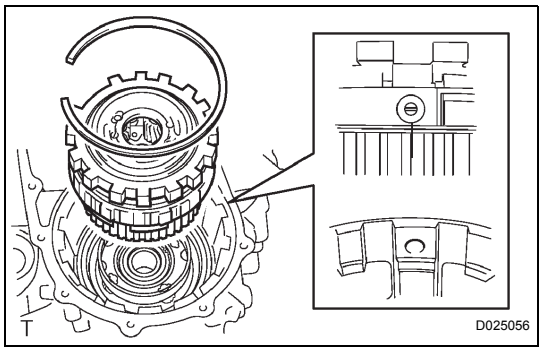
31. INSTALL NO. 2 1-WAY CLUTCH

(a) Install the 1-way clutch and 2nd brake piston assembly onto the rear planetary gear assembly.



32. INSTALL REAR PLANETARY GEAR THRUST NEEDLE ROLLER BEARING

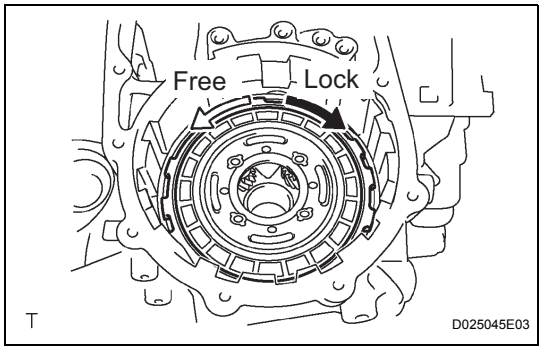
(a) Install No. 2 thrust bearing race, the planetary gear thrust needle roller bearing and thrust bearing race onto the rear planetary gear assembly.



33. INSTALL REAR PLANETARY GEAR ASSEMBLY

(a) Install the rear planetary gear assembly onto the transaxle case.

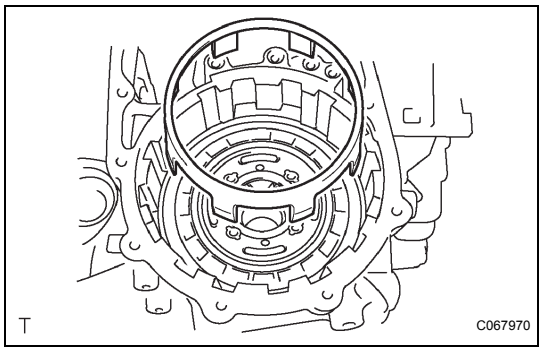
(b) Using a screwdriver, install the snap ring.



34. INSPECT NO. 2 1-WAY CLUTCH

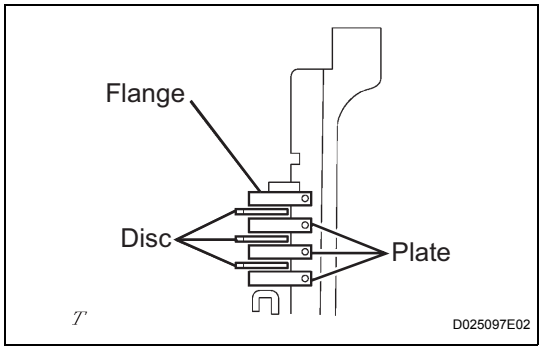
(a) Check that the rear planetary gear turns freely counterclockwise and locks when turned clockwise.

AX



35. INSTALL 2ND BRAKE PISTON SLEEVE

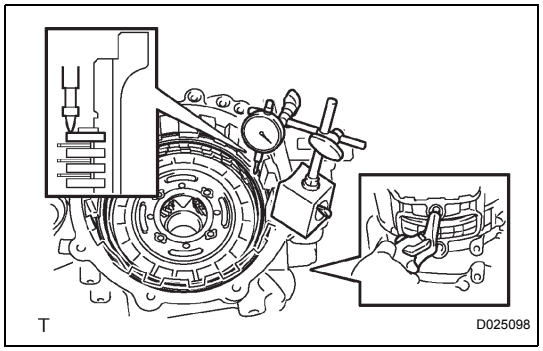
(a) Install the 2nd brake piston sleeve onto the transaxle case.



36. INSTALL 2ND BRAKE BRAKE DISC

(a) Install the 3 discs, 3 plates and flange onto the transaxle case.

(b) Using a screwdriver, install a snap ring onto the transaxle case.



37. INSPECT PACK CLEARANCE OF 2ND BRAKE

(a) Using a dial indicator, measure the 2nd brake pack clearance while applying and releasing compressed air (392 to 785 kPa, 4 to 8 kgf/cm^2, 57 to 114 psi).

Pack clearance:

0.847 to 1.247 mm (0.0333 to 0.0491 in.)

NOTICE:

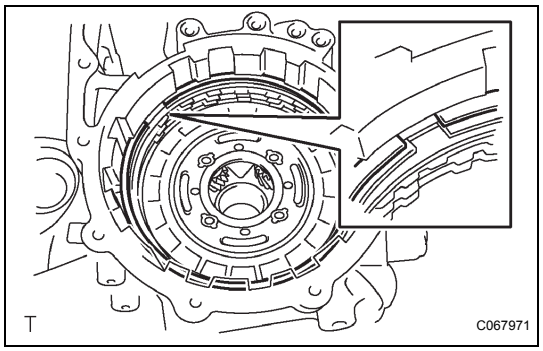
If the clearance is outside the specifications, select a new brake flange.

HINT:

There are 4 different flange thicknesses.

Flange thickness

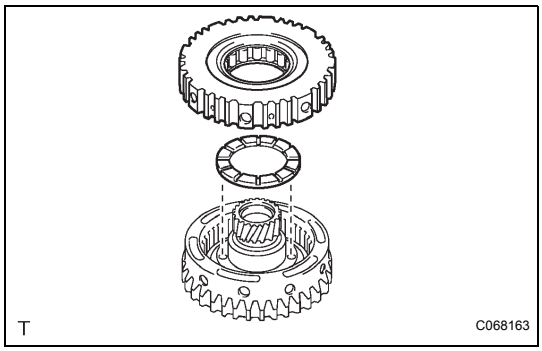
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
-	3.0 (0.118)	2	3.4 (0.134)
1	3.2 (0.126)	3	3.6 (0.142)



38. INSTALL 2ND COAST AND OVERDRIVE BRAKE FLANGE HOLE SNAP RING

(a) Using a screwdriver, install a snap ring onto the transaxle case.

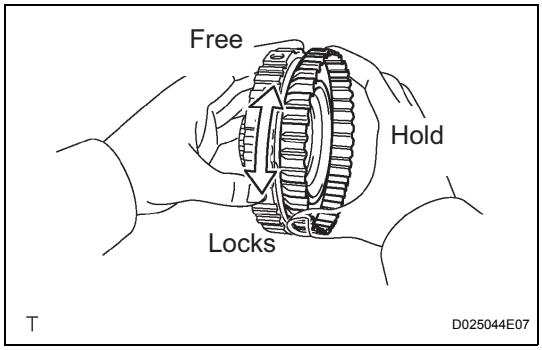
AX



39. INSTALL 1-WAY CLUTCH ASSEMBLY

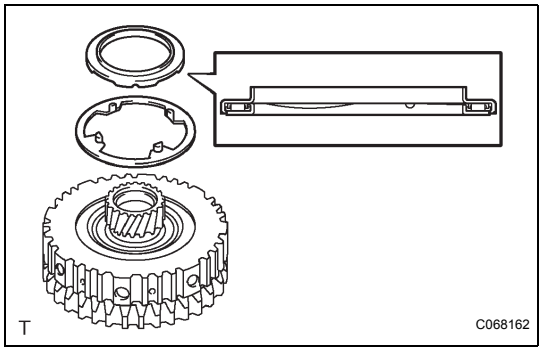
(a) Install No. 2 thrust washer onto the rear planetary gear assembly.

(b) Install 1-way clutch assembly onto the rear planetary sun gear assembly.



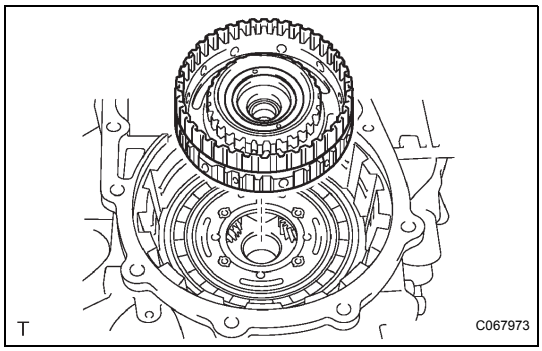
40. INSPECT 1-WAY CLUTCH ASSEMBLY

(a) Hold the rear planetary sun gear and turn the 1-way clutch and check that the 1-way clutch turns freely counterclockwise and locks when turned clockwise.



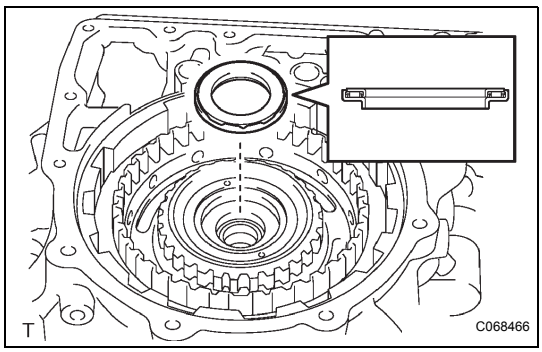
41. INSTALL REAR PLANETARY SUN GEAR THRUST NEEDLE ROLLER BEARING

(a) Install the thrust bearing and a washer onto the rear planetary sun gear.



42. INSTALL REAR PLANETARY SUN GEAR ASSEMBLY

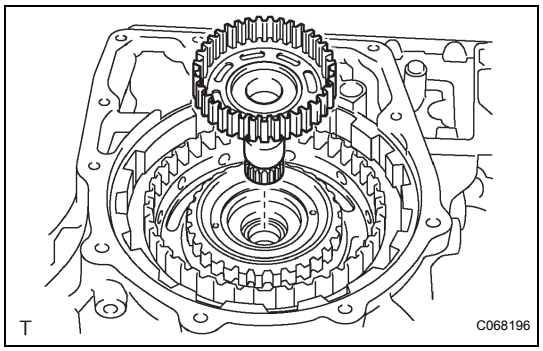
(a) Install the rear planetary sun gear assembly.



43. INSTALL REAR NO. 2 PLANETARY SUN GEAR THRUST NEEDLE ROLLER BEARING

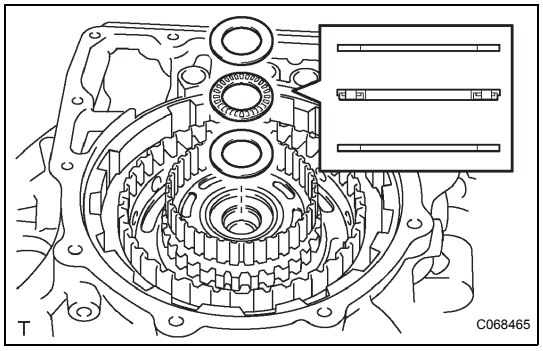
(a) Install the thrust bearing onto the rear planetary sun gear.

AX



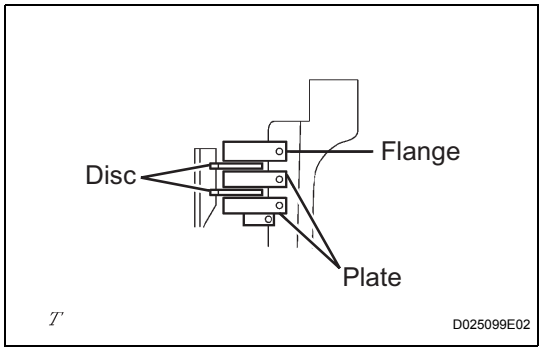
44. INSTALL DIRECT CLUTCH HUB

(a) Install the direct clutch hub.



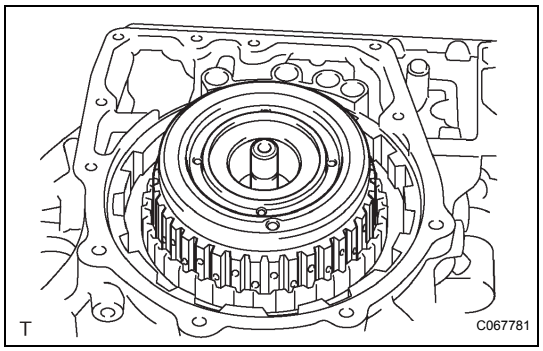
45. INSTALL THRUST NEEDLE ROLLER BEARING

(a) Install No. 3 thrust bearing race, the thrust needle roller bearing and the C-2 hub thrust bearing race onto the direct clutch hub.



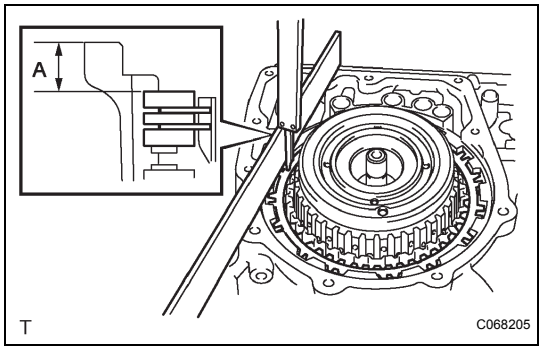
46. INSTALL 2ND COAST AND OVERDRIVE BRAKE DISC

(a) Install the 2 discs, 2 plates and flange onto the transaxle case.



47. INSTALL INTERMEDIATE SHAFT ASSEMBLY

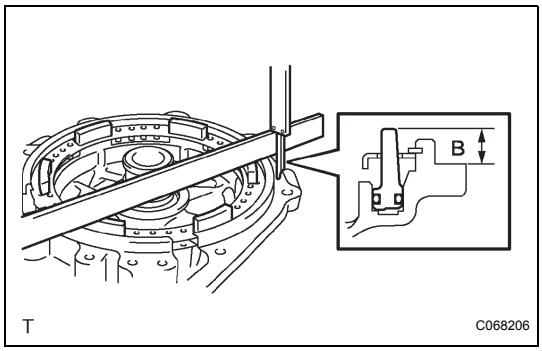
(a) Install the intermediate shaft assembly onto the transaxle case.



48. INSPECT 2ND COAST AND OVERDRIVE BRAKE CLEARANCE

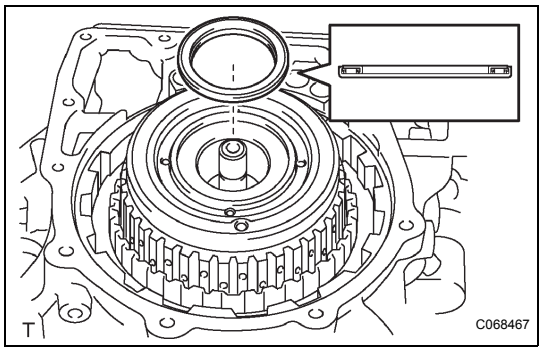
(a) As shown in the illustration, place a straight edge on the transaxle case and measure the distance between the 2nd coast and O/D brake flange and straight edge using vernier calipers. (Dimension A)

AX



(b) As shown in the illustration, place a straight edge on the O/D brake piston and measure the distance between the transaxle rear cover and straight edge using vernier calipers. (Dimension B)
Calculate the piston stroke value using the following formula. Select a flange which meets the piston stroke value and install it.
Pack clearance:
2.091 to 2.491 mm (0.0823 to 0.0981 in.)
NOTICE:
If the clearance is outside the specifications, select a new brake flange.
HINT:
There are 4 different flange thicknesses.
Flange thickness

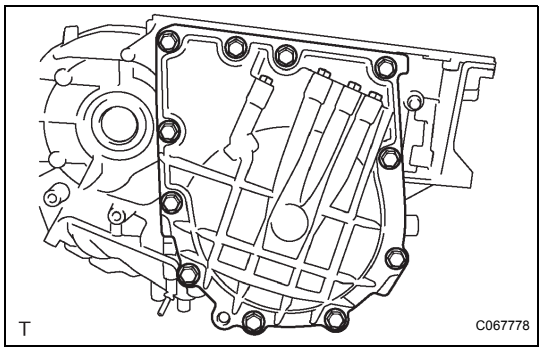
Mark	Thickness mm (in.)	Mark	Thickness mm (in,)
4	4.0 (0.1575)	6	4.4 (0.1732)
5	4.2 (0.1654)	7	4.6 (0.1811)



49. INSTALL REAR CLUTCH DRUM THRUST NEEDLE ROLLER BEARING

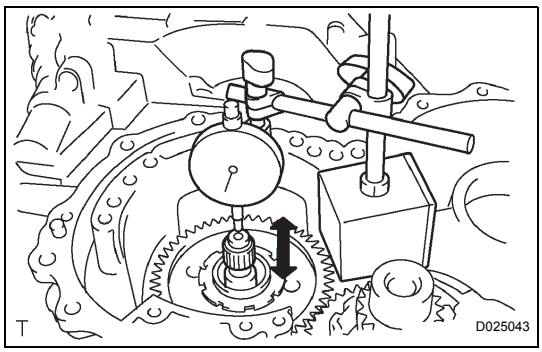
(a) Install the bearing onto the intermediate shaft.

AX



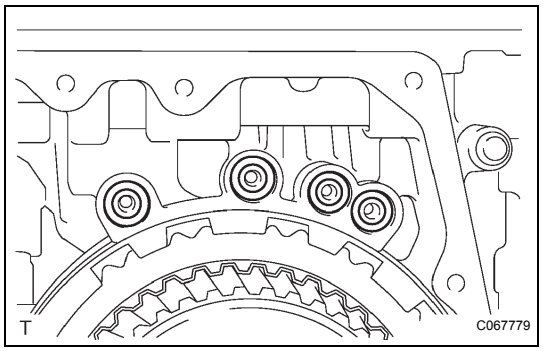
50. INSPECT INTERMEDIATE SHAFT ASSEMBLY

(a) Install the transaxle rear cover with the 11 bolts.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)



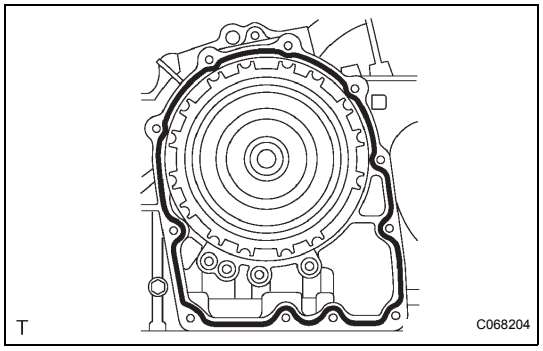
(b) Using a dial indicator, measure the clearance of the intermediate shaft.
Standard clearance:
0.204 to 0.966 mm (0.008 to 0.038 in.)

(c) Remove the 11 bolts and the transaxle rear cover.



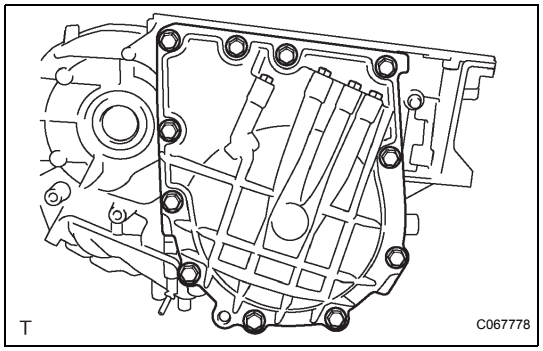
51. INSTALL TRANSAXLE CASE GASKET

(a) Install 4 new gaskets onto the transaxle case.

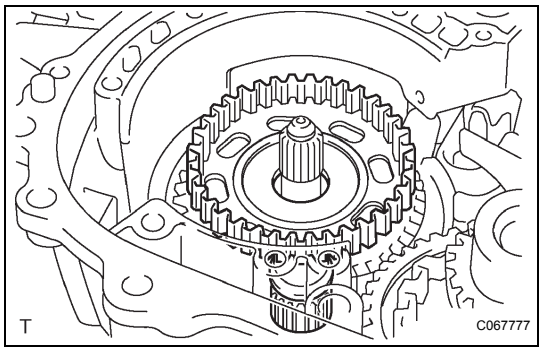


52. INSTALL REAR TRANSAXLE COVER ASSEMBLY

(a) Apply FIPG to the transaxle case.
FIPG:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or Equivalent

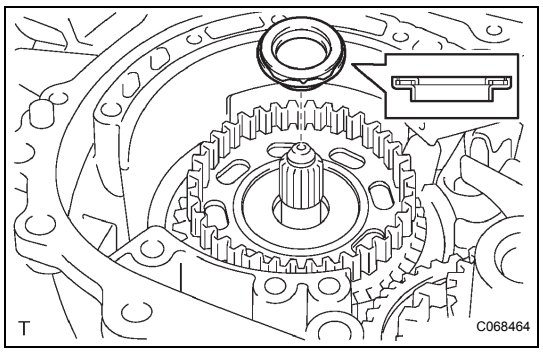


(b) Install the rear transaxle cover with the 11 bolts.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)



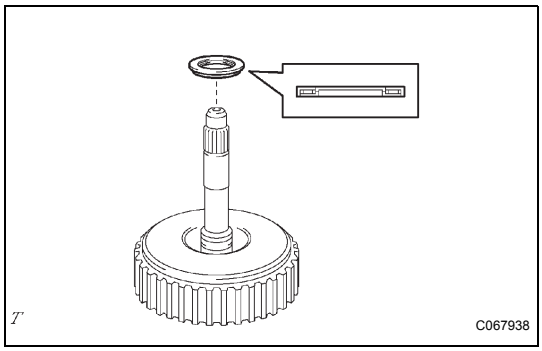
53. INSTALL FORWARD CLUTCH HUB SUB-ASSEMBLY

(a) Install the forward clutch hub sub-assembly onto the transaxle case.



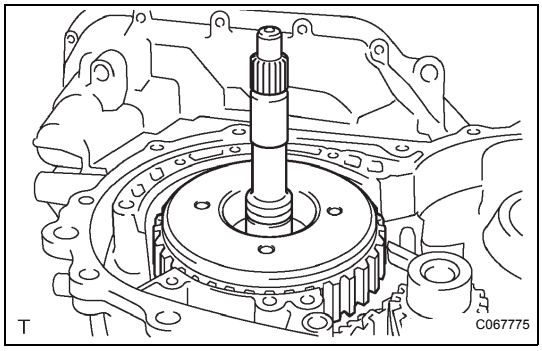
54. INSTALL FORWARD CLUTCH HUB THRUST NEEDLE ROLLER BEARING

(a) Install the bearing onto the forward clutch hub.



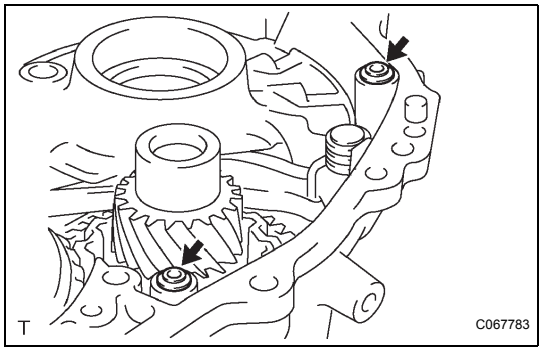
55. INSTALL STATOR SHAFT THRUST NEEDLE ROLLER BEARING

(a) Install the bearing onto the input shaft assembly.



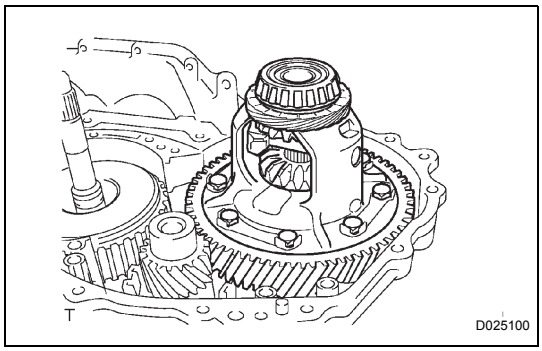
56. INSTALL INPUT SHAFT ASSEMBLY

(a) Install the input shaft assembly onto the transaxle case.



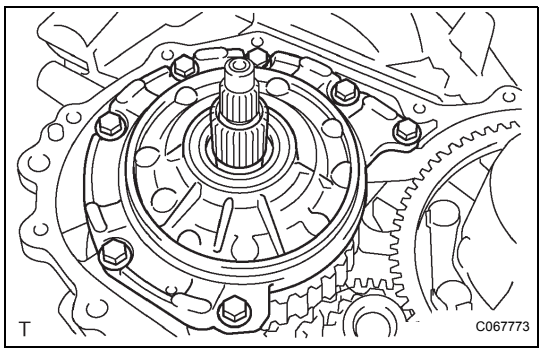
57. INSTALL OVERDRIVE BRAKE GASKET

(a) Install 2 new gaskets onto the transaxle case.



58. INSTALL DIFFERENTIAL GEAR ASSEMBLY

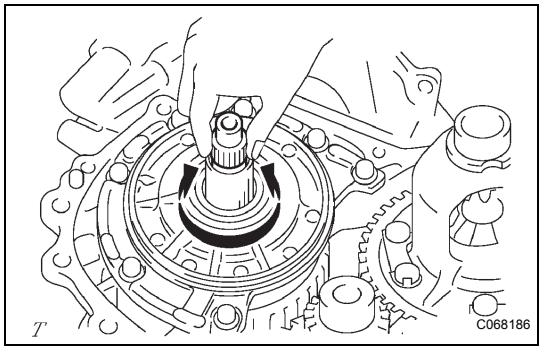
(a) Install the differential gear assembly onto the transaxle case.



59. INSTALL OIL PUMP ASSEMBLY

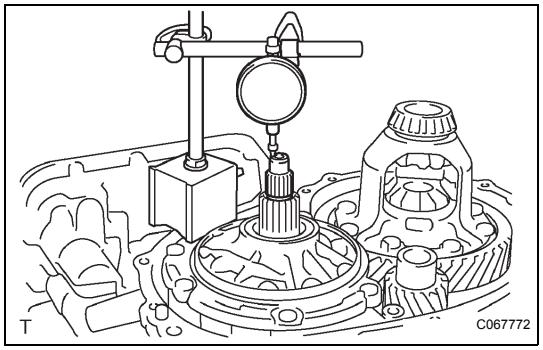
(a) Install the oil pump with the 7 bolts.
Torque: 22 N*m (225 kgf*cm, 16 ft.*lbf)

AX



60. INSPECT INPUT SHAFT ASSEMBLY

(a) Make sure that the input shaft turns smoothly.



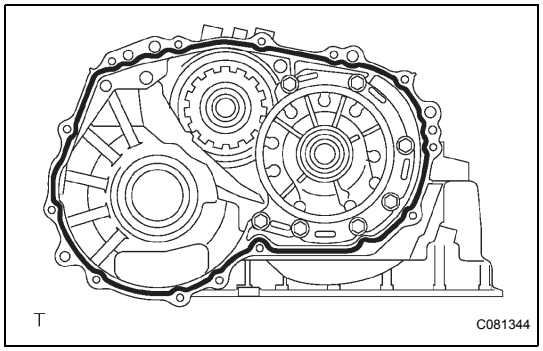
61. INSPECT INPUT SHAFT END PLAY

(a) Measure the end play in the axial direction.

End play:

0.37 to 1.29 mm (0.0146 to 0.0508 in.)

If the end play is not as specified, replace the thrust needle roller bearing.

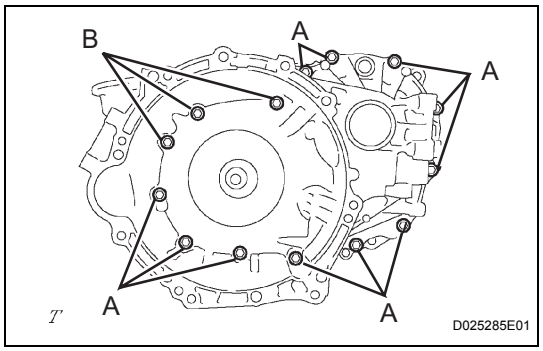


62. INSTALL TRANSAXLE HOUSING

(a) Apply FIPG to the transaxle case.

FIPG:

Toyota Genuine Seal Packing 1281, Three Bond 1281 or Equivalent



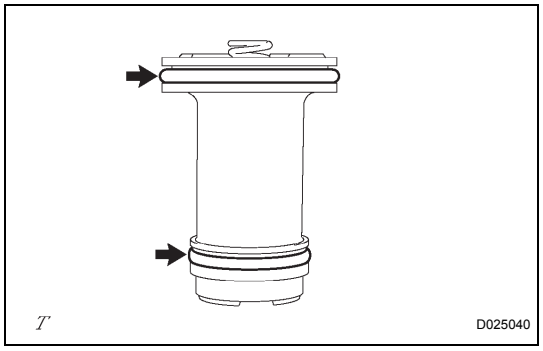
(b) Install the transaxle housing with the 14 bolts.

Torque: Bolt A

29 N*m (300 kgf*cm, 22 ft.*lbf)

Bolt B

22 N*m (225 kgf*cm, 16 ft.*lbf)

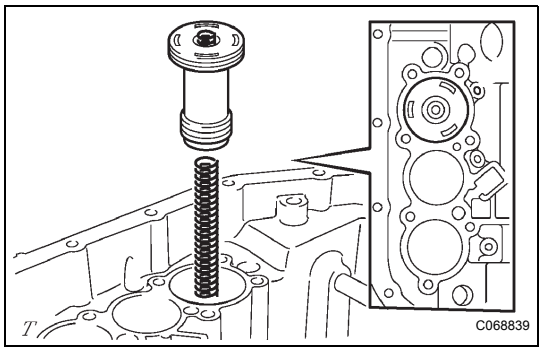


63. INSTALL C-2 ACCUMULATOR PISTON

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

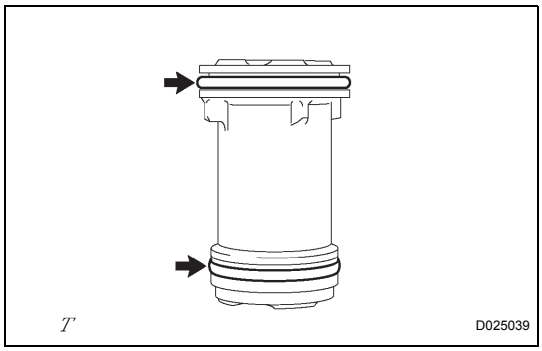
NOTICE:

Do not damage the O-rings.



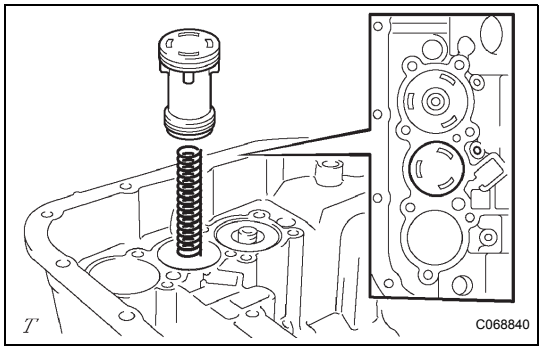
(b) Install the spring and C-2 accumulator piston.
Accumulator spring

Spring	Free length/ Outer diameter mm (in.)	Color
C-2	66.90 (2.6339) 17.20 (0.6772)	-



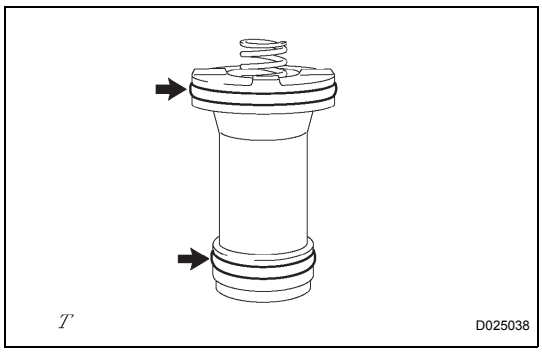
64. INSTALL C-3 ACCUMULATOR PISTON

(a) Coat 2 new O-rings with ATF and install them onto the C-3 accumulator piston.
NOTICE:
Do not damage the O-rings.



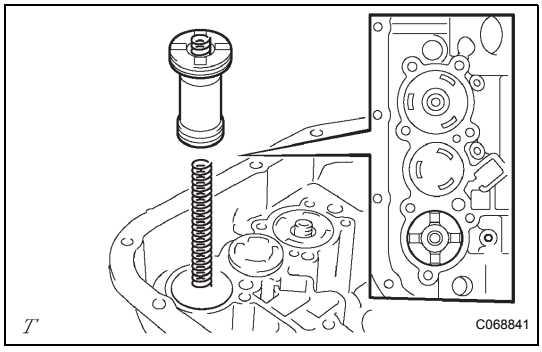
(b) Install the spring and C-3 accumulator piston.
Accumulator spring

Spring	Free length/ Outer diameter mm (in.)	Color
C-3	80.20 (3.1575) 18.70 (0.7362)	Blue



65. INSTALL B-2 ACCUMULATOR PISTON

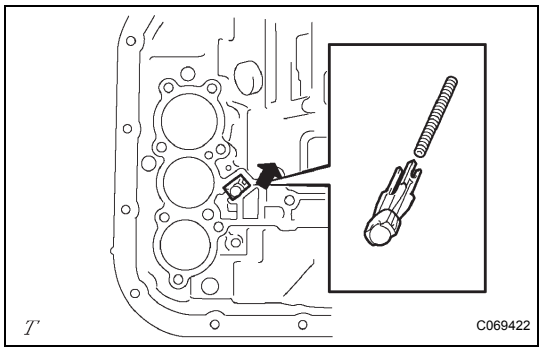
(a) Coat 2 new O-rings with ATF and install them onto the B-2 accumulator piston.
NOTICE:
Do not damage the O-rings.



(b) Install the spring and B-2 accumulator piston.
Accumulator spring

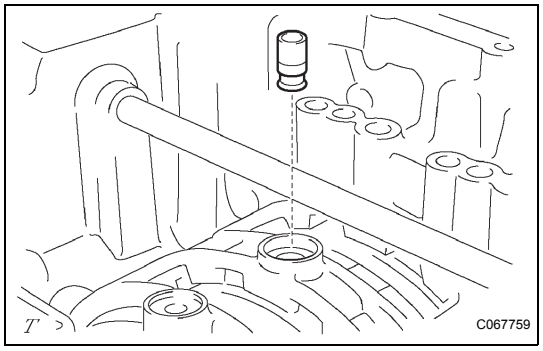
Spring	Free length/ Outer diameter mm (in.)	Color
B-2	66.90 (2.6339) 15.50 (0.6102)	Green

AX



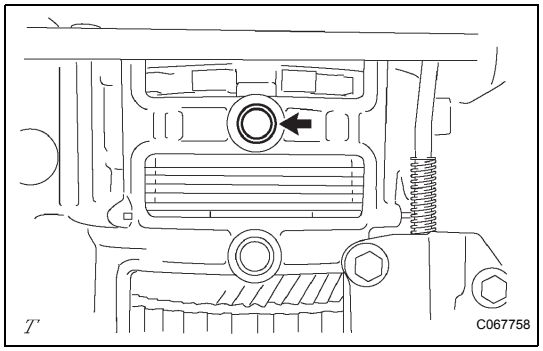
66. INSTALL CHECK BALL BODY

(a) Install the spring and check ball body.



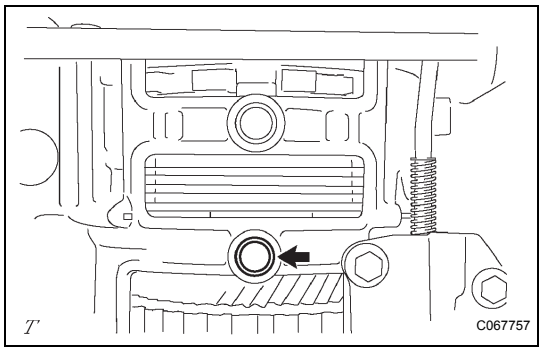
67. INSTALL BRAKE DRUM GASKET

(a) Install a new brake drum gasket.



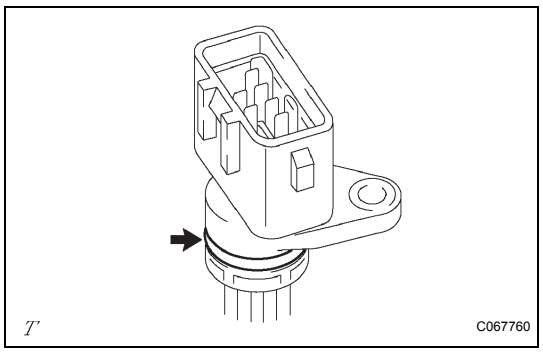
68. INSTALL TRANSAXLE CASE GASKET

(a) Coat a new transaxle case gasket with ATF, and install it onto the transaxle case.



69. INSTALL TRANSAXLE CASE 2ND BRAKE GASKET

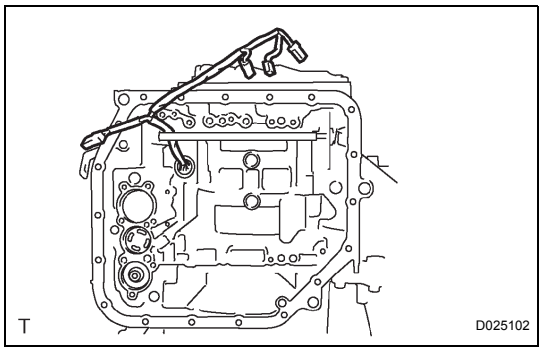
(a) Coat a new transaxle case 2nd brake gasket with ATF, and install it onto the transaxle case.



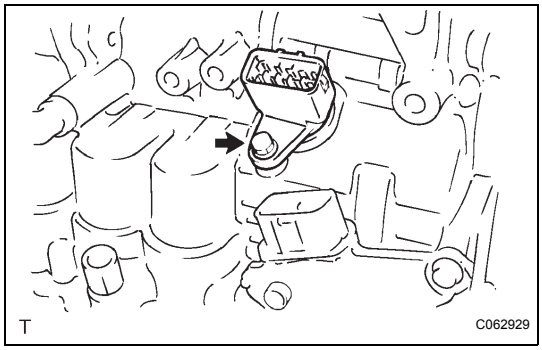
70. INSTALL TRANSMISSION WIRE

(a) Coat a new O-ring with ATF, and install it onto the transmission wire.

AX



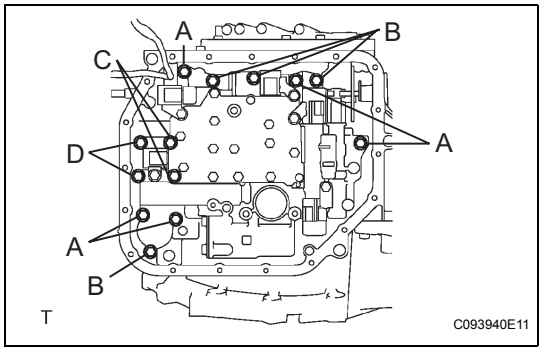
(b) Insert the transmission wire into the transaxle.



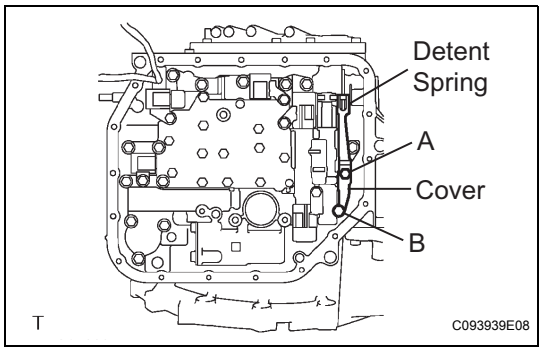
(c) Install the transmission wire with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

71. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

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



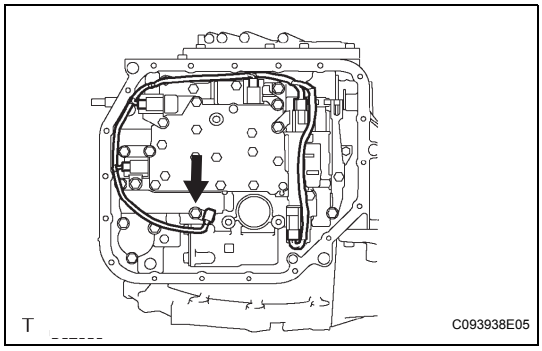
(b) Provisionally install the valve body with the 13 bolts.
Bolt length:
Bolt A: 32 mm (1.26 in.)
Bolt B: 22 mm (0.87 in.)
Bolt C: 55 mm (2.17 in.)
Bolt D: 45 mm (1.77 in.)



(c) Provisionally install the detent spring and detent spring cover with the 2 bolts.
Bolt length:
Bolt A: 14 mm (0.55 in.)
Bolt B: 45 mm (1.77 in.)

(d) Check that the manual valve lever is in contact with the center of the roller at the tip of the detent spring.

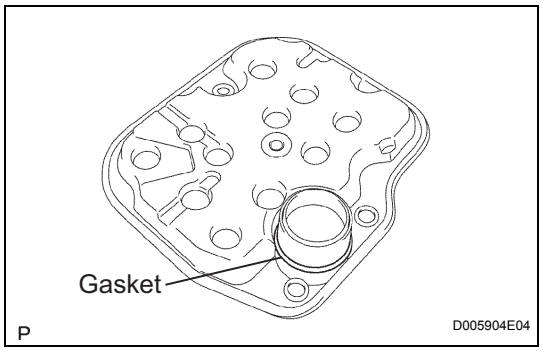
(e) Tighten the 15 bolts.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)



(f) Connect the 5 solenoid connectors.

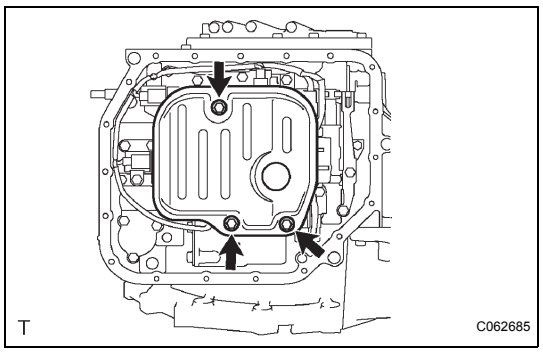
(g) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)
Bolt length:
55 mm (2.17 in.)

AX

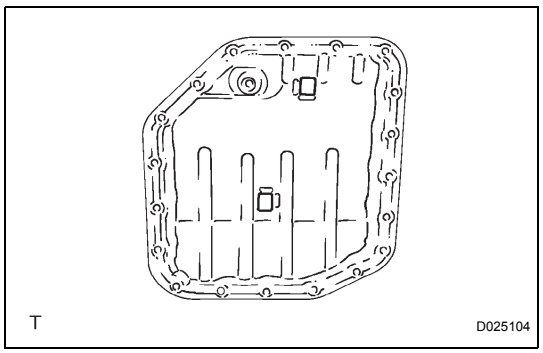


72. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

(a) Coat a new O-ring with ATF, and install it into the oil strainer.



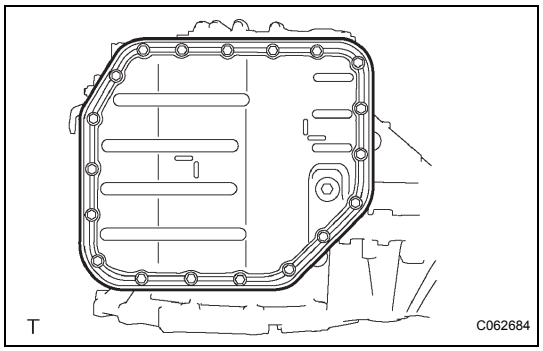
(b) Install the valve body oil strainer assembly onto the automatic transaxle with the 3 bolts.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)



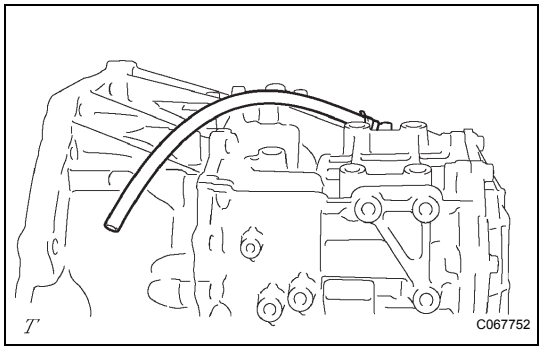
73. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets onto the oil pan.

(b) Install a new oil pan gasket onto the oil pan.



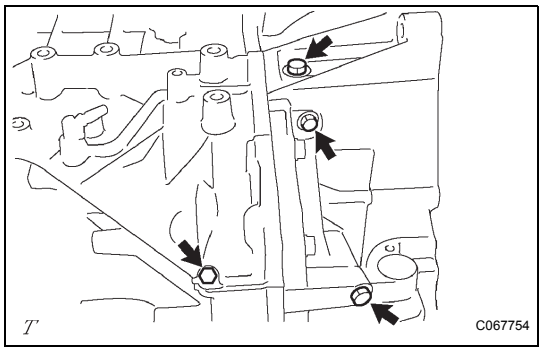
(c) Install the oil pan with the 19 bolts.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)



74. INSTALL BREATHER PLUG HOSE

(a) Install the breather plug hose onto the transaxle case.

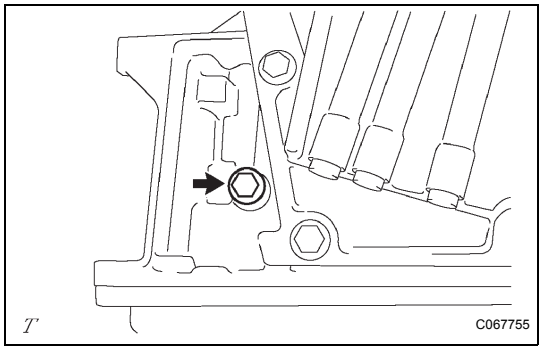
AX



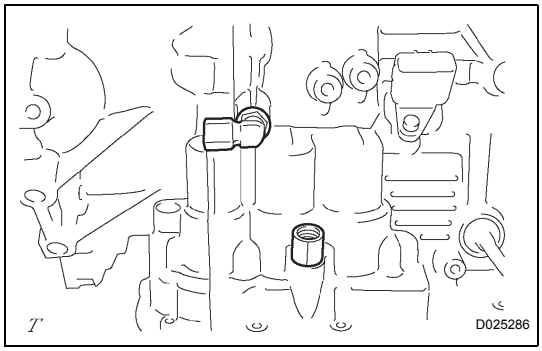
75. INSTALL NO. 1 TRANSAXLE CASE PLUG

(a) Coat 5 new O-rings with ATF, and install them onto the screw plugs.

(b) Install the 4 screw plugs onto the transaxle housing and transaxle case.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



(c) Install the screw plug onto the transaxle case.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)

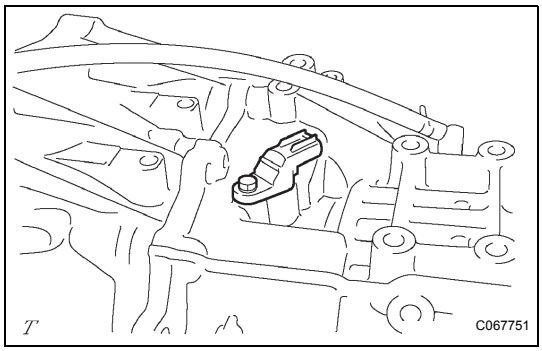


76. INSTALL OIL COOLER TUBE UNION

(a) Coat 2 new O-rings with ATF, and install them into the 2 oil cooler tube unions.

(b) Install the 2 oil cooler tube unions onto the transaxle case.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

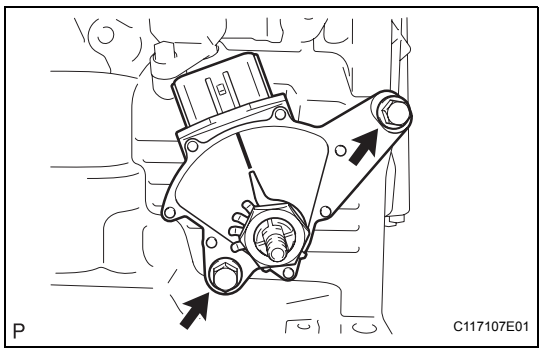
AX



77. INSTALL TRANSMISSION REVOLUTION SENSOR

(a) Coat a new O-ring with ATF, and install it into the transmission revolution sensor.

(b) Install the transmission revolution sensor onto the transaxle case with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



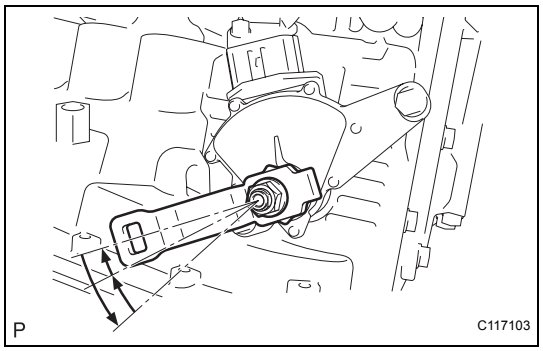
78. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Install the park/neutral position switch assembly onto the manual transaxle.

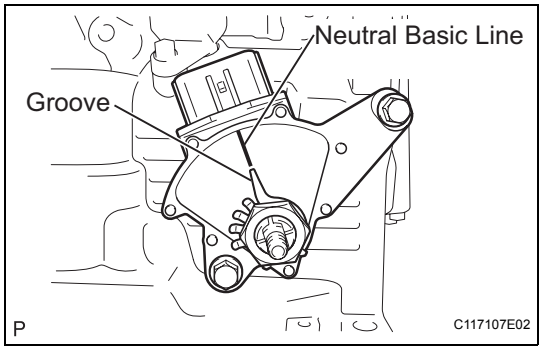
(b) Provisionally install the 2 bolts.

(c) Replace the lock plate with a new one and tighten the manual valve shaft nut.
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

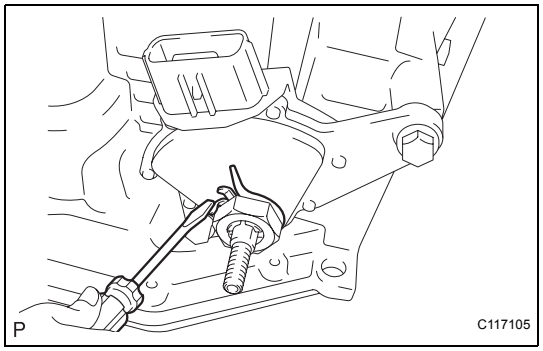
(d) Provisionally install the control shaft lever.



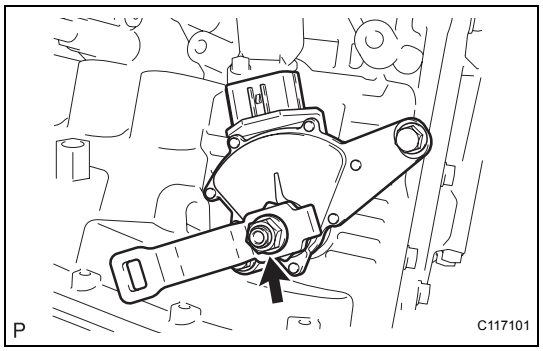
(e) Turn the lever counterclockwise until it stops, then turn it clockwise 2 notches.
(f) Remove the control shaft lever.



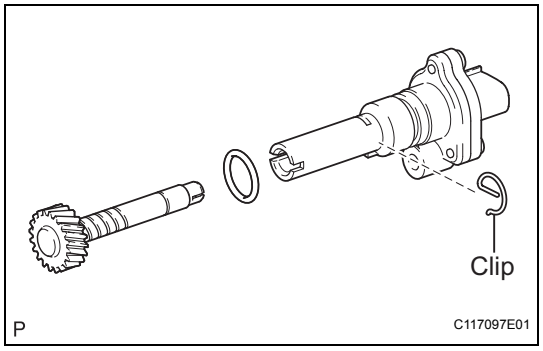
(g) Align the groove with the neutral basic line.
(h) Hold the switch in this position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



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

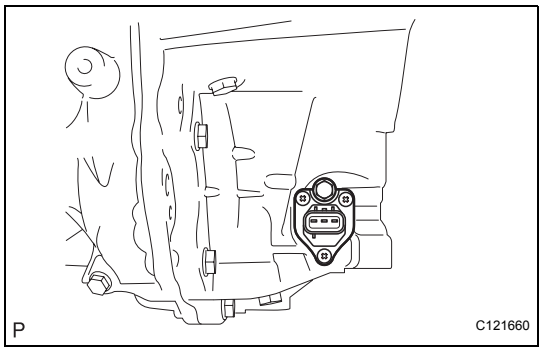


(j) Install the control shaft lever with the nut and washer.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



79. INSTALL SPEEDOMETER DRIVEN GEAR
(a) Coat a new O-ring with ATF and install it into the speedometer sensor.
(b) Install the driven gear into the speedometer sensor with the clip.

AX

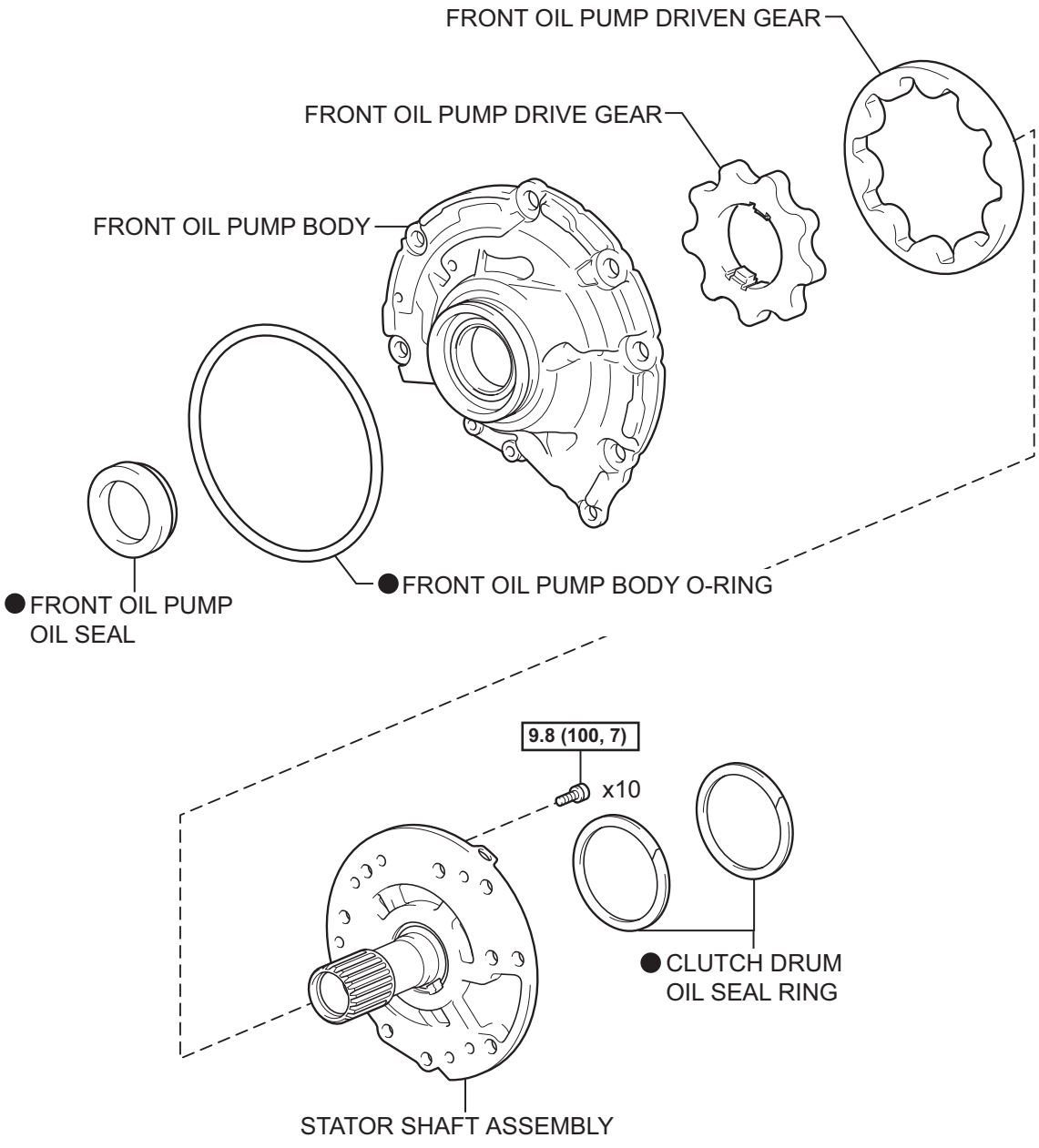


80. INSTALL SPEEDOMETER SENSOR

(a) Install the speedometer sensor onto the transaxle housing.

OIL PUMP

COMPONENTS



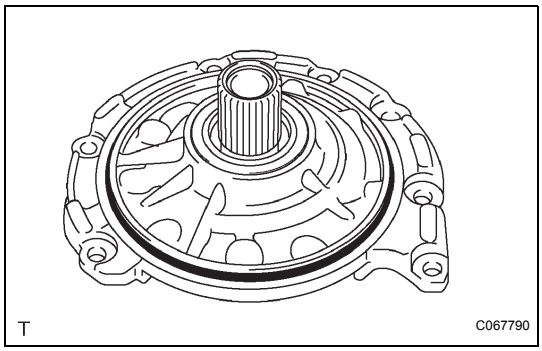
N*m (kgf*cm, ft*lbf) : Specified torque

● Non-reusable part

P

C121631E03

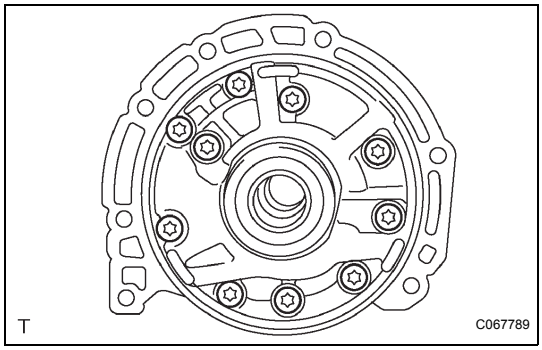
AX



DISASSEMBLY

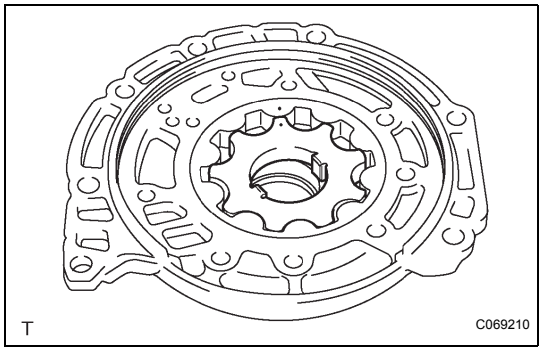
1. REMOVE FRONT OIL PUMP BODY O-RING

(a) Remove the front oil pump O-ring from the oil pump.



2. REMOVE STATOR SHAFT ASSEMBLY

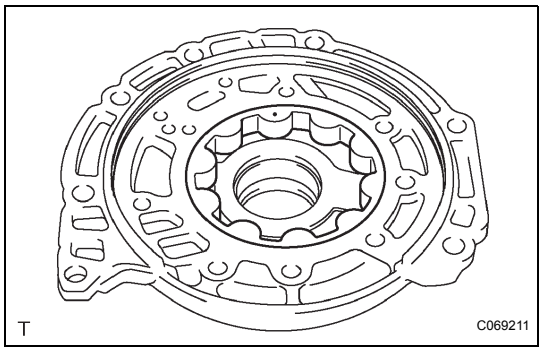
(a) Using "Torx" socket wrench T30, remove the 10 "Torx" screws.



3. REMOVE FRONT OIL PUMP DRIVE GEAR

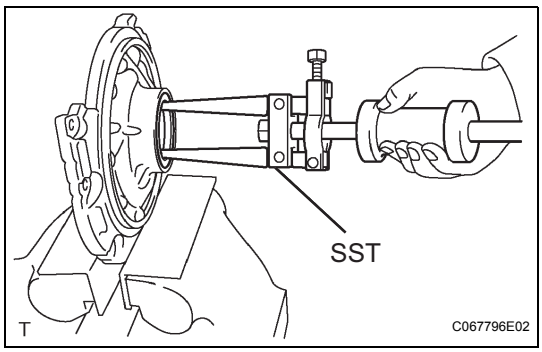
(a) Remove the front oil pump drive gear from the oil pump body.

AX



4. REMOVE FRONT OIL PUMP DRIVEN GEAR

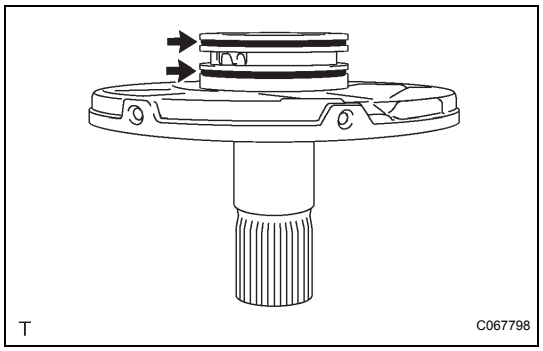
(a) Remove the front oil pump driven gear from the oil pump body.



5. REMOVE FRONT OIL PUMP OIL SEAL

(a) Using SST, remove the front oil pump oil seal from the oil pump body.

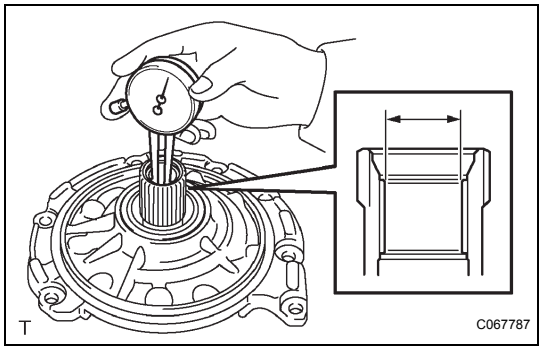
SST 09308-00010



6. REMOVE CLUTCH DRUM OIL SEAL RING

(a) Using a screwdriver, remove the 2 clutch drum oil seal rings from the stator shaft assembly.

INSPECTION

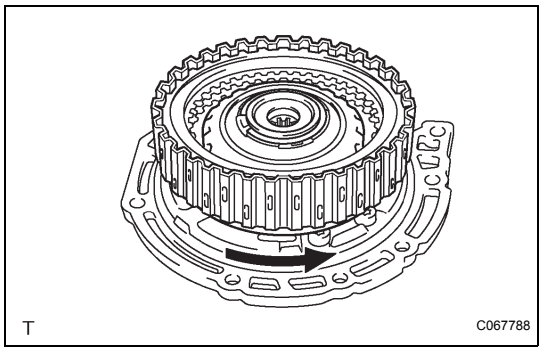


1. INSPECT STATOR SHAFT ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the stator shaft bushings.

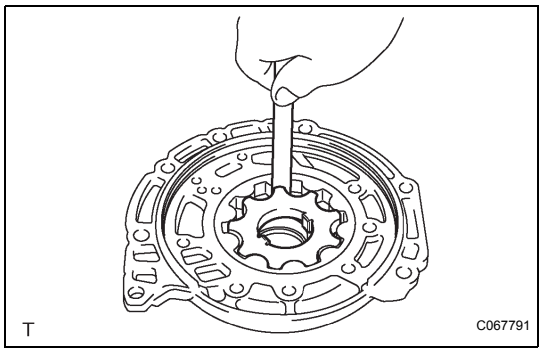
Standard inside diameter:
21.500 to 21.526 mm (0.84646 to 0.84748 in.)
Maximum inside diameter:
21.526 mm (0.84748 in.)

If the inside diameter is greater than the maximum, replace the stator shaft.



(b) Install the input shaft assembly onto the stator shaft assembly and check that the input shaft assembly turns smoothly.

NOTICE:
Replace the stator assembly with a new one if it moves roughly or makes unusual noise.
Inspect the input shaft's contact surface with the bearing when replacing, and replace the input shaft with a new one if any damage or discoloration is found.

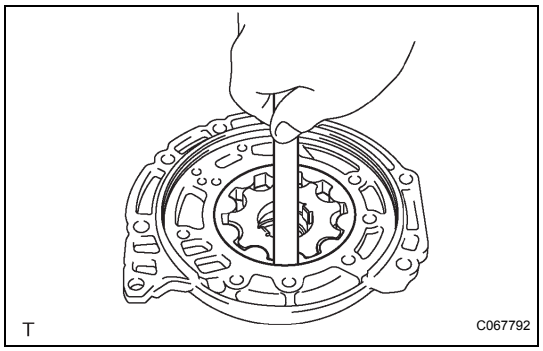


2. INSPECT OIL PUMP GEAR CLEARANCE

(a) Measure the clearance between the tips of the driven gear teeth and the 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.

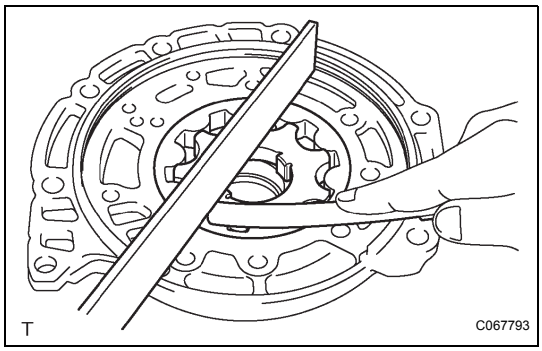


(b) Push the driven gear to one side of the body. Using a feeler gauge, measure the clearance.

Standard body clearance:
0.10 to 0.15 mm (0.0039 to 0.0059 in.)
Maximum body clearance:
0.15 mm (0.0059 in.)

If the body clearance is greater than the maximum, replace the oil pump body sub-assembly.

AX

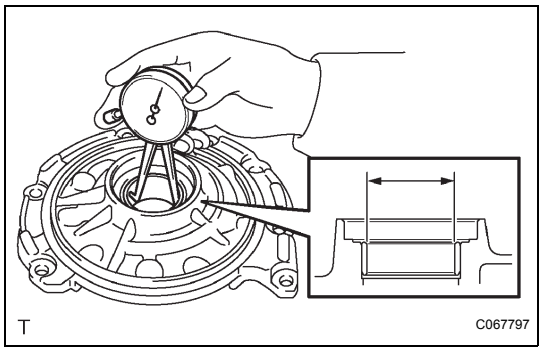


(c) Using a steel straight edge and feeler gauge, measure the side clearance of both gears.
Standard side clearance:
0.02 to 0.05 mm (0.0008 to 0.0020 in.)
Maximum side clearance:
0.05 mm (0.0020 in.)
If the side clearance is greater than the maximum, replace the drive gear, driven gear or pump body.
Drive gear thickness

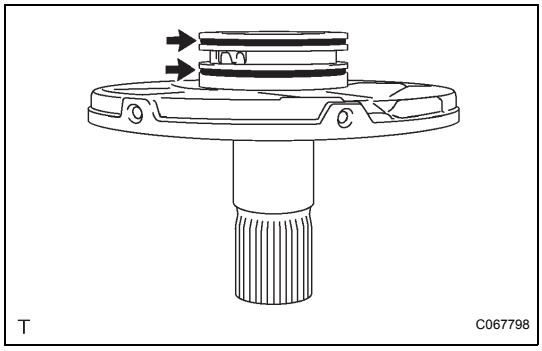
No.	Thickness mm (in.)
1	9.44 to 9.45 (0.3709 to 0.3713)
2	9.45 to 9.46 (0.3713 to 0.3717)
3	9.46 to 9.47 (0.3717 to 0.3721)
4	9.47 to 9.48 (0.3721 to 0.3725)
5	9.48 to 9.49 (0.3725 to 0.3729)

Driven gear thickness

No.	Thickness mm (in.)
1	9.44 to 9.45 (0.3709 to 0.3713)
2	9.45 to 9.46 (0.3713 to 0.3717)
3	9.46 to 9.47 (0.3717 to 0.3721)
4	9.47 to 9.48 (0.3721 to 0.3725)
5	9.48 to 9.49 (0.3725 to 0.3729)

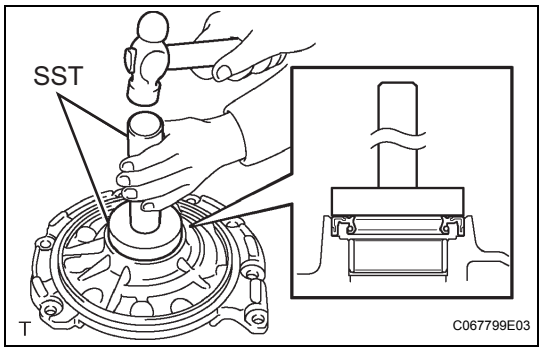


3. INSPECT FRONT OIL PUMP BODY SUB-ASSEMBLY
(a) Using a dial indicator, measure the inside diameter of the oil pump body bushing.
Standard inside diameter:
38.113 to 38.138 mm (1.50050 to 1.50149 in.)
Maximum inside diameter:
38.138 mm (1.50149 in.)
If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.



REASSEMBLY

1. INSTALL CLUTCH DRUM OIL SEAL RING
(a) Coat 2 new clutch drum oil seal rings with ATF, and install them onto the stator shaft.

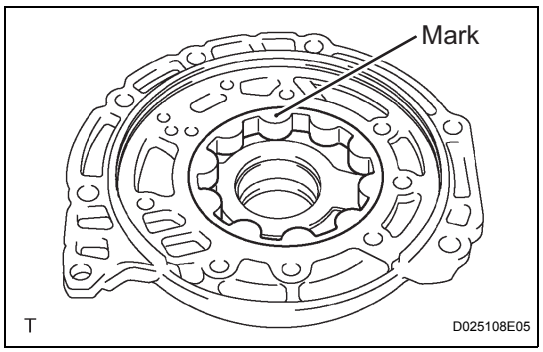


2. INSTALL FRONT OIL PUMP OIL SEAL

(a) Using SST, install the front oil pump oil seal into the oil pump body.

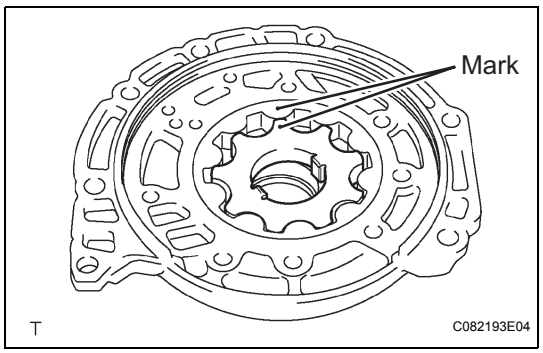
SST 09950-60010 (09951-00550), 09950-70010 (09951-07100)

Oil seal drive in depth:
-0.15 to 0.15 mm (-0.006 to 0.006 in.)



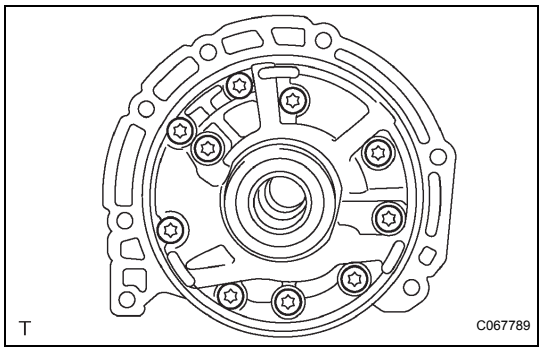
3. INSTALL FRONT OIL PUMP DRIVEN GEAR

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



4. INSTALL FRONT OIL PUMP DRIVE GEAR

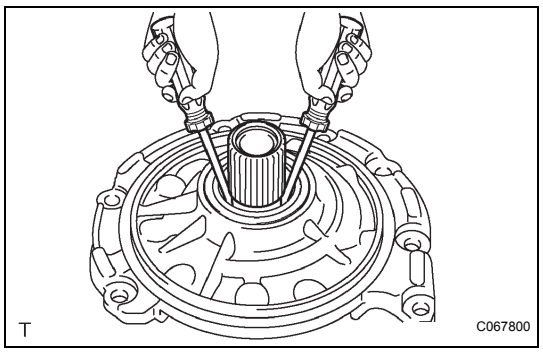
(a) Coat the front oil pump drive gear with ATF, and install it into the oil pump body with the marked side facing upward.



5. INSTALL STATOR SHAFT ASSEMBLY

(a) Using "Torx" socket wrench T30, install the stator shaft assembly with 10 "Torx" screws.

Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)

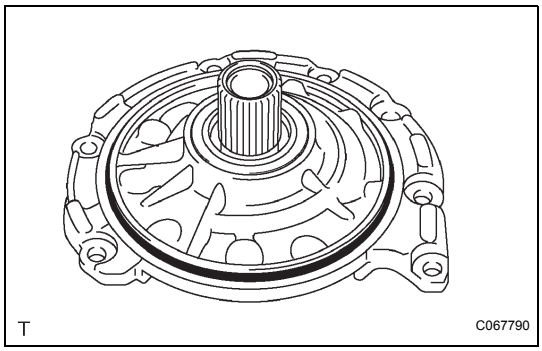


6. INSPECT OIL PUMP ASSEMBLY

(a) Turn the drive gear with 2 screwdrivers and make sure it rotates smoothly.

NOTICE:
Do not damage the oil seal lip.

AX

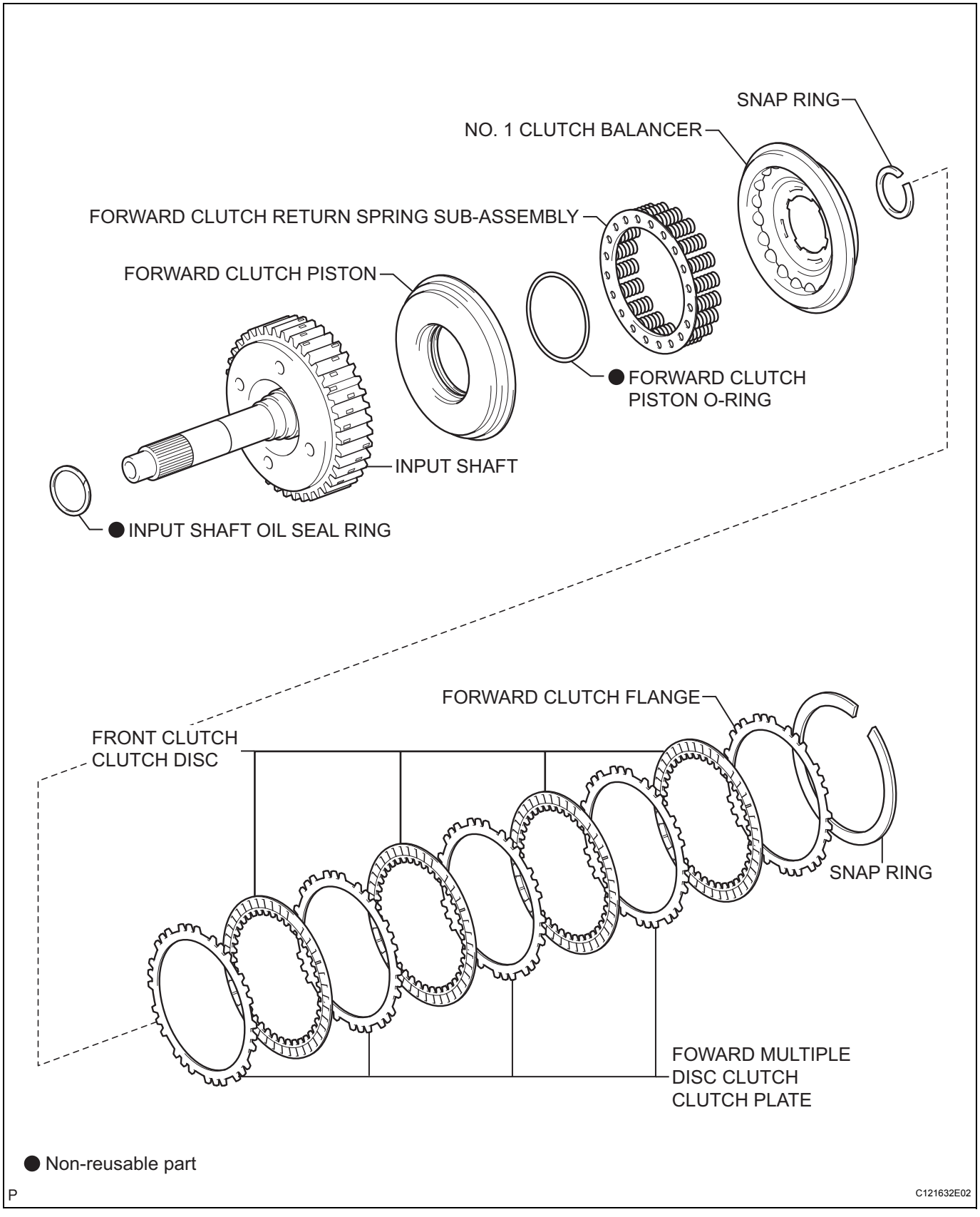


7. INSTALL FRONT OIL PUMP BODY O-RING

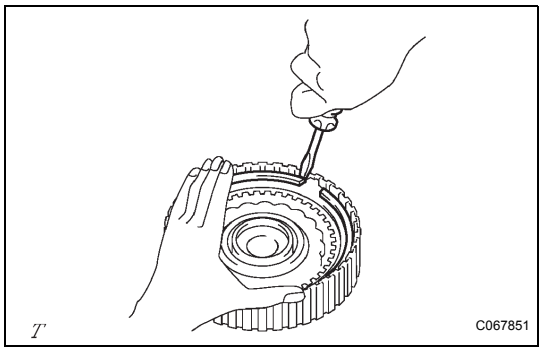
(a) Coat a new front oil pump body O-ring with ATF, and install it onto the oil pump.

INPUT SHAFT

COMPONENTS



AX

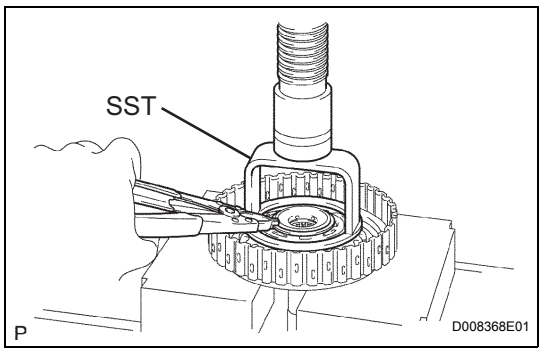


DISASSEMBLY

1. REMOVE FRONT CLUTCH CLUTCH DISC

(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange, 4 discs and 4 plates from the input shaft.



2. REMOVE FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

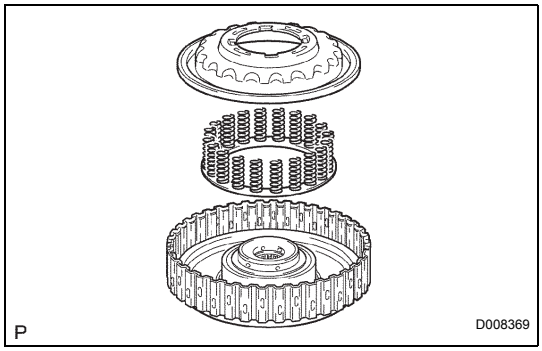
(a) Using SST on the clutch balancer, compress the return spring with a press.

SST 09320-89010

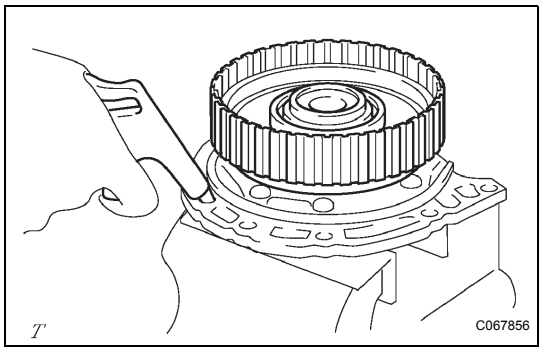
NOTICE:

Do not compress the return spring excessively.

(b) Using a snap ring expander, remove the snap ring.



(c) Remove the clutch balancer and piston return spring.



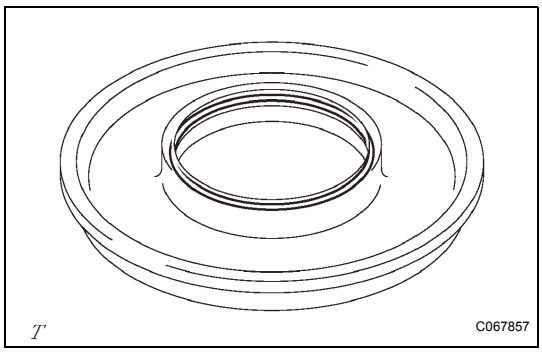
3. REMOVE FORWARD CLUTCH PISTON

(a) Place the input shaft onto the oil pump.

(b) Holding the forward clutch piston by hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil pump to remove the forward clutch piston.

HINT:

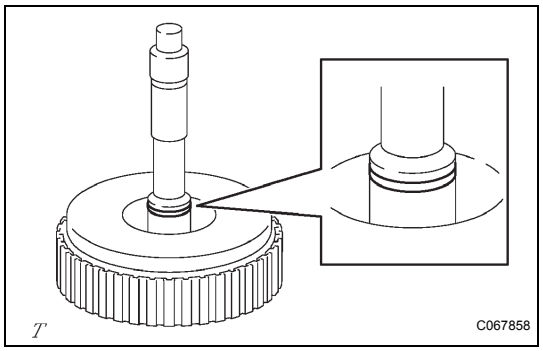
When the piston can not be removed due to being slanted, either blow the air again with the protruding side pushed or remove the piston using needle-nose pliers with their tips wrapped in protective tape.



4. REMOVE FORWARD CLUTCH PISTON O-RING

(a) Using a screwdriver, remove the clutch piston O-ring from the forward clutch piston.

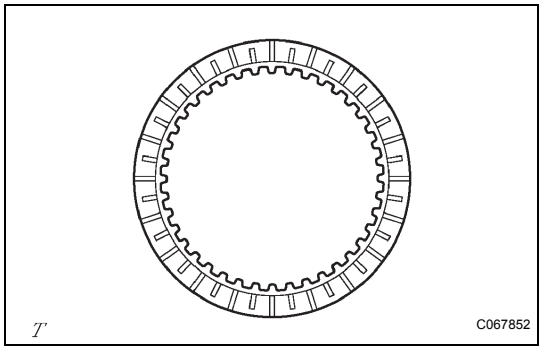
AX



5. REMOVE INPUT SHAFT OIL SEAL RING

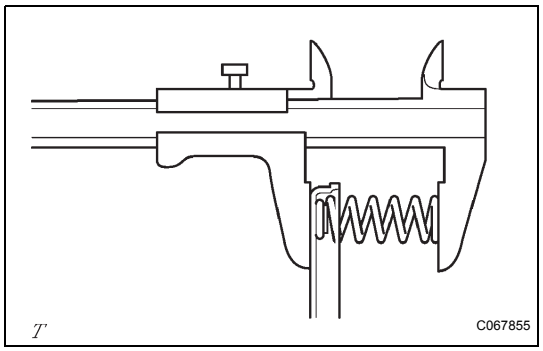
(a) Using a screwdriver, remove the input shaft oil seal ring from the input shaft.

INSPECTION



1. INSPECT FRONT CLUTCH CLUTCH DISC

(a) Check whether 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 the discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**

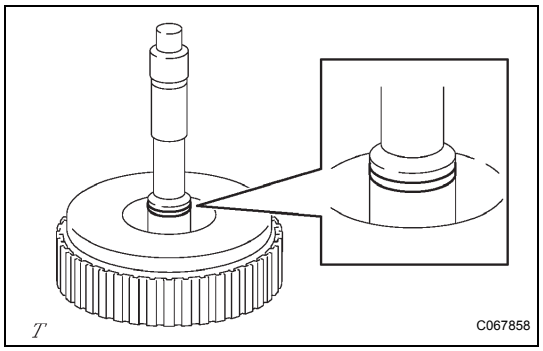


2. INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the spring together with the spring seat.
Standard free length:
21.69 mm (0.8540 in.)

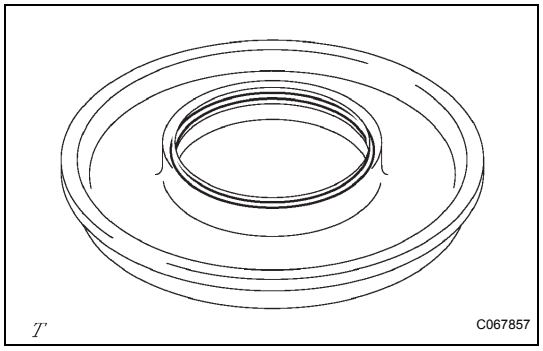
AX

REASSEMBLY



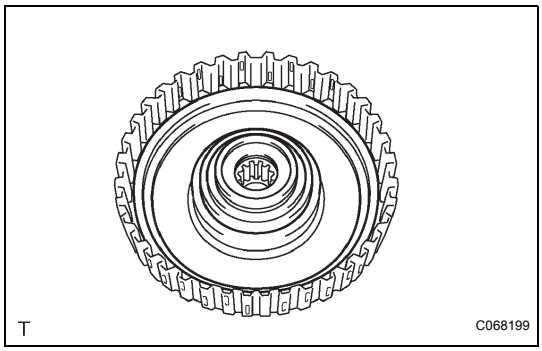
1. INSTALL INPUT SHAFT OIL SEAL RING

(a) Coat a new input shaft oil seal ring with ATF, and install it into the input shaft.



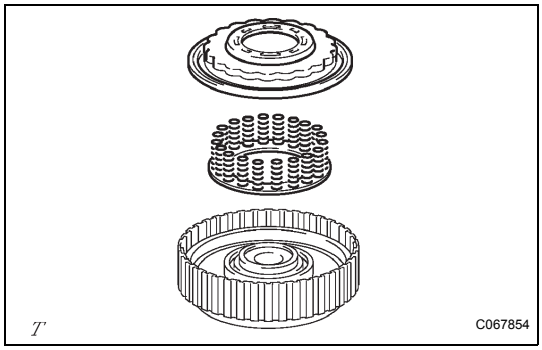
2. INSTALL FORWARD CLUTCH PISTON O-RING

(a) Coat a new clutch piston O-ring with ATF, and install it into the forward clutch piston.



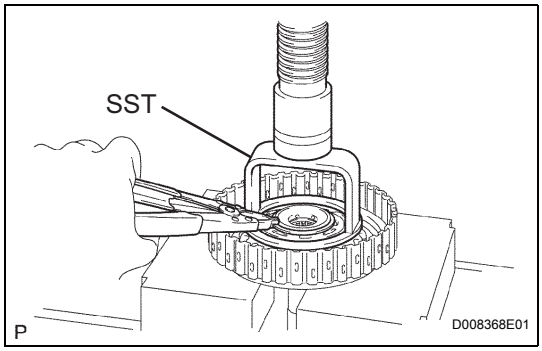
3. INSTALL FORWARD CLUTCH PISTON

(a) Install the forward clutch piston into the input shaft.
NOTICE:
Do not damage the O-ring.

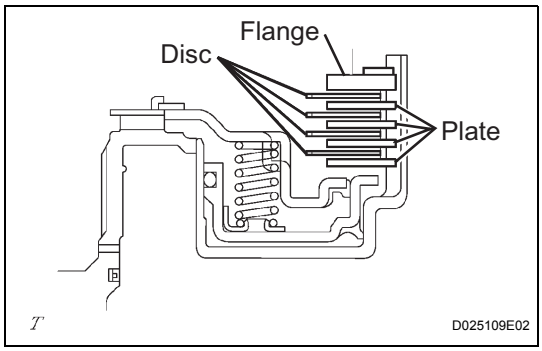


4. INSTALL FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Install the return spring and clutch balancer into the input shaft.

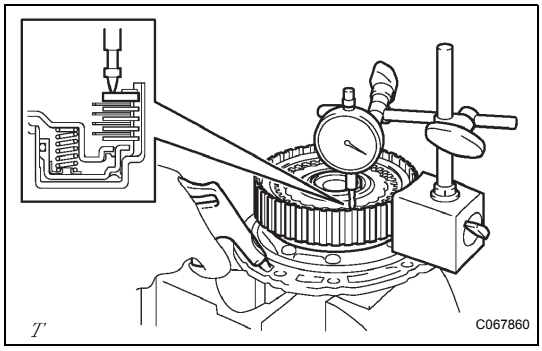


(b) Using SST, a press and snap ring pliers, install the snap ring onto the input shaft.
SST 09320-89010



5. INSTALL FRONT CLUTCH CLUTCH DISC

(a) Install the 4 plates, 4 discs and flange.
(b) Using a screwdriver, install the snap ring into the input shaft.



6. INSPECT PACK CLEARANCE OF FORWARD CLUTCH

(a) Using a dial indicator, measure the pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).
Pack clearance:
1.406 to 1.806 mm (0.05535 to 0.07110 in.)
NOTICE:
If the clearance is outside the specifications, select a new brake flange.

AX

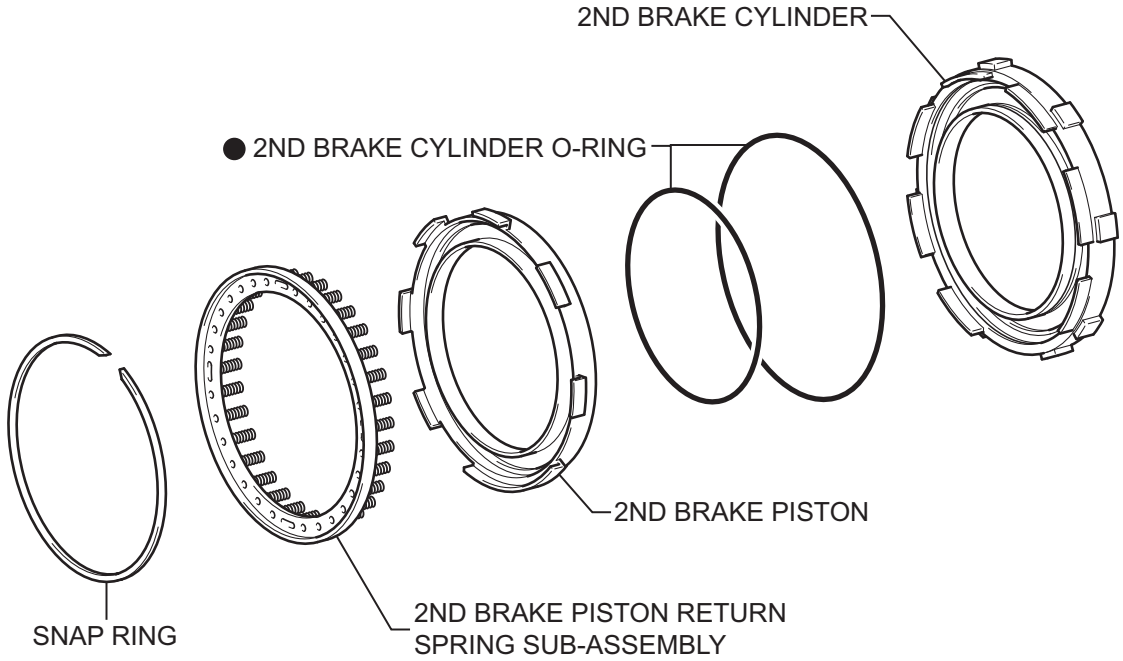
HINT:
There are 4 different flange thicknesses.

Flange thickness

No.	Thickness mm (in.)	No.	Thickness mm (in.)
-	3.0 (0.118)	2	3.4 (0.134)
1	3.2 (0.126)	3	3.6 (0.142)

SECOND BRAKE PISTON

COMPONENTS

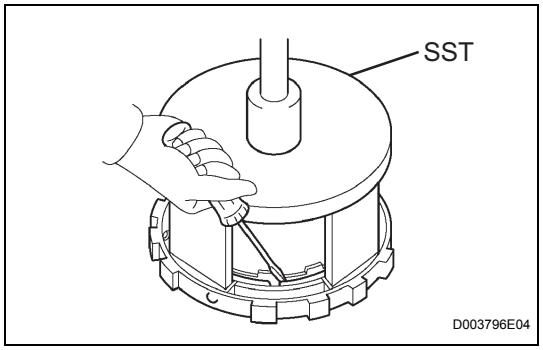


● Non-reusable part

P

C121633E02

AX

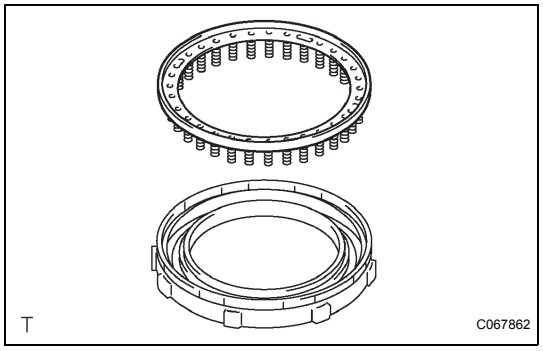


DISASSEMBLY

1. REMOVE 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

(a) Using SST and a press, remove the snap ring from the 2nd brake piston.
SST 09387-00060

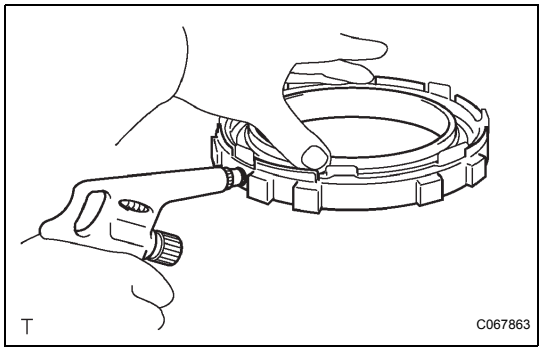
(b) Remove the 2nd brake return spring from the 2nd brake cylinder.



(c) Remove the 2nd brake piston return spring sub-assembly from the 2nd brake cylinder.

2. REMOVE 2ND BRAKE PISTON

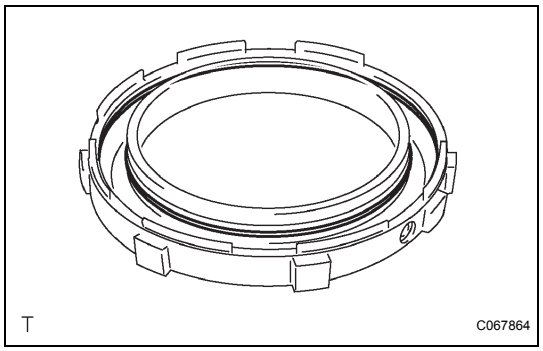
(a) Hold the 2nd brake piston and apply compressed air (392 kPa, 4.0 kgf/cm^2 , 57 psi) to the 2nd brake cylinder to remove the 2nd brake piston.



AX

3. REMOVE 2ND BRAKE CYLINDER O-RING

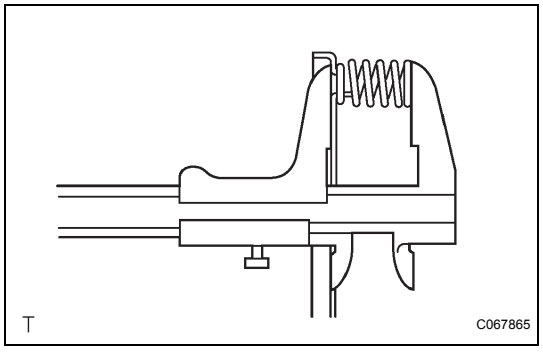
(a) Using a screwdriver, remove the 2 O-rings from the 2nd brake cylinder.

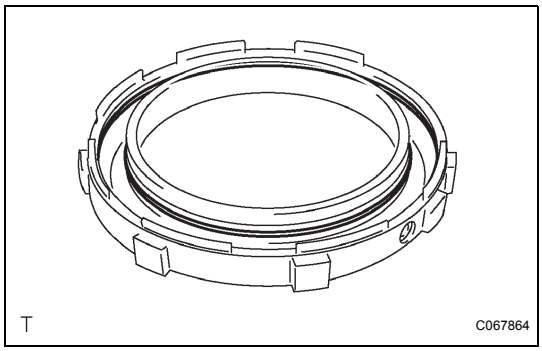


INSPECTION

1. INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the spring together with the spring seat.
Standard free length:
14.65 mm (0.5768 in.)





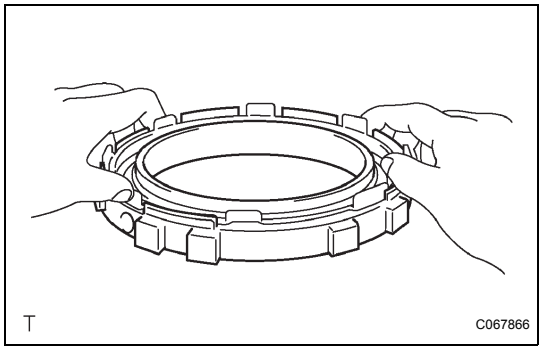
REASSEMBLY

1. INSTALL 2ND BRAKE CYLINDER O-RING

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

NOTICE:

Do not damage the O-rings.

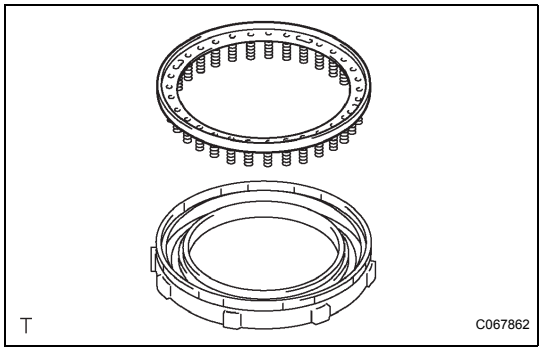


2. INSTALL 2ND BRAKE PISTON

(a) Coat the 2nd brake piston with ATF, and install it into the 2nd brake cylinder.

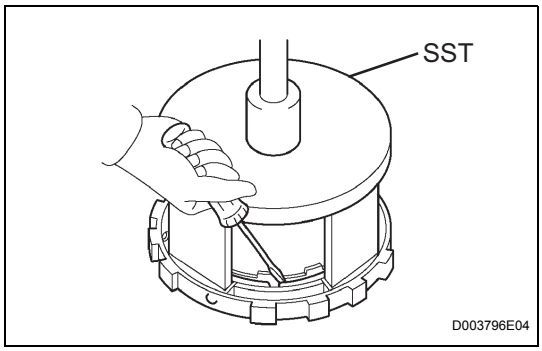
CAUTION:

Do not damage the O-rings when pressing the 2nd brake piston into the 2nd brake cylinder by hand.



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.

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

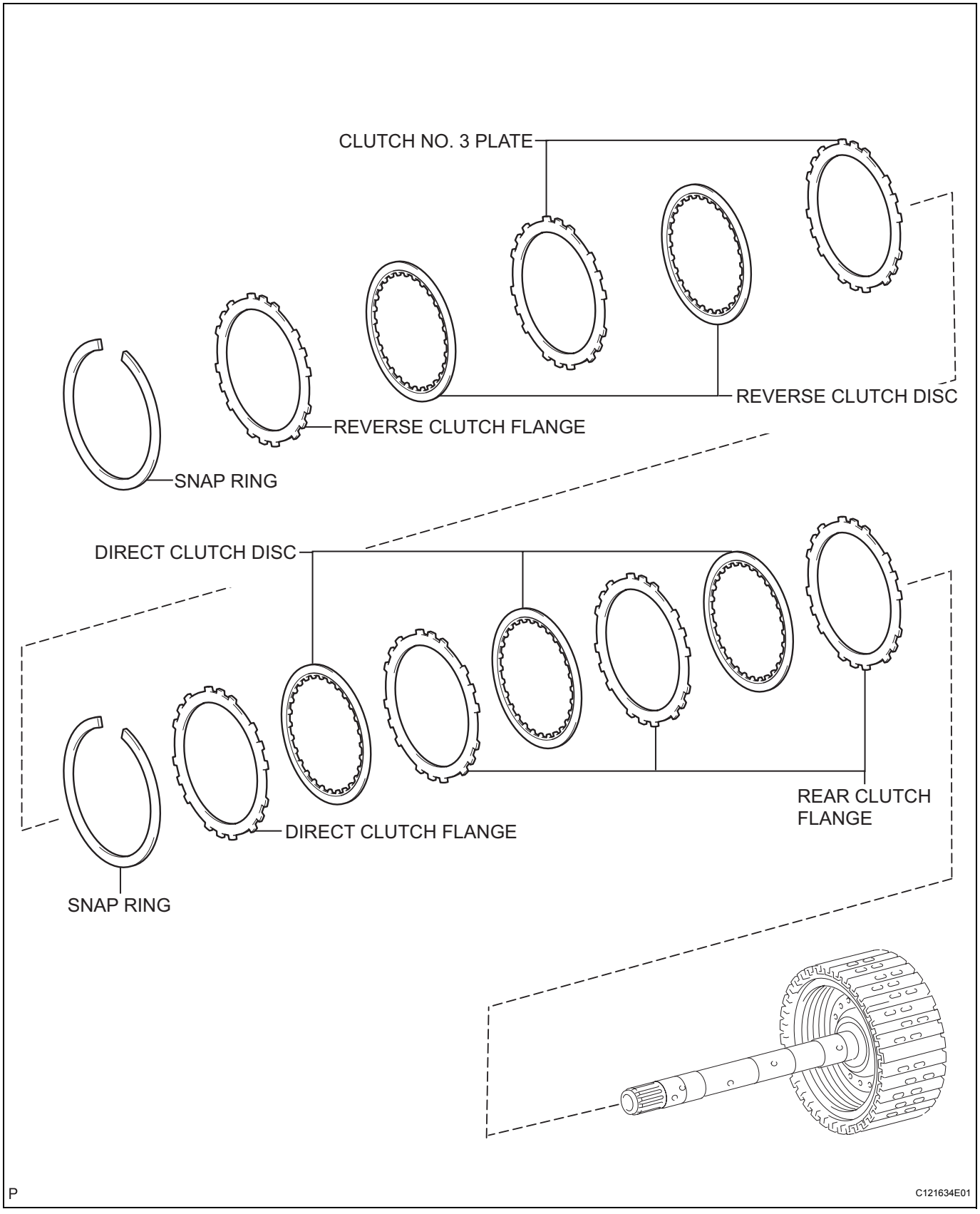
NOTICE:

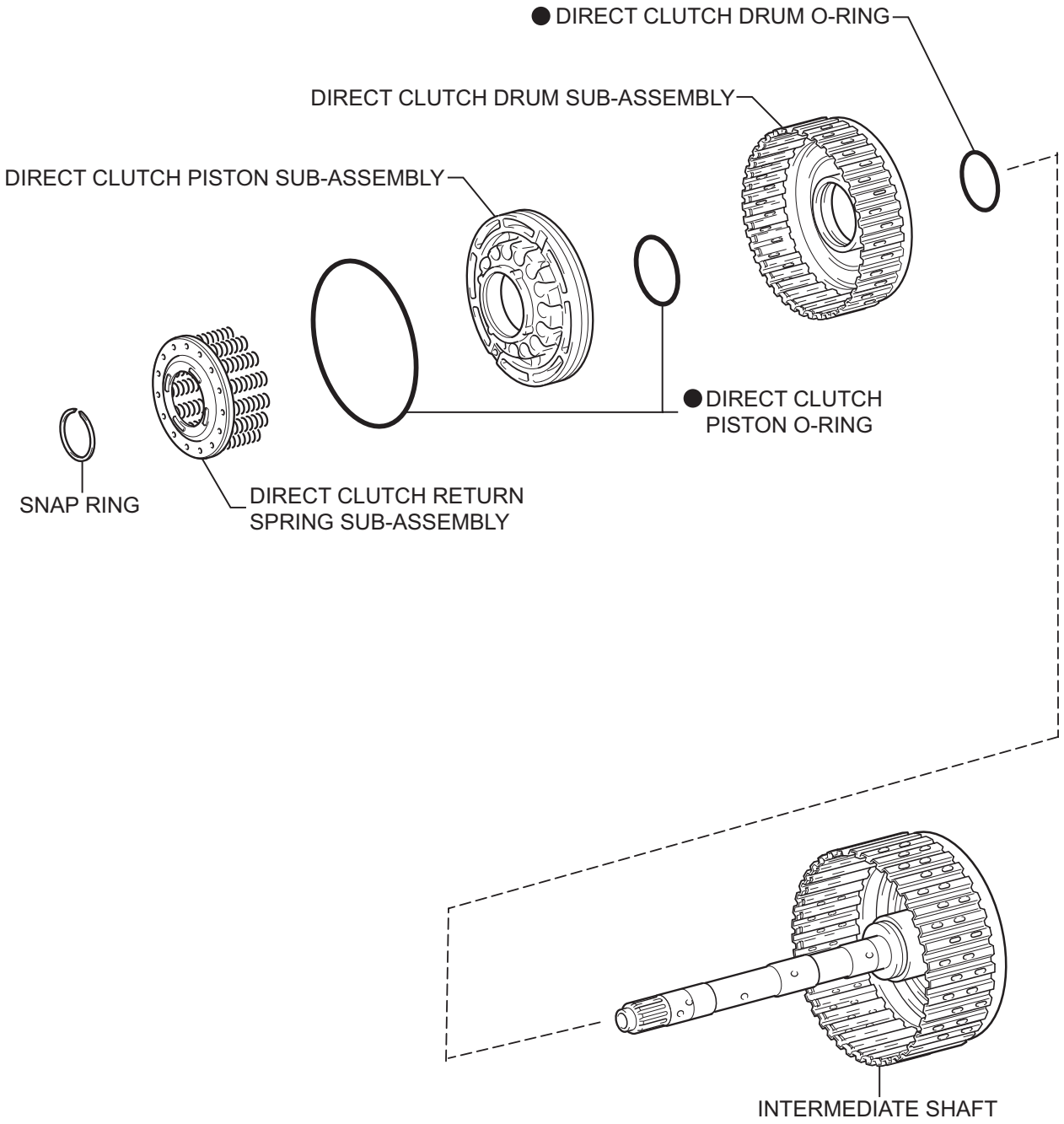
Make sure that the end gap of the snap ring is not aligned with the piston return spring claw.

AX

INTERMEDIATE SHAFT

COMPONENTS



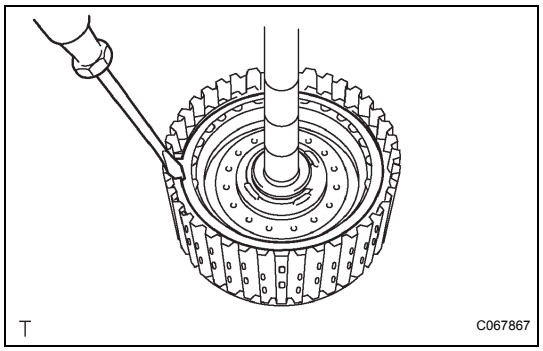


● Non-reusable part

P

C121635E02

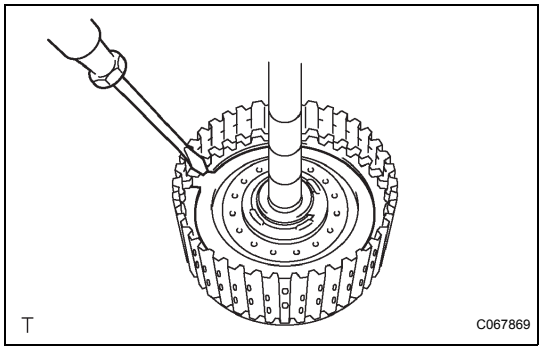
DISASSEMBLY



1. REMOVE REVERSE CLUTCH DISC

(a) Using a screwdriver, remove the snap ring.

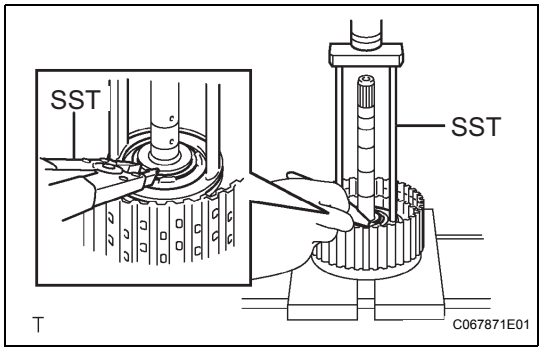
(b) Remove the flange, 2 discs and 2 plates.



2. REMOVE DIRECT CLUTCH DISC

(a) Using a screwdriver, remove the snap ring.

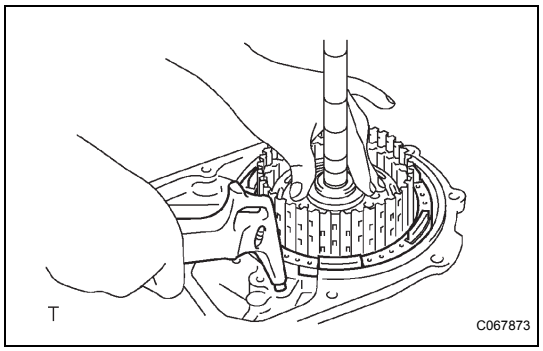
(b) Remove the direct clutch flange, 3 plates and 3 rear clutch flanges.



3. REMOVE DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Using SST and a press, remove the snap ring.
SST 09387-00020

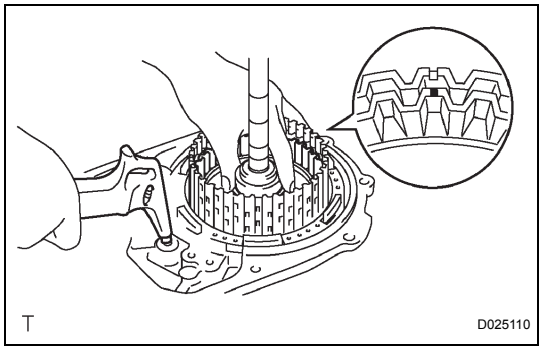
(b) Remove the direct clutch return spring sub-assembly from the intermediate shaft.



4. REMOVE DIRECT CLUTCH PISTON SUB-ASSEMBLY

(a) Install the intermediate shaft onto the transaxle rear cover.

(b) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole shown in the illustration and remove the direct clutch piston from the intermediate shaft.
NOTICE:
- **Blowing the air may cause the piston to jump out. When removing the piston, hold it by hand using a shop rag or piece of cloth.**
- **Do not splash ATF with the compressed air.**

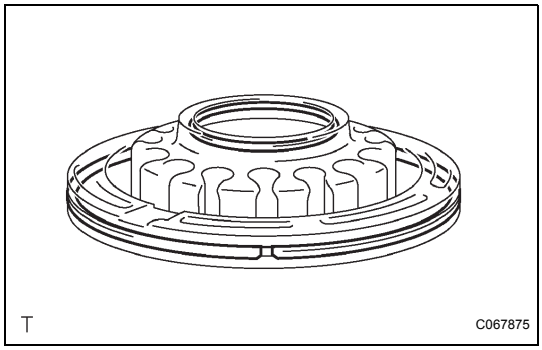


5. REMOVE DIRECT CLUTCH DRUM SUB-ASSEMBLY

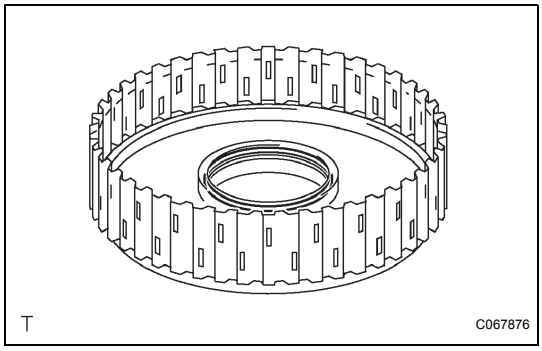
(a) Install the intermediate shaft onto the transaxle rear cover.

(b) Put a matchmark on the direct clutch drum in the same position as the cutout of the intermediate shaft assembly.

(c) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole shown in the illustration and remove the direct clutch drum from the intermediate shaft.
NOTICE:
- **Blowing the air may cause the drum to jump out. When removing the drum, hold it by hand using a shop rag or piece of cloth.**
- **Do not splash ATF with the compressed air.**



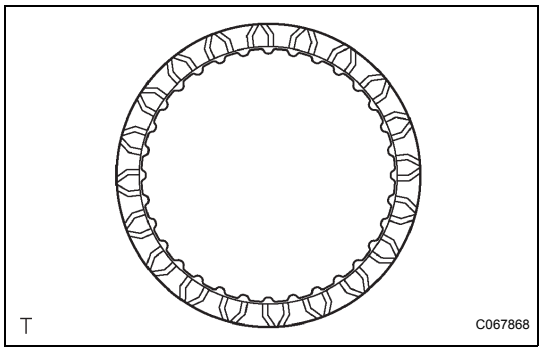
6. REMOVE DIRECT CLUTCH PISTON O-RING
(a) Using a screwdriver, remove the 2 piston O-rings from the direct clutch piston.



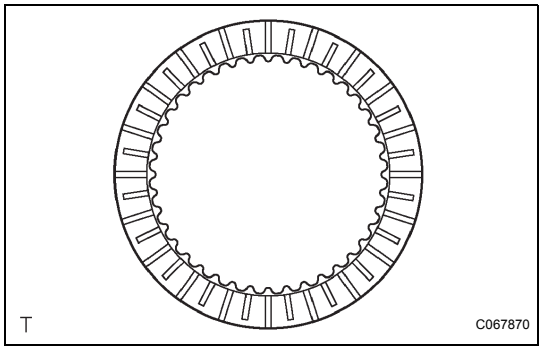
7. REMOVE DIRECT CLUTCH DRUM O-RING
(a) Using a screwdriver, remove the direct clutch drum O-ring from the direct clutch drum.

AX

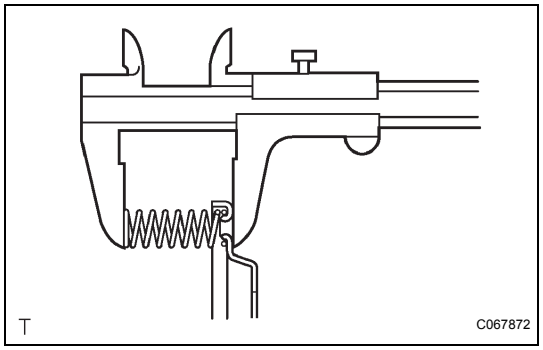
INSPECTION



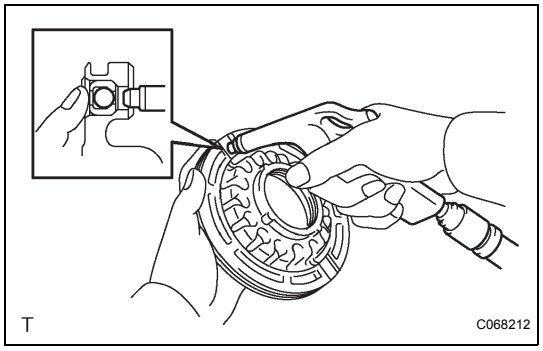
1. INSPECT REVERSE CLUTCH DISC
(a) Check whether the sliding surfaces of the disc, plate and flange are worn or burnt.
If necessary, replace them.
NOTICE:
- **If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all the discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**



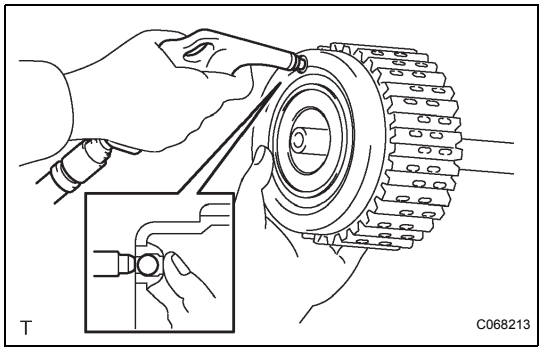
2. INSPECT DIRECT CLUTCH DISC
(a) Check whether the sliding surface of the disc, plate and flange are worn or burnt.
If necessary, replace them.
NOTICE:
- **If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all the discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**



3. **INSPECT DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY**
   (a) Using vernier calipers, measure the free length of the spring together with the spring seat.
   Standard free length:
   32.9 mm (1.2953 in.)



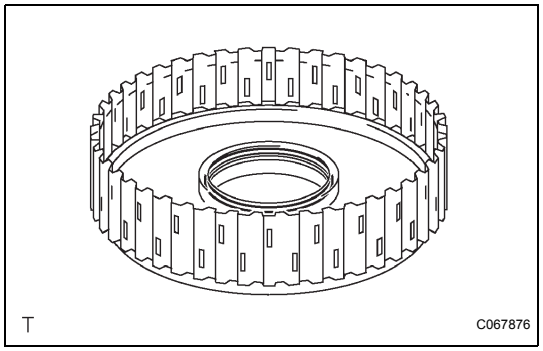
4. **INSPECT DIRECT CLUTCH PISTON SUB-ASSEMBLY**
   (a) Shake the direct clutch pin and confirm that the check ball is not stuck.
   (b) Apply low pressure compressed air to the check ball and check that no air leakage is identified.



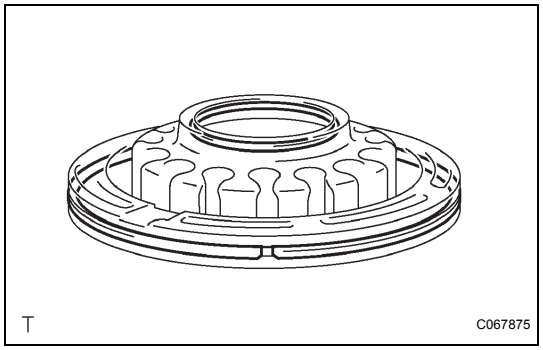
5. **INSPECT INTERMEDIATE SHAFT SUB-ASSEMBLY**
   (a) Shake the direct clutch pin and confirm that the check ball is not stuck.
   (b) Apply low pressure compressed air to the check ball and check that no air leakage is identified.

AX

REASSEMBLY

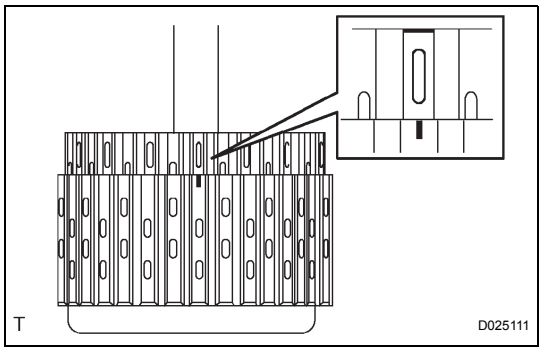


1. **INSTALL DIRECT CLUTCH DRUM O-RING**
   (a) Coat a new O-ring with ATF and install it into the direct clutch drum.
   NOTICE:
   Do not damage the O-rings.

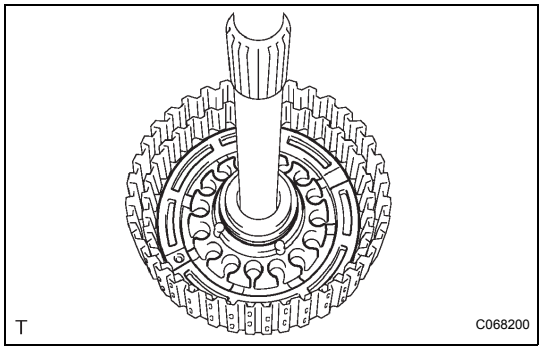


2. **INSTALL DIRECT CLUTCH PISTON O-RING**
   (a) Coat 2 new O-rings with ATF and install them into the direct clutch piston.
   NOTICE:
   Do not damage the O-rings.

3. **INSTALL DIRECT CLUTCH DRUM SUB-ASSEMBLY**
   (a) Coat the direct clutch drum with ATF.

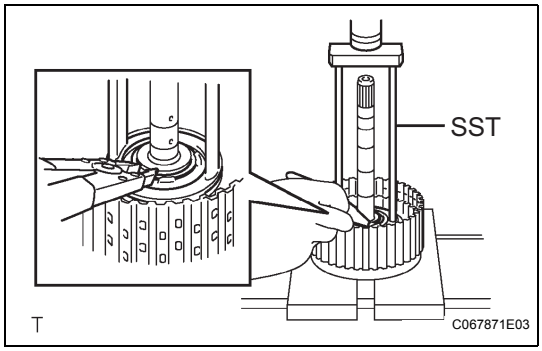


(b) Align the cutout in the intermediate shaft assembly with the matchmark on the direct clutch drum and install the direct clutch drum onto the intermediate shaft assembly.
NOTICE:
Do not damage the O-ring or the lip of the clutch drum.



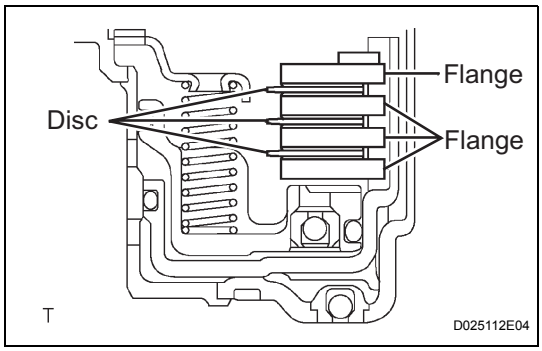
4. INSTALL DIRECT CLUTCH PISTON SUB-ASSEMBLY

(a) Coat the direct clutch piston with ATF and install it into the intermediate shaft.
NOTICE:
Do not damage the O-ring or the direct clutch piston.



5. INSTALL DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

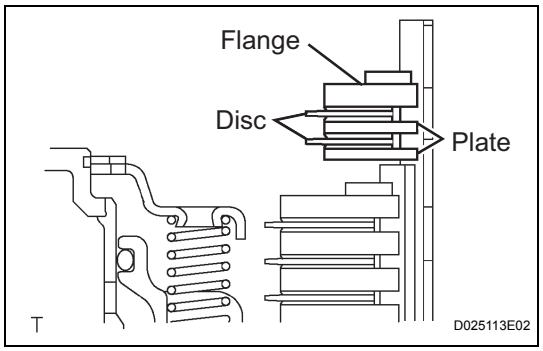
(a) Install the direct clutch return spring onto the direct clutch piston.
(b) Place SST on the piston return spring and compress the springs with a press.
SST 09387-00020
(c) Using snap ring pliers, install the snap ring into the direct clutch drum.
NOTICE:
- **Stop pressing the press when the spring seat is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove to prevent the spring seat from deforming.**
- **Do not expand the snap ring excessively.**



6. INSTALL DIRECT CLUTCH DISC

(a) Coat the 3 rear clutch flanges, 3 discs and direct clutch flange with ATF and install them onto the intermediate shaft.
(b) Install the snap ring into the intermediate shaft.

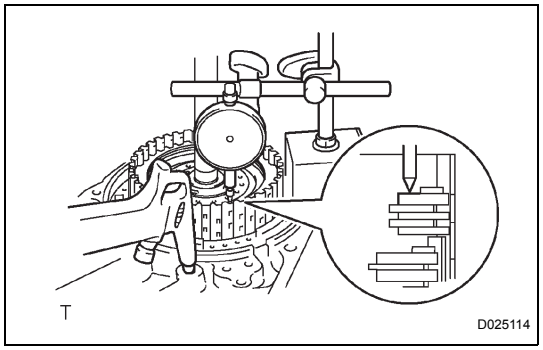
AX



7. INSTALL REVERSE CLUTCH DISC

(a) Coat the 2 plates, 2 discs and flange with ATF, and install them onto the intermediate shaft.

(b) Install the snap ring into the intermediate shaft.



8. INSPECT PACK CLEARANCE OF REVERSE CLUTCH

(a) Install the intermediate shaft and thrust needle roller bearing onto the transaxle rear cover.

(b) Using a dial indicator, measure the reverse clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Pack clearance:

0.86 to 1.26 mm (0.0339 to 0.0496 in.)

NOTICE:

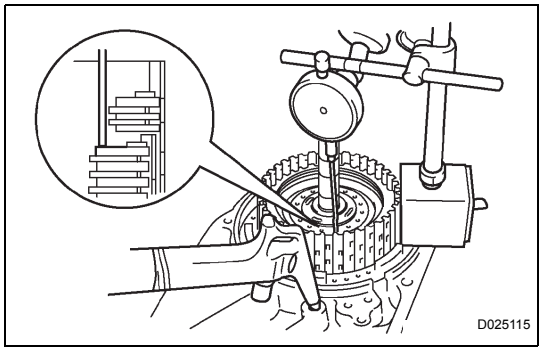
If the clearance is outside the specifications, select a new brake flange.

HINT:

There are 4 different flange thicknesses.

Flange thickness

No.	Thickness mm (in.)	No.	Thickness mm (in.)
-	3.0 (0.118)	2	3.4 (0.134)
1	3.2 (0.126)	3	3.6 (0.142)



9. INSPECT PACK CLEARANCE OF DIRECT CLUTCH

(a) Install the intermediate shaft and thrust needle roller bearing onto the transaxle rear cover.

(b) Using a dial indicator and measuring terminal (SST), measure the forward clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

SST 09350-36010 (09350-06110)

HINT:

The direct and reverse clutch will come out as the compressed air is applied.

Therefore, while performing the check, press on the input shaft of the direct and reverse clutch using a stamping machine or the equivalent so that the pressure is not applied to the direct and reverse clutch.

Pack clearance:

0.62 to 1.02 mm (0.0244 to 0.0402 in.)

NOTICE:

If the clearance is outside the specifications, select a new brake flange.

HINT:

There are 4 different flange thicknesses.

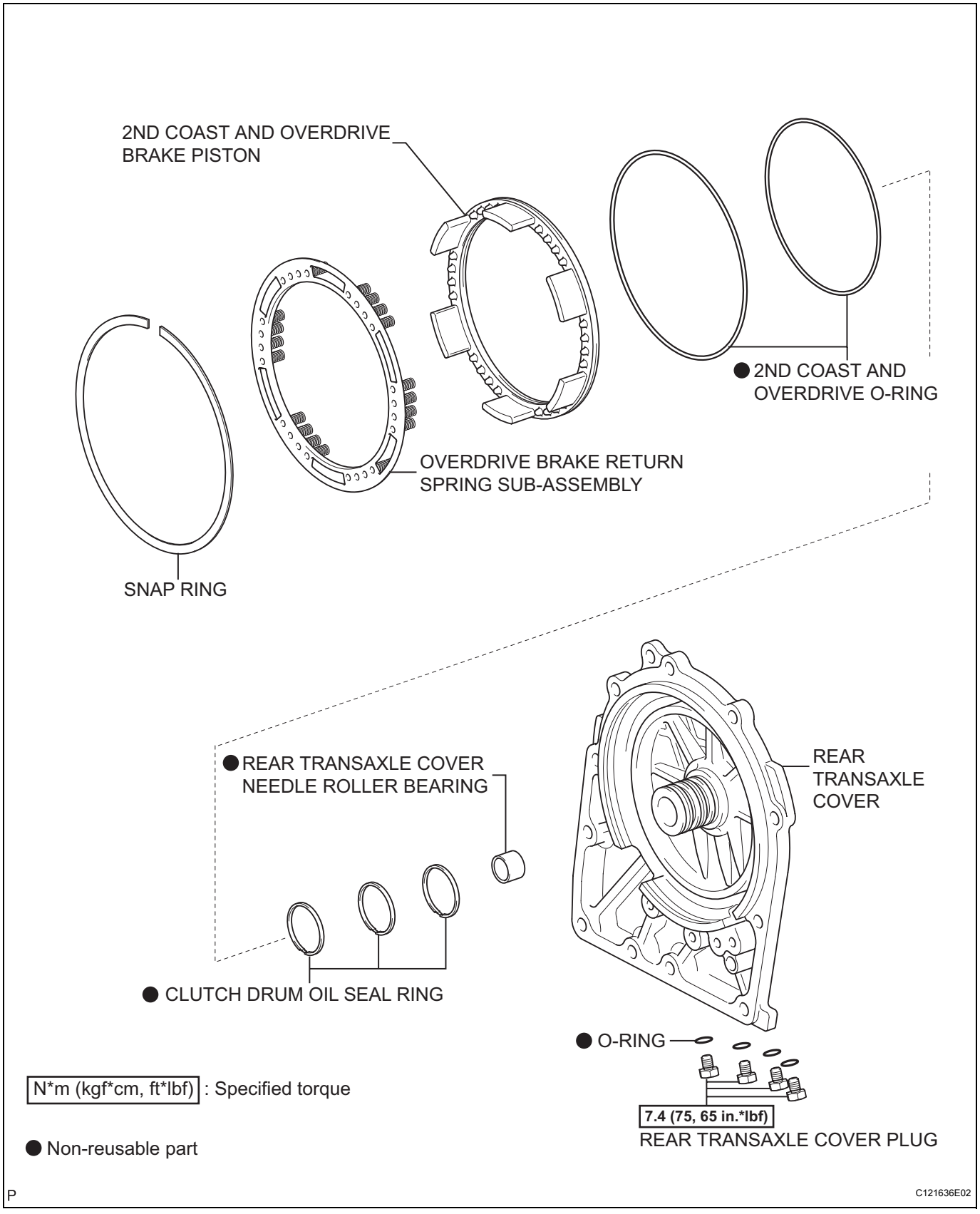
AX

Flange thickness

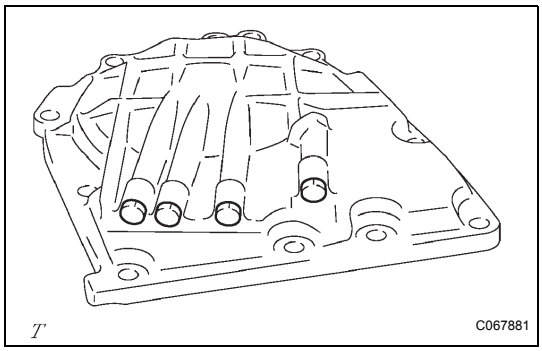
No.	Thickness mm (in.)	No.	Thickness mm (in.)
-	3.0 (0.118)	2	3.4 (0.134)
1	3.2 (0.126)	3	3.6 (0.142)

TRANSAXLE REAR COVER

COMPONENTS



AX

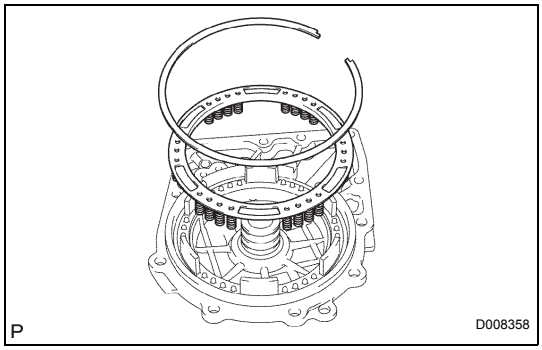


DISASSEMBLY

1. REMOVE REAR TRANSAXLE COVER PLUG

(a) Remove the 4 rear transaxle cover plugs from the rear transaxle cover.

(b) Using a screwdriver, remove the 4 O-rings from the 4 rear transaxle cover plugs.



2. REMOVE OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

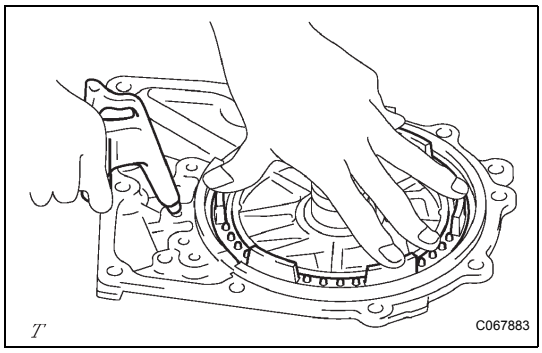
(a) Using SST, a press and a screwdriver, remove the snap ring.

SST 09387-00070

NOTICE:

Stop the press when the overdrive brake piston is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, to prevent the overdrive brake piston from being deformed.

(b) Remove the overdrive brake return spring from the transaxle rear cover.

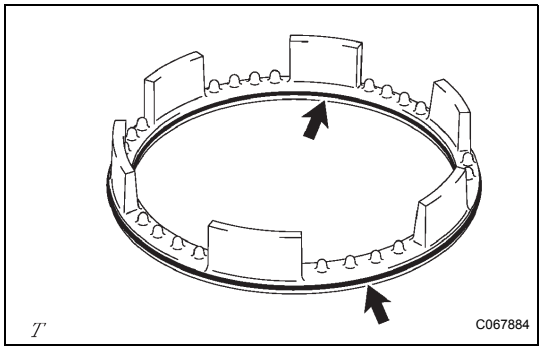


3. REMOVE 2ND COAST AND OVERDRIVE BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle rear cover to remove the overdrive brake piston.

NOTICE:

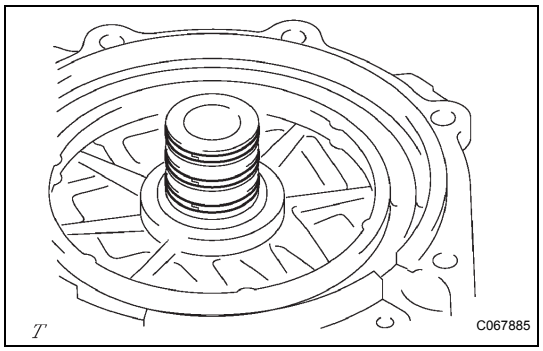
- **Blowing the air may cause the piston to jump out. When removing the piston, hold it by hand using a shop rag or piece of cloth.**
- **Do not splash ATF with the compressed air.**



4. REMOVE 2ND COAST AND OVERDRIVE O-RING

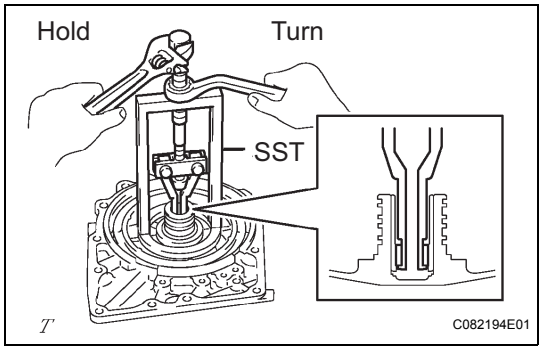
(a) Using a screwdriver, remove the 2 O-rings from the 2nd coast and overdrive brake piston.

AX



5. REMOVE CLUTCH DRUM OIL SEAL RING

(a) Remove the 3 oil seals from the transaxle rear cover.

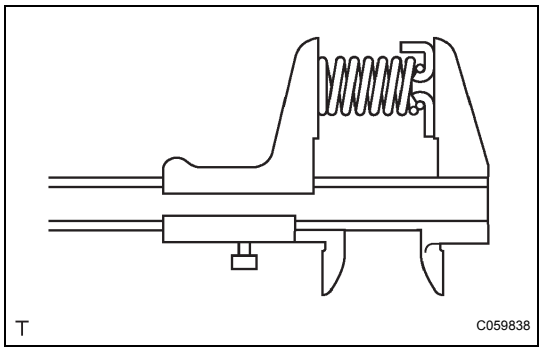


6. REMOVE REAR TRANSAXLE COVER NEEDLE ROLLER BEARING

(a) Using SST, remove the bearing from the rear transaxle cover.

SST 09387-00041 (09387-01021)

INSPECTION



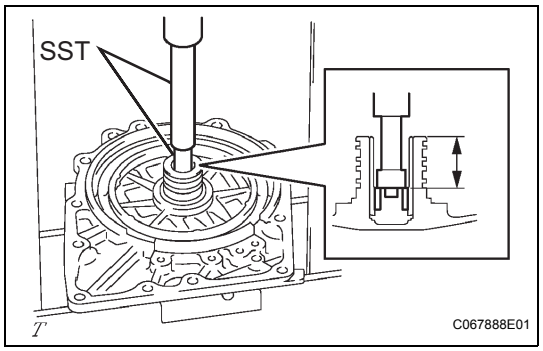
1. INSPECT OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

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

Standard free length:
17.88 mm (0.7039 in.)

AX

REASSEMBLY



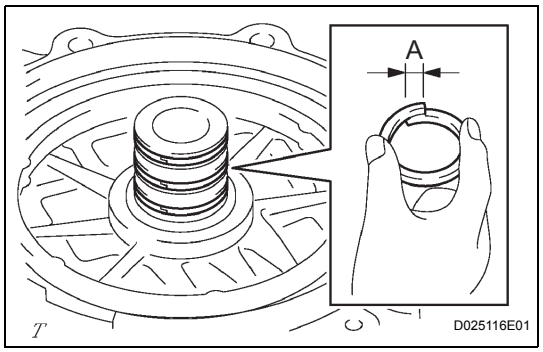
1. INSTALL REAR TRANSAXLE COVER NEEDLE ROLLER BEARING

(a) Coat a new needle roller bearing with ATF.

(b) Using SST and a press, install the needle roller bearing into the rear transaxle cover.

SST 09950-60010 (09951-00190, 09952-06010), 09950-70010 (09951-07100)

Standard clearance:
25.2 mm (0.992 in.)

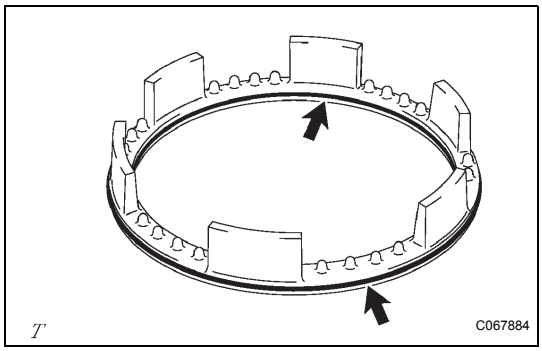


2. INSTALL CLUTCH DRUM OIL SEAL RING

(a) Compress the oil seal ring from both sides to reduce dimension A.

Dimension A:
5.0 mm (0.197 in.)

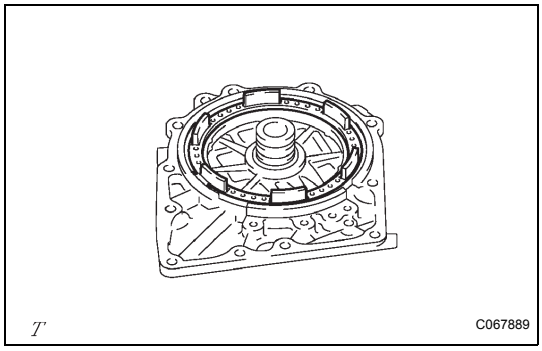
(b) Coat the oil seal ring with ATF and install it onto the rear transaxle cover.



3. INSTALL 2ND COAST AND OVERDRIVE O-RING

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

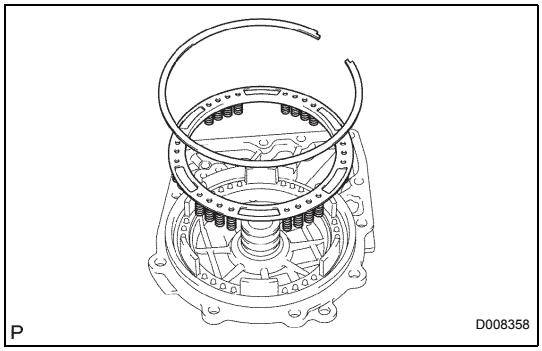
NOTICE:
Do not damage the O-rings.



4. INSTALL 2ND COAST AND OVERDRIVE BRAKE PISTON

(a) Coat the piston with ATF and install it into the transaxle rear cover.

NOTICE:
Do not damage the O-rings.

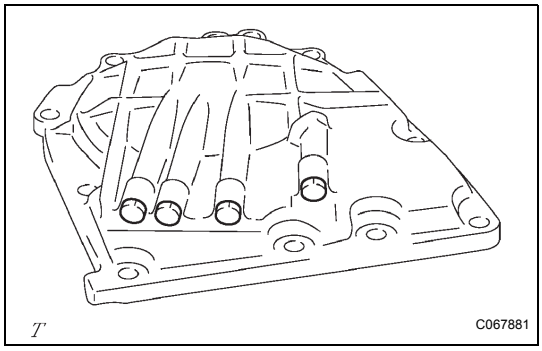


5. INSTALL OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using SST and a press, install the overdrive brake return spring and snap ring onto the transaxle rear cover.

SST 09387-00070

NOTICE:
- **Stop pressing the press when the spring sheet is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, to prevent the spring sheet from deforming.**
- **Do not expand the snap ring excessively.**



6. INSTALL REAR TRANSAXLE COVER PLUG

(a) Coat 4 new O-rings with ATF, and install them into the 4 rear transaxle cover plugs.

(b) Install the 4 rear transaxle cover plugs into the rear transaxle cover.

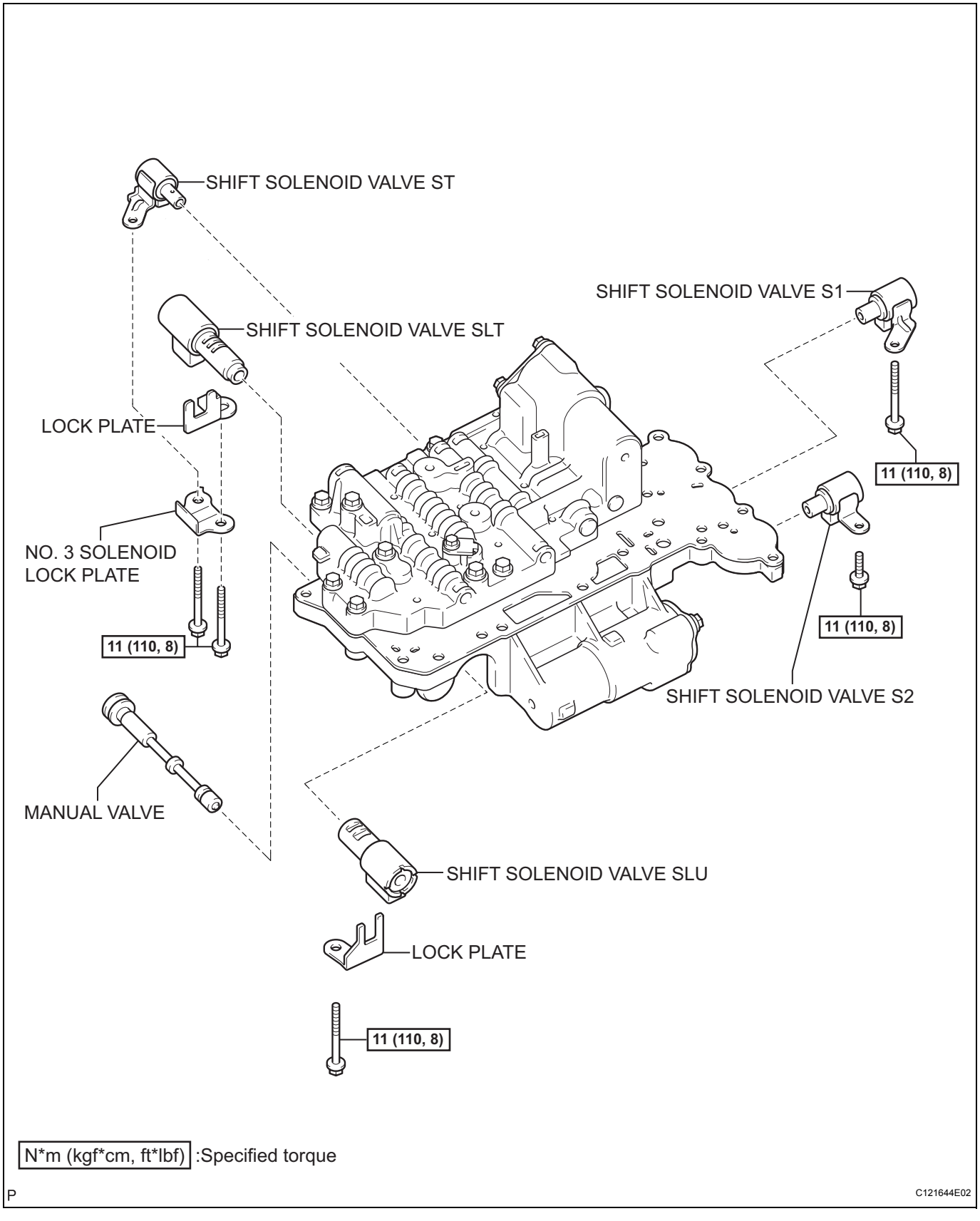
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)

NOTICE:
Do not damage the O-rings.

AX

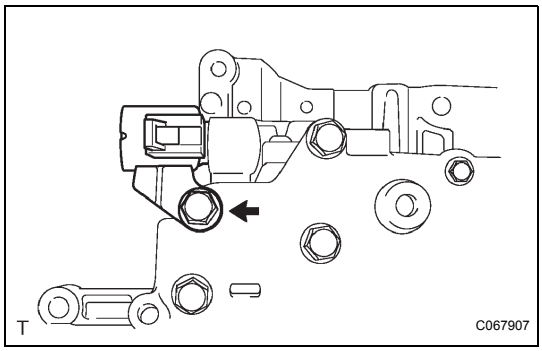
VALVE BODY

COMPONENTS



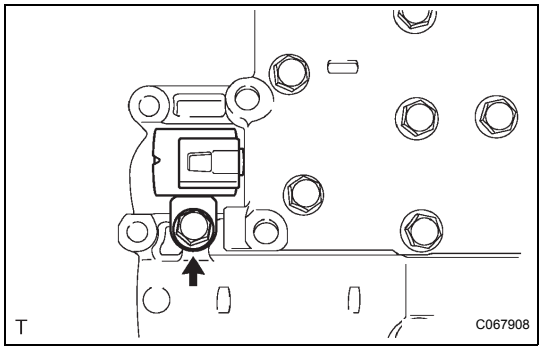
AX

DISASSEMBLY



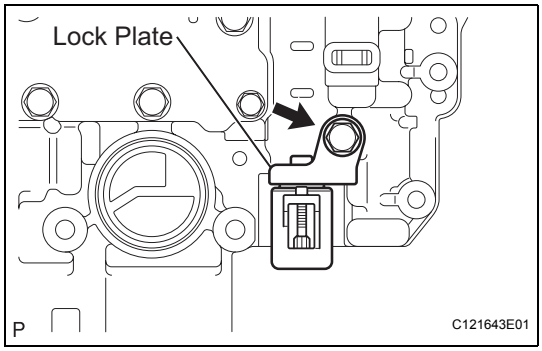
1. REMOVE SHIFT SOLENOID VALVE S1

(a) Remove the bolt and pull out shift solenoid valve S1.



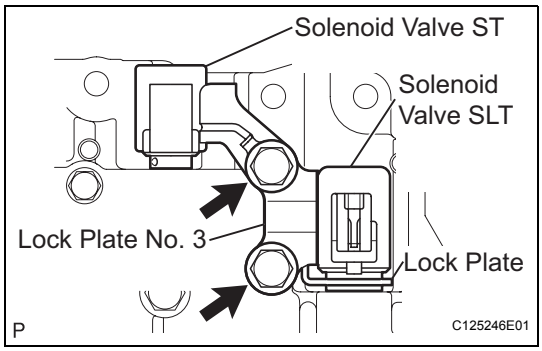
2. REMOVE SHIFT SOLENOID VALVE S2

(a) Remove the bolt and pull out shift solenoid valve S2.



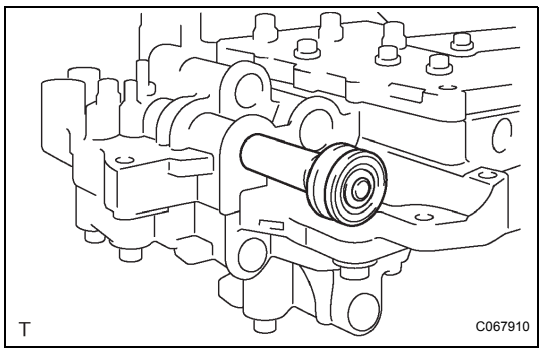
3. REMOVE SHIFT SOLENOID VALVE SLU

(a) Remove the bolt and the solenoid lock plate.
(b) Pull out the shift solenoid valve SLU.



4. REMOVE NO. 3 SOLENOID LOCK PLATE

(a) Remove the 2 bolts and No. 3 solenoid lock plate from the valve body.
(b) Pull out the shift solenoid valve ST from the valve body.
(c) Remove the solenoid lock plate from the shift solenoid valve SLT.
(d) Pull out the shift solenoid valve SLT from the valve body.

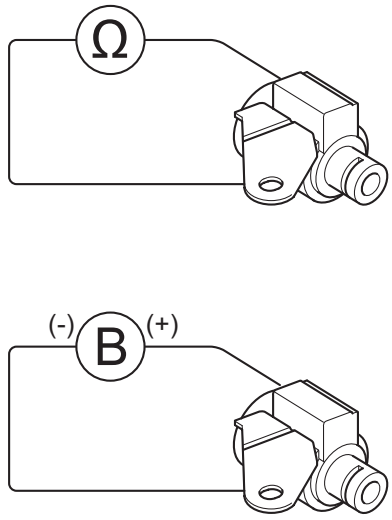


5. REMOVE MANUAL VALVE

(a) Remove the manual valve from the valve body assembly.

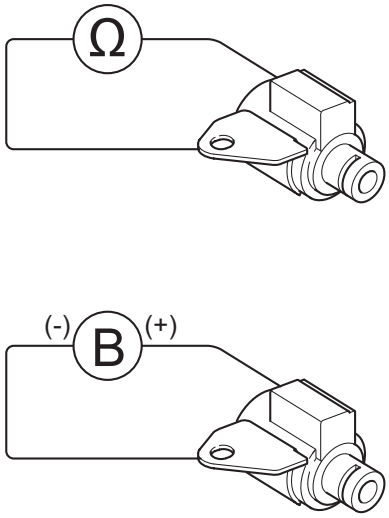
AX

Shift Solenoid Valve S1:



Y C130146E01

Shift Solenoid Valve S2:



Y C130147E01

INSPECTION

1. INSPECT SHIFT SOLENOID VALVE S1

(a) Measure the resistance.

Standard resistance

Tester Connection	Specified Condition
Solenoid Connector (S1) - Solenoid Body (S1)	11 to 15 Ω at 20°C (68°F)

(b) Connect the positive (+) battery lead to the terminal of the solenoid connector, and the negative (-) battery lead to the solenoid body, and check the operation of the valve.

NOTICE:

While using the battery during the inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

OK:

The solenoid makes an operating sound.

2. INSPECT SHIFT SOLENOID VALVE S2

(a) Measure the resistance.

Standard resistance

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

(b) Connect the positive (+) battery lead to the terminal of the solenoid connector, and the negative (-) battery lead to the solenoid body, and check the operation of the valve.

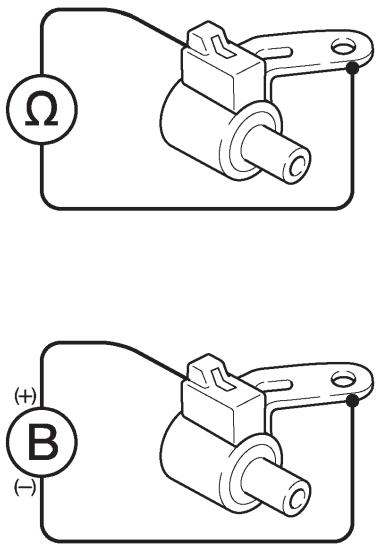
NOTICE:

While using the battery during the inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

OK:

The solenoid makes an operating sound.

Shift Solenoid Valve ST:



N D009034E02

3. INSPECT SHIFT SOLENOID VALVE ST

(a) Measure the resistance.

Standard resistance

Tester Connection	Specified Condition
Solenoid Connector (ST) - Solenoid Body (ST)	11 to 15 Ω at 20°C (68°F)

(b) Connect the positive (+) battery lead to the terminal of the solenoid connector, and the negative (-) battery lead to the solenoid body, and check the operation of the valve.

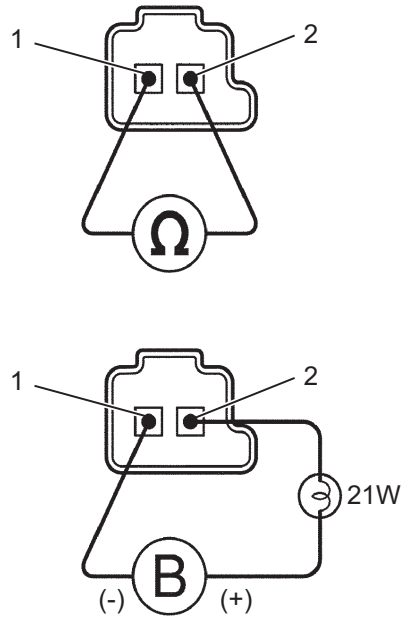
NOTICE:

While using the battery during the inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

OK:

The solenoid makes an operating sound.

Shift Solenoid Valve SLT:



P G020767E42

4. INSPECT SHIFT SOLENOID VALVE SLT

(a) Measure the resistance.

Standard resistance

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

(b) Connect the positive (+) battery lead with a 21 W bulb to terminal 2 and the negative (-) battery lead to terminal 1 of the solenoid valve connector, and check the operation of the valve.

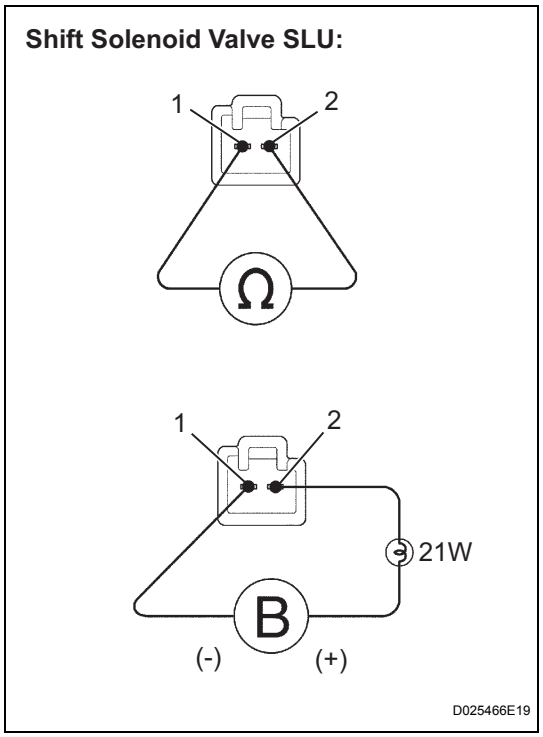
NOTICE:

While using the battery during the inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

OK:

The solenoid makes an operating sound.

AX



5. INSPECT SHIFT SOLENOID VALVE SLU

(a) Measure the resistance.

Standard resistance

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

(b) Connect the positive (+) battery lead with a 21 W bulb to terminal 2 and the negative (-) battery lead to terminal 1 of the solenoid valve connector, and check the operation of the valve.

NOTICE:

While using the battery during the inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

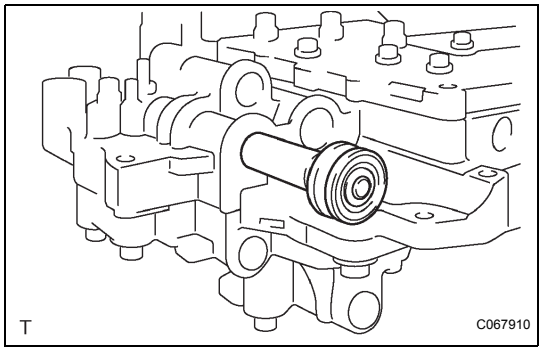
OK:

The solenoid makes an operating sound.

REASSEMBLY

1. INSTALL MANUAL VALVE

(a) Coat the manual valve with ATF, and install it onto the valve body.



AX

2. INSTALL NO. 3 SOLENOID LOCK PLATE

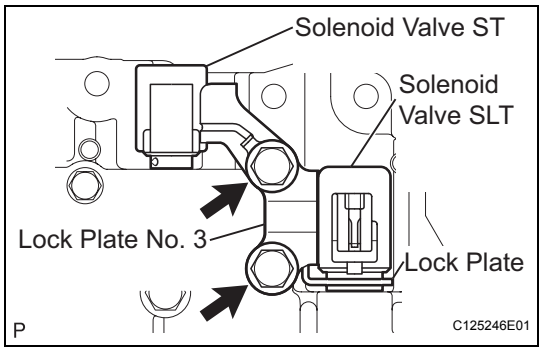
(a) Install the shift solenoid valve SLT onto the valve body.

(b) Install the solenoid lock plate onto the shift solenoid valve SLT.

(c) Install the shift solenoid valve ST onto the valve body.

(d) Install the No. 3 solenoid lock plate onto the valve body with the 2 bolts.

Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

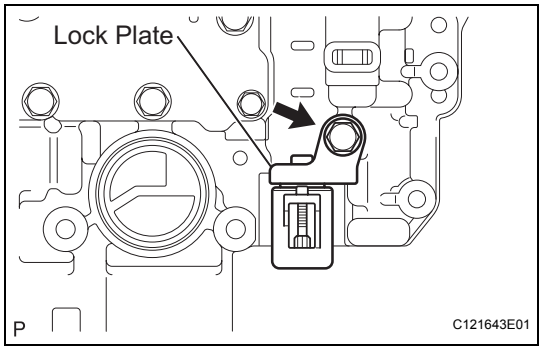


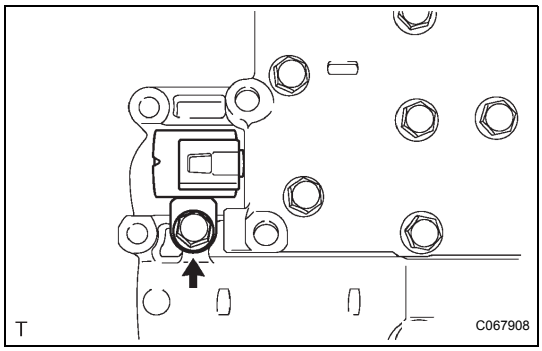
3. INSTALL SHIFT SOLENOID VALVE SLU

(a) Install the shift solenoid valve SLU onto the valve body.

(b) Install the solenoid lock plate with the bolt.

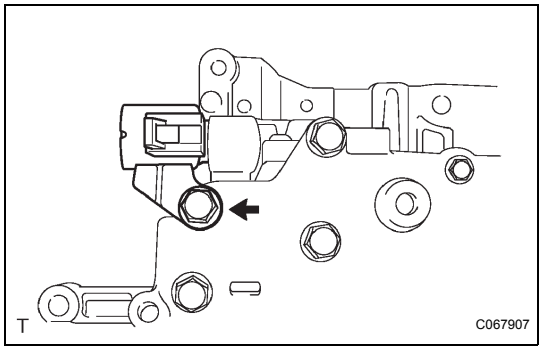
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)





4. INSTALL SHIFT SOLENOID VALVE S2

(a) Install shift solenoid valve S2 with the bolt.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

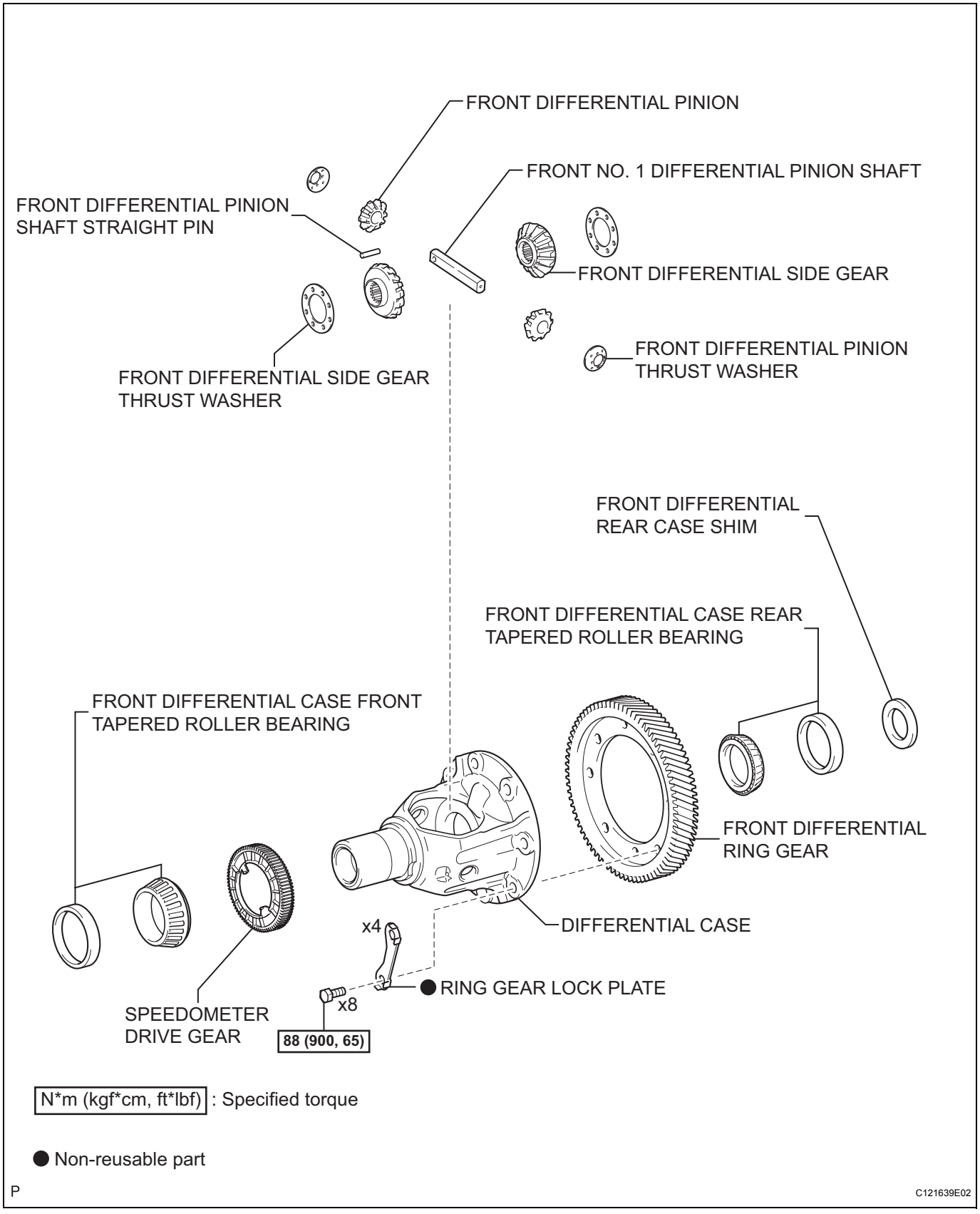


5. INSTALL SHIFT SOLENOID VALVE S1

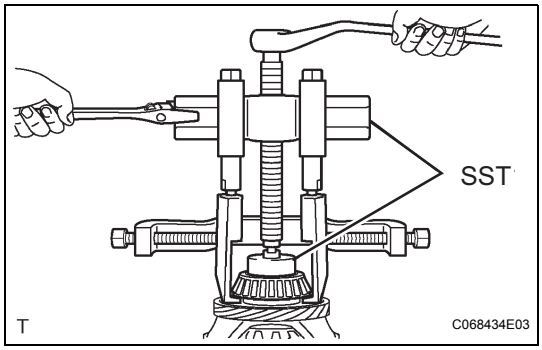
(a) Install shift solenoid valve S1 with the bolt.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

DIFFERENTIAL CASE

COMPONENTS



AX

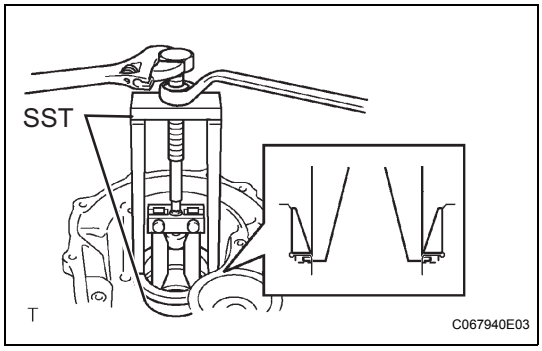


DISASSEMBLY

1. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

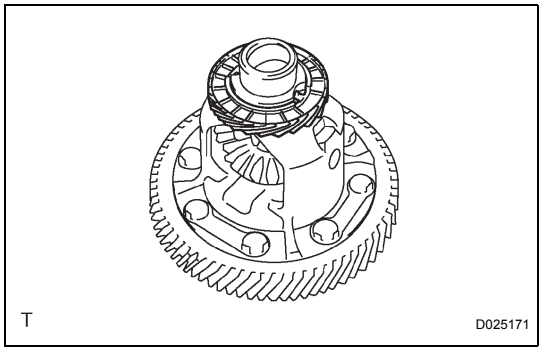
(a) Using SST, remove the front differential case front tapered roller bearing from the differential case.

SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00390)



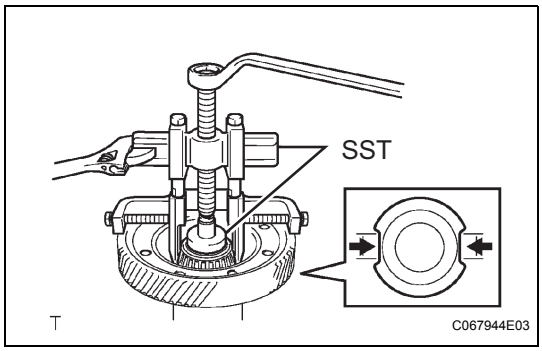
(b) Using SST, remove the front differential case RH tapered roller bearing outer race from the transaxle housing.

SST 09387-00041 (09387-02020, 09387-02010)



2. REMOVE SPEEDOMETER DRIVE GEAR

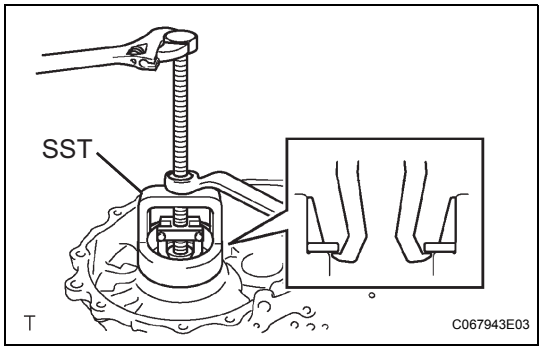
(a) Remove the speedometer drive gear from the differential case.



3. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

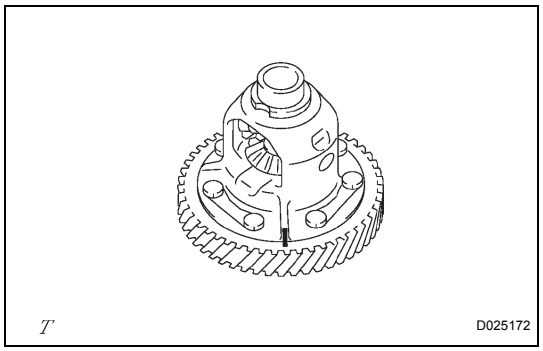
(a) Using SST, remove the front differential case tapered roller bearing from the differential case.

SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00430)



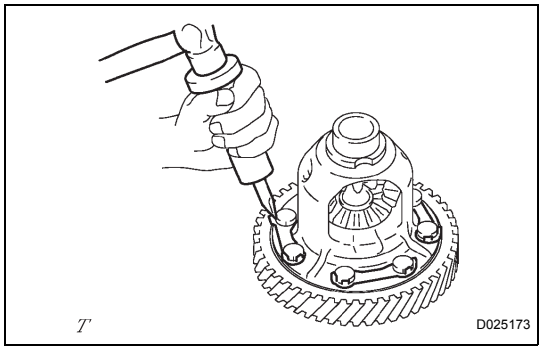
(b) Using SST, remove the front differential case tapered roller bearing outer race from the transaxle case.

SST 09612-65014 (09612-01010)

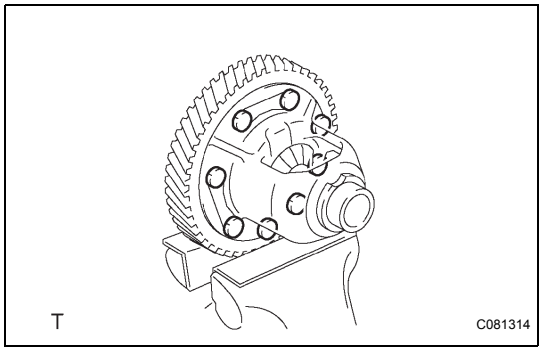


4. REMOVE FRONT DIFFERENTIAL RING GEAR

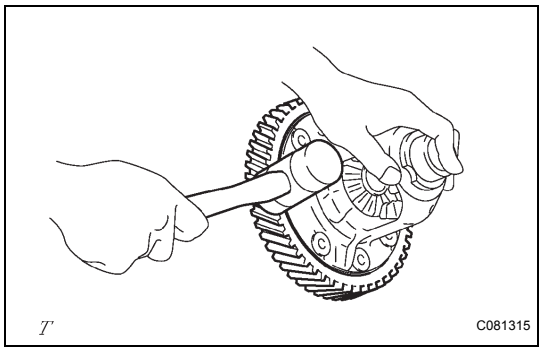
(a) Place matchmarks on the front differential ring gear and differential case.



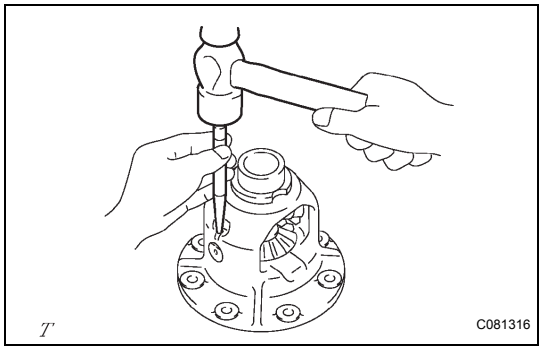
(b) Using SST and a hammer, release the lock plate.
SST 09930-00010



(c) Remove the 8 bolts and the lock plate.



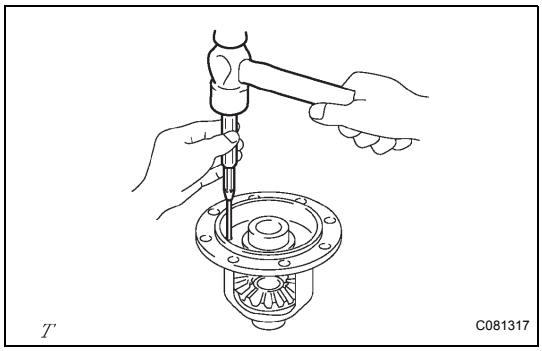
(d) Using a plastic hammer, remove the front differential ring gear from the differential case.



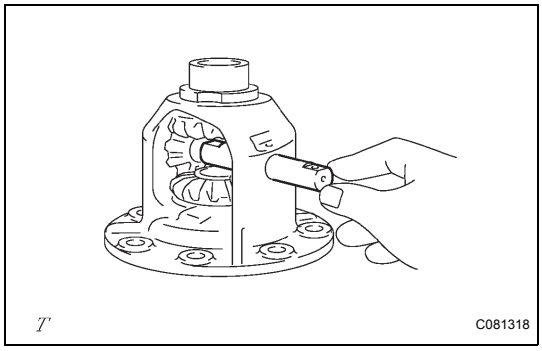
5. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a punch and a hammer, release the differential case.

AX

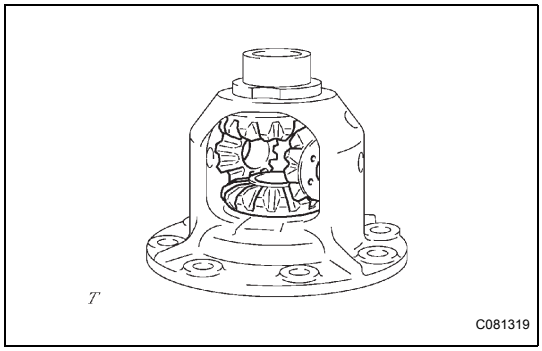


(b) Using a pin punch and a hammer, remove the straight pin.



6. REMOVE FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Remove the pinion shaft from the front differential case.

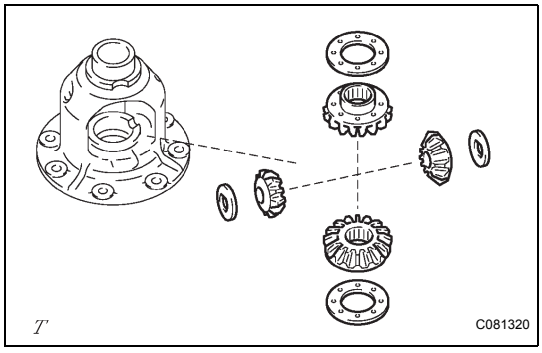


7. REMOVE FRONT DIFFERENTIAL SIDE GEAR

(a) Remove the 2 pinions, 2 thrust washers, 2 side gears and 2 thrust washers No. 1 from the front differential case.

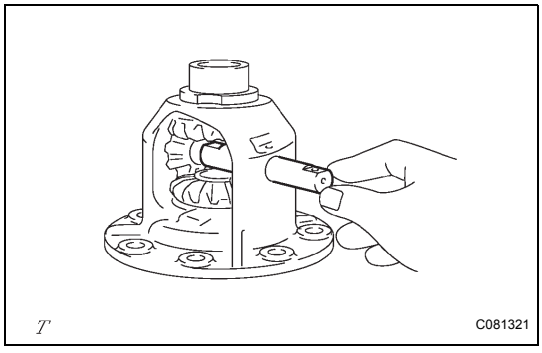
AX

REASSEMBLY



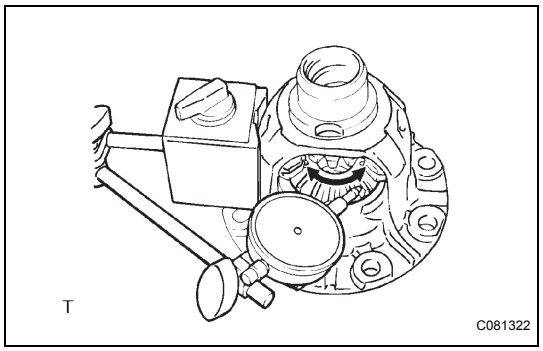
1. INSTALL FRONT DIFFERENTIAL SIDE GEAR

(a) After applying ATF to the 2 front differential side gears, 2 side gear thrust washers No. 1, 2 front differential pinions and 2 pinion thrust washers, install them onto the front differential case.
HINT:
When installing them, set the alignment of the front differential pinions perpendicular to that of the side gear and rotate them so that their holes are aligned with the holes in the differential case.



2. INSTALL FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Install the pinion shaft so as to align the lock pin holes in the pinion shaft and differential case.



3. INSPECT BACKLASH

(a) Measure the side gear backlash while holding 1 pinion gear toward the case.

Standard backlash:

0.05 to 0.20 mm (0.0020 to 0.0079 in.)

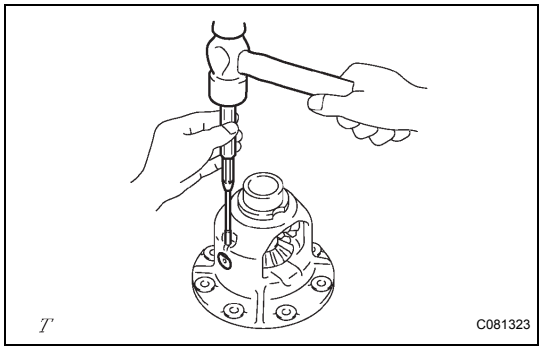
If the backlash is outside the specifications, install the correct thrust washer to the side gear.

(b) Referring to the table below, select thrust washers which will ensure that the backlash is within the specifications for both sides.

Thrust washer thickness

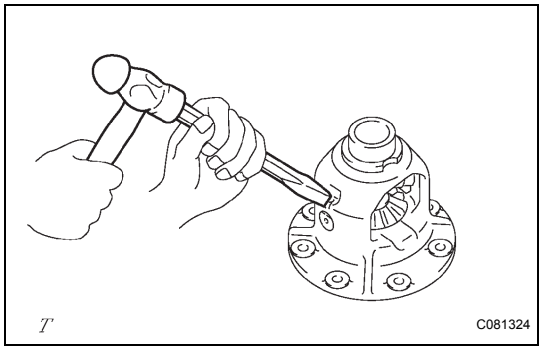
Thickness mm (in.)	Thickness mm (in.)
0.95 (0.0374)	1.10 (0.0433)
1.00 (0.0394)	1.15 (0.0453)
1.05 (0.0413)	1.20 (0.0472)

If the backlash is not within the specifications, install a thrust washer of a different thickness.

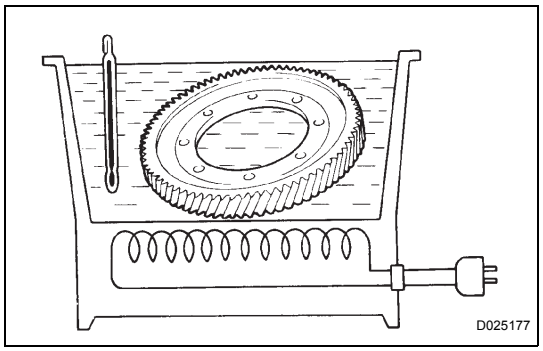


4. INSTALL FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a pin punch and a hammer, install the pinion shaft straight pin.



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

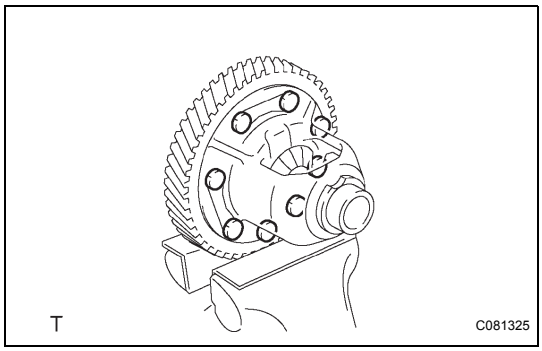


5. INSTALL FRONT DIFFERENTIAL RING GEAR

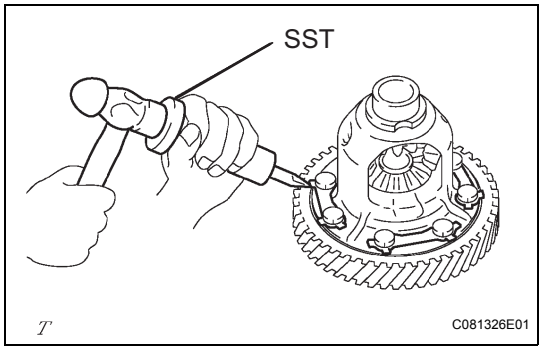
(a) Using ATF and a heater, heat the front differential ring gear to 90 to 110°C (194 to 230°F).

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

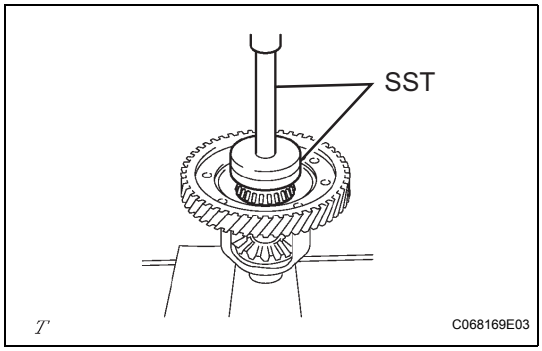
AX



(c) Install 4 new ring gear lock plates with the 8 bolts.
Torque: 88 N*m (900 kgf*cm, 65 ft.*lbf)

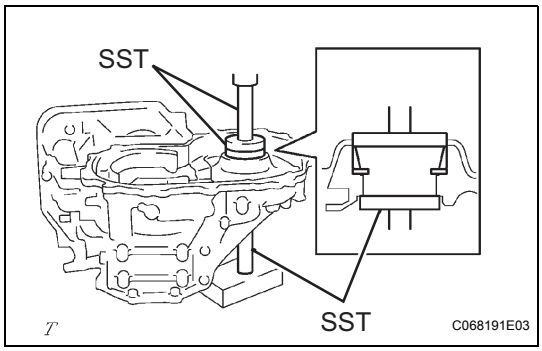


(d) Using SST, stake the ring gear lock plate.
SST 09930-00010

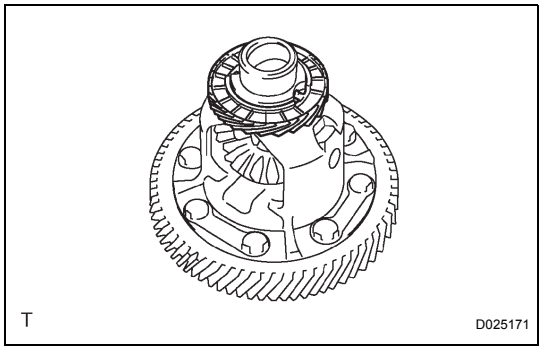


6. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST and a press, install the front differential case LH tapered roller bearing inner race onto the differential case.
SST 09726-40010, 09950-60020 (09951-00790)



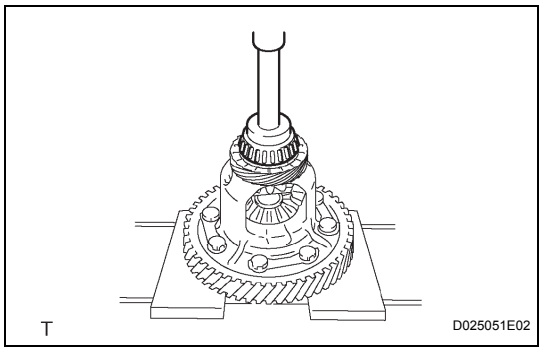
(b) Using SST and a press, install the shim and bearing outer race onto the transaxle case.
SST 09950-60020 (09951-00720), 09950-60010 (09951-00650), 09950-70010 (09951-07100, 09951-07200)



7. INSTALL SPEEDOMETER DRIVE GEAR

(a) Install the speedometer drive gear onto the differential case.

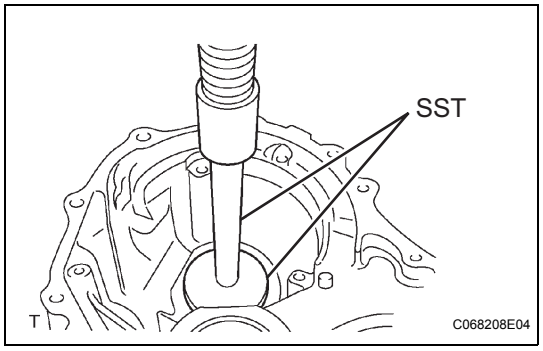
AX



8. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, install the bearing inner race onto the differential case.

SST 09950-60010 (09951-00460), 09950-70010 (09951-07100)



(b) Using SST and a press, install the tapered roller bearing onto the transaxle housing.

SST 09950-70010 (09951-07150), 09950-60020 (09951-00680)