AUTOMATIC TRANSAXLE SYSTEM

PRECAUTION

NOTICE:

- If the following parts have been replaced, initialize the TCM and perform a road test to allow the TCM to learn (See page AX-25).
  - Valve body assembly
  - Shift solenoid SL3
  - Shift solenoid SL4
- If the following parts have been replaced, perform a road test to allow the TCM to learn (See page AX-25).
  - Shift solenoid SL1
  - Shift solenoid SL2
- If the TCM or transaxle has been replaced, register the transmission compensation code in the TCM (See page AX-19).
- Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assembly, engine assembly or ECM (See page AX-25).

1. The automatic transaxle is composed of highly precision-finished parts which need careful inspection before reassembly. Even a small nick could cause fluid leakage or affect transmission 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. Complete as much as possible of the inspection, repair and reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because some parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups. Recommended: ATF WS
2. All disassembled parts should be washed clean and any fluid passages and holes should be blown through with compressed air.
3. Dry all parts with compressed air. Never use a shop rag or a piece of cloth to dry them.
4. When using compressed air, always aim away from yourself to prevent accidentally spraying ATF or kerosene in your face.
5. Only recommended automatic transmission fluid or kerosene should be used for cleaning.

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6. After cleaning, the parts should be arranged in the correct order for efficient inspection, repair, and reassembly.
7. When disassembling a valve body, be sure to match each valve together with its corresponding spring.
8. New discs for the brakes and clutches must be soaked in ATF for at least 15 minutes before reassembly.
9. All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.
10. All gaskets, seals, and rubber O-rings should be replaced with new ones.
11. Do not apply adhesive cements to gaskets and similar parts.
12. Make sure that the ends of a snap ring are not aligned with one of the cutouts and that the snap ring is installed in the groove correctly.
13. When replacing a worn bushing, the sub-assembly containing the bushing must also be replaced.
14. Check thrust bearings and races for wear or damage. If they are damaged, replace them.
15. 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.
    - Thoroughly clean all components to remove any loose material.
    - 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.

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	Off
Ignition switch on (IG)	ON	On (IG)
Ignition switch on (ACC)	ACC	ON (ACC)
Engine start	START	Start

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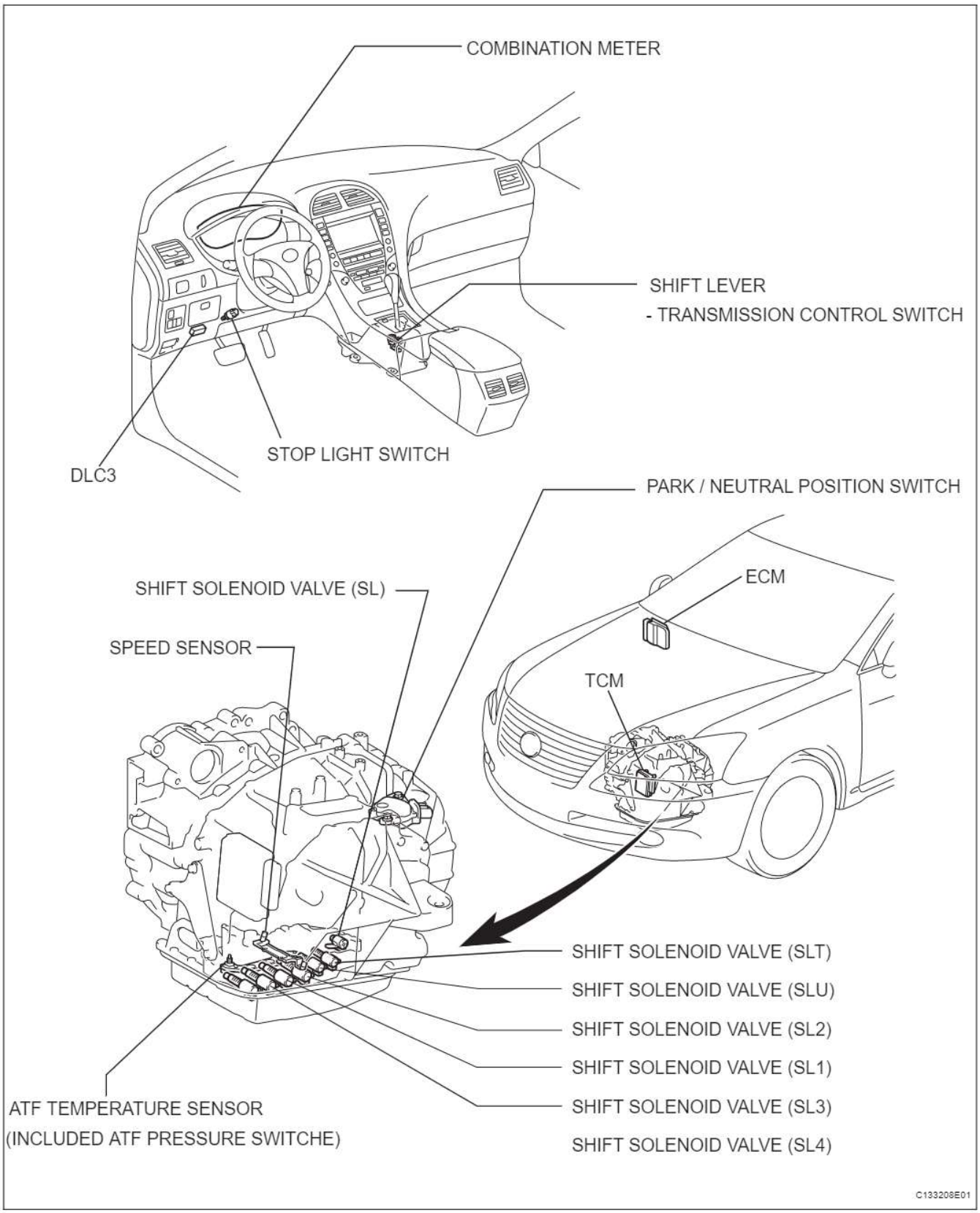
DEFINITION OF TERMS

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

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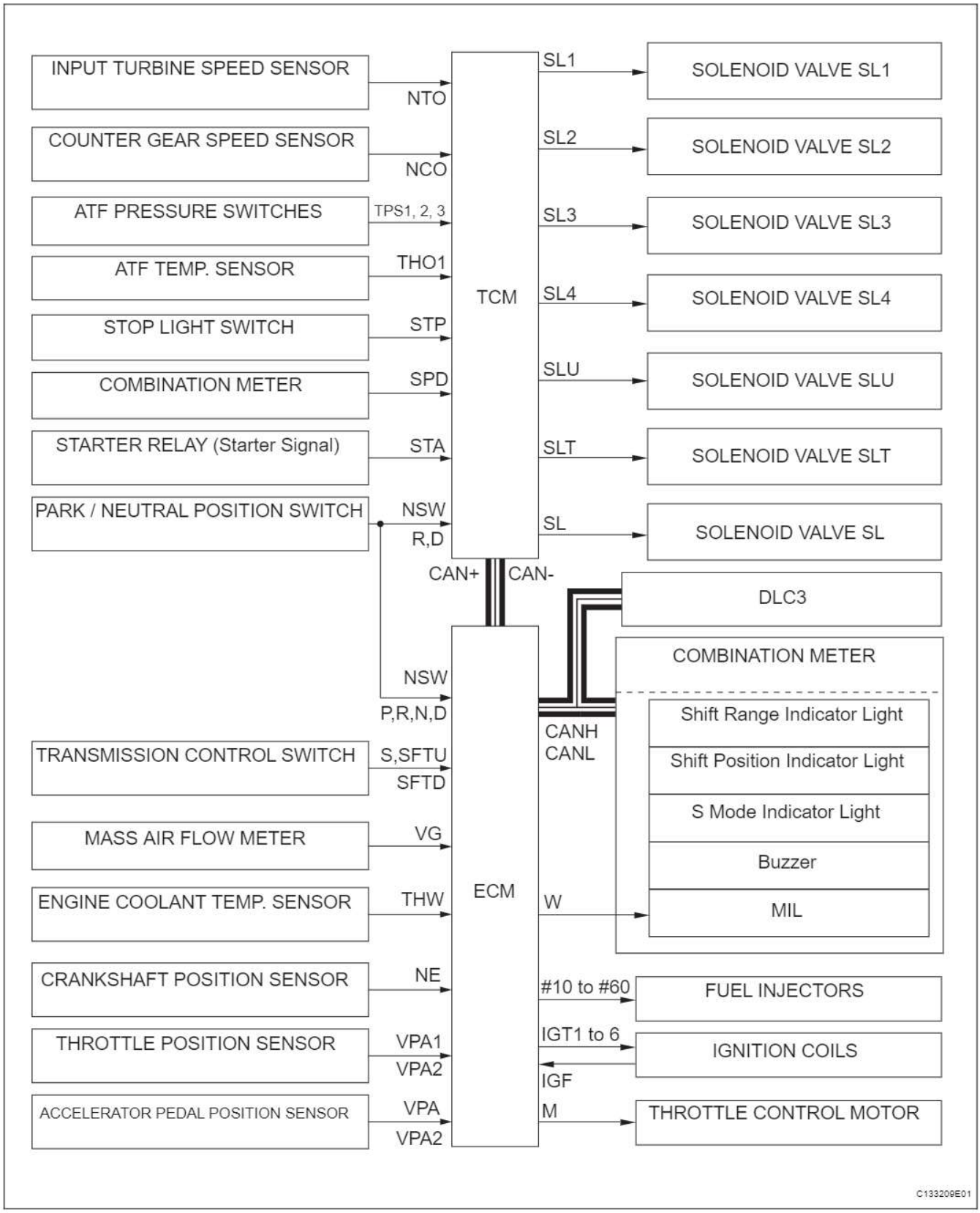
PARTS LOCATION



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SYSTEM DIAGRAM

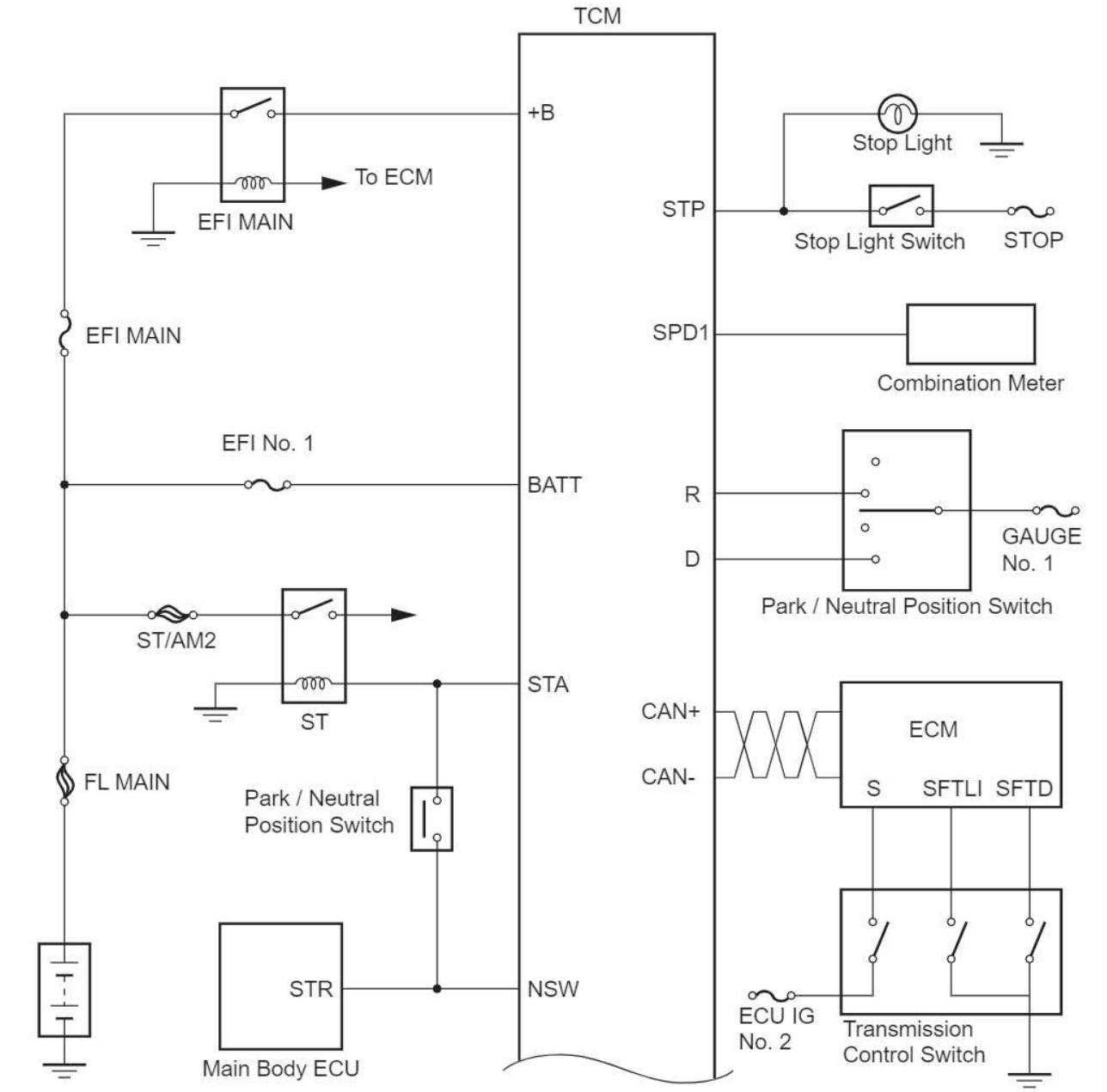
The configuration of the electronic control system in the U660E automatic transaxle is as shown in the following chart.



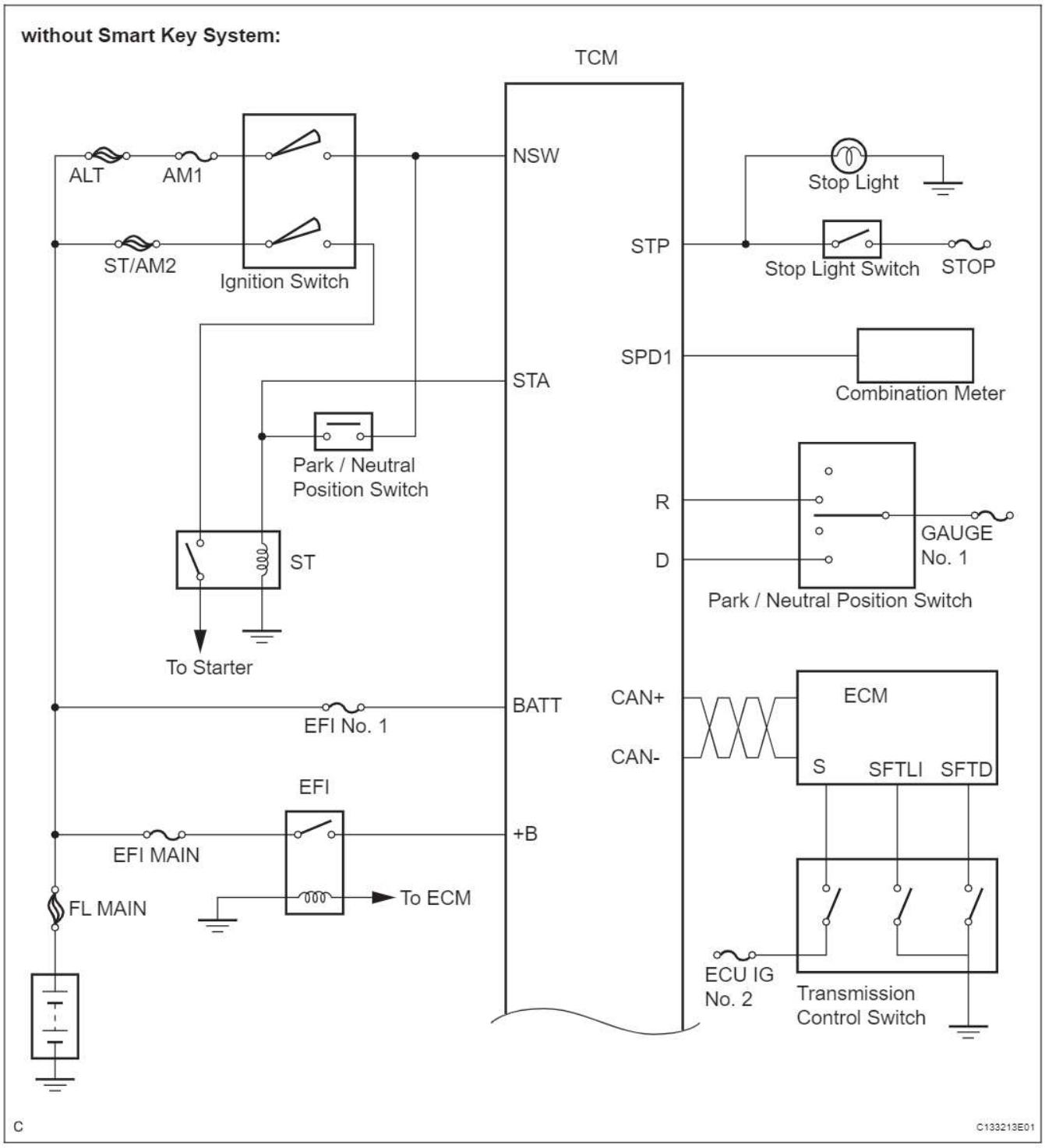
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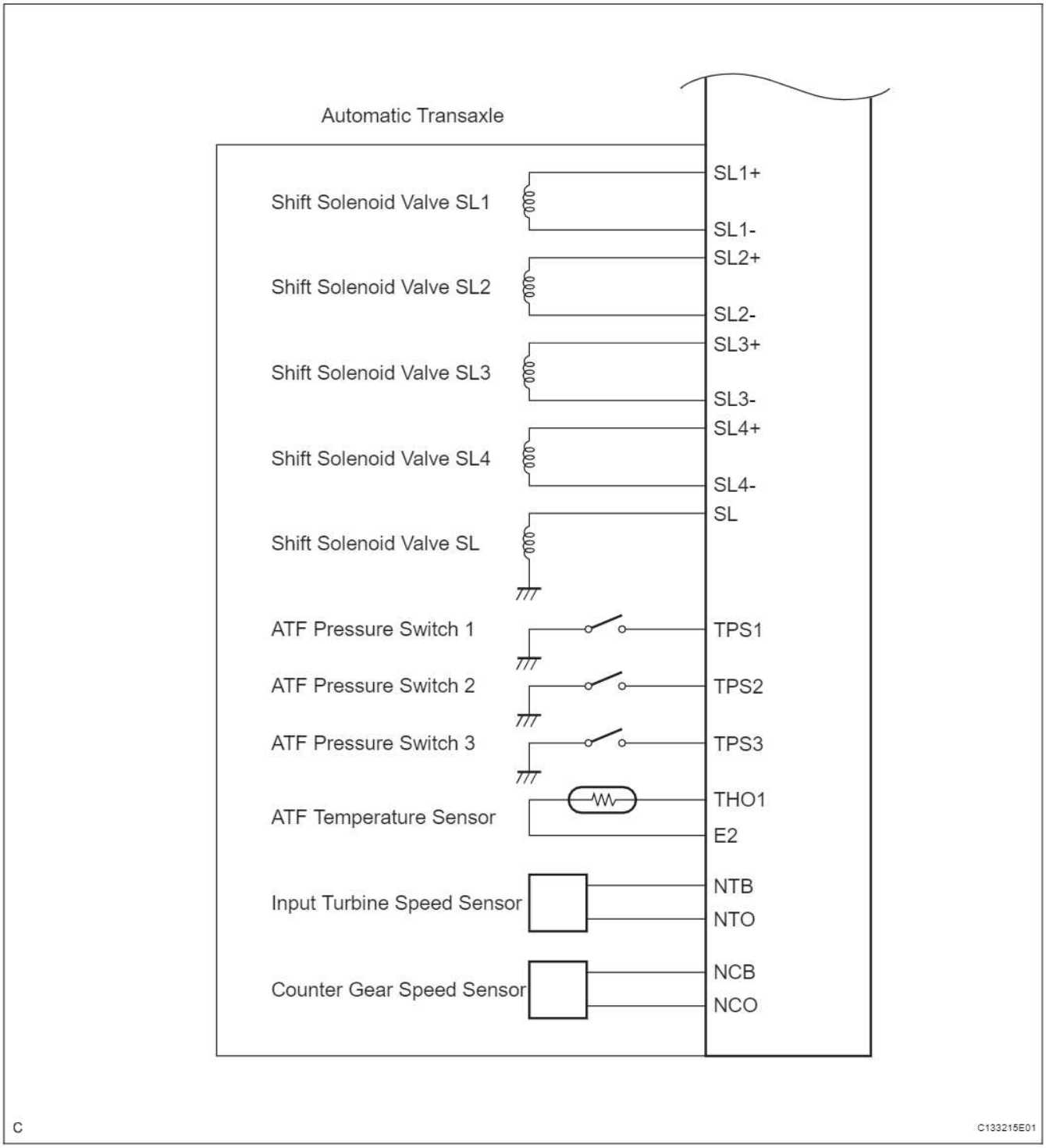
with Smart Key System:



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SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

(a) The ECT (Electronic controlled automatic transaxle) is an automatic transaxle that has its shift timing electronically controlled by the Transmission Control Module (TCM). The TCM detects electrical signals that indicate engine and driving conditions, and controls the shift point, based on driver's habits and road conditions. As a result, fuel efficiency and transaxle performance are improved.
Shift shock has been reduced by controlling the engine and transaxle simultaneously.
In addition, the ECT has features such as:

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

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HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

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

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4	CONNECT INTELLIGENT TESTER TO DLC3*

NEXT

5	CHECK AND CLEAR DTCS AND FREEZE FRAME DATA*

(a) Refer to the DTC CHECK / CLEAR (See page AX-38).

NEXT

6	VISUAL INSPECTION

NEXT

7	SETTING CHECK MODE DIAGNOSIS*

(a) Refer to the CHECK MODE PROCEDURE (See page AX-39).

NEXT

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8	PROBLEM SYMPTOM CONFIRMATION

(a) Refer to the ROAD TEST (See page AX-12).
Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → GO TO STEP 10

A

9	SYMPTOM SIMULATION

(a) Refer to the ELECTRONIC CIRCUIT INSPECTION PROCEDURE (See page IN-40).

NEXT

10	DTC CHECK*

(a) Refer to the DTC CHECK / CLEAR (See page AX-38).
Result

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

B → GO TO STEP 18

A

11	BASIC INSPECTION

(a) Refer to the AUTOMATIC TRANSMISSION FLUID (See page AX-164).
(b) Refer to the PARK/NEUTRAL POSITION SWITCH (See page AX-174).
(c) Refer to the SHIFT LEVER ASSEMBLY (See page AX-224).

NG → GO TO STEP 21

OK

12	MECHANICAL SYSTEM TEST

(a) Refer to the MECHANICAL SYSTEM TEST (See page AX-15).

NG → GO TO STEP 17

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OK

13	HYDRAULIC TEST

(a) Refer to the HYDRAULIC TEST (See page AX-17).

NG → GO TO STEP 17

OK

14	MANUAL SHIFTING TEST

(a) Refer to the MANUAL SHIFTING TEST (See page AX-18).

NG → GO TO STEP 16

OK

15	PROBLEM SYMPTOMS TABLE CHAPTER 1

(a) Refer to the PROBLEM SYMPTOMS TABLE (See page AX-29).

NG → GO TO STEP 19

OK

16	PROBLEM SYMPTOMS TABLE CHAPTER 2

(a) Refer to the PROBLEM SYMPTOMS TABLE (See page AX-29).

NEXT

17	PART INSPECTION

NEXT → GO TO STEP 21

18	DTC CHART

(a) Refer to the DIAGNOSTIC TROUBLE CODE CHART (See page AX-46).

NEXT

19	CIRCUIT INSPECTION

NEXT

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20	IDENTIFICATION OF PROBLEM

NEXT

21	REPAIR OR REPLACE

NEXT

22	CONFIRMATION TEST

NEXT

END

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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 or down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and attempt to duplicate the problem symptoms.

2. **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 and fully depress the accelerator pedal and check the following:
   (1) Check up-shift operation.
   Check that 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6 up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-46).
   HINT:
   6th Gear Up-shift Prohibition Control
   - Engine coolant temperature is 60°C (140°F) or less and vehicle speed is 50 mph (80 km/h) or less.

   5th Gear Up-shift Prohibition Control
   - Engine coolant temperature is 55°C (131°F) or less and vehicle speed is 32 mph (51 km/h) or less.

   4th Gear Up-shift Prohibition Control
   - Engine coolant temperature is 47°C (117°F) or less and vehicle speed is 31 mph (49 km/h) or less.

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

   (2) Check for shift shock and slip.
   Check for shock and slip at the 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6th up-shifts.
   (3) Check for abnormal noise and vibration.
   Check for abnormal noise and vibration when up-shifting from 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6 while driving with the shift lever in the D position, and also while driving in the lock-up condition.
   HINT:
   The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

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(4) Check kick-down operation.
Check vehicle speeds when the 2nd to 1st, 3rd to 2nd, 4th to 3rd, 5th to 4th, and 6th to 5th kick-downs take place while driving with the shift lever in the D position. Confirm that each speed is within the applicable vehicle speed range indicated in the automatic shift schedule (See page SS-46).
(5) Check for abnormal shock and slip at kick-down.
(6) Check the lock-up mechanism.
- Drive the vehicle with the shift lever in the D position (2nd, 3rd, 4th, 5th or 6th gear) at a steady speed (lock-up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:
- There is no lock-up function in the 1st gears.
- If there is a jump in engine speed, this indicates that lock-up is not operating.

(b) S position test
Shift to the S position, depress the accelerator pedal and check the following:
(1) Check shift operation.
- With the shift lever in the S position (while the vehicle is stopped), shift into the "+" position to check that the shift position on the combination meter changes as follows: 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6.
- While driving in the 5 (S) position and 5th gear (at a vehicle speed of approximately 34 to 40 mph (55 to 65 km/h), shift into the "-" position and check if the 4th gear down-shift occurs and proper engine braking occurs.
- While driving in the 4 (S) position and 4th gear (at a vehicle speed of approximately 19 to 25 mph (30 to 40 km/h), shift into the "-" position and check if the 3rd gear down-shift occurs and proper engine braking occurs.
- While driving in the 3 (S) position and 3rd gear (at a vehicle speed of approximately 12 to 19 mph (20 to 30 km/h), shift into the "-" position and check if the 2nd gear down-shift occurs and proper engine braking occurs.
- While driving in the 2 (S) position and 2nd gear (at a vehicle speed of approximately 6 to 12 mph (10 to 20 km/h), shift into the "-" position and check if the 1st gear down-shift occurs and proper engine braking occurs.

HINT:
Manual shift (S position) is prohibited under either of the following conditions:
- Down-shifting may cause engine overrun.

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- The driver continuously down-shifts. (Down-shifting to 1st gear may not be performed.)

(c) R position test:
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.
CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(d) P position test:
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

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MECHANICAL SYSTEM TESTS

1. PERFORM MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

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

NOTICE:

- **Driving test should be done on a paved road (a nonskid road).**
- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, perform this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers from a safe location outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.

(2) Connect the intelligent tester to the DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressed firmly on the brake pedal.

(5) Start the engine.

(6) Using the intelligent tester, shift into the D position and hold 3rd gear using active test. Press all the way down on the accelerator pedal with your right foot.

(7) Quickly read the stall speed at this time.

Stall speed:

2,520 +- 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D position	• Engine power output may be insufficient • Stator one-way clutch is not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	• Line pressure is too low • Clutch No. 1 (C_1) slipping • One-way clutch (F_1) is not operating properly • Improper fluid level

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(b) Measure the time lag.

(1) When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the clutches and brakes.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).**
- **Be sure to allow 1 minute interval between tests.**
- **Perform the test three times and measure the time lags. Calculate the average value of the three time lags.**

(2) Connect the intelligent tester to the DLC3.

(3) Fully apply the parking brake.

(4) Start and warm up the engine and check idle speed.

Idle speed:

approx. 650 rpm (In N position and A/C OFF)

(5) Shift the lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag:

N to D less than 1.2 seconds

(6) In the same way, measure the time lag for N to R.

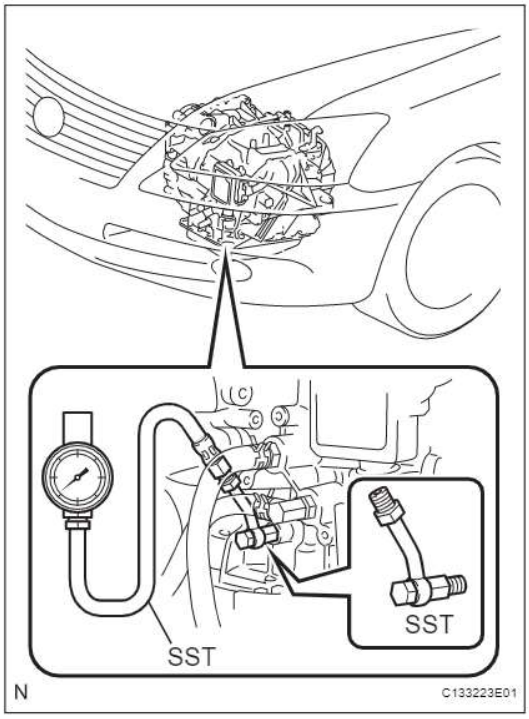
Time lag:

N to R less than 1.5 seconds

Evaluation (If N to D or N to R time lag is longer than the specified time):

Problem	Possible cause
N to D time lag is longer	• Line pressure is too low • Clutch No.1 (C_1) is worn • One-way clutch (F_1) is not operating properly
N to R time lag is longer	• Line pressure is too low • Brake No. 2 (B_2) is worn • Brake No. 3 (B_3) is worn

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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 should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.**
- **Be sure to prevent SST hose from interfering with the exhaust pipe.**
- **This check must be conducted after checking and adjusting engine.**
- **Perform the test with the A/C is OFF.**
- **When conducting stall test, do not continue more than 5 seconds.**

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

(2) Lift the vehicle up.

(3) Remove the engine under cover.

(4) Connect the intelligent tester to the DLC3.

(5) Remove the test plug on the transaxle case front left side and install the SST.

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

(6) Start the engine.

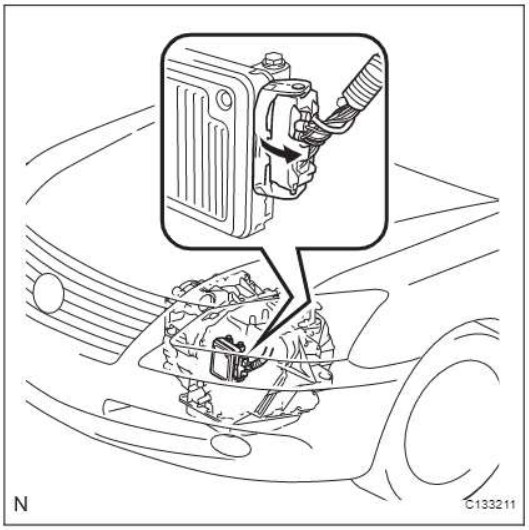
(7) Shift to the D position, and then use the intelligent tester to hold 3rd gear using active test. Measure the line pressure while the engine is idling.

Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)
Idling	362 to 412 kPa (3.7 to 4.2 kgf/cm^2, 52 to 60 psi)

(8) Turn the ignition switch OFF.

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(9) Disconnect the connector of the TCM.
HINT:
Disconnect the connector only when performing the D position stall test.
(10)Start the engine.
(11)Firmly depress the brake pedal, shift to the D position, depress the accelerator pedal all the way down, and check the line pressure while the stall test is performed.
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)
Stall test	1,160 to 1,350 kPa (11.8 to 13.8 kgf/cm^2, 168 to 196 psi)

(12)Turn the ignition switch OFF.
(13)Connect the TCM connector, depress the brake pedal firmly, shift to the R position, and check that the line pressure while the engine is idling and during the stall test.
Specified line pressure:

Condition	R position kPa (kgf/cm^2, psi)
Idling	806 to 916 kPa (8.2 to 9.3 kgf/cm^2, 117 to 133 psi)
Stall test	1,890 to 2,000 kPa (19.3 to 20.4 kgf/cm^2, 274 to 290 psi)

(14)Remove the SST, install the test plug.
(15)Clear the DTC.

Evaluation:

Problem	Possible cause
Measured values are higher than the specified value in all positions	• Shift solenoid valve (SLT) defective • Regulator valve defective
Measured values are lower than the specified value in all positions	• Shift solenoid valve (SLT) defective • Regulator valve defective • Oil pump defective
Pressure is low in the D position only	• D position circuit fluid leak • Clutch No. 1 (C_1) defective
Pressure is low in the R position only	• R position circuit fluid leak • Brake No. 2 (B_2) defective • Brake No. 3 (B_3) defective

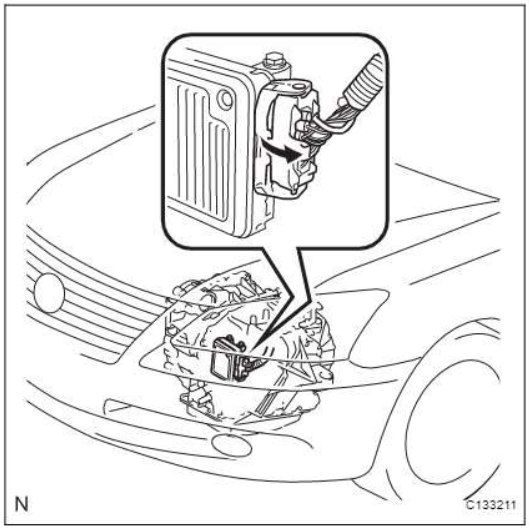
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MANUAL SHIFTING TEST

1. PERFORM MANUAL SHIFTING TEST

HINT:

- With this test, it can be determined whether trouble occurs in the electrical circuit. Also, trouble can be 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 TCM connector.

(b) Drive the vehicle with the TCM disconnected. Shifting the shift lever to the D position to check whether the shifting condition changes as shown in the table below.

Shift Position	Shifting Condition
D	No Shift (No Change)

HINT:

When driving the vehicle with the TCM disconnected, the gear position will be as follows:

- When the shift lever is in the D position, the transmission will stay in 3rd gear.
- When the shift lever is in the R or the P position, the transmission will also be in the R or P position respectively.

(c) Connect the connector of the TCM.

(d) Clear the DTC (See page AX-38).

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REGISTRATION

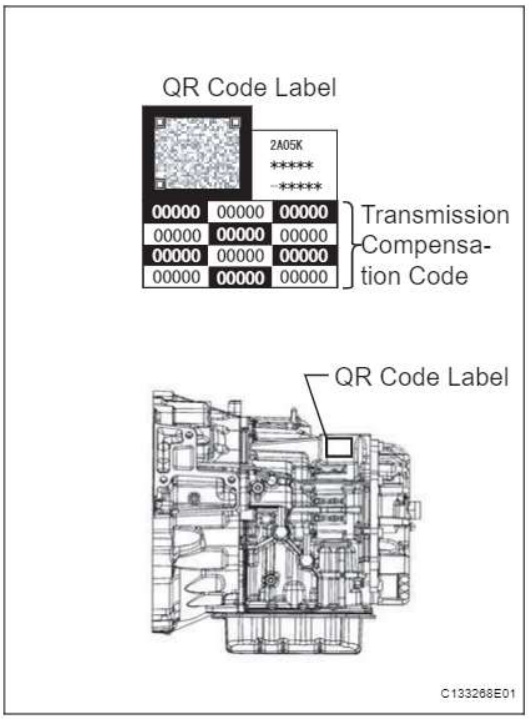
NOTICE:

- **When the automatic transaxle is replaced, the transaxle's compensation code must be input into the TCM (Proceed to step 1).**
- **When the TCM is replaced, the existing transaxle compensation codes must be input into the new TCM (Proceed to step 2).**

1. INPUT COMPENSATION CODE

NOTICE:

Transaxle compensation codes are unique, 60-digit alphanumeric values printed on the QR label. If an incorrect transaxle compensation code is input into the TCM, shift shock may occur.



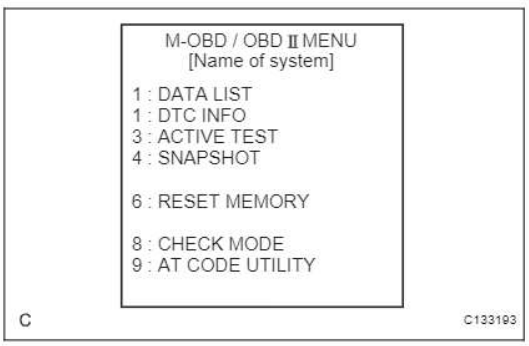
(a) Record the transmission compensation code specified on the QR label.
HINT:
The transaxle compensation code is imprinted on the QR label.

(b) Shift the shift lever to N or P position.

(c) Connect the intelligent tester to the DLC3.

(d) Turn the ignition switch on (IG).

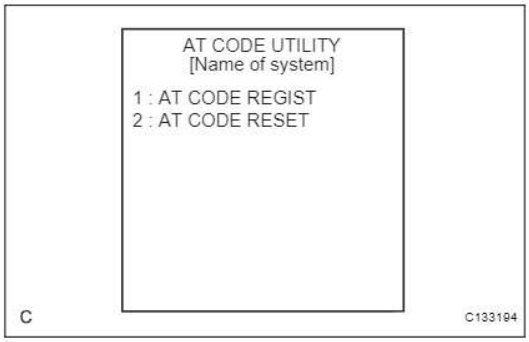
(e) Turn the tester on.
NOTICE:
Do not start the engine.



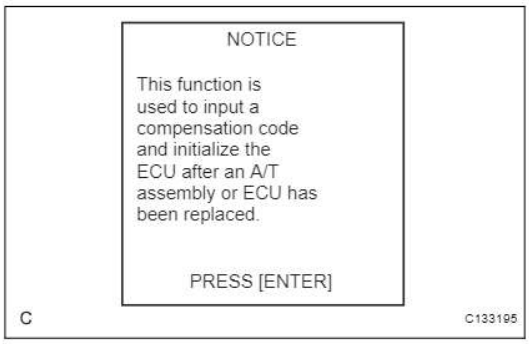
(f) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.

(g) Press "ENTER".

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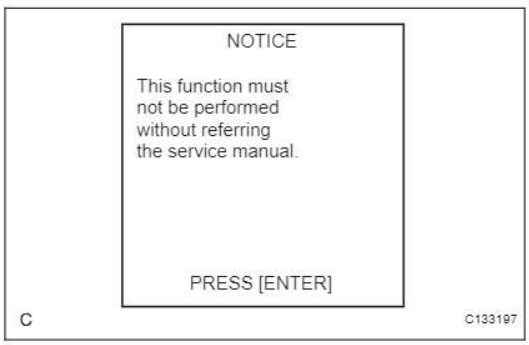
(h) Select "AT CODE REGIST".
(i) Press "ENTER".



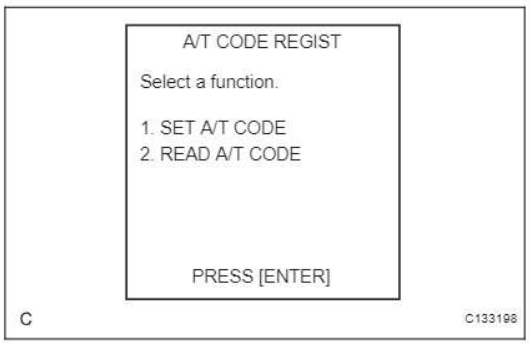
(j) Press "ENTER" again to proceed.



(k) Press "ENTER" again to proceed.



(l) Press "ENTER" again to proceed.

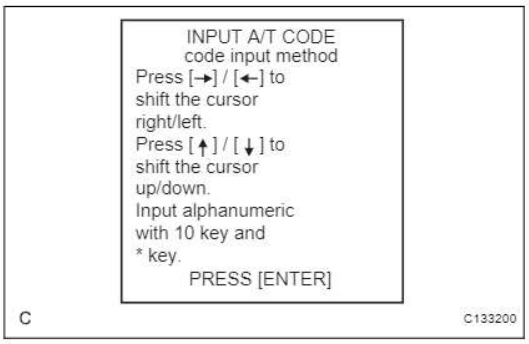


(m) Select "SET A/T CODE".
(n) Press "ENTER".

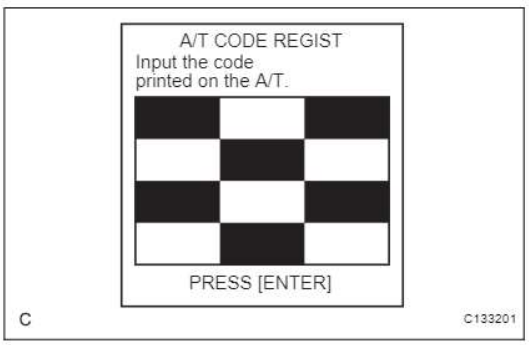
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(o) Select "INPUT A/T CODE".
(p) Press "ENTER".



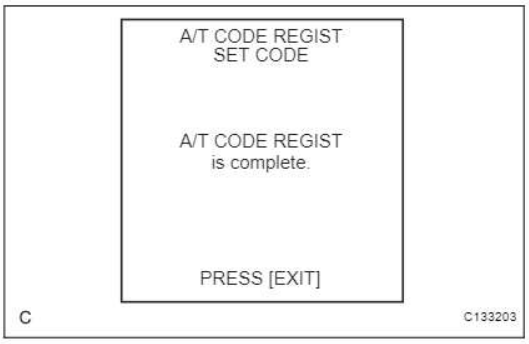
(q) Register the compensation code.
(1) Press "ENTER".



(2) Manually input the transaxle compensation code. The code is a 60-digit alphanumeric value imprinted on the QR label.

(r) Check that the compensation code displayed on the screen is correct by comparing it with the 60-digit alphanumeric value on the QR label.

NOTICE:
If an incorrect transaxle compensation code is input into the TCM, shift shock will occur.
HINT:
Input letters by operating the keys from 0 to 5 while pressing the * key.



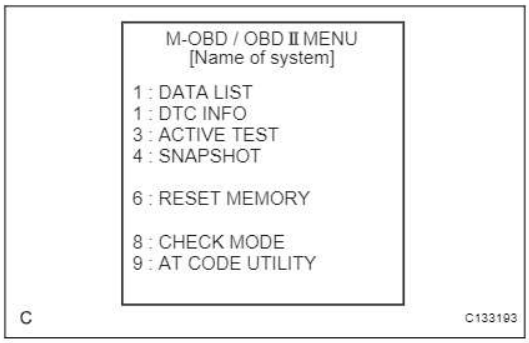
(s) Press "ENTER" to set the compensation code to the TCM.
HINT:
- If the registration process fails, the compensation code may be incorrect. Check the compensation code again.
- If the attempted compensation code is correct, a problem with the wire harness or a bad connection with the DLC3 may cause a registration failure. Check the wire harness and the DLC3 connection. If no problem is found, the TCM may be malfunctioning. Check the TCM and repeat this operation.

2. TRANSFER COMPENSATION CODE
NOTICE:
Transaxle compensation codes are 60-digit alphanumeric values imprinted on the QR label. If an incorrect transaxle compensation code is input into the TCM, shift shock may occur.

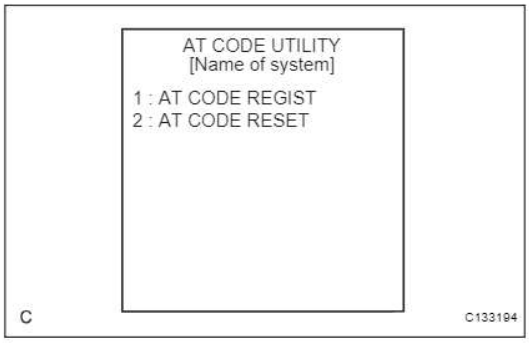
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HINT:
The following operation is available for use with TCMs that can transmit the registered transaxle compensation code to the intelligent tester.

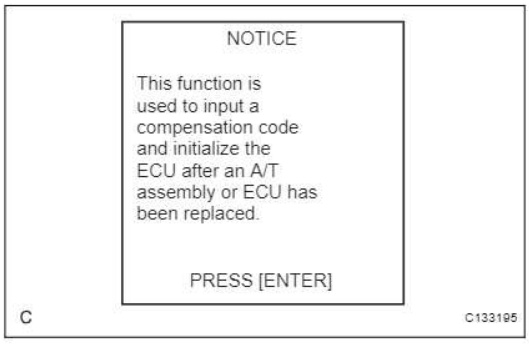
(a) Shift the shift lever to N or P position.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Turn the tester on.
NOTICE:
Do not start the engine.
HINT:
The transaxle compensation code is imprinted on the QR label.



(e) Read the transaxle compensation code.
(1) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.
(2) Press "ENTER".

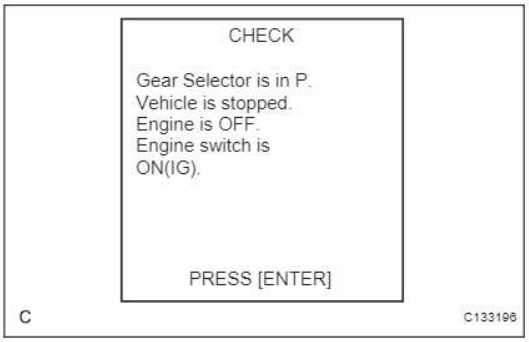


(3) Select "AT CODE REGIST".
(4) Press "ENTER".

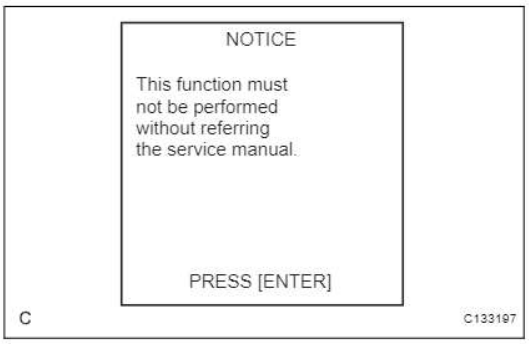


(5) Press "ENTER" again to proceed.

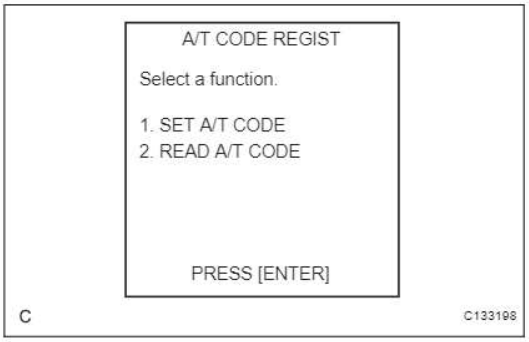
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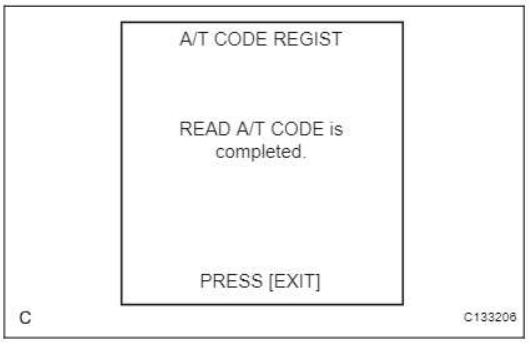
(6) Press "ENTER" again to proceed.



(7) Press "ENTER" again to proceed.



(8) Select "READ A/T CODE".
(9) Press "ENTER".



(10) Press "EXIT".

NOTICE:

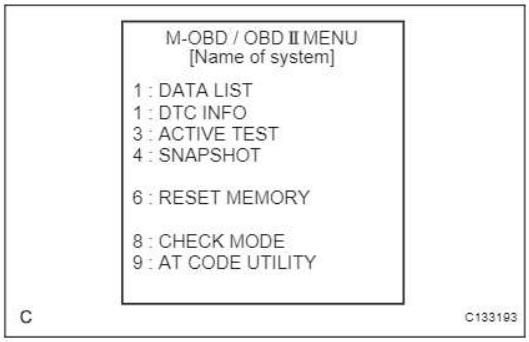
Do not use the code specified on the transaxle QR label even if the transmission compensation code cannot be read using the intelligent tester. The code printed on an in-service transaxle may not match its current characteristics. Replace the TCM with a new one and perform a road test to allow the TCM to learn.

(11) Turn the ignition switch off.

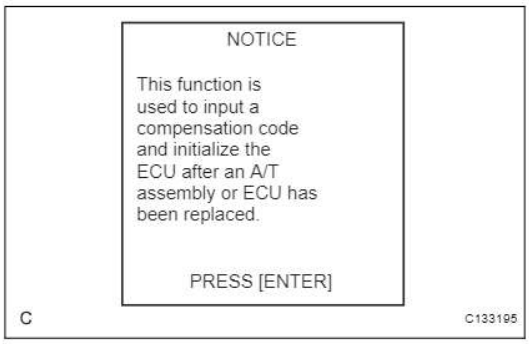
(f) Replace the TCM.

(g) Set the transaxle compensation code.
(1) Turn the ignition switch on (IG).
(2) Turn the tester on.

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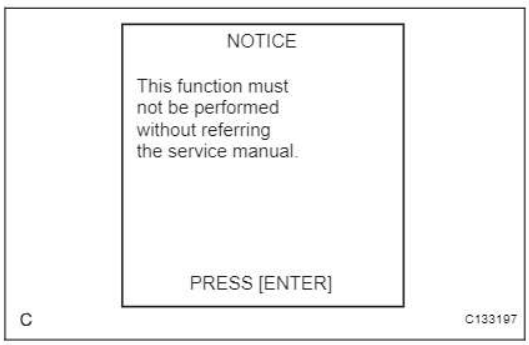
(3) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.
(4) Press "ENTER".



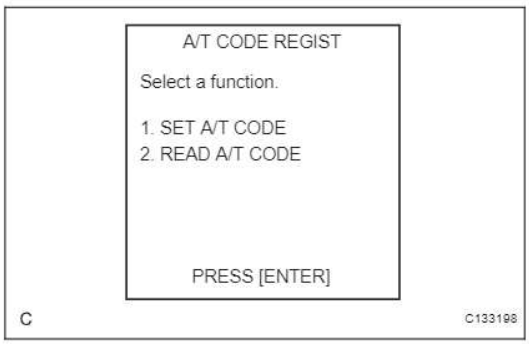
(5) Press "ENTER" again to proceed.



(6) Press "ENTER" again to proceed.

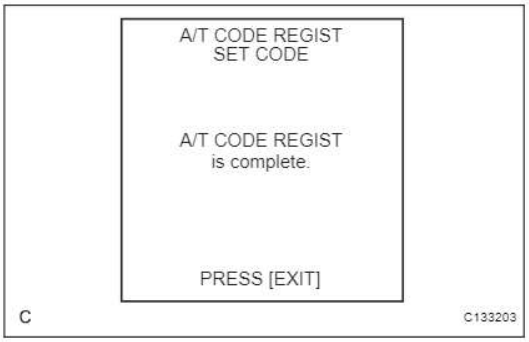


(7) Press "ENTER" again to proceed.

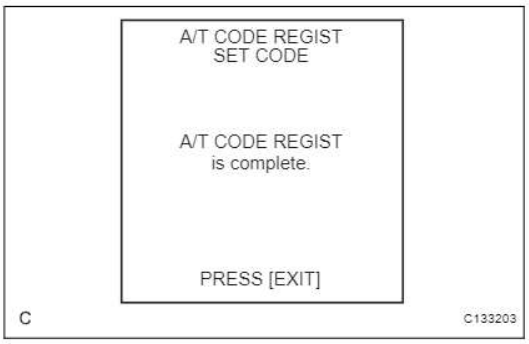


(8) Select "SET A/T CODE".
(9) Press "ENTER".

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(10) Select "SAVED A/T CODE".
(11) Press "ENTER".



(12) Press "EXIT".

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INITIALIZATION

1. RESET TRANSAXLE COMPENSATION CODE

NOTICE:

The transaxle compensation code can be reset only with the intelligent tester.

HINT:

The TCM memorizes the condition that the ECT controls the automatic transaxle assembly and engine assembly according to those characteristics. Therefore, when the automatic transaxle assembly, engine assembly, or TCM has been replaced, it is necessary to reset the memory so that the TCM can memorize the new information. Reset procedure is as follows.

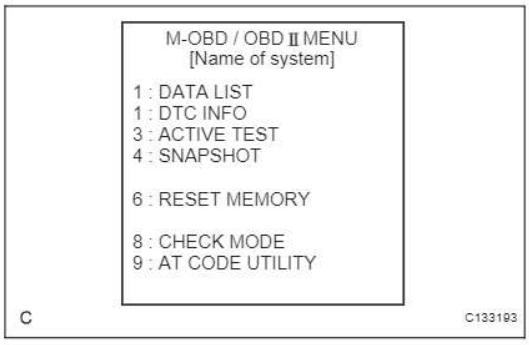
(a) Shift the shift lever to N or P position.

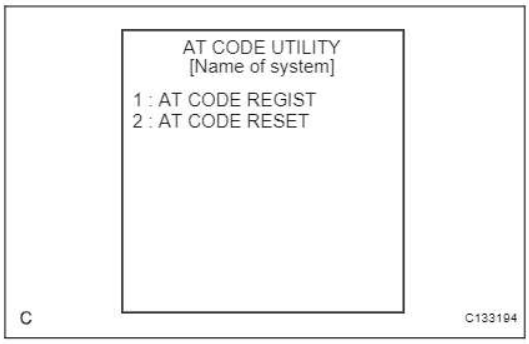
(b) Turn the ignition switch off.

(c) Connect the intelligent tester to the DLC3.

(d) Turn the ignition switch on (IG) and push the intelligent tester main switch on.

(e) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.





(f) Select "AT CODE RESET".

(g) Press the "ENTER"

CAUTION:

After the transaxle compensation code, be sure to perform a road test to allow TCM to learn.

2. PERFORM ROAD TEST TO ALLOW TCM TO LEARN

NOTICE:

Perform the following procedures while strictly observing all traffic laws and speed limits.

(a) From a standstill, achieve highest possible speed with the accelerator pedal opened 15% or less. Keep the accelerator pedal angle steady while driving the vehicle.

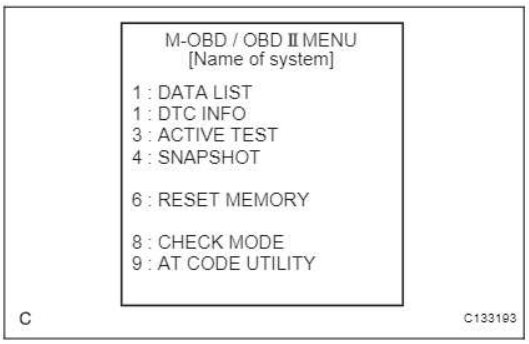
(b) Repeat the previous step until shift shock no longer occurs.

(c) From a standstill, achieve highest possible speed with the accelerator pedal opened 25% or more. Keep the accelerator pedal angle steady while driving the vehicle.

(d) Repeat the previous step until shift shock no longer occurs.

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3. RESET MEMORY

NOTICE:

- **Perform the RESET MEMORY (AT initialization) when replacing the engine assembly.**
- **The RESET MEMORY can be performed only with the intelligent tester.**

HINT:

The ECM memorizes the condition that the ECT controls the automatic transmission assembly and engine assembly according to those characteristics. Therefore, when the automatic transmission assembly, engine assembly, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

(a) Reset procedure is as follows.

(1) Turn the engine switch off.

(2) Connect the intelligent tester to the DLC3.

(3) Turn the ignition switch on (IG) position.

(4) Turn the intelligent tester main switch on.

(5) Select the item "DIAGNOSIS / OBD/MOBD / ECT / RESET MEMORY".

NOTICE:

After performing the RESET MEMORY, be sure to perform the ROAD TEST (See page AX-12) described previously.

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MONITOR DRIVE PATTERN

1. MONITOR DRIVE PATTERN FOR ECT TEST

(a) Perform this drive pattern as one method to simulate the detection conditions of the ECT malfunctions. (The DTCs may not be detected due to differences from the actual driving conditions. Some codes may not be detected using this drive pattern.)

HINT:

Preparation for driving

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

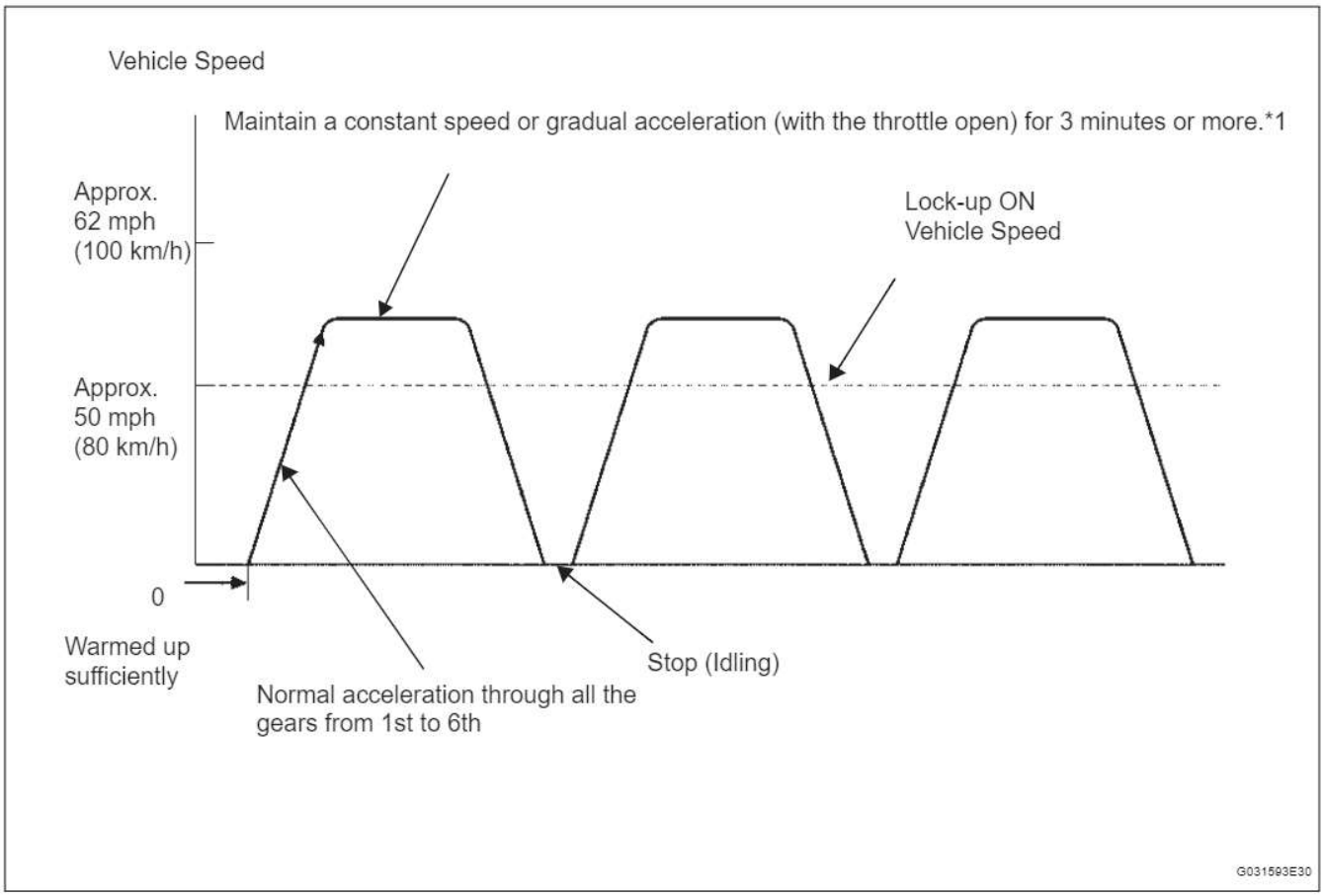
Notice on driving

- Drive the vehicle through all gears.
  Stop to 1st to 2nd to 3rd to 4th to 5th to 6th (lock-up ON).
- Confirm engine braking using the S position.
  While driving in the 6 (S) position and 6th gear lock-up, shift to the "-" position to down-shift from 6th to 5th, 5th to 4th, 4th to 3rd, 3rd to 2nd, 2nd to 1st.
  Check that proper engine braking occurs whenever down-shift takes place.
- Repeat the above driving pattern three times or more.

NOTICE:

- **The monitor status can be checked using the intelligent tester. When using the intelligent tester, monitor status can be found in "OBD/ MOBD / ECT / DATA LIST".**
- **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.**
- **Perform this drive pattern on a road with the fewest hills possible and strictly observe the posted speed limits and traffic laws while driving.**

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HINT:
*1: Drive the vehicle at a sufficient speed in the uppermost gear, to allow lock-up to engage. The vehicle can be driven at a speed lower than that in the above diagram under the lock-up condition.
NOTICE:
It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

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PROBLEM SYMPTOMS TABLE

HINT:
If a normal code is displayed during the diagnostic trouble code check although the problem or symptom still occurs, check the electrical circuits for each symptom in the order given in the charts on the following pages. Proceed to the page given in the chart and perform troubleshooting.
The Matrix Chart is divided into 2 chapters.
Chapter 1:
Refer to the table below when the trouble cause is considered to be electrical.
If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart of each circuit, proceed to the circuit with the next highest number in the table to continue the check.
If the trouble still occurs even though there are no abnormalities in any of the other circuits, check and replace the TCM.
Chapter 2:
Chapter 2 covers on and off vehicle repair of the transaxle. Contents specified in the table below may not match while fail-safe control is operating.

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected area	See page
No up-shift (1st to 2nd)	1. Shift solenoid valve (SL3) circuit *1	AX-105
	2. TCM	IN-40
No up-shift (2nd to 3rd)	1. Shift solenoid valve (SL4) circuit *1	AX-148
	2. TCM	IN-40
No up-shift (3rd to 4th)	1. Shift solenoid valve (SL2) circuit *1	AX-92
	2. Engine coolant temp. sensor circuit *1	ES-145
	3. TCM	IN-40
No up-shift (4th to 5th)	1. Shift solenoid valve (SL1) circuit *1	AX-84
	2. Shift solenoid valve (SL4) circuit *1	AX-148
	3. Engine coolant temp. sensor circuit	ES-145
	4. TCM	IN-40
No up-shift (5th to 6th)	1. Engine coolant temp. sensor circuit *1	ES-145
	2. Shift solenoid valve (SL3) circuit *1	AX-105
	3. Shift solenoid valve (SL4) circuit *1	AX-148
	4. TCM	IN-40
No down-shift (6th to 5th)	1. Shift solenoid valve (SL4) circuit *1	AX-148
	2. TCM	IN-40
No down-shift (5th to 4th)	1. Shift solenoid valve (SL1) circuit *1	AX-84
	2. TCM	IN-40
No down-shift (4th to 3rd)	1. Shift solenoid valve (SL2) circuit *1	AX-92
	2. Shift solenoid valve (SL4) circuit *1	AX-148
	3. TCM	IN-40
No down-shift (3rd to 2nd)	1. Shift solenoid valve (SL4) circuit *1	AX-148
	2. Shift solenoid valve (SL3) circuit *1	AX-105
	3. TCM	IN-40
No down-shift (2nd to 1st)	1. Shift solenoid valve (SL3) circuit *1	AX-100
	2. TCM	IN-40

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Symptom	Suspected area	See page
No lock-up	1. Shift solenoid valve (SLU) circuit *1	AX-136
	2. Shift solenoid valve (SL) circuit	AX-139
	3. Engine coolant temp. sensor circuit *1	ES-145
	4. Stop light switch circuit *1	AX-71
	5. Speed sensor NT circuit *1	AX-66
	6. TCM	IN-40
No lock-up off	1. TCM	IN-40
Shift point too high or too low	1. Shift solenoid valve (SLT) circuit *1	AX-128
	2. Speed sensor NT circuit *1	AX-66
	3. Speed sensor NC circuit *1	AX-95
	4. Accelerator pedal position sensor circuit *1	ES-334
	5. ATF temperature sensor circuit *1	AX-55
	6. TCM	IN-40
Up-shift from 3rd to 4th while engine is cold	1. Engine coolant temp. sensor circuit *1	ES-145
	2. TCM	IN-40
Up-shift from 4th to 5th while engine is cold	1. Engine coolant temp. sensor circuit *1	ES-145
	2. TCM	IN-40
No gear change by shifting into "+" or "-" while shifting the lever	1. Transmission control switch circuit	AX-154
	2. TCM	IN-40
Harsh engagement (N to D)	1. Shift solenoid valve (SL1) circuit *1	AX-84
	2. TCM	IN-40
Harsh engagement (Lock-up)	1. Speed sensor NT circuit *1	AX-66
	2. Speed sensor NC circuit *1	AX-95
	3. Shift solenoid valve (SLU) circuit *1	AX-136
	4. TCM	IN-40
Harsh engagement (Any driving position)	1. Accelerator pedal position sensor circuit *1	ES-334
	2. Shift solenoid valve (SLT) circuit *1	AX-128
	3. Speed sensor NC circuit	AX-95
	4. Speed sensor NT circuit *1	AX-66
	5. TCM	IN-40
Poor acceleration	1. Shift solenoid valve (SLT) circuit *1	AX-128
	2. TCM	IN-40
No engine brake	1. TCM	IN-40
No kick-down	1. TCM	IN-40
Engine stalls when starting off or stopping	1. TCM	IN-40
Malfunction in shifting	1. Park/neutral position switch circuit *1	AX-158
	2. Transmission control switch circuit	AX-154
	3. TCM	IN-40
Slip or shudder (5th to 6th and 6th to 5th)	1. Shift solenoid valve (SLT) circuit *1	AX-128
Initial acceleration or subsequent acceleration is improper. Vehicle is stuck in a gear (1st to 6th).	1. Shift solenoid valve (SL1) circuit	AX-84
	2. Shift solenoid valve (SLT) circuit	AX-128
	3. TCM	IN-40
Acceleration is improper when the gear is 4th or higher.	1. Shift solenoid valve (SL2) circuit	AX-92
	2. Shift solenoid valve (SLT) circuit	AX-128
	3. TCM	IN-40
Initial acceleration or subsequent acceleration is improper. Vehicle does not shift down (from 4th to 3rd). Vehicle is stuck in a gear (1st to 4th).	1. Shift solenoid valve (SL2) circuit	AX-92
	2. TCM	IN-40
Acceleration is improper when the gear is 6th.	1. Shift solenoid valve (SL3) circuit	AX-105
	2. TCM	IN-40

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Symptom	Suspected area	See page
Acceleration is improper when the gear is 3rd or 5th.	1. Shift solenoid valve (SL4) circuit	AX-148
	2. Shift solenoid valve (SLT) circuit	AX-128
	3. TCM	IN-40
Initial acceleration or subsequent acceleration is improper. Vehicle does not shift down (from 3rd to 2nd). No up-shift (5th to 6th).	1. Shift solenoid valve (SL4) circuit	AX-148
	2. TCM	IN-40

AX

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

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

Symptom	Suspected area	See page
Vehicle does not move in any forward and reverse positions.	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239
Vehicle does not move in R position.	1. Valve body assembly	AX-181
	2. Brake No. 2 (B2)	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
No up-shift (1st to 2nd)	1. Valve body assembly	AX-181
	2. Brake No. 1 (B1)	AX-274
	3. Shift solenoid valve (SL3)*1	AX-100
No up-shift (2nd to 3rd)	1. Valve body assembly	AX-181
	2. Brake No. 3 (B3)	AX-274
	3. Shift solenoid valve (SL4)*1	AX-142
No up-shift (3rd to 4th)	1. Valve body assembly	AX-181
	2. Clutch No. 2 (C2)	AX-274
	3. Shift solenoid valve (SL2)*1	AX-87
No up-shift (4th to 5th)	1. Valve body assembly	AX-181
	2. Brake No. 3 (B3)	AX-274
	3. Shift solenoid valve (SL3)*1	AX-100
No up-shift (5th to 6th)	1.Valve body assembly	AX-181
	2. Brake No. 1 (B1)	AX-274
	3. Shift solenoid valve (SL3)*1	AX-100
No down-shift (6th to 5th)	1. Brake No. 3 (B3)	AX-274
	2. Shift solenid valve (SL4)*1	AX-142
	3. Valve body assembly	AX-181
No down-shift (5th to 4th)	1. Shift solenoid valve (SL1)*1	AX-79
	2. Clutch No. 1 (C1)	AX-274
	3. Valve body assembly	AX-181
No down-shift (4th to 3rd)	1. Brake No. 3 (B3)	AX-274
	2. Shift solenid valve (SL4)*1	AX-142
	3. Valve body assembly	AX-181
No down-shift (3rd to 2nd)	1. Brake No. 1 (B1)	AX-274
	2. Shift solenid valve (SL3)*1	AX-100
	3. Valve body assembly	AX-181
No down-shift (2nd to 1st)	1. Valve body assembly	AX-181
No lock-up or No lock-up off	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239

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Symptom	Suspected area	See page
Harsh engagement (N to D)	1. Valve body assembly	AX-181
	2. C1 accumulator	AX-274
	3. One-way clutch No. 1 (F1)	AX-274
	4. Clutch No. 1 (C1)	AX-274
	5. Shift solenoid valve (SL1)*1	AX-79
Harsh engagement (Lock-up)	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239
	3. Shift solenoid valve (SLU)*1	AX-131
Harsh engagement (N to R)	1. Valve body assembly	AX-181
	2. Brake No. 2 (B2)	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
Harsh engagement (1 to 2 to 3 to 4 to 5 to 6)	1. Valve body assembly	AX-181
	2. Shift solenoid valve (SLT)*1	AX-121
Harsh engagement (1st to 2nd)	1. Valve body assembly	AX-181
	2. B1 accumulator	AX-274
	3. Brake No. 1 (B1)	AX-274
	4. Shift solenoid valve (SL3)*1	AX-100
Harsh engagement (2nd to 3rd)	1. Valve body assembly	AX-181
	2. B3 accumulator	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
Harsh engagement (3rd to 4th)	1. Valve body assembly	AX-181
	2. C2 accumulator	AX-274
	3. Clutch No. 2 (C2)	AX-274
	4. Shift solenoid valve (SL2)*1	AX-87
Harsh engagement (4th to 5th)	1. Valve body assembly	AX-181
	2. B3 accumulator	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
Harsh engagement (5th to 6th)	1. Valve body assembly	AX-181
	2. B1 accumulator	AX-274
	3. Brake No. 1 (B1)	AX-274
	4. Shift solenoid valve (SL3)*1	AX-100
Harsh engagement (6th to 5th)	1. Valve body assembly	AX-181
	2. B3 accumulator	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
Slip or shudder (Forward and reverse: After warm-up)	1. Valve body assembly	AX-181
	2. Oil strainer	-
	3. Brake No. 1 (B1)	AX-274
	4. Brake No. 2 (B2)	AX-274
	5. Brake No. 3 (B3)	AX-274
	6. One-way clutch No. 1 (F1)	AX-274
	7. Clutch No. 1 (C1)	AX-274
	8. Clutch No. 2 (C2)	AX-274
Slip or shudder (Particular position: just after engine starts)	1. Torque converter clutch	AX-239
Slip or shudder (R position)	1. Brake No. 2 (B2)	AX-274
	2. Brake No. 3 (B3)	AX-274

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Symptom	Suspected area	See page
Slip or shudder (1 position)	1. One-way clutch No. 1 (F1)	AX-274
	2. Clutch No. 1 (C1)	AX-274
Slip or shudder (2 position)	1. Brake No. 1 (B1)	AX-274
	2. Clutch No. 1 (C1)	AX-274
Slip or shudder (3 position)	1. Brake No. 3 (B3)	AX-274
	2. Clutch No. 1 (C1)	AX-274
Slip or shudder (4 position)	1. Clutch No. 1 (C1)	AX-274
	2. Clutch No. 2 (C2)	AX-274
Slip or shudder (5 position)	1. Brake No. 3 (B3)	AX-274
	2. Clutch No. 2 (C2)	AX-274
Slip or shudder (6 position)	1. Brake No. 3 (B3)	AX-274
	2. Clutch No. 2 (C2)	AX-274
No engine braking (1st position)	1. Valve body assembly	AX-181
	2. Brake No. 2 (B2)	AX-274
No engine braking (2nd position)	1. Valve body assembly	AX-181
	2. Brake No. 1 (B1)	AX-274
No engine braking (3rd position)	1. Valve body assembly	AX-181
	2. Brake No. 3 (B3)	AX-274
No engine braking (4th position)	1. Valve body assembly	AX-181
	2. Clutch No. 2 (C2)	AX-274
No kick-down	1. Valve body assembly	AX-181
Shift point too hight or too low	1. Valve body assembly	AX-181
Poor acceleration (All positions)	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239
Poor acceleration (6th)	1. Brake No. 1 (B1)	AX-274
	2. Clutch No. 2 (C2)	AX-274
Engine stalls when starting off or stopping	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239

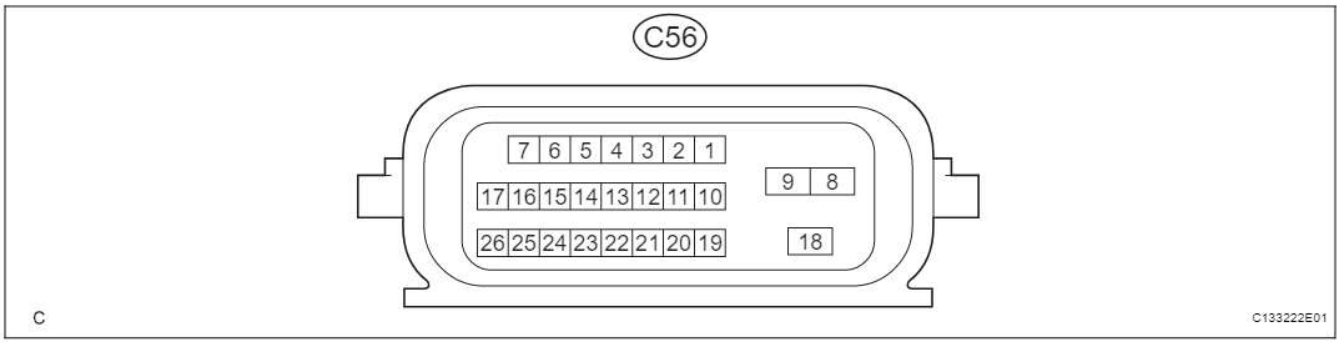
HINT:
*1: When the circuit is defective, a DTC may be output.

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TERMINALS OF ECU

1. TCM

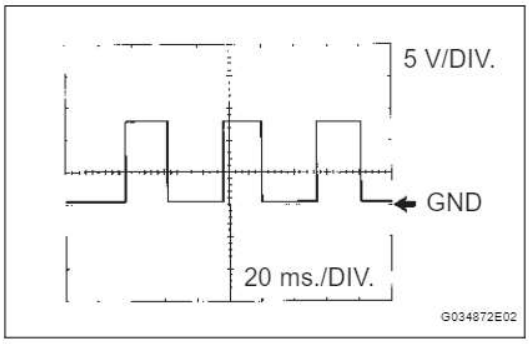


HINT:
Each TCM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition". Look under "Symbols (Terminals No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".
Use the illustration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

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
R (C56-15) - E1 (C56-8)	W - B-W	R shift position switch signal	IG switch ON (IG) and shift lever in R position	10 to 14 V
			IG switch ON (IG) and shift lever in any position except R position	Below 1 V
D (C56-16) - E1 (C56-8)	R - B-W	D shift position switch signal	IG switch ON (IG) and shift lever in D or 3 position	10 to 14 V
			IG switch ON (IG) and shift lever in any position except D and 3 position	Below 1 V
STP (C56-12) - E1 (C56-8)	B - B-W	Stop light switch signal	Brake pedal is depressed	7.5 to 14 V
			Brake pedal is released	Below 1.5 V
NSW (C56-11) - E1 (C56-8)	L - B-W	Park/neutral switch signal	IG switch ON (IG) and shift lever in P or N position	Below 2 V
			IG switch ON (IG) and shift lever in any position except P or N position	10 to 14 V
STA (C56-10) - E1 (C56-8)	Y - B-W	Starter signal	Cranking (shift lever position in P or N position, ignition switch START)	10 to 14 V
			IG switch ON (IG) and shift lever in any position except P or N position	Below 2 V
SPD1 (C56-3) - E1 (C56-8)	BR - B-W	Speed signal from combination meter	Vehicle speed 12 mph (20 km/h)	Pulse generation (See waveform 1)
BATT (C56-1) - E1 (C56-8)	W-L - B-W	Battery (for measuring battery voltage and for TCM memory)	Always	9 to 14 V
IG2 (C56-13) - E1 (C56-8)	L-B - B-W	Ignition switch	Ignition switch ON (IG)	9 to 14 V
+B (C56-18) - E1 (C56-8)	W-L - B-W	Power source of TCM	Ignition switch ON (IG)	9 to 14 V
CAN+ (C56-6) - E1 (C56-8)	B - B-W	CAN communication line	Ignition switch ON (IG)	Pulse generation (See waveform 2)

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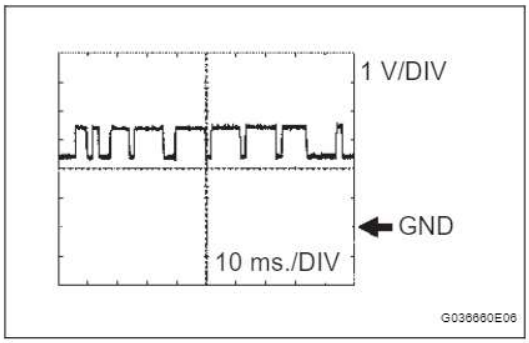
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CAN- (C56-7) - E1 (C56-8)	Y - B-W	CAN communication line	Ignition switch ON (IG)	Pulse generation (See waveform 3)



(a) Waveform 1

Reference:

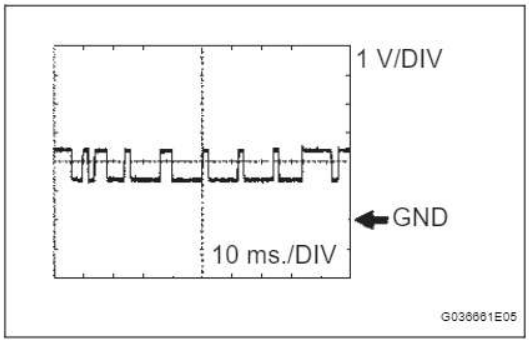
Terminal	SPD1 - E1
Tool setting	2 V/DIV., 20 ms./DIV.
Vehicle condition	Vehicle speed 12 mph (20 km/h)



(b) Waveform 2

Reference:

Terminal	CAN+ - E1
Tool setting	1 V/DIV., 10 ms./DIV.
Vehicle condition	Engine is stopped, ignition ON (IG)



(c) Waveform 3

Reference:

Terminal	CAN- - E1
Tool setting	1 V/DIV., 10 ms./DIV.
Vehicle condition	Engine is stopped, ignition ON (IG)

2. ECM

HINT:

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

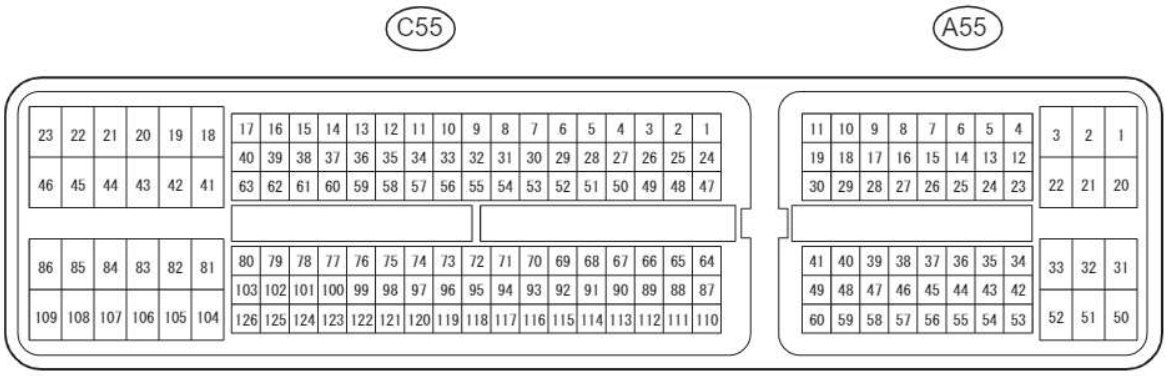
In the table, first follow the information under "Condition". Look under "Symbols (Terminals No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".

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

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ECM:



A107881E27

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
S (A55-25) - E1 (C55-81)	Y - W-B	S shift position switch signal	IG switch ON (IG) and shift lever in S position	10 to 14 V
			IG switch ON (IG) and shift lever in any position except S position	Below 1 V
SFTU (A55-16) - E1 (C55-81)	R - W-B	Up shift switch signal	IG switch ON (IG) and shift lever in S position	10 to 14 V
			IG switch ON (IG) and shift lever in "+" position (Up shift)	Below 1 V
SFTD (A55-51) - E1 (C55-81)	L - W-B	Down shift switch signal	IG switch ON (IG) and shift lever in S position	10 to 14 V
			IG switch ON (IG) and shift lever in "-" position (Down shift)	Below 1 V

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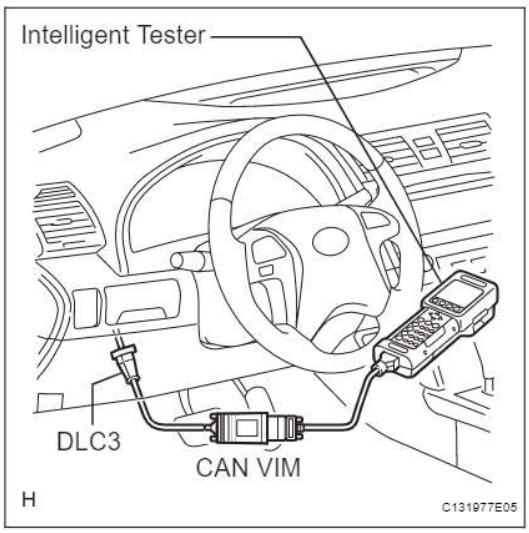
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle's TCM can be read then.



(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:
(1) The emission control system/components
(2) The power train control components (which affect vehicle emissions)
(3) The computer
In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the TCM memory.
If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the TCM memory.



(c) To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester displays DTCs, the freeze frame data and a variety of the engine data.
The DTCs and freeze frame data can be erased with the intelligent tester (See page AX-38).

2. NORMAL MODE AND CHECK MODE

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

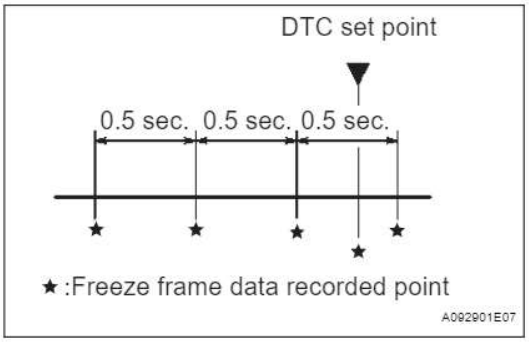
3. 2 TRIP DETECTION LOGIC

(a) When a malfunction is first detected, the malfunction is temporarily stored in the TCM memory (1st trip). If the ignition switch is turned off and then on (IG) again, and the same malfunction is detected again, the MIL will illuminate.

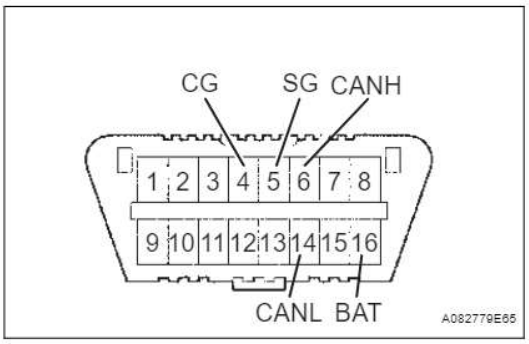
4. FREEZE FRAME DATA

(a) The TCM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

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(b) The intelligent tester displays freeze frame data recorded at five different points: 1) 3 points before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. The data can be used to simulate the vehicle's condition around the time of the malfunction. The data may be helpful in determining the cause of a malfunction. It may also be helpful in determining whether a DTC is being caused by a temporary malfunction.



5. DLC3 (Data Link Connector 3)

(a) The vehicle's TCM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.
HINT:
Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or the tester side.
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.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
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)	HIGH-level CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 kΩ or higher
CANH (6) - BAT (16)	HIGH-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.**

6. CHECK BATTERY VOLTAGE

Battery voltage:
11 to 14 V

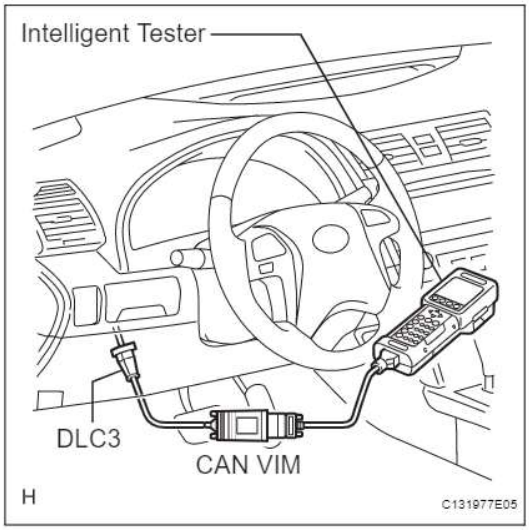
(a) If the voltage is below 11 V, replace or recharge the battery before proceeding.

7. CHECK MIL

(a) Check that the MIL illuminates when turning the ignition switch on (IG).
If the MIL does not illuminate, there is a problem in the MIL circuit (See page ES-471).

(b) When the engine is started, the MIL should turn off.

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DTC CHECK / CLEAR

1. CHECK DTC

(a) DTCs which are stored in the TCM can be displayed with the intelligent tester.
These scan tools can display pending DTCs and current DTCs. Some DTCs are not stored if the TCM doesn't detect a malfunction during consecutive driving. However, the malfunction detected while a driving is stored as a pending DTC.

(1) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connector 3 (DLC3).

(2) Turn the ignition switch on (IG).

(3) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ECT / DTC INFO / CURRENT CODES (or PENDING CODE).

(4) Confirm the DTCs and freeze frame data and then write them down.

(5) Confirm the details of the DTCs (See page AX-46).

NOTICE:
When a symptom has been duplicated using normal mode, use the intelligent tester to check for DTCs. For DTCs that are subject to "2-trip detection logic", perform the following steps:
Turn the ignition switch OFF after the symptom has occurred once. Repeat the process of attempting to duplicate the symptom. When the problem or symptom happens for the second time and a DTC has been recorded, the MIL will illuminate, and the code will be stored.

2. CLEAR DTC

(a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ECT / DTC INFO / CLEAR CODES and press YES.

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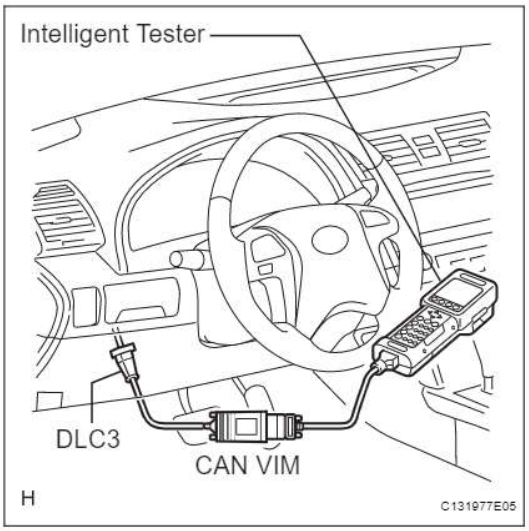
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CHECK MODE PROCEDURE

1. DESCRIPTION

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

2. CHECK MODE PROCEDURE



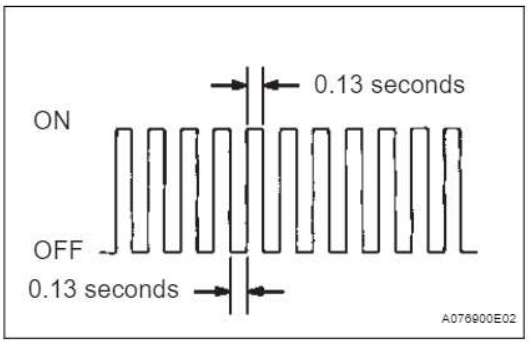
(a) Make sure that the items below are satisfied:
(1) Battery positive voltage is 11 V or more
(2) Throttle valve is fully closed
(3) Transaxle is in the P or N position
(4) A/C is switched OFF

(b) Turn the ignition switch off.

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

(d) Turn the ignition switch on (IG).

(e) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ECT / CHECK MODE.



(f) Change the TCM to check mode. Make sure that the MIL flashes as shown in the illustration.
NOTICE:
All DTCs and freeze frame data recorded will be erased if: 1) the intelligent tester is used to change the TCM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from on (IG) to on (ACC) or off.
Before entering check mode, make notes of any DTCs and freeze frame data that are present.

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

(h) Perform "MONITOR DRIVE PATTERN" for the ECT test (See page AX-27).
(Or, duplicate the conditions of the malfunction described by the customer).

(i) After duplicating the malfunction conditions, use the intelligent tester diagnosis selector to check the DTC and freeze frame data.

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FAIL-SAFE CHART

1. Fail-safe

This function minimizes the loss of operation when any abnormality occurs in a sensor or solenoid.

Fail-safe Control List

Malfunction Part	Function
Input Turbine Speed Sensor	Shifting to only either the 1st or 3rd gears is allowed.
Counter Gear Speed Sensor	• The counter gear speed is determined based on the signals from the skid control ECU (speed sensor signals). • Shifting between 1st to 4th gears is allowed.
ATF Temp. Sensor	Shifting between 1st to 4th gears is allowed.
ECT ECU Power Supply (Voltage is Low)	When the vehicle is being driven in 6th gear, the transaxle is fixed in 6th gear. When being driven in any of the 1st to 5th gears, the transaxle is fixed in 5th gear.
CAN communication	Shifting to only either 1st or 3rd gears is allowed.
Knock Sensor	Shifting between 1st to 4th gears is allowed.
Solenoid Valve SL1, SL2, SL3 and SL4	The current to the failed solenoid valve is cut off and operating the other solenoid valves with normal operation performs shift control. (Shift controls in fail-safe mode are described in the table on the next page. For details, refer to Fail-Safe Control Chart)

Solenoid Valve Operation when Normal:

Gear Position		1st	2nd	3rd	4th	5th	6th
Solenoid	SL1	ON	ON	ON	ON	OFF	OFF
	SL2	OFF	OFF	OFF	ON	ON	ON
	SL3	OFF	ON	OFF	OFF	OFF	ON
	SL4	OFF	OFF	ON	OFF	ON	OFF

Fail-safe Control Chart:

	Gear Position in Normal Operation	1st	2nd	3rd	4th	5th	6th
SL1	ON Malfunction (without Fail-safe Control) *1	1st	2nd	3rd	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st to N	2nd to N	3rd to N	4th to N	5th	6th
	Fail-safe Control during OFF Malfunction	Fixed in 3rd or 5th					
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 3rd or 5th					
SL2	ON Malfunction (without Fail-safe Control) *1	1st to 4th	2nd to 4th	3rd to 4th	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st	2nd	3rd	4th to 1st	5th to N	6th to N
	Fail-safe Control during OFF malfunction	1st	2nd	3rd	3rd	3rd	3rd
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 2nd or 3rd					
SL3	ON Malfunction (without Fail-safe Control) *1	1st to 2nd	2nd	3rd	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st	2nd to 1st	3rd	4th	5th	6th to N
	Fail-safe Control during OFF malfunction	1st	3rd	3rd	4th	5th	5th
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 3rd					

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	Gear Position in Normal Operation	1st	2nd	3rd	4th	5th	6th
SL4	ON Malfunction (without Fail-safe Control)*1	3rd	3rd	3rd	4th	5th	5th
	OFF Malfunction (without Fail-safe Control)	1st	2nd	3rd to 1st	4th	5th to N	6th
	Fail-safe Control during OFF malfunction	1st *2	2nd *2	4th*2	4th*2	6th	6th
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 2nd					

*1: Fail-safe control is not actuated when the ON malfunction occurs.

*2: Shifting to 5th and 6th gears is prohibited.

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DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

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

(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 on (IG).

(e) Turn the tester on.

(f) Enter the following menus: "DIAGNOSIS / OBD/ MOBD / ECT / DATA LIST".

(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
CALC LOAD	Calculated load by ECM: Min.: 0%, Max.: 100%	• 15.0 to 35.0%: Idling • 10.0 to 30.0%: Running without load (2,000 rpm)	-
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383.75 rpm	550 to 800 rpm: Idling	-
VEHICLE SPD	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle load	-
COOLANT TEMP	Engine coolant temperature: Min.: -40°C (419°F), Max.: 140°C (258°F)	80 to 105°C (176 to 221°F): After warming up	• If value -40°C (-40°F): sensor circuit open • If value 140°C (284°F): sensor circuit shorted
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	10 to 22%: Idling	Calculated value based on VTA1
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	• 0%: Accelerator pedal released • 64 to 96%: Accelerator pedal fully depressed	Recognition valve for throttle opening angle on ECM
SPD (NC)	Min.: 0 rpm, Max.: 12750 rpm	-	-
SPD (NT)	Input turbine speed/ display: 50 r/min	HINT: • Lock-up ON (After warming up the engine): Input turbine speed (NT) equal to the engine speed. • Lock-up OFF (Idling at N position): Input turbine speed (NT) nearly equal to the engine speed.	-
CTP SW	Closed throttle position switch: ON or OFF	• ON: Throttle fully closed • OFF: Throttle open	-

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Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP switch status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-165.
STOP LIGHT SW	Stop light switch status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF	-
BATTERY VOLTAGE	Battery voltage: Min.: 0, Max.: 65.535 V	9 to 14 V: Idling	-
TC/TE1	TC and TE1 terminals of DLC3: ON or OFF	-	Active Test support data
FC IDL	Fuel cut idle: ON or OFF	ON: Fuel cut operating	FC IDL= "ON" when throttle valve fully closed and engine speed over 2,800 rpm
FC TAU	Fuel cut TAU (Fuel cut during very light load):	ON: Fuel cut operating	Fuel cut being performed under very light load to prevent engine combustion from becoming incomplete
SHIFT	ECM gear shift command/ 1st, 2nd, 3rd, 4th, 5th or 6th	Shift lever position is; • D: 1st, 2nd, 3rd, 4th, 5th or 6th • S: 1st, 2nd, 3rd, 4th, 5th or 6th	-
REVERSE	PNP switch status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-158
PARKING	PNP switch status/ ON or OFF	Shift lever position is; P: ON Except P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-158
NEUTRAL	PNP switch status/ ON or OFF	Shift lever position is; N: ON Except N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-158
DRIVE	PNP switch status/ ON or OFF	Shift lever position is; D and S: ON Except D and S: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-158

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Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
SPORTS UP SW	Sport shift up switch status/ ON or OFF	• Press continuously "+" (Up shift): ON • Release "+" (Up shift): OFF	-
SPORTS DOWN SW	Sport shift down switch status/ ON or OFF	• Press continuously "-" (Down shift): ON • Release "-" (Down shift): OFF	-
MODE SELECT SW	Sport mode select switch status/ ON or OFF	Shift lever position is; S, "+" and "-": ON Except S, "+" and "-": OFF	-
TPS 1 SW	0: OFF / 1: ON	Gear position 1st, 2nd, 3rd or 4th: ON Gear position 5th or 6th: OFF	-
TPS 2 SW	0: OFF / 1: ON	Gear position 4th, 5th or 6th: ON Gear position 1st, 2nd or 3rd: OFF	-
TPS 3 SW	0: OFF / 1: ON	Shift solenoid valve SLU is ON: ON Shift solenoid valve SLU is OFF: OFF	-
A/T OIL TEMP 1	ATF temp. sensor value/ min.: -40°C (-40°F) max.: 215°C (419°F)	• After stall test; Approx. 80°C (176°F) • Equal to ambient temperature when cold soak	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor circuit is open or shorted.
NT SENS VOL	Min.: 0 V, Max.: 5 V	0.1 to 1.9 V	-
NC SENS VOL	Min.: 0 V, Max.: 5 V	0.1 to 1.9 V	-
ATF	0: OFF / 1: ON		-
LOCK UP	0: OFF / 1: ON	Lock up: ON	-
LOCK UP SOL	Lock up solenoid status/ ON or OFF	• Lock up: ON • Except lock up: 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	-
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383.75 rpm	550 to 800 rpm: Idling	-
INTAKE AIR TEMP	Intake air temperature Min.: -40°C (-40°F), Max.: 140°C (258°F)	Equivalent to ambient air temperature	• If value -40°C(-40°F): sensor circuit open • If value 140°C(284°F): sensor circuit shorted
COOLANT TEMP	Engine coolant temperature Min.: -40°C (-40°F), Max.: 215°C (419°F)	80 to 105°C (176 to 221°F): After warming up	• If value -40°C (-40°F): sensor circuit open • If value 140°C (284°F): sensor circuit shorted
THROTTLE POS	Throttle sensor position: Min.: 0%, Max.: 100%	• Accelerator pedal released: 0% • Accelerator pedal fully depressed: 64 to 96%	Recognition value for throttle opening angle on ECM
THROTTLE POS	Whether throttle position sensor detecting idle: ON or OFF	ON: Idling	-
ACCEL POS	Min.: 0%, Max.: 100%		-
#CODES	# of Codes: Min.: 0, Max.: 255	-	Number of detected DTCs
CHECK MODE	Check mode: 0: OFF, 1: ON	ON: Check mode ON	-

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Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
SPD TEST	Check mode result for vehicle speed sensor: 0: COMPL, 1: INCMPL	-	-
MIL	MIL status: ON or OFF	ON: MIL ON	-
MIL ON RUN DIST	MIL ON run distance: Min.: 0 mile (65,535 km), Max.: 110,950 mile (65,535 km)	Distance after DTC detected	-
MIL ON RUN TIME	Running time from MIL ON: Min.: 0 minute, Max.:65,535 minutes	Equivalent to running time after MIL ON	-
ENG RUN TIME	Engine run time: Min.: 0 second, Max.: 65,535 seconds	Time after engine start	-
TIME DTC CLEAR	Time after DTC cleared: Min.: 0 minute, Max.: 65,535 minutes	Equivalent to time after DTCs erased	-
DIST DTC CLEAR	Distance after DTC cleared: Min.: 0 km/h, Max.: 65,535 km/h	Equivalent to time after DTCs erased	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared: Min.: 0, Max.: 255	-	Number of warm-up cycles after DTC cleared
OBD CERT	OBD requirement	OBD2	-
COMP ON	Comprehensive component monitor 0: NOT AVL, 1: AVAIL	-	Comprehensive Component Monitor
CCM ENA	Comprehensive component monitor UNABLE or ENABLE	-	-
CCM CMPL	Comprehensive component monitor COMPL or INCMPL	-	-
FUEL ENA	Fuel system monitor UNABLE or ENABLE	-	-
FUEL CMPL	Fuel system monitor COMPL or INCMPL	-	-
MISFIRE ENA	Misfire monitor UNABLE or ENABLE	-	-
MISFIRE CMPL	Misfire monitor COMPL or INCMPL	-	-
HTR ENA	O2S (A/FS) heater monitor UNABLE or ENABLE	-	-
HTR CMPL	O2S (A/FS) heater monitor COMPL or INCMPL	-	-
O2S(A/FS) ENA	O2S (A/FS) monitor UNABLE or ENABLE	-	-
O2S(A/FS) CMPL	O2S (A/FS) monitor COMPL or INCMPL	-	-
EVAP ENA	EVAP monitor UNABLE or ENABLE	-	-
EVAP CMPL	EVAP monitor COMPL or INCMPL	-	-
CAT ENA	Catalyst monitor: UNABLE or ENABLE	-	-
CAT CMPL	Catalyst monitor COMPL or INCMPL	-	-

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Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
TRANSMISSION	Transmission type	-	Identifying transmission type: 6 speed
SYSTEM	System identification	-	Identifying engine type: GASOLINE (gasoline engine)

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save 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 on (IG).
(e) Turn the intelligent tester on.
(f) Enter the following items: "DIAGNOSIS / OBD/ MOBD / ECT / ACTIVE TEST".
(g) According to the display on tester, perform "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] • IDL: ON [Others] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves. Upshifts and downshifts should be performed consecutively. A 10-second interval is required between gear changes. Do not downshift at high speeds. Doing so will damage the automatic transaxle.
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transaxle to the lock-up condition. [Vehicle Condition] • Throttle valve opening angle: Less than 35% • Vehicle speed: 37 mph (60 km/h) or more, and 6th gear	Possible to check the SLU solenoid operation.
SOLENOID (SL1)	[Test Details] Operate the shift solenoid SL1 [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-
SOLENOID (SL2)	[Test Details] Operate the shift solenoid SL2 [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-
SOLENOID (SL3)	[Test Details] Operate the shift solenoid SLU [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-

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Item	Test Details	Diagnostic Note
SOLENOID (SL4)	[Test Details] Operate the shift solenoid S1 [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-
SOLENOID (SL)	[Test Details] Operate the shift solenoid S2 [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-
SOLENOID (SLT)	[Test Details] Operate the 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, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	-
SOLENOID (SLU)	[Test Details] Operate the shift solenoid SLU and raise the line pressure. [Vehicle Condition] • Vehicle Stopped. • IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLU)" is performed, the ECM commands the SLU solenoid to turn off). ON: No action (normal operation)	-

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle. The same SST is used for the HYDRAULIC TEST (See page AX-17) as well.
HINT:
The pressure values in ACTIVE TEST and HYDRAULIC TEST will be different from each other.

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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: MIL (Malfunction Indicator Lamp) comes on
- *2: "DTC stored" mark means TCM memorizes the trouble code if the TCM detects that the DTC detection condition is satisfied.
- A DTC may be output when the clutch, brake and gear components, etc. inside the automatic transaxle are damaged.

AUTOMATIC TRANSAXLE SYSTEM

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0500	Vehicle Speed Sensor "A"	1. Vehicle speed sensor 2. Vehicle speed sensor signal circuit 3. Combination meter 4. TCM	Comes on	DTC stored	AX-50
P0560	System Voltage	1. Open in back-up power source circuit 2. TCM	Comes on	DTC stored	AX-53
P0710	Transmission Fluid Temperature Sensor "A" Circuit	1. Open or short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-55
P0711	Transmission Fluid Temperature Sensor "A" Performance	Transmission wire (ATF temperature sensor)	Comes on	DTC stored	AX-60
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	1. Short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-55
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	1. Open in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-55
P0715	Input / Turbine Speed Sensor Circuit Malfunction	1. Transmission revolution sensor (speed sensor NT) 2. TCM	Comes on	DTC stored	AX-66
P0717	Input Speed Sensor Circuit No Signal	1. Transmission revolution sensor (speed sensor NT) 2. TCM	Comes on	DTC stored	AX-66
P0724	Brake Switch "B" Circuit High	1. Short in stop light switch signal circuit 2. Stop light switch 3. TCM	Comes on	DTC stored	AX-71
P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)	1. Shift solenoid valve SL remains closed 2. Valve body is blocked 3. Torque converter clutch 4. Automatic transaxle (clutch, brake or gear etc.) 5. Line pressure is too low	Comes on	DTC stored	AX-74
P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)	1. Shift solenoid valve SL1 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-79

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DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	1. Open or short in shift solenoid valve SL1 circuit 2. Shift solenoid valve SL1 3. TCM	Comes on	DTC stored	AX-84
P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	1. Shift solenoid valve SL2 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-87
P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	1. Open or short in shift solenoid valve SL2 circuit 2. Shift solenoid valve SL2 3. TCM	Comes on	DTC stored	AX-92
P0791	Intermediate Shaft Speed Sensor "A" Circuit	1. Transmission revolution sensor (speed sensor NC) 2. TCM	Comes on	DTC stored	AX-95
P0793	Intermediate Shaft Speed Sensor "A"	1. Transmission revolution sensor (speed sensor NC) 2. TCM	Comes on	DTC stored	AX-95
P0796	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)	1. Shift solenoid valve SL3 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-100
P0798	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)	1. Open or short in shift solenoid valve SL3 circuit 2. Shift solenoid valve SL3 3. TCM	Comes on	DTC stored	AX-105
P0872	Transmission Fluid Pressure Switch No.1 Circuit Low	1. ATF temperatuer sensor assembly (ATF pressure switch No. 1) 2. Transmission wire	-	DTC stored	AX-108
P0873	Transmission Fluid Pressure Switch No.1 Circuit High	1. ATF temperatuer sensor assembly (ATF pressure switch No 1) 2. Transmission wire 3. TCM	-	DTC stored	AX-108
P0877	Transmission Fluid Pressure Switch No.2 Circuit Low	1. ATF temperatuer sensor assembly (ATF pressure switch No. 2) 2. Transmission wire	-	DTC stored	AX-112
P0878	Transmission Fluid Pressure Switch No.2 Circuit High	1. ATF temperatuer sensor assembly (ATF pressure switch No. 2) 2. Transmission wire 3. TCM	-	DTC stored	AX-112
P0989	Transmission Fluid Pressure Switch No.3 Circuit Low	1. ATF temperatuer sensor assembly (ATF pressure switch No. 3) 2. Transmission wire	Comes on	DTC stored	AX-116
P0990	Transmission Fluid Pressure Switch No.3 Circuit High	1. ATF temperatuer sensor assembly (ATF pressure switch No. 3) 2. Transmission wire 3. TCM	Comes on	DTC stored	AX-116
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	1. Shift solenoid valve SLT remains open 2. Shift solenoid valve SL1, SL2, SL3 or SL4 remains open or closed 4. Valve body is blocked 5. Automatic transaxle (clutch, brake or gear, etc.)	Comes on	DTC stored	AX-121

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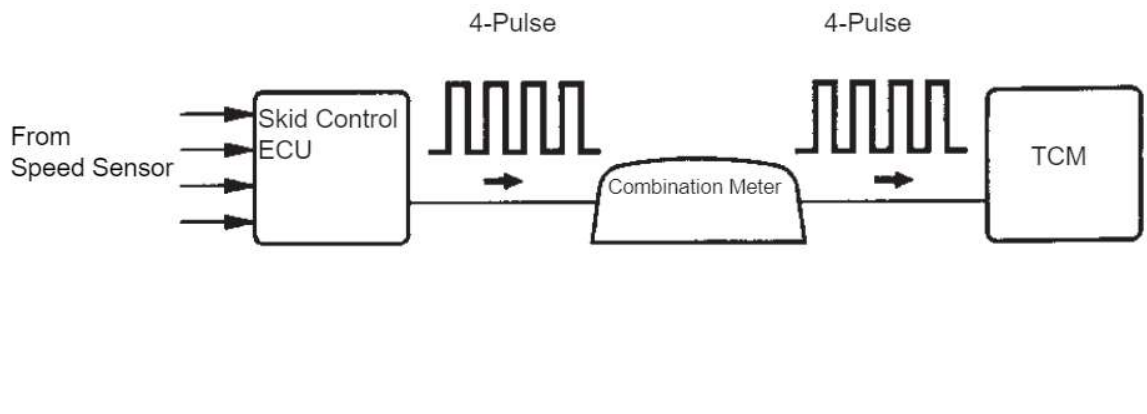
DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	1. Open or short in shift solenoid valve SLT circuit 2. Shift solenoid valve SLT 3. TCM	Comes on	DTC stored	AX-128
P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	1. Shift solenoid valve SLU remains open or closed 2. Valve body is blocked 3. Torque converter clutch 4. Automatic transaxle (clutch, brake or gear, etc.) 5. Line pressure is too low	Comes on	DTC stored	AX-131
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. TCM	Comes on	DTC stored	AX-136
P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	1. Short in shift solenoid valve SL circuit 2. Shift solenoid valve SL 3. TCM	Comes on	DTC stored	AX-139
P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	1. Open in shift solenoid valve SL circuit 2. Shift solenoid valve SL 3. TCM	Comes on	DTC stored	AX-139
P2808	Pressure Control Solenoid "D" Performance or Stuck OFF (Shift Solenoid Valve SL4)	1. Shift solenoid valve SL4 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-142
P2810	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SL4)	1. Open or short in shift solenoid valve SL4 circuit 2. Shift solenoid valve SL4 3. TCM	Comes on	DTC stored	AX-148
U0100	Lost Communication with ECM/ PCM "A"	TCM	Comes on	DTC stored	AX-151

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DTC	P0500	Vehicle Speed Sensor "A"

DESCRIPTION

The speed sensors detect the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4-pulse signal and outputs it to the TCM via the combination meter. The TCM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500	When the ECT sensor is normal and the counter gear speed is 300 rpm or more, the vehicle speed signal is not input for 2 seconds or more.	• Vehicle speed sensor • Vehicle speed sensor signal circuit • Combination meter • TCM

MONITOR DESCRIPTION

The TCM assumes that the vehicle is being driven when the transmission counter gear indicates more than 300 rpm and over 30 seconds have passed since the park/neutral position switch was turned off. If there is no signal from the vehicle speed sensor with these conditions satisfied, the TCM concludes that the vehicle speed sensor is malfunctioning. The TCM will turn on the MIL and a DTC will be set.

MONITOR STRATEGY

Related DTCs	P0500: Vehicle Speed Sensor Circuit
Required sensors/components (Main)	Vehicle speed sensor, Combination meter, ABS ECU
Required sensors/components (Sub)	Counter gear Speed (CS) sensor, ECT sensor
Frequency of operation	Continuous
Duration	2 seconds
MIL operation	Immediately
Sequence operation	None

TYPICAL ENABLING CONDITIONS

Engine	Running
Transmission counter gear revolution	300 rpm or more
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

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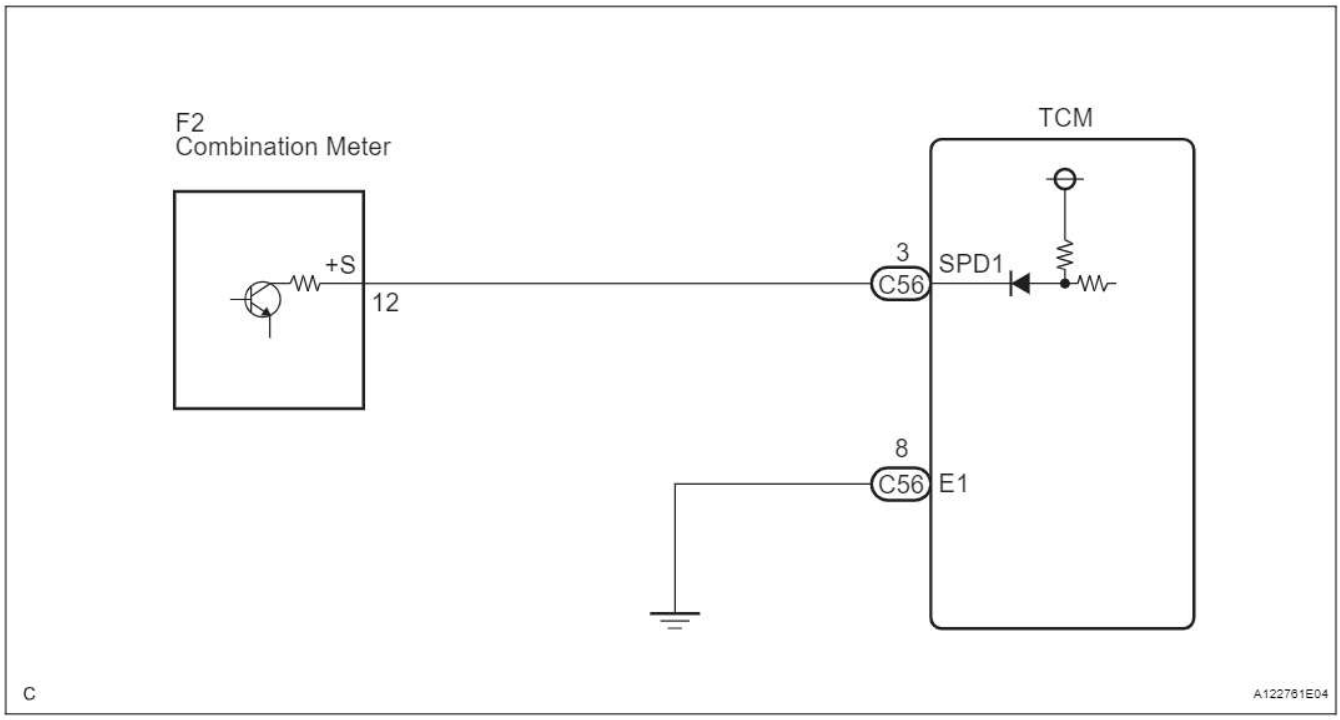
Either a or b is met (See below)	
a. All of the following conditions are met	
ECT	20°C (68°F) or more
ECT sensor fail	Not detected
Time after PNP switch ON to OFF	2 sec. or more
b. All of the following conditions are met	
ECT	Less than 20°C (68°F)
ECT sensor fail	Detected
Time after PNP switch ON to OFF	30 sec. or more

AX

TYPICAL MALFUNCTION THRESHOLDS

Vehicle speed sensor signal	No pulse input

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT SPEEDOMETER (METER OPERATION)

(a) Drive the vehicle and check if operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedometer display is normal.

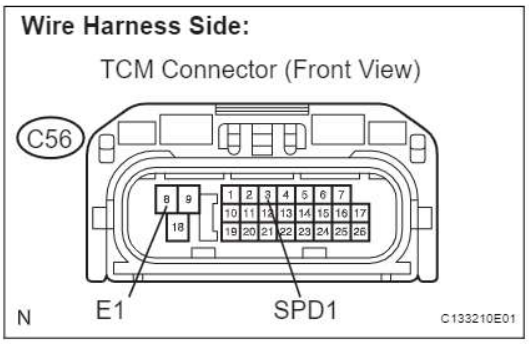
NG → CHECK SPEEDOMETER CIRCUIT

OK

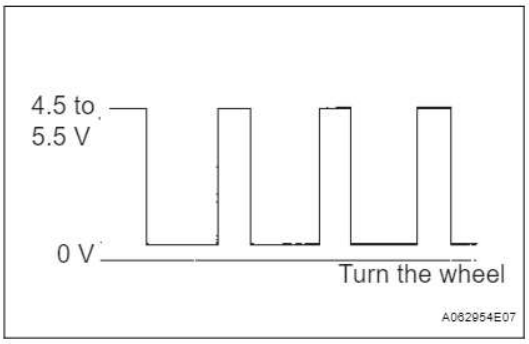
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AX

2	INSPECT TCM



(a) Shift the lever to the neutral position.
(b) Jack up the vehicle.
(c) Disconnect the TCM connector.
(d) Turn the ignition switch on (IG).



(e) Measure the voltage according to the value(s) in the table below as the wheel is turned slowly.

Standard

Tester Connection	Specified Condition
C56-3 (SPD1) - C56-8 (E1)	Voltage is generated intermittently

HINT:
The output voltage should fluctuate up and down similarly to the diagram when the wheel is turned slowly.

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

OK

REPLACE TCM

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DTC	P0560	System Voltage

DESCRIPTION

The battery supplies electricity to the TCM even when the ignition switch is off. This power allows the TCM to store data such as DTC history, freeze frame data and fuel trim values. If the battery voltage falls below a minimum level, these memories are cleared and the TCM determines that there is a malfunction in the power supply circuit. When the engine is next started, the TCM will illuminate the MIL and set the DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in TCM back-up power source circuit (1 trip detection logic)	• Open in back-up power source circuit • TCM

HINT:
If DTC P0560 is set, the TCM does not store other DTCs.

MONITOR STRATEGY

Related DTCs	P0560: TCM system voltage
Required Sensors/Components (Main)	TCM
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate (MIL illuminated after next engine start)
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present:	None
Stand-by RAM	Initialized

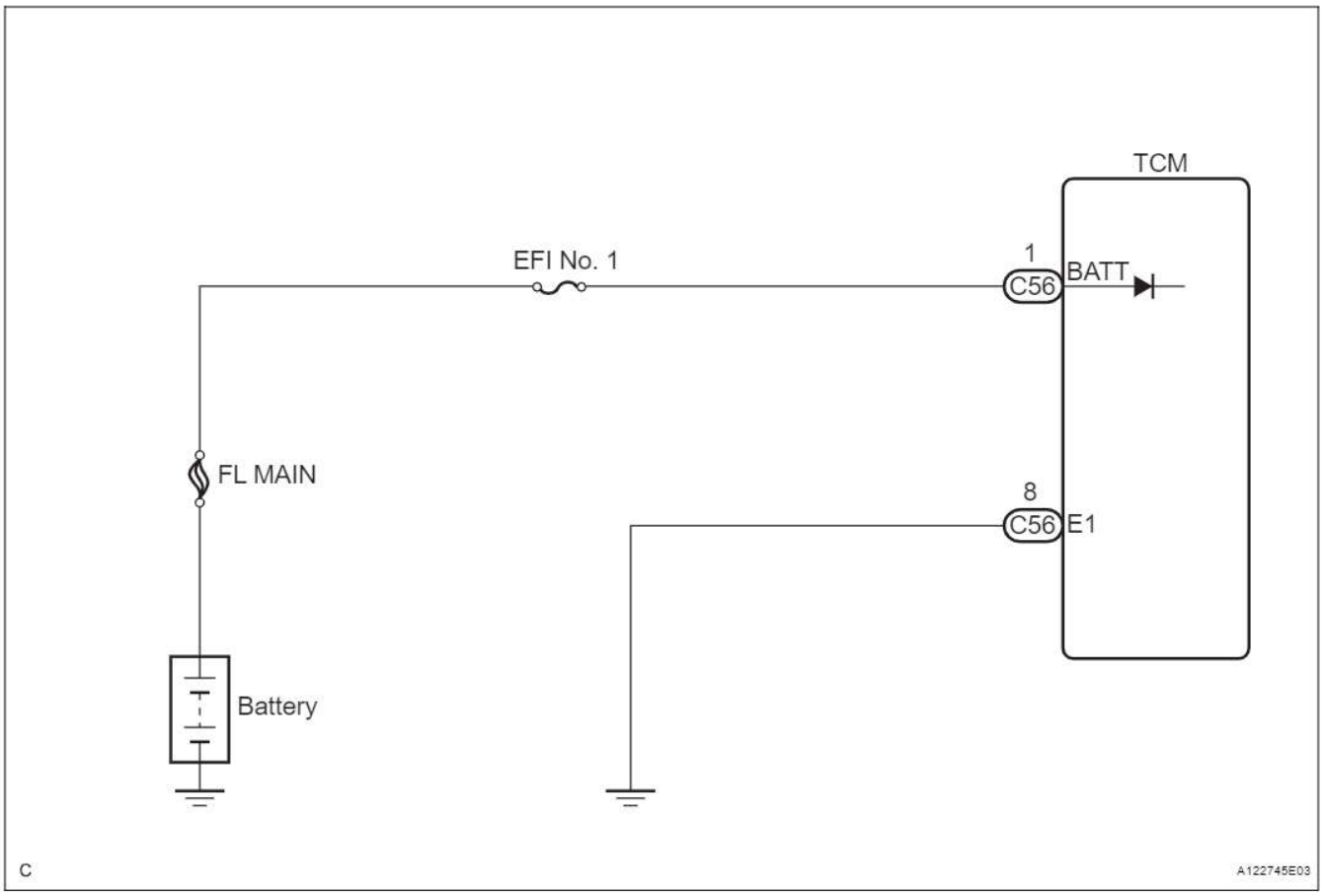
TYPICAL MALFUNCTION THRESHOLDS

TCM power source	Less than 3.5 V

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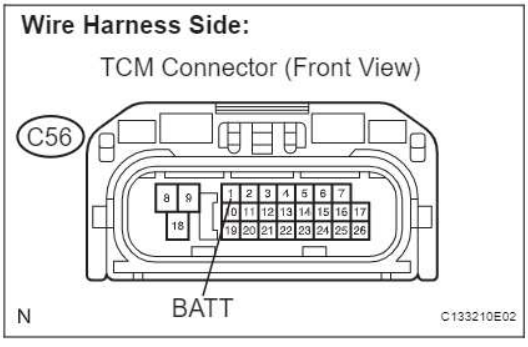
AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TERMINAL VOLTAGE (BATT VOLTAGE OF TCM)



(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
BATT (C56-1) - E1 (C56-8)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (EFI NO. 1 FUSE - TCM)**

OK

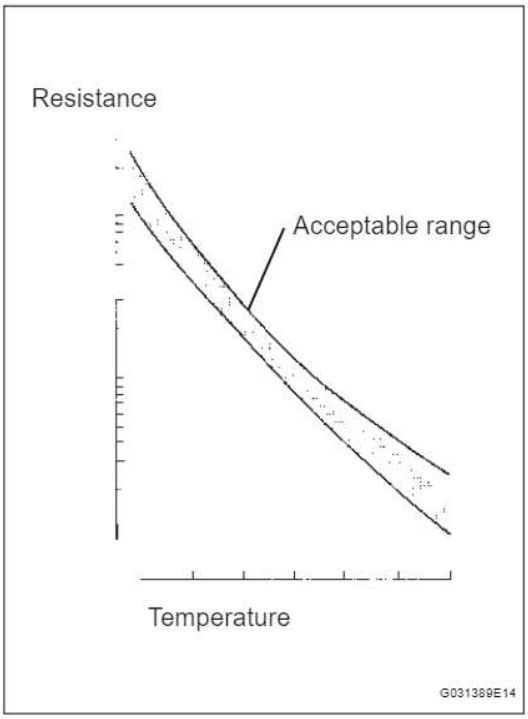
REPLACE TCM

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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 for use by the TCM.



The TCM applies a voltage to the temperature sensor through terminal OIL of the TCM.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The TCM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0710	(a) and (b) are detected momentarily within 0.5 sec. 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 sec., the malfunction switches from (a) to (b) or from (b) to (a)	• Open or short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • TCM

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DTC No.	DTC Detection Condition	Trouble Area
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more have (1-trip detection logic)	• Short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • TCM
P0713	ATF temperature sensor resistance is more than 156 kΩ when 15 minutes or more have elapsed after the engine starts DTC is detected for 0.5 sec. or more (1-trip detection logic)	• Open in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • TCM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the automatic transmission fluid (ATF) temperature sensor (TFT sensor) circuit. The automatic transmission fluid (ATF) temperature sensor converts ATF temperature into an electrical resistance value. Based on the resistance, the TCM determines the ATF temperature, and the TCM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the TCM interprets this as a fault in the ATF sensor or wiring. The TCM will turn on the MIL and store 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 (Chattering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0710:

Range check (Chattering)

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available.	-

P0712:

Range check (Low resistance)

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available.	-

P0713:

Range check (High resistance)

The monitor will run whenever this DTC is not present.	None
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710:

Range check (Chattering)

TFT (transmission fluid temperature) sensor resistance	Less than 79 Ω or more than 156 kΩ

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P0712:

Range check (Low resistance)

TFT sensor resistance	Less than 79 Ω

P0713:

Range check (High resistance)

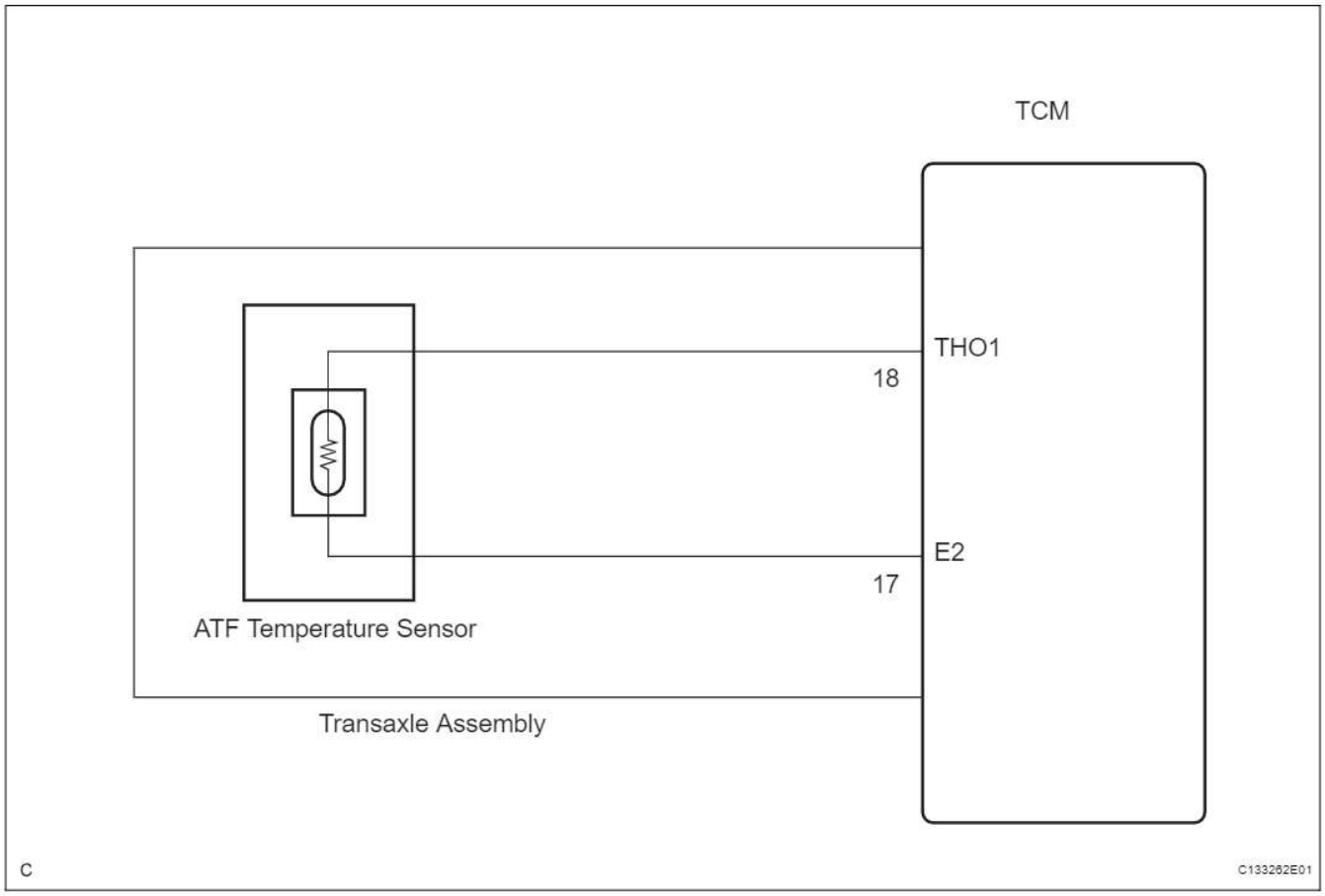
TFT sensor resistance	More than 156 kΩ

AX

COMPONENT OPERATING RANGE

TFT sensor	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1. **DATA LIST**

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save 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.

(a) Warm up the engine.

(b) Turn the ignition switch off.

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(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on tester, read "DATA LIST".

AX

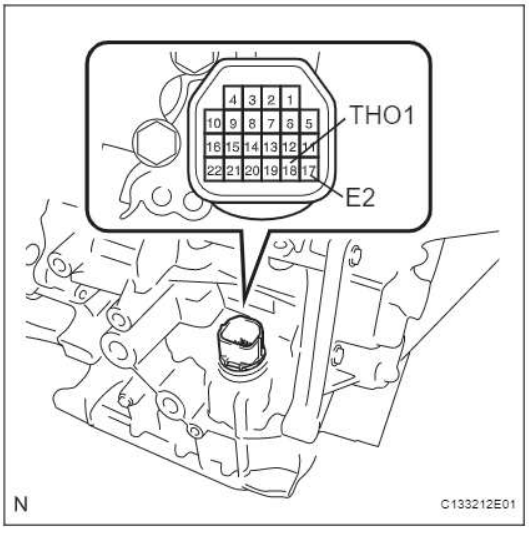
Item	Measurement Item/ Range (display)	Normal Condition
AT OIL TEMP1	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	• After Stall Test; Approx. 80°C (176°F) • Equal to ambient temperature when cold soak

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

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

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

1 INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
17 (E2) - 18 (THO1)	90 Ω to 156 kΩ
17 (E2) - Body ground	10 kΩ or higher
18 (THO1) - Body ground	10 kΩ or higher

HINT:
If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

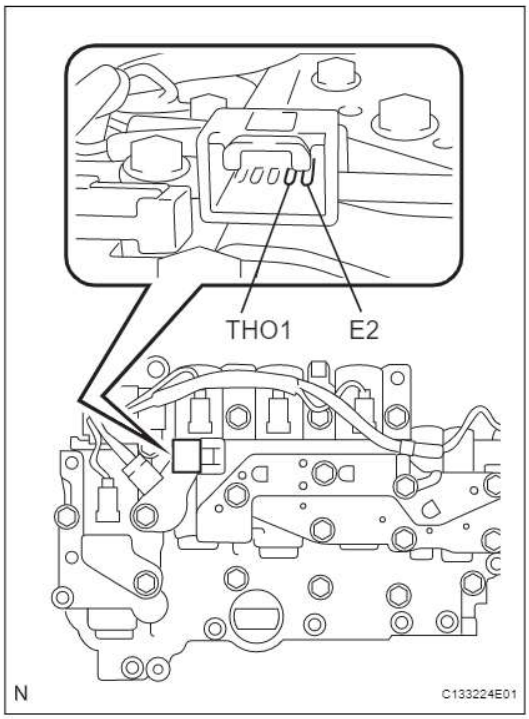
ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

OK → REPLACE TCM

NG

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2	INSPECT ATF TEMPERATURE SENSOR



(a) Disconnect the ATF temperature sensor connector from the transmission wire.

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

Standard resistance

Tester Connection	Specified Condition
E2 - THO1	90 Ω to 156 kΩ
E2 - Body ground	10 kΩ or higher
THO1 - Body ground	10 kΩ or higher

HINT:
If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK

REPLACE TRANSMISSION WIRE

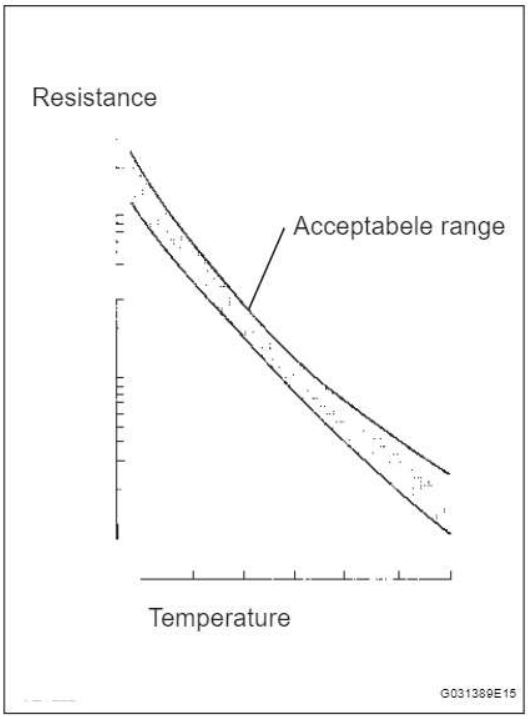
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DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance

DESCRIPTION

AX

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value for use by the TCM.



The TCM applies a voltage to the temperature sensor through terminal OIL of the TCM.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The TCM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0711	Both (a) and (b) are detected: (2-trip detection logic) (a) Intake air and engine coolant temps. are more than -10°C (14°F) at engine start. (b) After normal driving for over 16 min. and 40 sec. and 5 mile (8 km) or more, ATF temp. is less than 20°C (68°F)	Transmission wire (ATF temperature sensor)

MONITOR DESCRIPTION

This DTC indicates that there is a problem with output signals from the automatic transmission fluid (ATF) temperature sensor (TFT sensor) and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the TCM determines the ATF temperature and detects an open or short 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 TCM interprets this as a fault, and turns on the MIL.

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MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	3 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
TFT (Transmission fluid temperature) sensor circuit	Circuit is not malfunctioning
ECT (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
IAT (Intake air temperature) sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning
Time after engine start	16 min. and 40 sec. or more
ECT (Engine coolant temperature)	Above -15°C (5°F)

Condition A:

Time after engine start	18 min. and 20 sec.
Driving distance after engine start	5 miles (8 km) or more
IAT (12 sec. after engine start)	Above -10°C (14°F)
ECT (12 sec. after engine start)	Above -10°C (14°F)
Accumulated driving time *1	200 sec. or more
*1: Following conditions are met	
Engine speed - Turbine speed	50 rpm or more
Output speed	400 rpm or more
Throttle valve opening angle	3% or more
TFT (Transmission fluid temperature)	Less than 20°C (68°F)
Shift position	Not "N" or "P"

Condition B:

Time after engine start	30 min.
Driving distance after engine start	9.3 miles (15 km)
IAT (12 sec. after engine start)	-15°C (5°F) or more
ECT (12 sec. after engine start)	-15°C (5°F) or more
TFT (Transmission fluid temperature)	Less than 20°C (68°F)
Accumulated driving time *1	400 sec. or more

Condition C:

Time after engine start	40 min.
Driving distance after engine start	12.4 miles (20 km)
TFT (Transmission fluid temperature)	Less than 20°C (68°F)

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Accumulated driving time *1	550 sec. or more

Condition D:

Time after ECT reaches 60°C (140°F)	10 sec. or more
TFT (12 sec. after engine start)	110°C (230°F) or more
ECT (12 sec. after engine start)	35°C (95°F) or less

AX

TYPICAL MALFUNCTION THRESHOLDS

Condition A, B and C:

TFT	Less than 20°C (68°F) (THO = -10°C (14°F) at engine start) (Conditions vary with THO at engine)

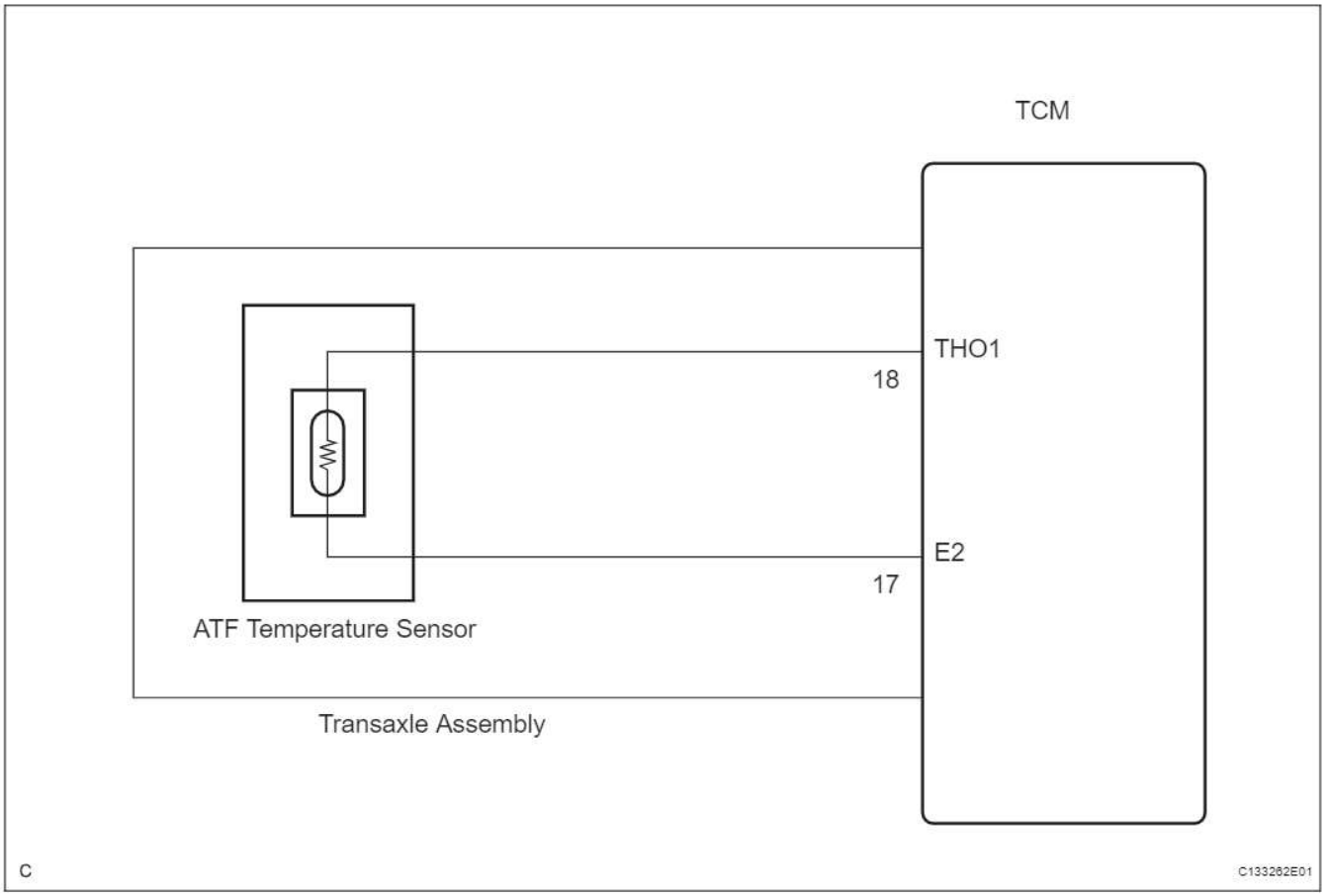
Condition D:

TFT	110°C (230°F) or more

COMPONENT OPERATING RANGE

TFT	Atmospheric temperature - approx. 130°C (266°F)

WIRING DIAGRAM



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INSPECTION PROCEDURE

1. DATA LIST

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save 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.

(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 on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
AT OIL TEMP1	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	• After Stall Test; Approx. 80°C (176°F) • Equal to ambient temperature when cold soak

HINT:

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

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

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

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

HINT:

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 seconds). When P0713 is set, P0711 cannot be detected.

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 the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the the intelligent tester on.
(c) Select the items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

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

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

B → GO TO DTC CHART

AX

A

2 CHECK TRANSMISSION FLUID LEVEL

(a) Check the transmission fluid level (See page AX-164).

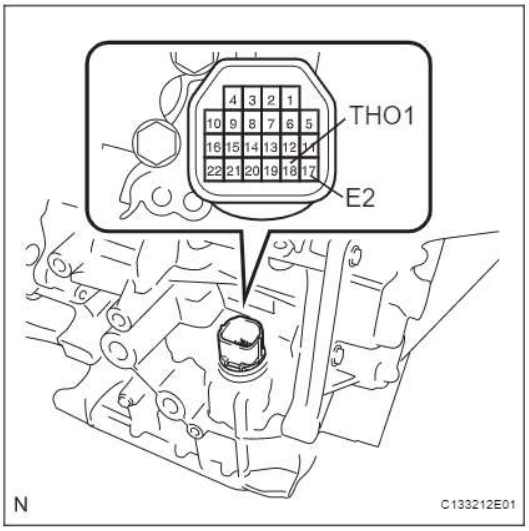
OK:

Automatic transmission fluid level is correct.

NG → ADD FLUID

OK

3 INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
17 (E2) - 18 (THO1)	90 Ω to 156 kΩ
17 (E2) - Body ground	10 kΩ or higher
18 (THO1) - Body ground	10 kΩ or higher

HINT:
If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

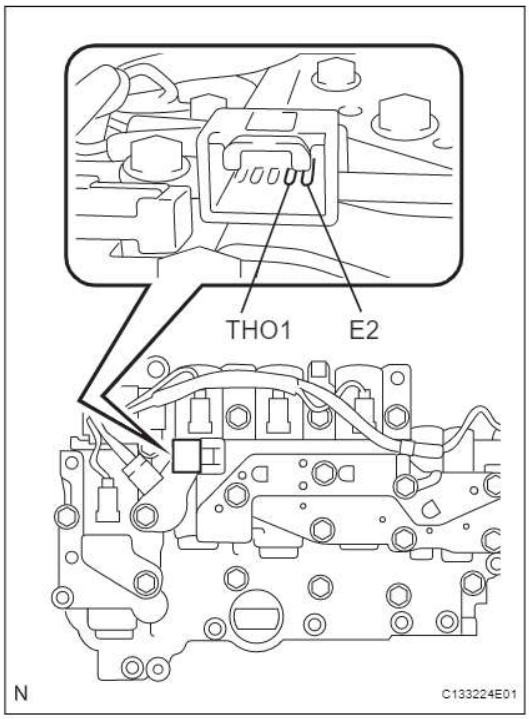
ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

OK → REPLACE TCM

NG

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4	CHECK ATF TEMPERATURE SENSOR



(a) Disconnect the ATF temperature sensor connector from the transmission wire.

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

Standard resistance

Tester Connection	Specified Condition
E2 - THO1	90 Ω to 156 kΩ
E2 - Body ground	10 kΩ or higher
THO1 - Body ground	10 kΩ or higher

HINT:
If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

NG → REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

OK → REPLACE TRANSMISSION WIRE

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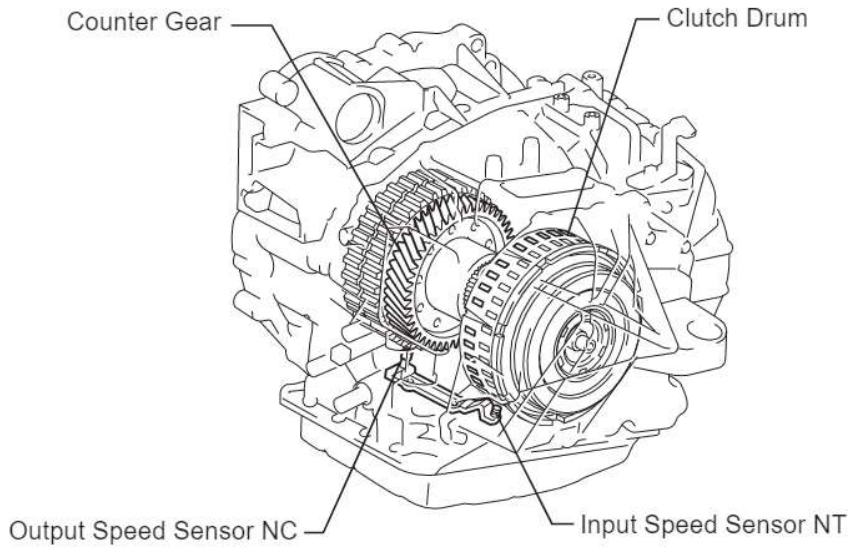
DTC	P0715	Input / Turbine Speed Sensor Circuit Malfunction

DTC	P0717	Input Speed Sensor Circuit No Signal

AX

SYSTEM DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input revolution of transaxle. By comparing the input turbine speed signal (NT) with the counter gear speed sensor signal (NC), the TCM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions, thus, providing smooth gear shift.



DTC No.	DTC Detection Condition	Trouble Area
P0715	When the speed sensor input voltage is either more than 1.9 V or less than 0.1 V for 4.5 seconds or more.	• Transmission revolution sensor (speed sensor NT) • TCM
P0717	ECM detects conditions (a), (b) and (c) continuously for 5 sec. or more: (1-trip detection logic) (a) Vehicle speed: 31 mph (50 km/h) or more (b) Park/neutral position switch (STAR and R) is OFF (c) Speed sensor (NT): less than 300 rpm	

MONITOR DESCRIPTION

The NT terminal of the TCM detects a revolution signal from the speed sensor (NT) (input RPM). The TCM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).
While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the input shaft revolution is less than 300 rpm *1although the output shaft revolution is more than 1,000 rpm *2, the TCM interprets this as a fault, 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: Speed sensor (NT)/Verify pulse input

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Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0715:

Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0717:

The monitor will run whenever this DTC is not present.	P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Shift change	Shift change is completed before starting next shift change operation
TCM selected gear	2nd, 3rd, 4th, 5th or 6th
Output shaft rpm	1,000 rpm or more
STAR switch	OFF
R switch	OFF
Engine	Running
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0715:

Sensor voltage	Less than 0.1 V or more than 1.9 V

P0717:

Sensor signal rpm	Less than 300 rpm

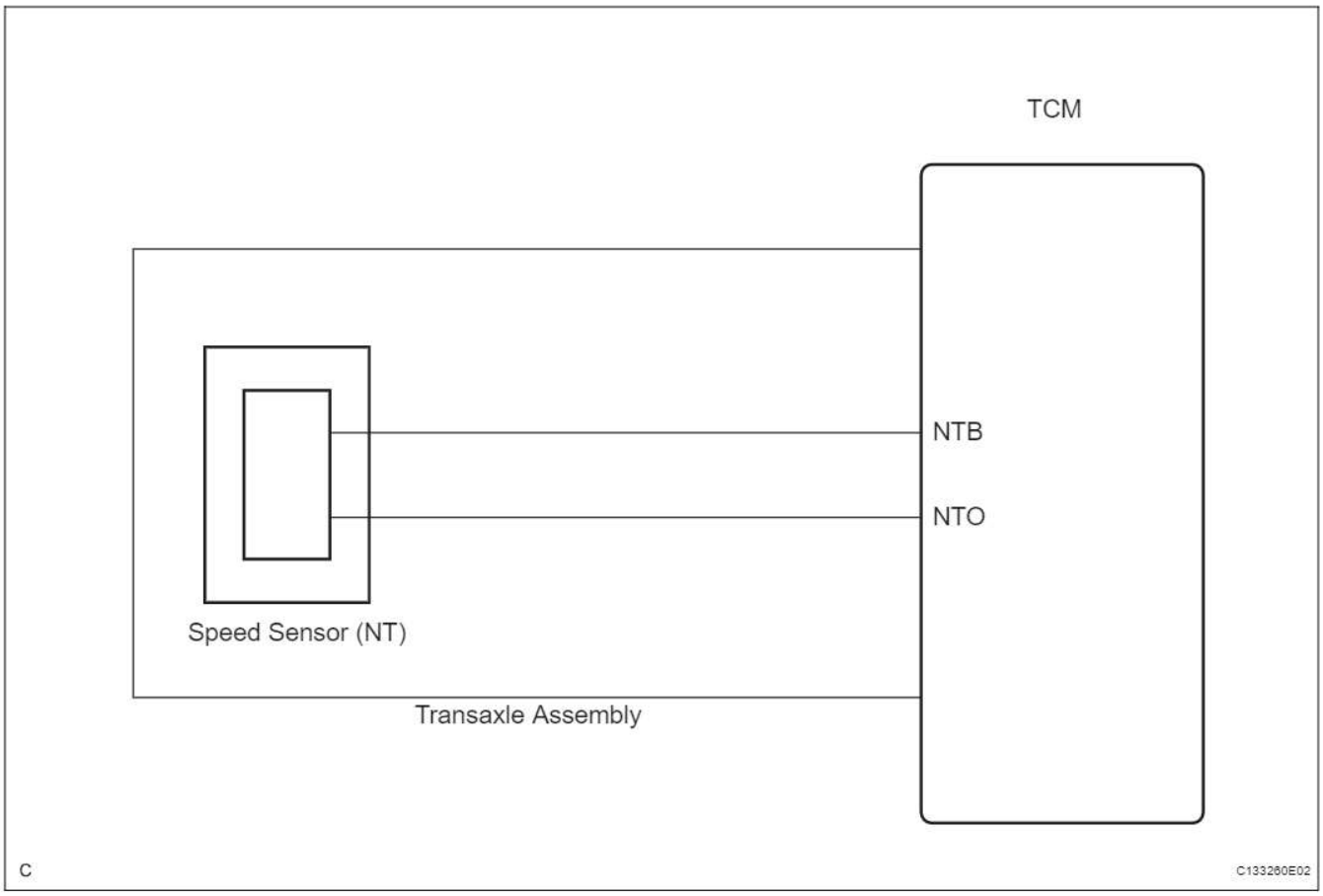
COMPONENT OPERATING RANGE

Speed sensor (NT)	Turbine speed is equal to engine speed with lock-up ON

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AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

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.

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

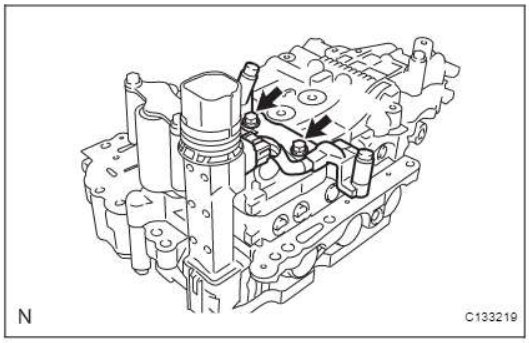
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NT)	Input Turbine Speed/display: 50 r/min	HINT: • Lock-up ON (after warming up the engine); input turbine speed (NT) is equal to the engine speed. • Lock-up OFF (Idling at N position); input turbine speed (NT) is nearly equal to the engine speed.

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

1 INSPECT SPEED SENSOR (SENSOR INSTALLATION)

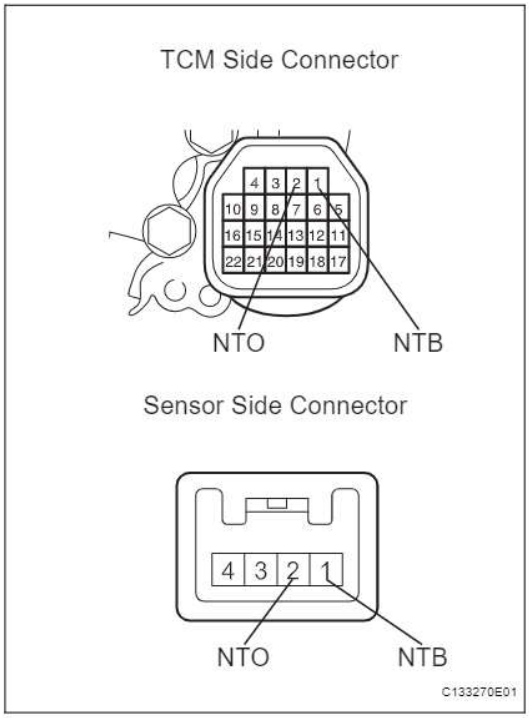


(a) Make sure that the connector is properly connected, and check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **REPAIR OR REPLACE SPEED SENSOR**

OK

2 CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the speed sensor connector from the transmission wire.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Condition	Specified Condition
NTO - NTO	Below 1 Ω
NTB - NTB	Below 1 Ω
NTO - NTB	10 kΩ or higher

NG → **REPLACE TRANSMISSION WIRE**

OK

3 REPLACE SPEED SENSOR

NEXT

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AX

4	CHECK IF DTC OUTPUT RECURS (SEE IF DTC P0715 AND/OR P0717 OUTPUT AGAIN)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester main switch ON.
(c) Perform the monitor drive pattern (See page AX-27)
(d) When you use the intelligent tester:
Select the item "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(e) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0715 or P0717" is output	A
No output	B

B → END

A

REPLACE TCM

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DTC	P0724	Brake Switch "B" Circuit High

DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in lock-up condition when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to the TCM. Then the TCM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	The stop light switch remains ON even when the vehicle is driven in a STOP (less than 2 mph (3 km/h)) and GO (19 mph (30 km/h) or more) fashion 5 times. (2-trip detection logic).	• Short in stop light switch signal circuit • Stop light switch • TCM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains ON. When the stop light switch remains ON during "stop and go" driving, the TCM interprets this as a fault in the stop light switch, illuminates the MIL, and stores the DTC. The vehicle must stop (less than 2 mph (3 km/h)) and go (19 mph (30 km/h) or more) five times for two consecutive driving cycles in order to set this DTC.

MONITOR STRATEGY

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

TYPICAL ENABLING CONDITIONS

The stop light switch remains ON during GO and STOP 10 times.
GO and STOP are defined as follows;

The monitor will run whenever this DTC is not present.	None
GO: (Vehicle speed is 18.63 mph (30 km/h) or more)	18.7 mph (30 km/h) or more
STOP: (Vehicle speed is less than 1.86 mph (3 km/h))	Less than 1.86 mph (3 km/h)
Starter	OFF
Battery voltage	8 V or more
Ignition switch	ON

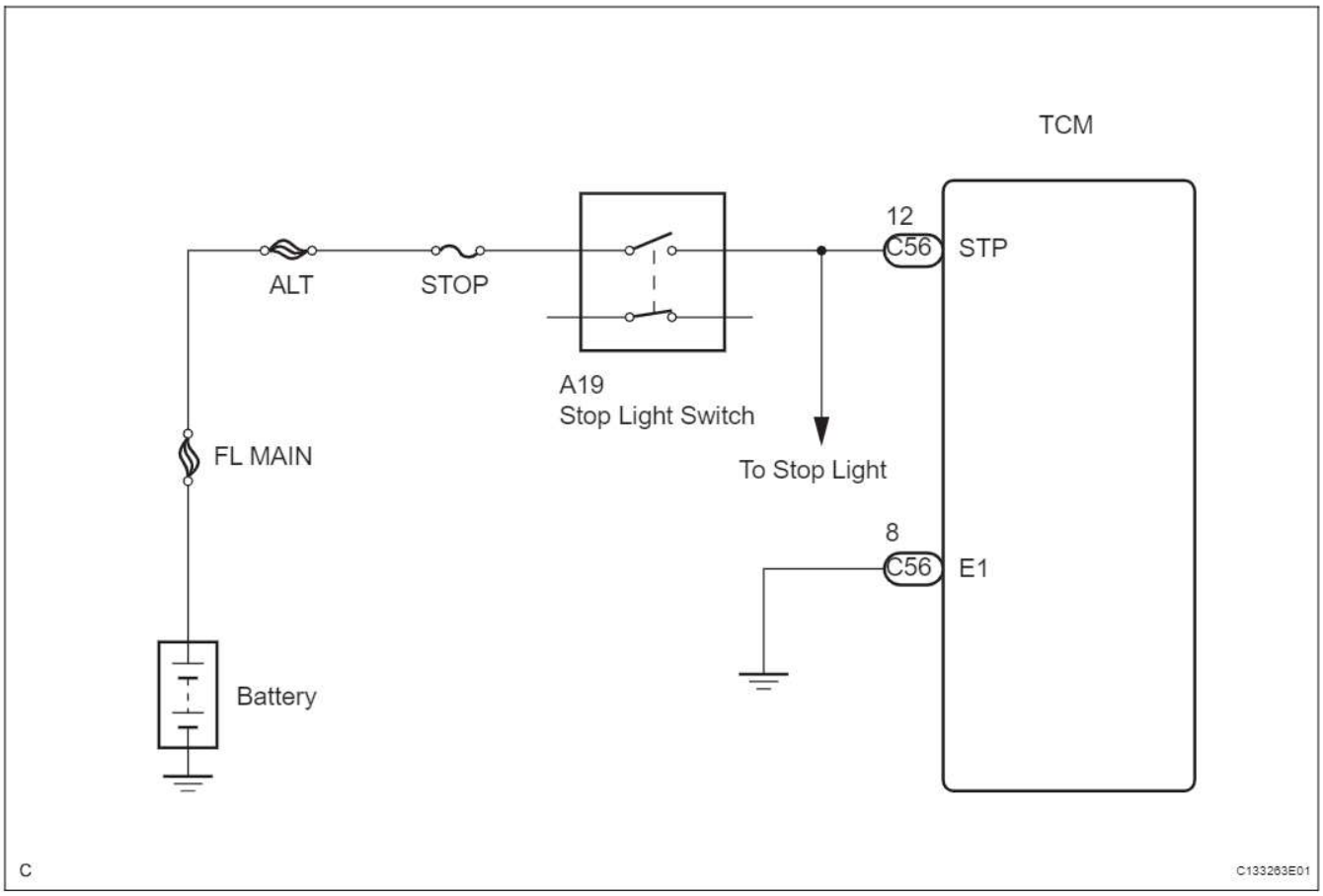
TYPICAL MALFUNCTION THRESHOLDS

Switch status	ON stuck

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AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (STP SIGNAL)

HINT:
According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save 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 on (IG).
(d) Turn on the tester.
(e) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(f) According to the display on the tester, read "DATA LIST".

Standard

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

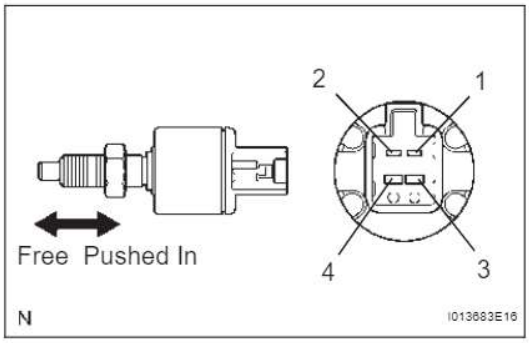
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NOTICE:
In the table above, the conditions listed under "Normal Condition" are reference conditions. Do not depend solely on these reference conditions when deciding whether a part is faulty.

OK → **Go to step 3**

NG

2 INSPECT STOP LIGHT SWITCH ASSEMBLY



(a) Remove the stop light switch assembly.
(b) Measure the resistance according to the value(s) in the table below.

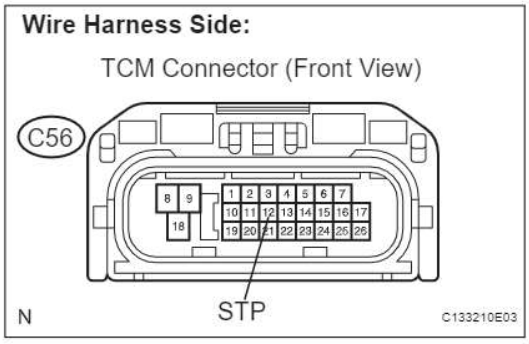
Standard resistance

Switch Position	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1 Ω

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

3 CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - TCM)



(a) Install the stop light switch assembly.
(b) Disconnect the TCM connector.
(c) Measure the voltage according to the value(s) in the table below when the brake pedal is depressed and released.

Standard voltage

Condition	Tester Connection	Specified Condition
Brake pedal is depressed	C56-12 (STP) - Body ground	10 to 14 V
Brake pedal is released	C56-12 (STP) - Body ground	Below 1 V

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

OK

REPLACE TCM

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DTC	P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)

SYSTEM DESCRIPTION

AX

The TCM uses signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, intermediate (counter) speed sensor and crankshaft position sensor to help determine the engagement timing of the lock-up clutch. The TCM monitors the engagement of the clutch using the turbine (input) speed sensor, intermediate (counter) speed sensor and crankshaft position sensor.
Then the TCM compares the engagement condition of the lock-up clutch with the lock-up schedule in the TCM memory to detect shift solenoid valve SL, valve body and torque converter clutch mechanical problems.

DTC No.	DTC Detection Condition	Trouble Area
P0741	When both of the following are detected (2-trip detection logic): • Lock-up does not occur when requested. • Transmission fluid pressure switch No. 3 is ON.	• Shift solenoid valve SL remains closed • Valve body is blocked • Torque converter clutch • Automatic transaxle (clutch, brake or gear etc.) • Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the TCM based on the speed sensor (NT), speed sensor (NC), engine rpm, engine load, engine temperature, vehicle speed, transmission fluid temperature, and gear selection. The TCM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The TCM calculates the actual transmission gear by comparing the input turbine rpm (NT) to the counter gear rpm (NC). When conditions are appropriate, the TCM requests "lock-up" by applying control voltage to the shift solenoid SL. When the SL is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.
If the TCM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the TCM interprets this as a fault in the shift solenoid valve SL or lock-up system performance. The TCM will turn on the MIL and store the DTC.
HINT:
Example:
When any of the following is met, the system judges it as a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up.
  (Engine speed is at least 70 rpm greater than the input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up off.
  (The difference between the engine speed and input turbine speed is less than 20 rpm.)

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve SL OFF malfunction Shift solenoid valve SL ON malfunction
Required sensors/Components	Shift solenoid valve SL, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE), Throttle position sensor (VPA1), Mass air flow sensor (MAF), Transmission temperature sensor (THO1), Engine coolant temperature sensor (ECT)
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec.
MIL operation	2 driving cycles
Sequence of operation	None

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TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	40°C (104°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-10°C (-14°F) or more
TFT sensor circuit	No circuit malfunction
ECT sensor circuit	No circuit malfunction
Turbine speed sensor circuit	No circuit malfunction
Intermediate shaft speed sensor circuit	No circuit malfunction
Torque converter clutch circuit	No circuit malfunction
Knock control sensor circuit	No circuit malfunction
Shift solenoid valve SL1 circuit	No circuit malfunction
Shift solenoid valve SL2 circuit	No circuit malfunction
Shift solenoid valve SL3 circuit	No circuit malfunction
Shift solenoid valve SL4 circuit	No circuit malfunction
Shift solenoid valve SLU circuit	No circuit malfunction
CAN communication circuit	No circuit malfunction
Electronic throttle system	No circuit malfunction
TCM selected gear	No 1st
Vehicle speed	15.5 miles (25 km)
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction:

Following conditions are met	(a) and (b)
(a) Engine Speed - Turbine speed	70 rpm or more
(b) Transmission fluid pressure switch	ON

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and so on to operate without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

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

1. **PERFORM ACTIVE TEST**
   (a) Warm up the engine.
   (b) Turn the ignition switch off.
   (c) Connect the intelligent tester to the DLC3.
   (d) Turn the ignition switch on (IG).
   (e) Turn the intelligent tester on.
   (f) When using the intelligent tester:
   Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".

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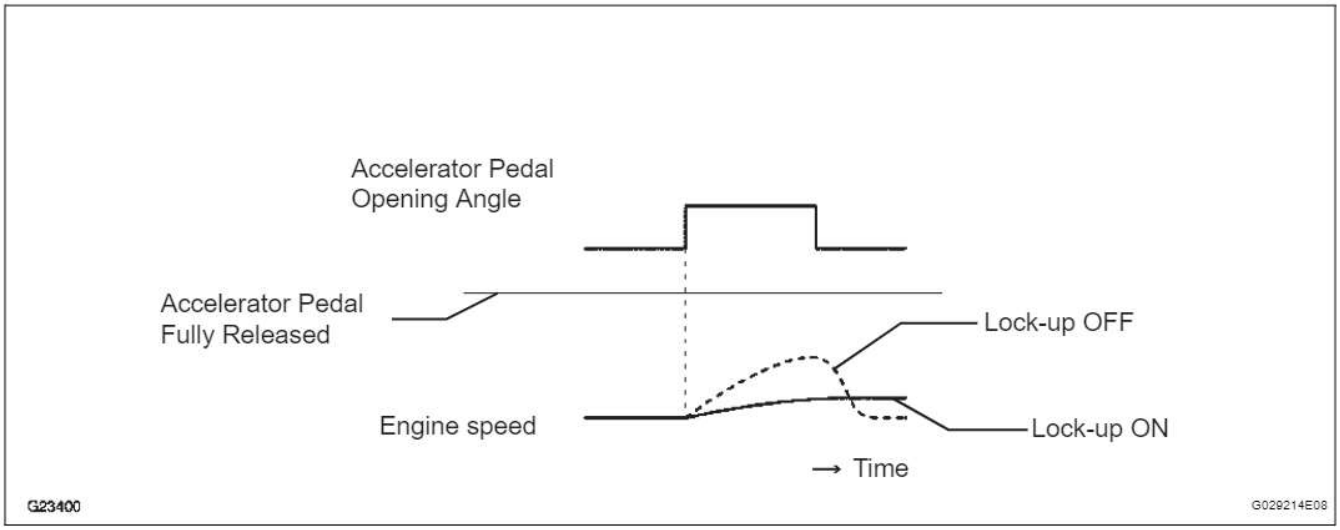
(g) According to the display on the tester, perform "ACTIVE TEST".

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid SL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 37 mph (60km/h) or more	Possible to check the SL operation.

AX

HINT:
- This test can be conducted when the vehicle speed is 37 mph (60km/h) or more.
- This test can be conducted in the 5th 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 release, but not fully, 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 P0741)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

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

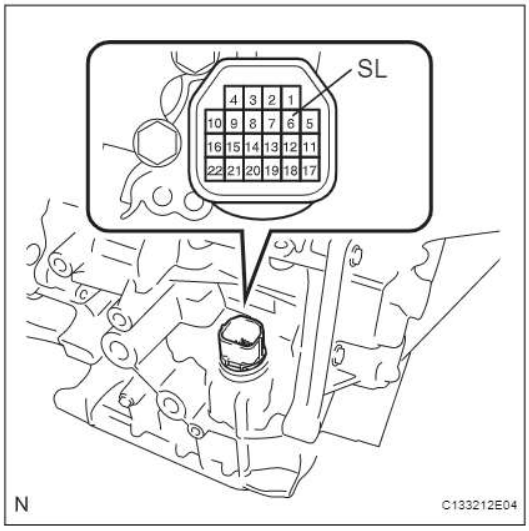
HINT:
If any other codes besides "P0741" are output, perform the troubleshooting for those DTCs first.

B	GO TO DTC CHART

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A

2 CHECK TRANSMISSION WIRE



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

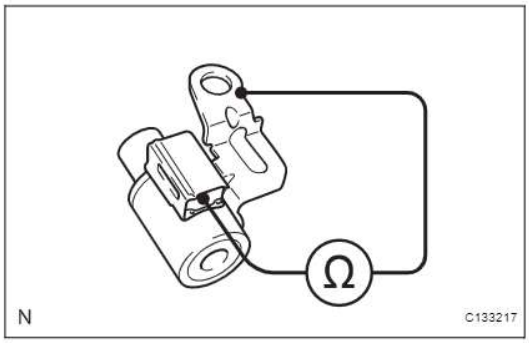
Standard resistance

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

OK → Go to step 4

NG

3 CHECK SHIFT SOLENOID VALVE SL (RESISTANCE)



(a) Remove the shift solenoid valve SL.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

NG → REPLACE SHIFT SOLENOID VALVE SL

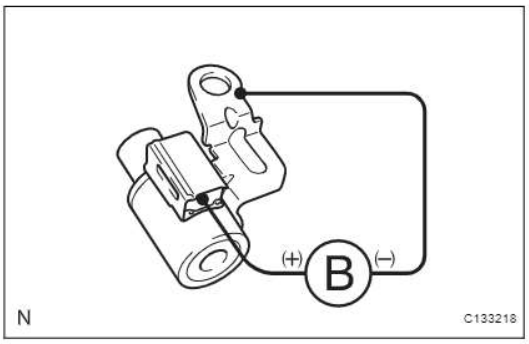
OK

REPLACE TRANSMISSION WIRE

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AX

4	CHECK SHIFT SOLENOID VALVE SL (OPERATION)



(a) Remove the shift solenoid valve SL.
(b) Connect a positive (+) lead to the terminal of the solenoid connector, and a negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SL**

OK

5	CHECK TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPLACE TRANSMISSION WIRE**

OK

6	CHECK TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

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

SYSTEM DESCRIPTION

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).
Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0746	The engine revs freely when 1st, 2nd, 3rd, or 4th gear is requested (2-trip detection logic). When either of the following is detected twice (2-trip detection logic): • When 5th gear is requested, 4th gear is engaged. • When 6th gear is requested, 4th gear is engaged	• Shift solenoid valve SL1 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0746: Shift solenoid valve SL1 OFF malfunction Shift solenoid valve SL1 ON malfunction
Required sensors/Components	Shift solenoid valve SL1, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	ON malfunction: 0.8 sec. OFF malfunction: 0.5 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	Above -10°C (14°F)
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
CAN communication circuit	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning

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OFF malfunction:

TCM selected gear	1st, 2nd, 3rd or 4th
TCM indicated pressure value of SL1	1,200 kPa
Throttle valve opening angle	3% or more

ON malfunction:

TCM selected gear	5th or 6th
Vehicle speed	1.2 mph (2 km/h) or more
ETC (Engine coolant temperature)	40°C (104°F) or more
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction:

Turbine speed - Output speed x Gear ratio	1,000 or more

ON malfunction:

Input (turbine) speed/Intermediate shaft speed when output speed less than 1,000 rpm	0.998 to 1.138

INSPECTION PROCEDURE

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

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

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

HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A → **Go to step 3**

B

2	PERFORM ACTIVE TEST BY SHIFT

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

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".

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HINT:
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables confirmation of the problem (See page AX-39).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.

(d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:
- *1: Neutral

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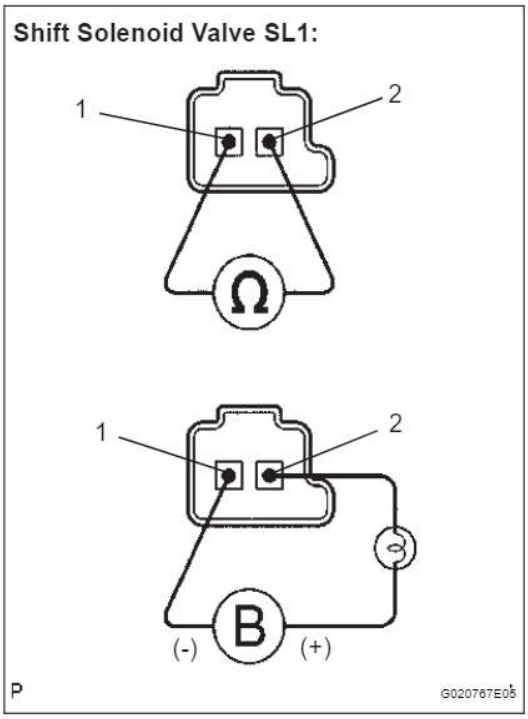
AX

- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

B	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)
C	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)
D	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)
E	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)

A

3 INSPECT SHIFT SOLENOID VALVE (SL1)



(a) Remove the shift solenoid valve SL1.

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

Standard resistance

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

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG	REPLACE SHIFT SOLENOID VALVE (SL1)

OK

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4	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:
There are no foreign objects on each valve and they operate smoothly.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

5	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

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

DESCRIPTION

AX

Shifting from 1st to 6th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, SL4 and SL which is controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page AX-39).

DTC No.	DTC Detection Condition	Trouble Area
P0748	The TCM checks for an open or short in the shift solenoid valve SL1 circuit while driving and shifting between 4th and 5th gears. (1-trip detection logic) • Output signal duty equals 100%. (NOTE: SL1 output signal duty is less than 100% under normal condition.)	• Open or short in shift solenoid valve SL1 circuit • Shift solenoid valve SL1 • TCM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL1 circuit. The TCM causes gear shifts to occur by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. The TCM also performs the fail-safe function and turns the other normal shift solenoid valves on or off. (In case of an open or short circuit, the TCM stops sending current to the circuit.)
While driving and shifting between 4th and 5th gears, if the TCM detects an open or short in the shift solenoid valve SL1 circuit, the TCM determines there is a malfunction (See page AX-39).

MONITOR STRATEGY

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

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

Malfunction (B):

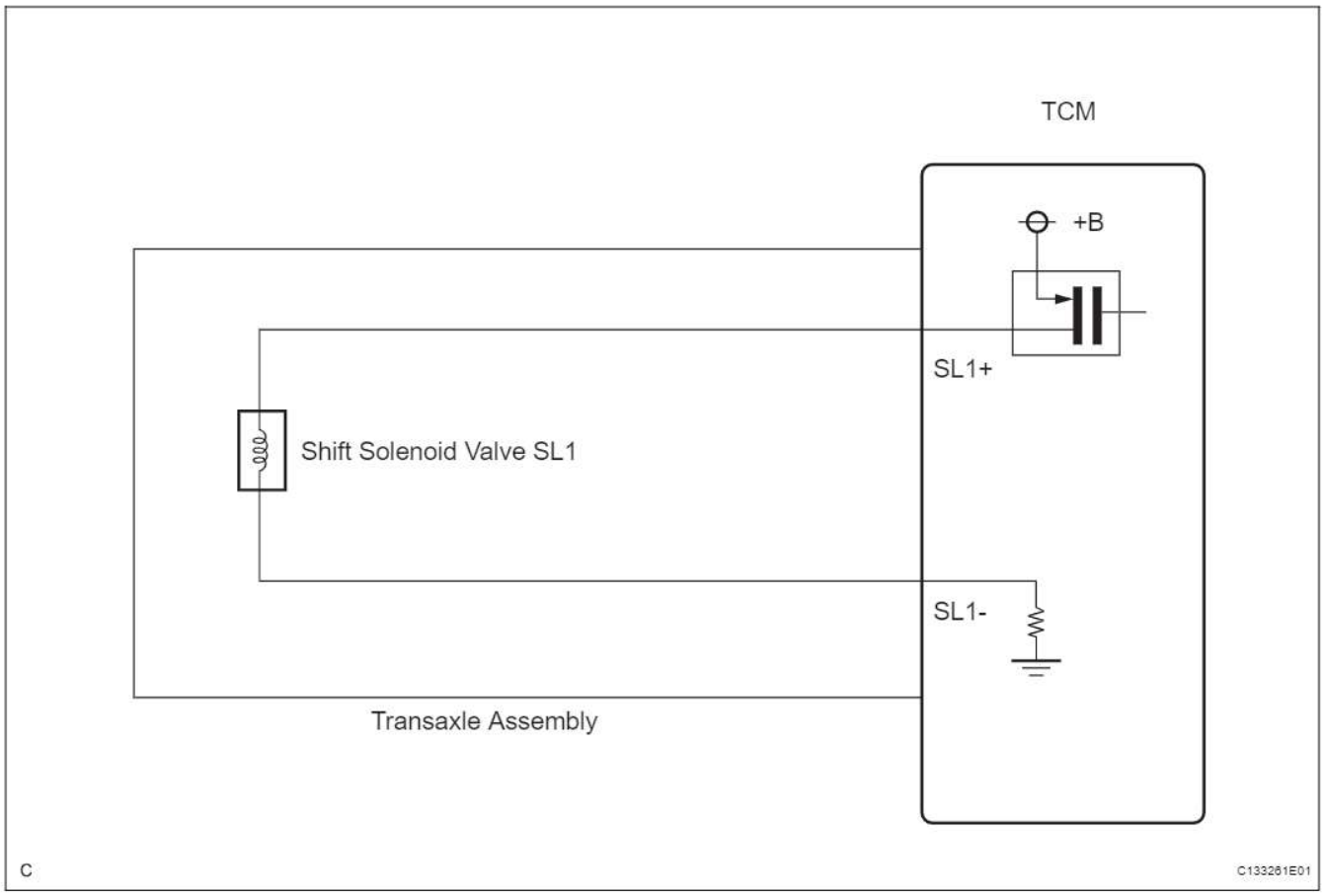
Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more

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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

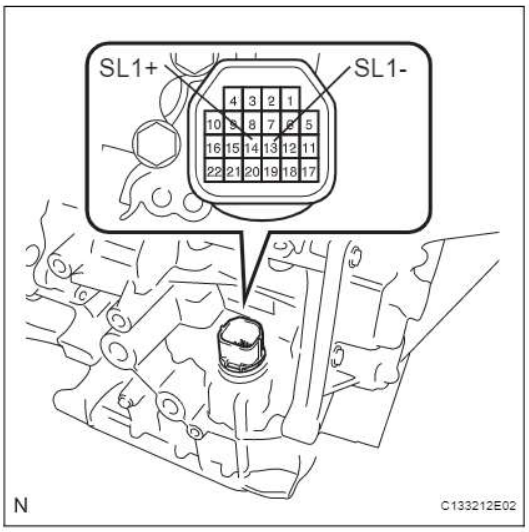
The shift solenoid valve SL1 is turned on or off automatically normally when the shift lever is in the D position:

TCM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL1	ON	ON	ON	ON	OFF	OFF

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AX

1 INSPECT TRANSMISSION WIRE (SL1)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
14 (SL1+) - 13 (SL1-)	5.0 to 5.6 Ω

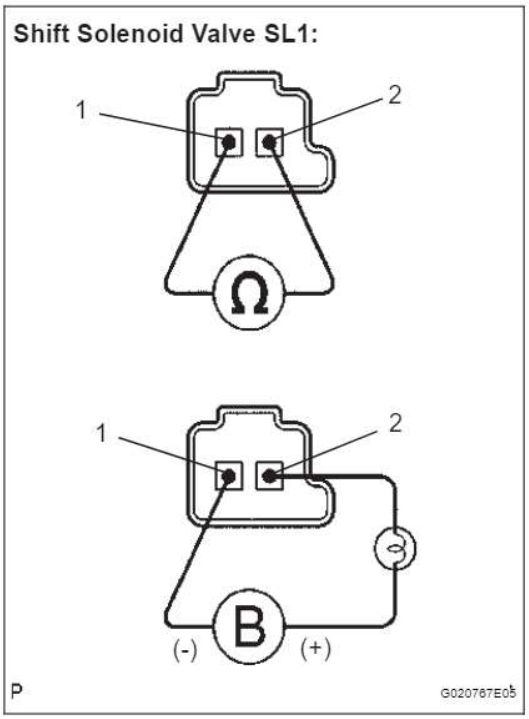
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

Tester Connection	Specified Condition
14 (SL1+) - Body ground	10 kΩ or higher
13 (SL1-) - Body ground	10 kΩ or higher

OK → REPLACE TCM

NG

2 INSPECT SHIFT SOLENOID VALVE SL1



(a) Remove the shift solenoid valve SL1.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

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

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

NG → REPLACE SHIFT SOLENOID VALVE SL1

OK

REPLACE TRANSMISSION WIRE

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

SYSTEM DESCRIPTION

The TCM uses the vehicle speed signal to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).
Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P0776	The engine revs freely when 4th, 5th, or 6th gear is requested (2-trip detection logic). When any of the following is detected twice (2-trip detection logic): • When 1st gear is requested, 4th gear is engaged. • When 2nd gear is requested, 4th gear is engaged. • When 3rd gear is requested, 4th gear is engaged.	• Shift solenoid valve SL2 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776: Shift solenoid valve SL2/OFF malfunction Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Shift solenoid valve SL2, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction 0.5 sec. ON malfunction 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	Above -10°C (-14°F)
Knock control sensor circuit	Circuit is not malfunctioning
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning

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CAN communication system	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning

OFF malfunction:

TCM selected gear	4th, 5th or 6th
TCM indicated pressure value of SL2	1,200 kPa
Throttle valve opening angle	3% or more

ON malfunction (A):

TCM selected gear	1st
Vehicle speed	1.2 mph (2 km/h) to 25 mph (40 km/h)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	Above 40°C (104°F)
Engine speed - Turbine speed	50 rpm or more

ON malfunction (B):

TCM selected gear	2nd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	Above 40°C (104°F)

ON malfunction (C):

TCM selected gear	3rd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	Above 40°C (104°F)
ECT (Engine coolant temperature)	40°C (104°F) or more

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction:

Input (turbine) speed-Intermediate shaft speed x Gear ratio	1,000 rpm or more

ON malfunction:

Input (turbine) speed/Intermediate shaft speed when output speed less than 1,000 rpm	0.998 to 1.138

INSPECTION PROCEDURE

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

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

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

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HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A	Go to step 3

B

AX

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

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

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
HINT:
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables confirm of the problem (See page AX-39).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.

(d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.
HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(e) Compare the TCM gear shift command and the actual gear position.

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AX

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:

- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)

C → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)

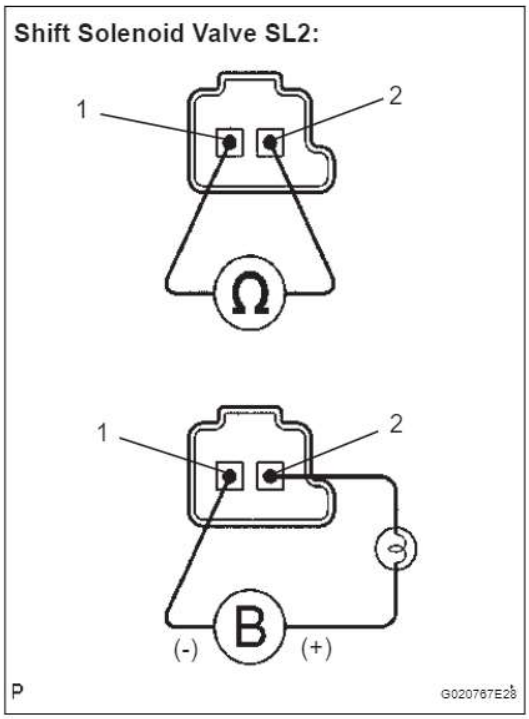
D → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)

E → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)

B

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3	INSPECT SHIFT SOLENOID VALVE (SL2)



(a) Remove the shift solenoid valve SL2.

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

Standard resistance

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

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE (SL2)**

OK

4	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

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

OK

5	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

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

DESCRIPTION

AX

Shifting from 1st to 6th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, SL4 and SL which is controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (See page AX-39).

DTC No.	DTC Detection Condition	Trouble Area
P0778	The TCM checks for an open or short in the shift solenoid valve SL2 circuit while driving and shifting gears. (1-trip detection logic) • Output signal duty equals to 100%. (NOTE: SL2 output signal duty is less than 100% under normal condition.)	• Open or short in shift solenoid valve SL2 circuit • Shift solenoid valve SL2 • TCM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL2 circuit. The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any of the shift solenoid valve circuits, the TCM detects the problem and illuminates the MIL and stores the DTC. The TCM also performs the fail-safe function and turns the other normal shift solenoid valves on or off. (In case of an open or short circuit, the TCM stops sending current to the circuit.)
While driving and shifting gears, if the TCM detects an open or short in the shift solenoid valve SL2 circuit, the TCM determines there is a malfunction (See page AX-39).

MONITOR STRATEGY

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

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

Malfunction (B):

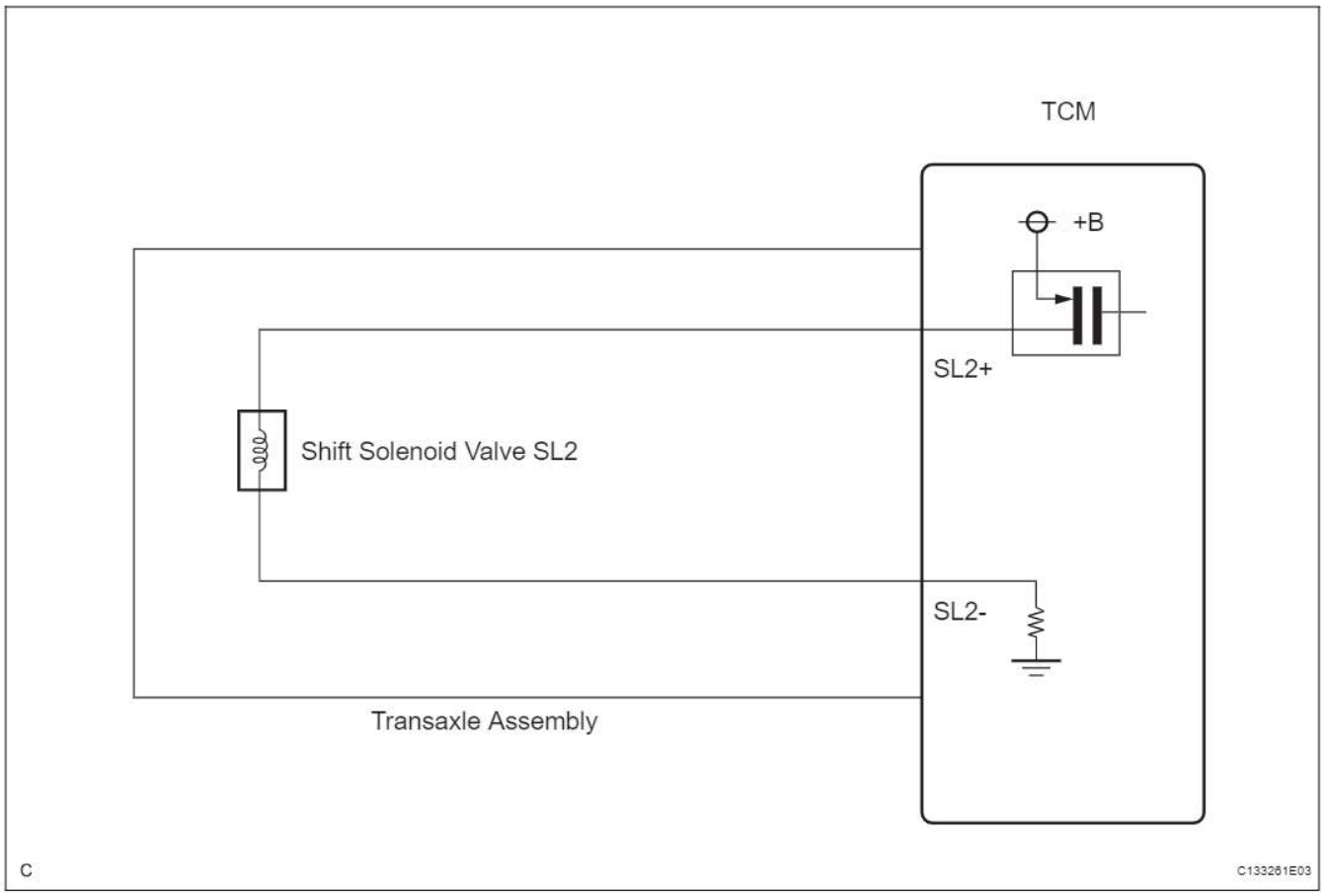
Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more

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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

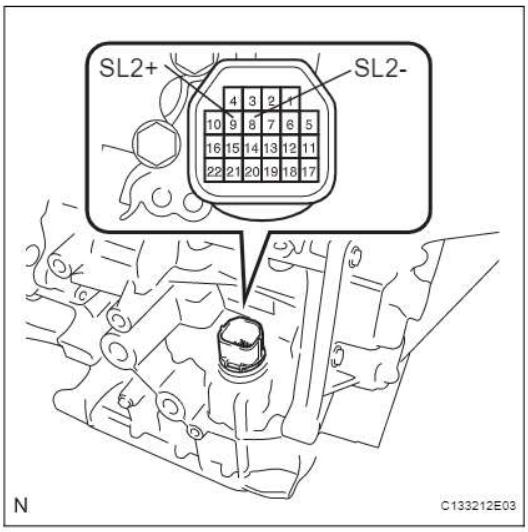
The shift solenoid valve SL2 is turned on or off automatically when the shift lever is in the D position:

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

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AX

1 INSPECT TRANSMISSION WIRE (SL2)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
9 (SL2+) - 8 (SL2-)	5.0 to 5.6 Ω

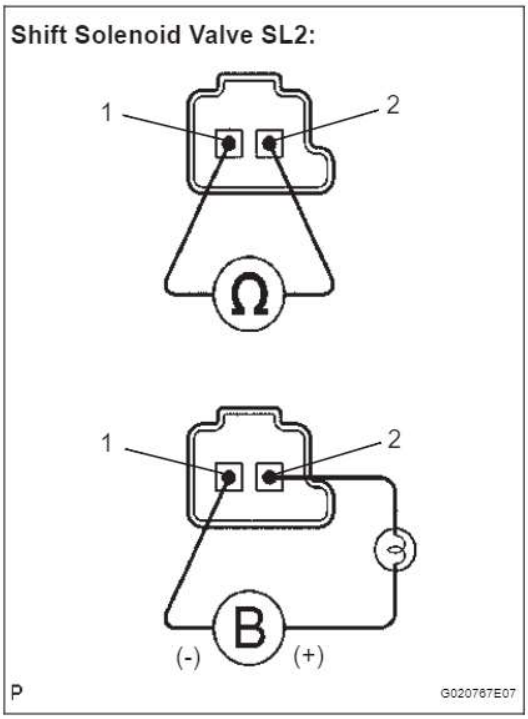
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

Tester Connection	Specified Condition
9 (SL2+) - Body ground	10 kΩ or higher
8 (SL2-) - Body ground	10 kΩ or higher

OK → REPLACE TCM

NG

2 INSPECT SHIFT SOLENOID SL2



(a) Remove the shift solenoid valve SL2.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

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

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

NG → REPLACE SHIFT SOLENOID SL2

OK

REPAIR OR REPLACE TRANSMISSION WIRE

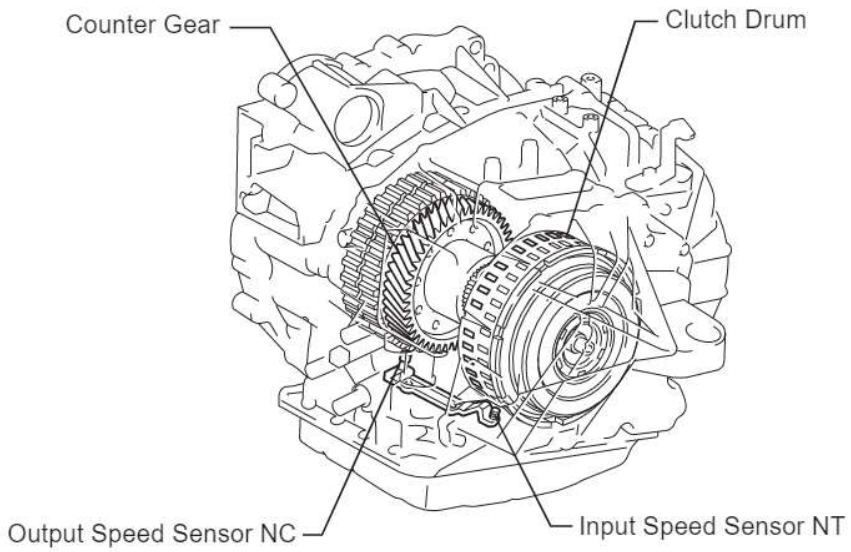
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DTC	P0791	Intermediate Shaft Speed Sensor "A" Circuit

DTC	P0793	Intermediate Shaft Speed Sensor "A"

DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input speed of transaxle. By comparing the input turbine speed signal (NC) with the counter gear speed sensor signal (NC), the TCM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions, thus, providing smooth gear shift.



DTC No.	DTC Detection Condition	Trouble Area
P0791	When the speed sensor input voltage is either more than 1.9 V or less than 0.1 V for 2 seconds or more.	• Transmission revolution sensor (speed sensor NC) • TCM
P0793	When the vehicle speed is 15.5 mph (25 km/h) or higher, the counter gear speed is less than 300 rpm for 2 seconds or more.	

MONITOR DESCRIPTION

The NT terminal of the TCM detects a revolution signal from the speed sensor (NT) (input RPM). The TCM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).
While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the input shaft revolution is less than 300 rpm *1although the output shaft revolution is more than 1,000 rpm *2, the TCM interprets this as a fault, 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: Speed sensor (NT) /Verify pulse input
Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous

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Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Vehicle speed	15.5 mph (25 km/h) or more
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

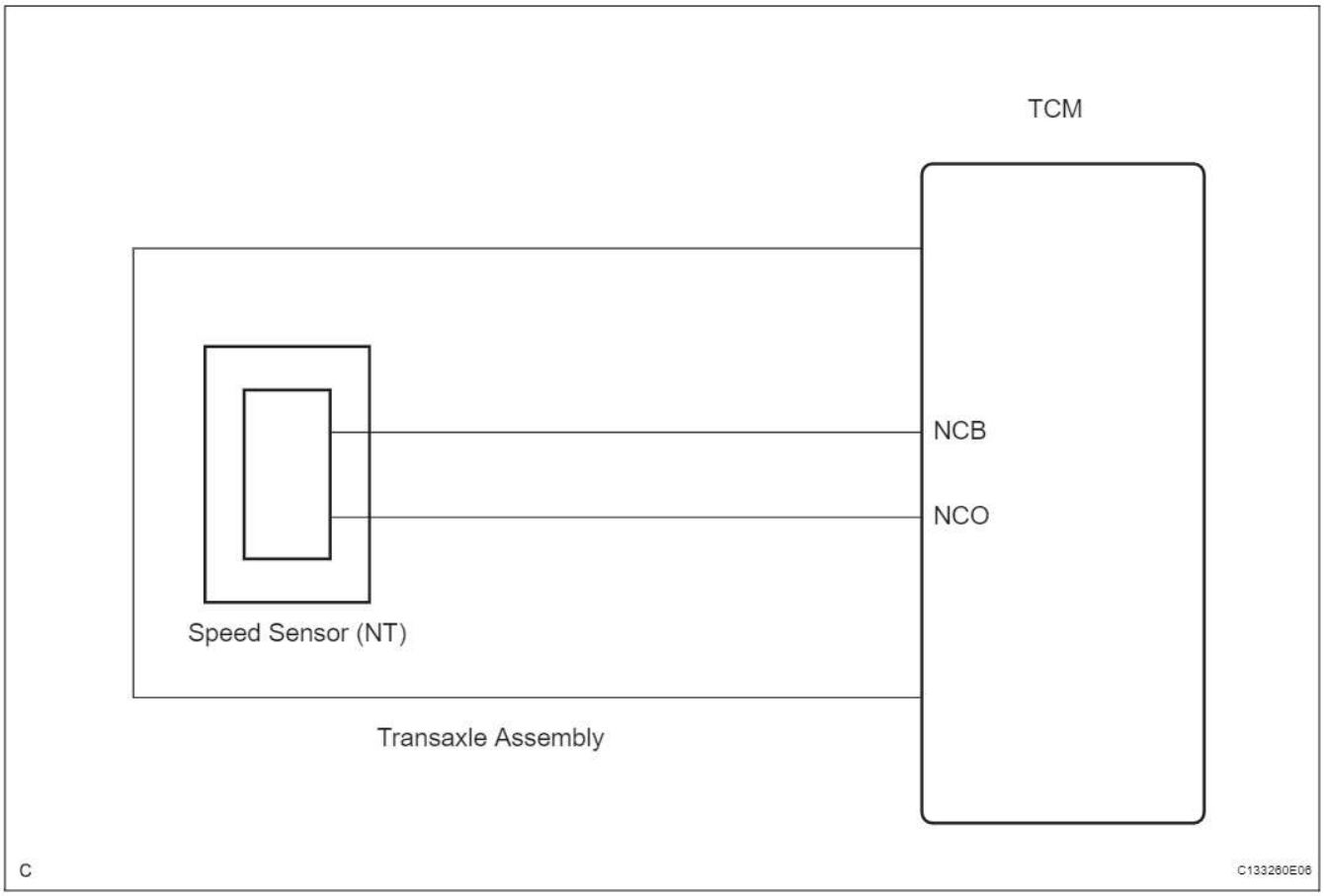
P0791:

Sensor voltage	Less than 0.1 V or more than 1.9 V

P0793:

Sensor signal rpm	Less than 300 rpm

WIRING DIAGRAM



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INSPECTION PROCEDURE

1. **DATA LIST**

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.

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

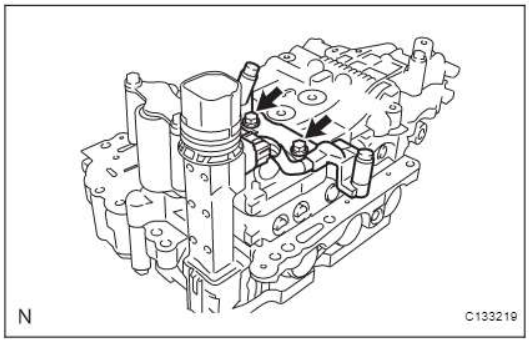
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / ENHANCED OBD / DATA LIST".
(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NC)	Counter Gear Speed/ display: 50 r/min	HINT: • Lock-up ON (after warming up the engine); input turbine speed (NC) is equal to the engine speed. • Lock-up OFF (Idling at N position); input turbine speed (NC) is nearly equal to the engine speed.

HINT:

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

1	INSPECT SPEED SENSOR (SENSOR INSTALLATION)



(a) Make sure that the connector is properly connected, and check the speed sensor installation.

OK:

The installation bolts are tightened properly and there is no clearance between the sensor and transaxle case.

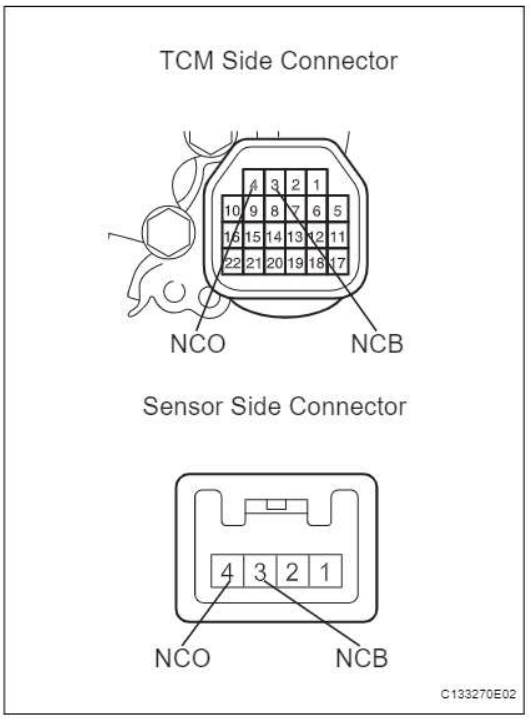
NG → **REPAIR OR REPLACE SPEED SENSOR**

OK

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AX

2	CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the speed sensor connector from the transmission wire.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
NCO - NCO	Below 1 Ω
NCB - NCB	Below 1 Ω
NCO - NCB	10 kΩ or higher

NG → REPLACE TRANSMISSION WIRE

OK

3	REPLACE SPEED SENSOR

NEXT

4	CHECK IF DTC OUTPUT RECURS (SEE IF DTC P0791 AND/OR P0793 IS OUTPUT AGAIN)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester main switch ON.
(c) Perform the monitor drive pattern (See page AX-27).
(d) When you use the intelligent tester:
Select the item "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(e) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0791 or P0793" is output	A
No outpur	B

B → END

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A

REPLACE TCM

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DTC	P0796	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)

SYSTEM DESCRIPTION

AX

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).
Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P0796	The engine revs freely when 2nd or 6th gear is requested (2-trip detection logic). When the following is detected twice (2-trip detection logic): • When 1st gear is requested, 2nd gear is engaged.	• Shift solenoid valve SL3 remains open or closed. • Valve body is blocked. • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0796: Shift solenoid valve SL3/OFF malfunction Shift solenoid valve SL3/ON malfunction
Required sensors/Components	Shift solenoid valve SL3, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) and (B) 0.5 sec. OFF malfunction (C) and (D) 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	Above -10°C (-14°F)
Knock control sensor circuit	Circuit is not malfunctioning
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning

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Electronic throttle system	Circuit is not malfunctioning

OFF malfunction (A):

TCM selected gear	2nd
Throttle valve opening angle	3% or more
TCM indicated pressure value of SL1	1,200 kPa
TCM indicated pressure value of SL2	0 kPa
TCM indicated pressure value of SL3	1,200 kPa

OFF malfunction (B):

TCM selected gear	6th
Throttle valve opening angle	3% or more
TCM indicated pressure value of SL1	0 kPa
TCM indicated pressure value of SL2	1,200 kPa
TCM indicated pressure value of SL3	1,200 kPa

OFF malfunction (C):

TCM selected gear	2nd
Throttle valve opening angle:	
(When condition "D" is not detected)	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
(When condition "D" is detected)	0.5% or more at engine speed 500 rpm (condition varies with engine speed)
ECT (engine coolant temperature)	40°C (104°F) or more

OFF malfunction (D):

Throttle valve opening angle	0.5% or more at engine speed 500 rpm (condition varies with engine speed)

ON malfunction:

TCM selected gear	1st
Vehicle speed	1.2 mph (2 km/h) or more
Engine speed - Turbine speed	50 rpm or more
ECT (engine coolant temperature)	Above 40°C (104°F)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction (A) or (B) or ((C) and (D)), or ON malfunctions

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction (A):

Turbine speed - Output speed x 2nd gear ratio	1,000 rpm or more

OFF malfunction (B):

Turbine speed - Output speed x 6th gear ratio	1,000 rpm or more

OFF malfunction (C):

Input (turbine) speed/Intermediate shaft speed	3.304 to 7.724

OFF malfunction (D):

Input (turbine) speed/Intermediate shaft speed	3.304 to 7.724

ON malfunction:

Input (turbine) speed/Intermediate shaft speed	1.901 to 2.340

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INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0796)

AX

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0796" is output	A
"P0796" and other DTCs	B

HINT:
If a solenoid is stuck OFF , DTCs for several solenoids including the malfunctioning solenoid will be detected.

A → **Go to step 3**

B

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

NOTICE:
This test should always be performed with at least 2 people.
(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
HINT:
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-39).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.
(d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

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HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:
- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)

B → GO TO DTC CHART (RELATED SHIFT SOLENOID VAVLE (SL2) PERFORMANCE DTC P0776)

D → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)

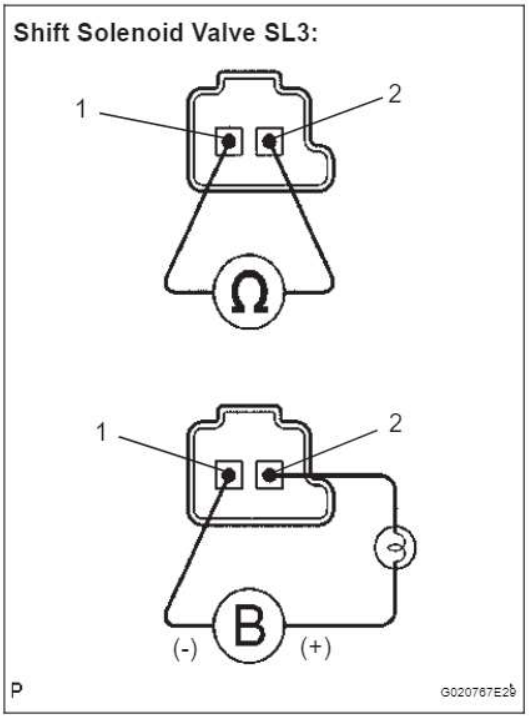
E → GO TO DTC CHART (RELATED SHIFT SOLENOID VAVLE (SLT) PERFORMANCE DTC P2714)

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C

3	INSPECT SHIFT SOLENOID VALVE (SL3)

AX



(a) Remove the shift solenoid valve SL3.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE (SL3)**

OK

4	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

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

OK

5	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

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DTC	P0798	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)

DESCRIPTION

Shifting gears from 1st through 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3 and SL4 which are controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detecting Condition	Trouble Area
P0798	The TCM checks for an open or short in the shift solenoid valve SL3 circuit while driving and shifting gears. (1-trip detection logic) • Output signal duty equals to 100%. (NOTE: SL3 output signal duty is less than 100% under normal condition.)	• Open or short in shift solenoid valve SL3 circuit • Shift solenoid valve SL3 • TCM

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. And the TCM performs the fail-safe function and turns the other normal shift solenoid valves on or off (In case of an open or short circuit, the TCM stops sending current to the circuit.)
(See page AX-39).

MONITOR STRATEGY

Related DTCs	P0798: Shift solenoid valve SL3/Range check
Required sensors/Components	Shift solenoid valve SL3
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100%

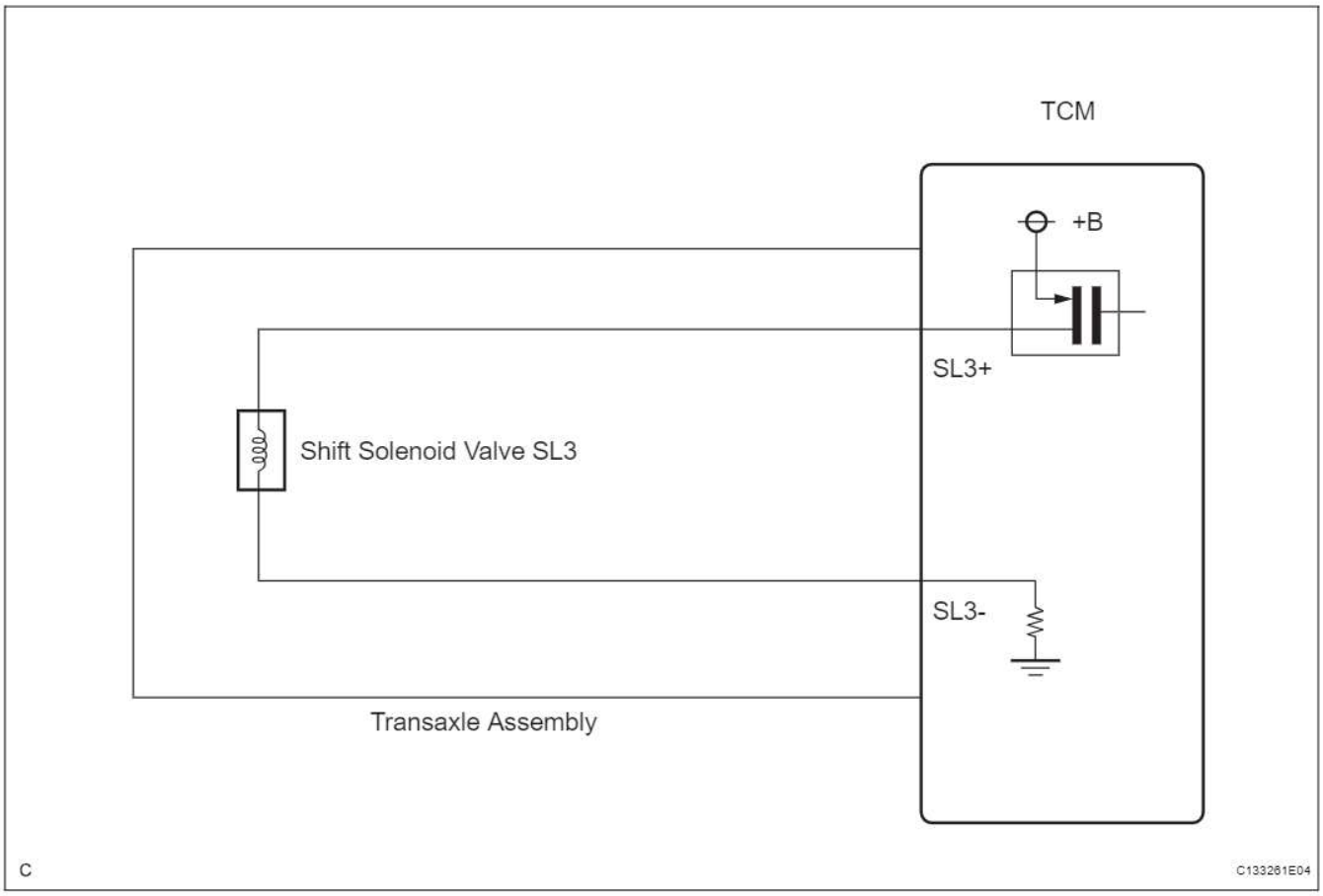
COMPONENT OPERATING RANGE

Output signal duty	Less than 100%

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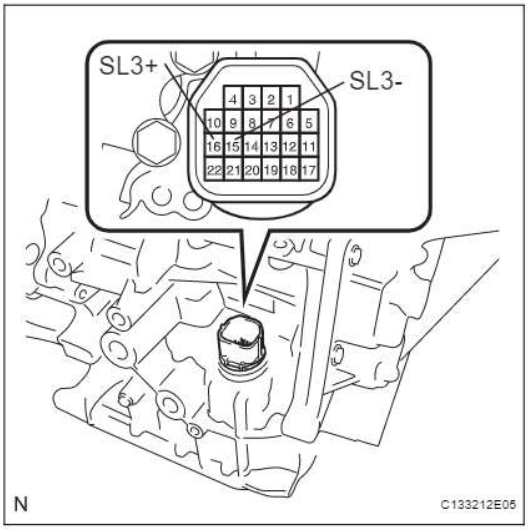
AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SL3)



(a) Remove the TCM from the transaxle.

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

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
16 (SL3+) - 15 (SL3-)	5.0 to 5.6 Ω

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

Standard resistance:
Check for short

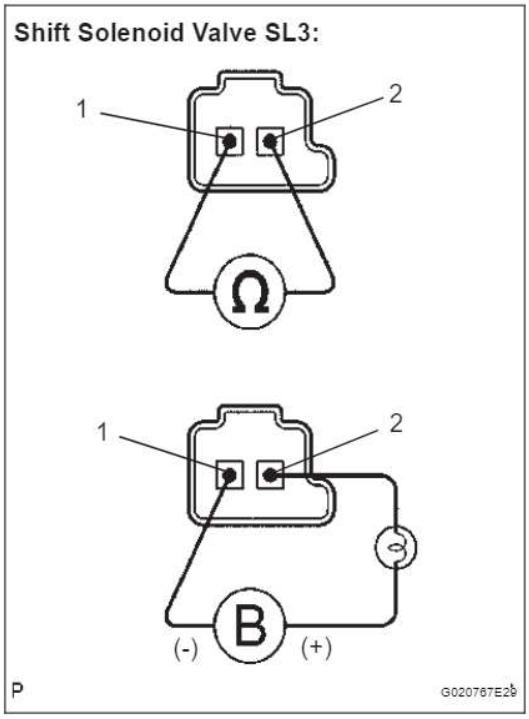
Tester Connection	Specified Condition
16 (SL3+) - Body ground	10 kΩ or higher
15 (SL3-) - Body ground	10 kΩ or higher

OK → REPLACE TCM

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NG

2	INSPECT SHIFT SOLENOID VALVE (SL3)



(a) Remove the shift solenoid valve SL3.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

(c) Connect a positive (+) lead throgh a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → REPLACE SHIFT SOLENOID VALVE (SL3)

OK

REPLACE TRANSMISSION WIRE

AX

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DTC	P0872	Transmission Fluid Pressure Switch No.1 Circuit Low

DTC	P0873	Transmission Fluid Pressure Switch No.1 Circuit High

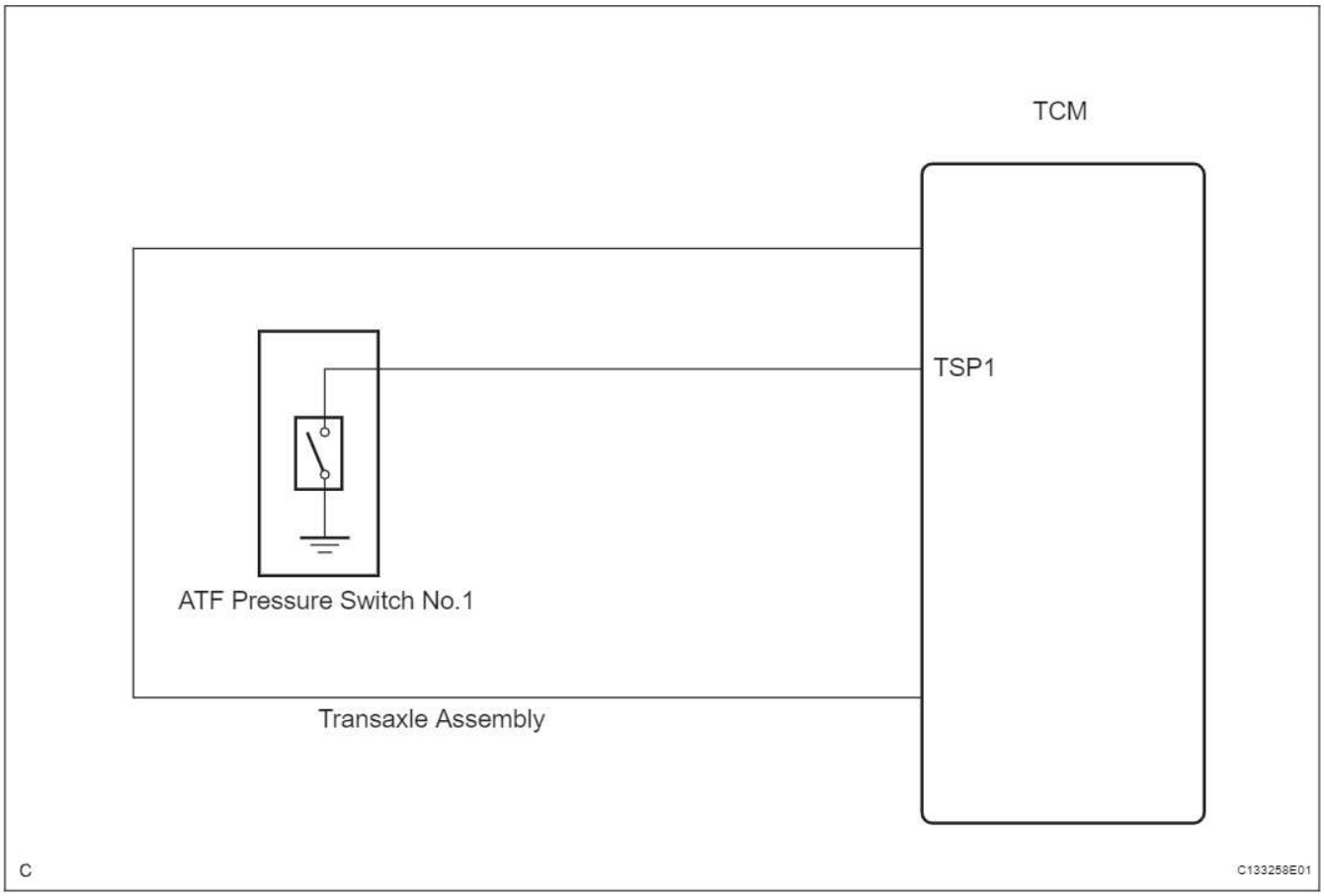
AX

DESCRIPTION

ATF pressure switch No. 1 is installed in the shift solenoid valve ATF output passage. This switch is used to identify the malfunctioning part when a fail-safe operation is performed. If the shift solenoid valve malfunctions when the ATF pressure switch has a malfunction, a fail-safe operation will be performed. This fail-safe operation is different from the fail-safe operation performed when the solenoid valve malfunctions and the ATF pressure switch is normal.

DTC No.	DTC Detecting Condition	Trouble Area
P0872	ATF pressure switch No. 1 OFF is detected twice when any of the gears from 1st to 4th engages normally.	• ATF temperature sensor assembly (ATF pressure switch No. 1) • Transmission wire • TCM
P0873	ATF pressure switch No. 1 ON is detected twice when 5th or 6th gear engages normally.	

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0872 OR P0873)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0873" is output	A
Only "P0872" is output	B
"P0872 or P0873" and other DTCs	C

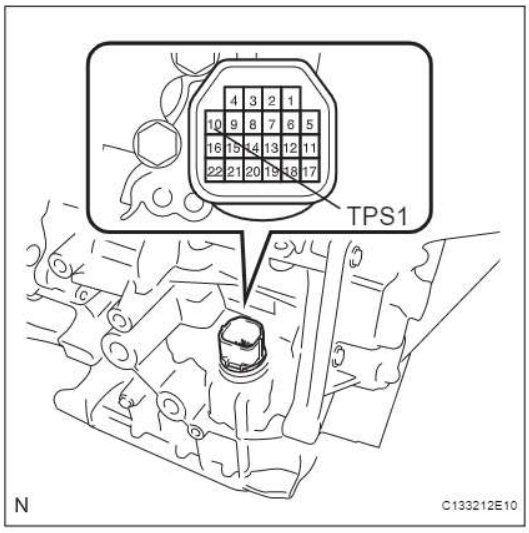
HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B → Go to step 4

C → GO TO DTC CHART

A

2	CHECK TRANSMISSION WIRE (SHORT TO GROUND)



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

Standard resistance

Tester Condition	Specified Condition
10 (TPS1) - Body ground (Valve body assembly)	10 kΩ or higher

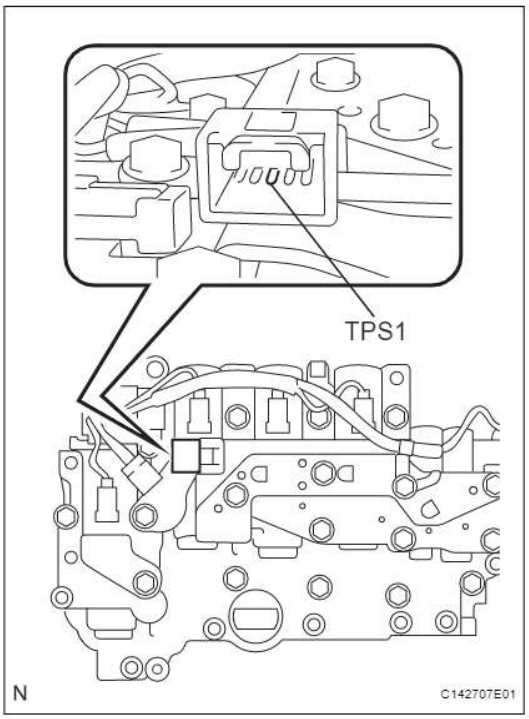
OK → REPLACE TCM

NG

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AX

3	CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 1)



(a) Disconnect the transmission wire connector from the ATF temperature sensor assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
3 (TPS1) - Body ground (Valve body assembly)	10 kΩ or higher

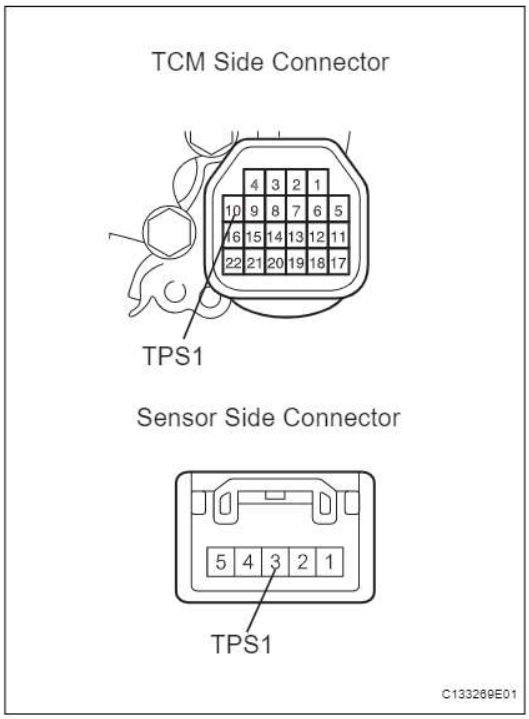
NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK

REPLACE TRANSMISSION WIRE

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4	CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the connector from the ATF temperature sensor assembly.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
10 (TPS1) - 3 (TPS1)	Below 1 Ω
10 (TPS1) or 3 (TPS1) - Body ground (Valve body assembly)	10 kΩ or higher

NG → REPLACE TRANSMISSION WIRE

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

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DTC	P0877	Transmission Fluid Pressure Switch No.2 Circuit Low

DTC	P0878	Transmission Fluid Pressure Switch No.2 Circuit High

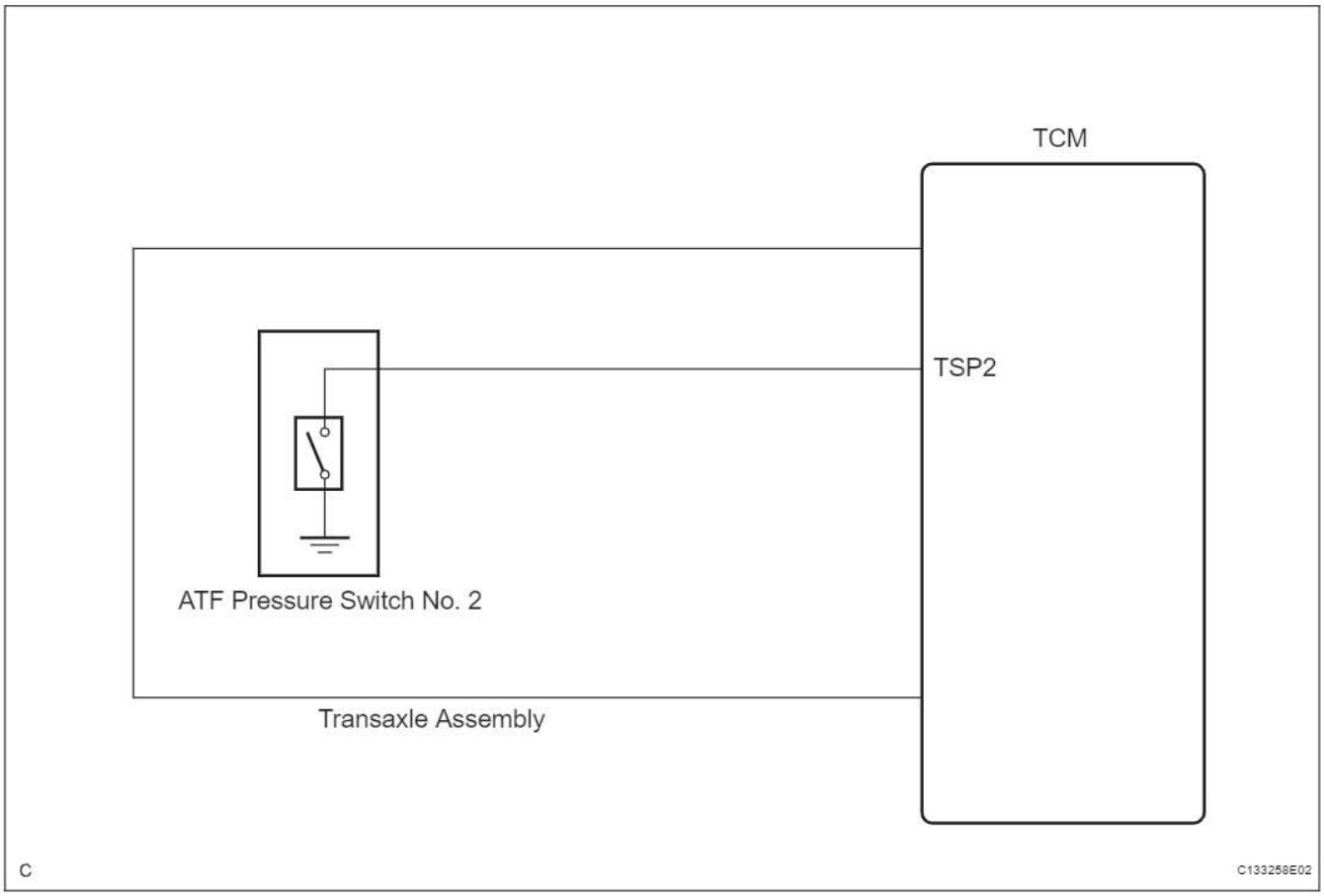
AX

DESCRIPTION

ATF pressure switch No. 2 is installed in the shift solenoid valve ATF output passage. This switch is used to identify the malfunctioning part when a fail-safe operation is performed. If the shift solenoid valve malfunctions when the ATF pressure switch has a malfunction, a fail-safe operation will be performed. This fail-safe operation is different from the fail-safe operation performed when the solenoid valve malfunctions and the ATF pressure switch is normal.

DTC No.	DTC Detecting Condition	Trouble Area
P0877	ATF pressure switch No. 2 OFF is detected twice when any of the gears from 4th to 6th engages normally.	• ATF temperature sensor assembly (ATF pressure switch No. 2) • Transmission wire • TCM
P0878	ATF pressure switch No. 2 ON is detected twice when any of the gears from 1st to 3rd engages normally.	

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0877 OR P0878)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0878" is output	A
Only "P0877" is output	B
"P0877 or P0878" and other DTCs	C

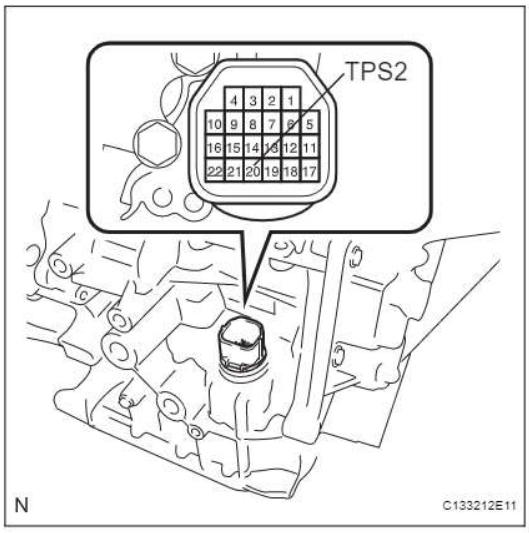
HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B → Go to step 4

C → GO TO DTC CHART

A

2	CHECK TRANSMISSION WIRE (SHORT TO GROUND)



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

Standard resistance

Tester Condition	Specified Condition
20 (TPS2) - Body ground (Valve body assembly)	10 kΩ or higher

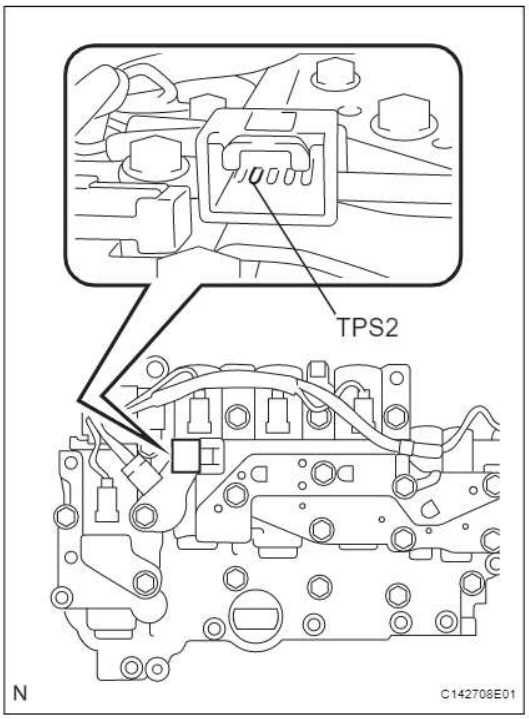
OK → REPAIR OR REPLACE TCM

NG

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AX

3	CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 2)



(a) Disconnect the transmission wire connector from the ATF temperature sensor assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
4 (TPS2) - Body ground (Valve body assembly)	10 kΩ or higher

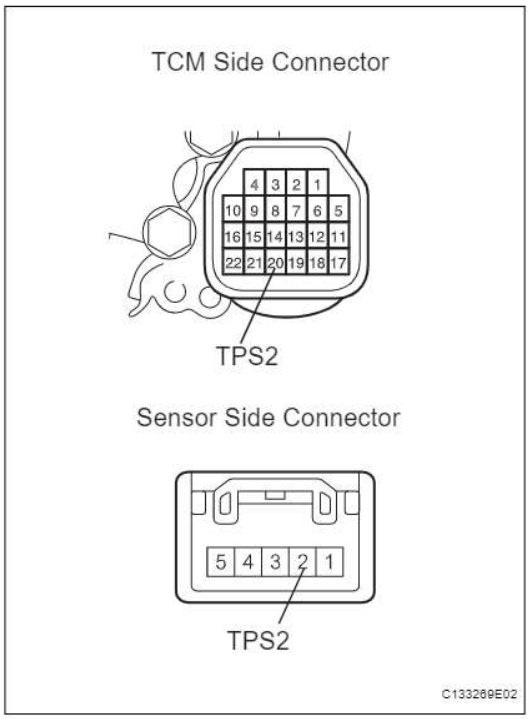
NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK

REPLACE TRANSMISSION WIRE

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4	CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the connector from the ATF temperature sensor assembly.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
20 (TPS2) - 2 (TPS2)	Below 1 Ω
20 (TPS2) or 2 (TPS2) - Body ground (Valve body assembly)	10 kΩ or higher

NG → REPLACE TRANSMISSION WIRE

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

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DTC	P0989	Transmission Fluid Pressure Switch No.3 Circuit Low

DTC	P0990	Transmission Fluid Pressure Switch No.3 Circuit High

AX

DESCRIPTION

ATF pressure switch No. 3 is installed in the lock-up solenoid ATF output passage and is used to detect a malfunction in the lock-up solenoid.

DTC No.	DTC Detection Condition	Trouble Area
P0989	Transmission fluid pressure switch No. 3 is OFF when lock-up occurs in response to a lock-up request (2 trip detection logic).	• ATF temperature sensor assembly (ATF pressure switch No. 3) • Transmission wire • TCM
P0990	When both of the following are detected (2 trip detection logic): • Transmission fluid pressure switch No. 3 is ON when lock-up does not occur. • Lock-up does not occur when shift solenoid valve (SLU) is requested to turn off in the lock-up range.	

MONITOR DESCRIPTION

The TCM illuminates the MIL and stores the DTC when the TCM detects that the ATF pressure switch is OFF with the lock-up solenoid ON or when the TCM detects that the ATF pressure switch is ON with the lock-up solenoid OFF.

MONITOR STRATEGY

Related DTCs	P0989: Transmission fluid pressure switch No. 3 OFF malfunction P0990: Transmission fluid pressure switch No. 3 ON malfunction
Required sensors/Components	Transmission fluid pressure switch No. 3
Frequency of operation	Continuous
Duration	4 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever these DTCs are not present	None
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLU circuit	Circuit is not malfunctioning
TFT sensor circuit	Circuit is not malfunctioning
Torque converter clutch circuit	Circuit is not malfunctioning
ECT sensor circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Electric throttle system	Circuit is not malfunctioning
TFT (Transmission fluid temperature)	Above -10°C (14°F)

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ECT (Engine coolant temperature)	40°C (104°F) or more
Transmission range	"D"
TCM selected gear	Not 1st
Vehicle speed	15.5 mph (25 km/h) or more

P0989:

TCM lock-up command	ON
Engine speed - Turbine speed	Less than 20 rpm
Throttle valve opening angle	7% or more
Vehicle speed	Less than 62 mph (100 km/h)
Shift solenoid valve SLU	Not ON malfunction

P0990:

TCM indicated pressure valve of SLU	Less than 4 kPa
TCM lock-up command	OFF
Shift solenoid valve SLU	Not malfunction
Shift solenoid valve SL	Not OFF malfunction

TYPICAL MALFUNCTION THRESHOLDS

P0989:

Transmission fluid pressure switch No. 3	OFF

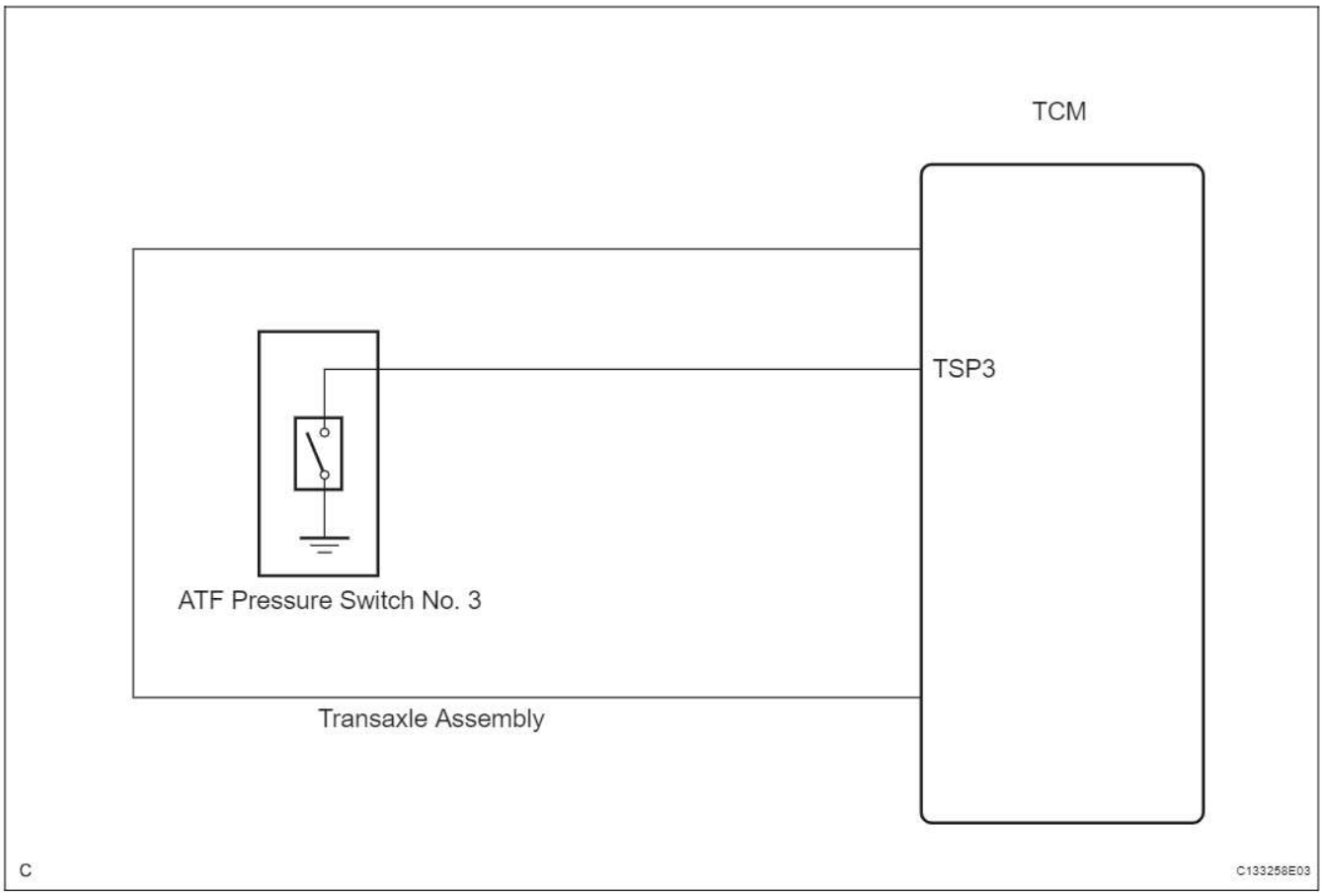
P0990:

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	Less than 20 rpm
(b) Transmission fluid pressure switch No. 3	ON

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AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0989 OR P0990)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0990" is output	A
Only "P0989" is output	B
"P0989 or P0990" and other DTCs	C

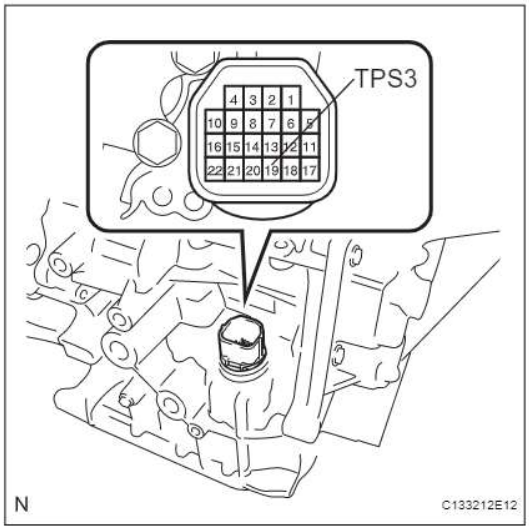
HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B	Go to step 4
C	GO TO DTC CHART

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A

2 CHECK TRANSMISSION WIRE (SHORT TO GROUND)



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

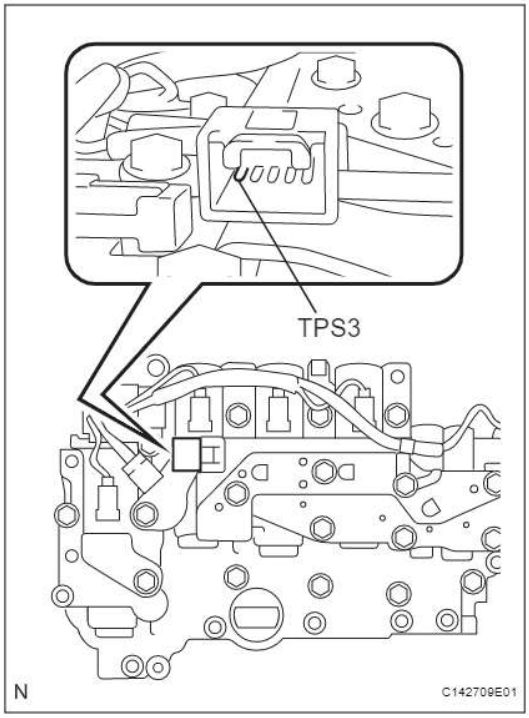
Standard resistance

Tester Condition	Specified Condition
19 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

OK → **REPLACE TCM**

NG

3 CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 3)



(a) Disconnect the connector from the ATF temperature sensor assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
5 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

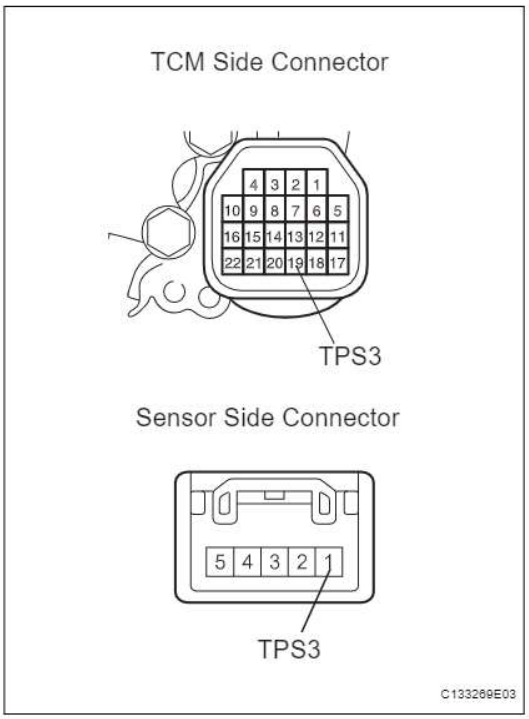
NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK

REPLACE TRANSMISSION WIRE

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4	CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the connector from the ATF temperature sensor assembly.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
19 (TPS3) - 1 (TPS3)	Below 1 Ω
19 (TPS3) or 1 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

NG → REPLACE TRANSMISSION WIRE

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

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DTC	P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

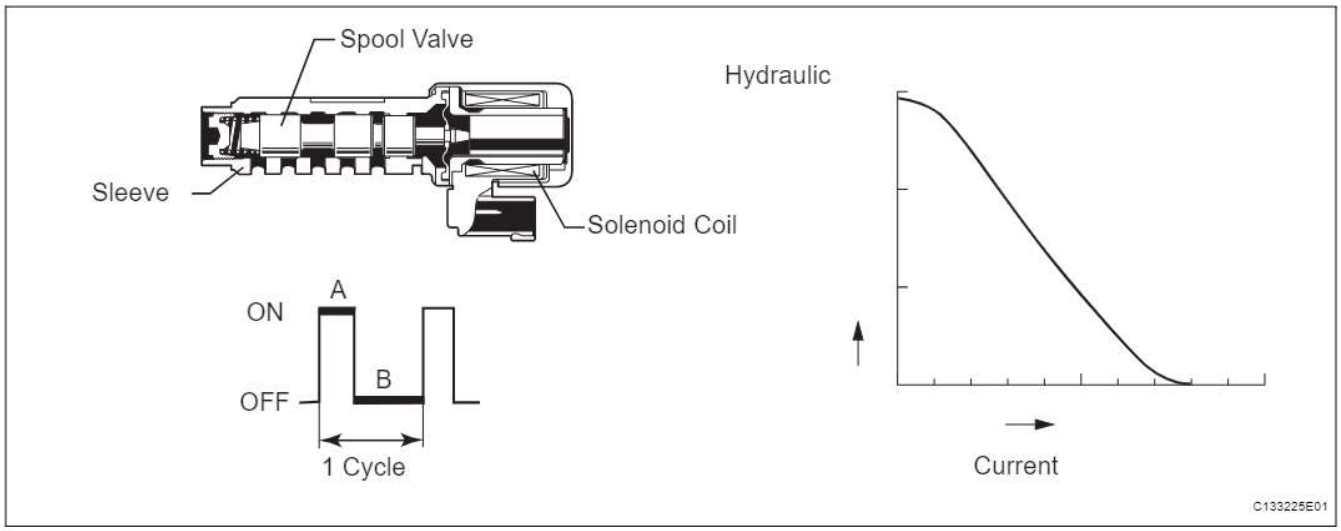
SYSTEM DESCRIPTION

The linear solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The TCM adjusts the duty ratio (*) of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

(*): Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

Duty Ratio= A/(A+B) x 100 (%)



DTC No.	DTC Detection Condition	Trouble Area
P2714	The ECM detects a malfunction in the shift solenoid valve SLT (ON side) according to the difference in the speed between the turbine and the output shaft, and also by the transmission fluid pressure. (2-trip detection logic)	• Shift solenoid valve SLT remains open • Shift solenoid valve SL1, SL2, SL3 or SL4 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

The TCM calculates the amount of heat absorbed by the friction material based on the difference in revolution (clutch slippage) between the turbine and output shaft. The TCM turns on the MIL and outputs this DTC when the amount of heat absorption exceeds the specified value.

When the shift solenoid valve SLT remains on, oil pressure goes down and clutch engagement force decreases.

NOTICE:

If driving continues under these conditions, the clutches will burn out and the vehicle will no longer be drivable.

MONITOR STRATEGY

Related DTCs	P2714: Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	Immediate
MIL operation	2 driving cycles
Sequence of operation	None

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AX

TYPICAL ENABLING CONDITIONS

ON malfunction:

The monitor will run whenever this DTC is not present.	None
Turbine speed sensor circuit	Circuit is not malfunctioning
TFT sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLT circuit	Circuit is not malfunctioning
ECT (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
ETCS (Electric throttle control system)	System is not down
Transmission range	"D"
Engine	Starting
TFT	-10°C (5°F) or more
Input turbine torque	100 N*m or more
Turbine speed	250 rpm or more
Output speed	250 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

ON malfunction:

Detection criteria	Threshold
Turbine speed - Output speed x Gear ratio at output speed 1,000 rpm (Condition varies with output speed)	75 rpm or more

INSPECTION PROCEDURE

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

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

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

HINT:
If a solenoid is stuck ON, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A → INSPECT SHIFT SOLENOID VALVE SLT

B

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2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F)**
- **Be sure to prevent SST hose from interfering with the exhaust pipe.**
- **This check must be conducted after checking and adjusting the engine.**
- **Perform the test with the A/C OFF.**

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to operate without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

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

(a) Turn the ignition switch off.

(b) Lift the vehicle up.

(c) Remove the test plug on the transmission case center right side and connect SST.

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

(d) Lower the vehicle.

(e) Fully apply the parking brake and chock the 4 wheels.

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

(g) Start the engine.

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

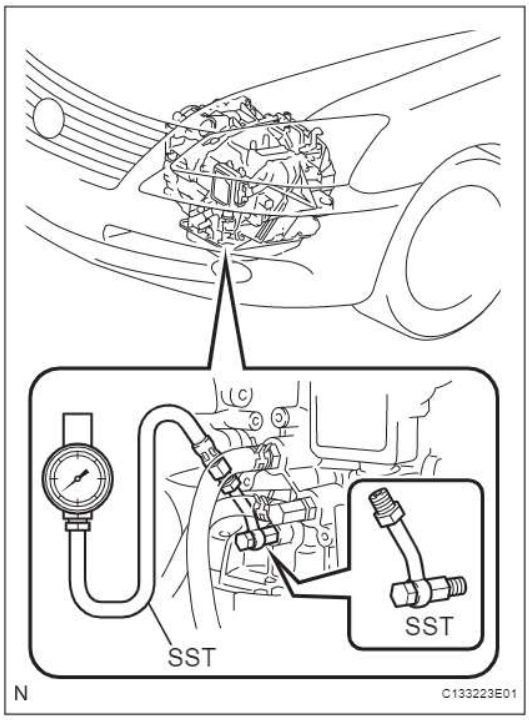
(i) Measure the line pressure when the engine is idling.

(j) Turn on the tester.

(k) Enter the following items: DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SOLENOID (SLT)".

(l) Follow the instructions on the tester and perform the ACTIVE TEST.

(m) Measure the line pressure with SST.



Item	Test Details
SOLENOID (SLT)*	[Test Details] Operate the 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, the TCM commands the SLT solenoid to turn off). ON: No action (normal operation)

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*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check that the line pressure changes by connecting the SST to the automatic transaxle. The same SST is used in the HYDRAULIC TEST (See page AX-17) as well.
HINT:
The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.
OK:
The line pressure changes as specified when performing the ACTIVE TEST.

NG → **Go to step 5**

OK

3	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SHIFTING TEST)

NOTICE:
This test should always be performed with at least 2 people.
HINT:
Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.
The DATA LIST can be displayed 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) Start the engine.
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
(g) Follow the instructions on the tester and read the ACTIVE TEST.

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] • IDL: ON [Others] • Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

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HINT:
The shift position commanded by the TCM is shown on the DATA LIST/SHIFT display on the intelligent tester.

(h) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(i) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:
- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)

B → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)

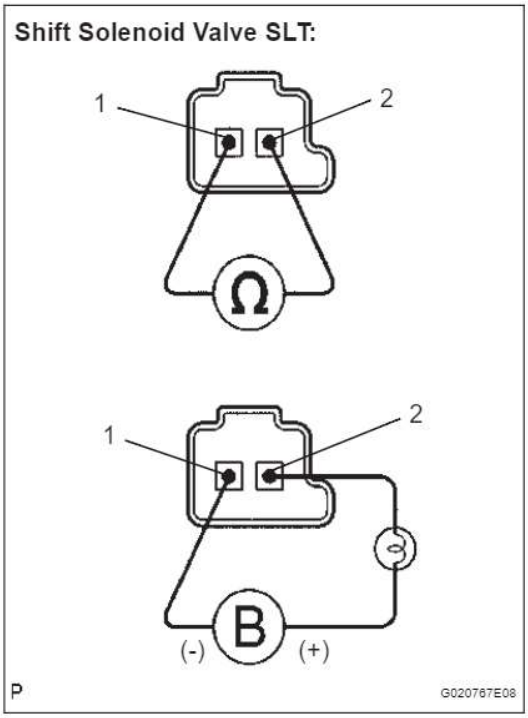
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AX

C	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)
D	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)

E

4 INSPECT SHIFT SOLENOID VALVE SLT



(a) Remove the shift solenoid valve SLT.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG	REPLACE SHIFT SOLENOID VALVE SLT

OK

5 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG	REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

6 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Check the torque converter clutch assembly (See page AX-239).

OK:

The torque converter clutch operates normally.

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NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

REPLACE AUTOMATIC TRANSMISSION ASSEMBLY

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

DESCRIPTION

AX

Refer to DTC P2714 (See page AX-121).

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 detection logic).	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • TCM

MONITOR DESCRIPTION

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

MONITOR STRATEGY

Related DTCs	P2716: Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Solenoid current cut status	Not cut
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	10 V to 12 V

Malfunction (B):

Battery voltage	10 V or more and less than 12 V
Target current	0.75 A

Malfunction (C):

Battery voltage	8 V or more
Target current	1 A

Malfunction (D):

Battery voltage	11 V or more
Target current	1 A or more

Malfunction (E):

Battery voltage	11 V or more
Target current	0.1 A or more
Commanded voltage - Last commanded voltage	Less than 0.02 V

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TYPICAL MALFUNCTION THRESHOLDS

Malfunction (A) and (B):

Output signal duty	100% or more

Malfunction (C):

Output signal duty	0% or less

Malfunction (D):

Output signal monitor	No signal

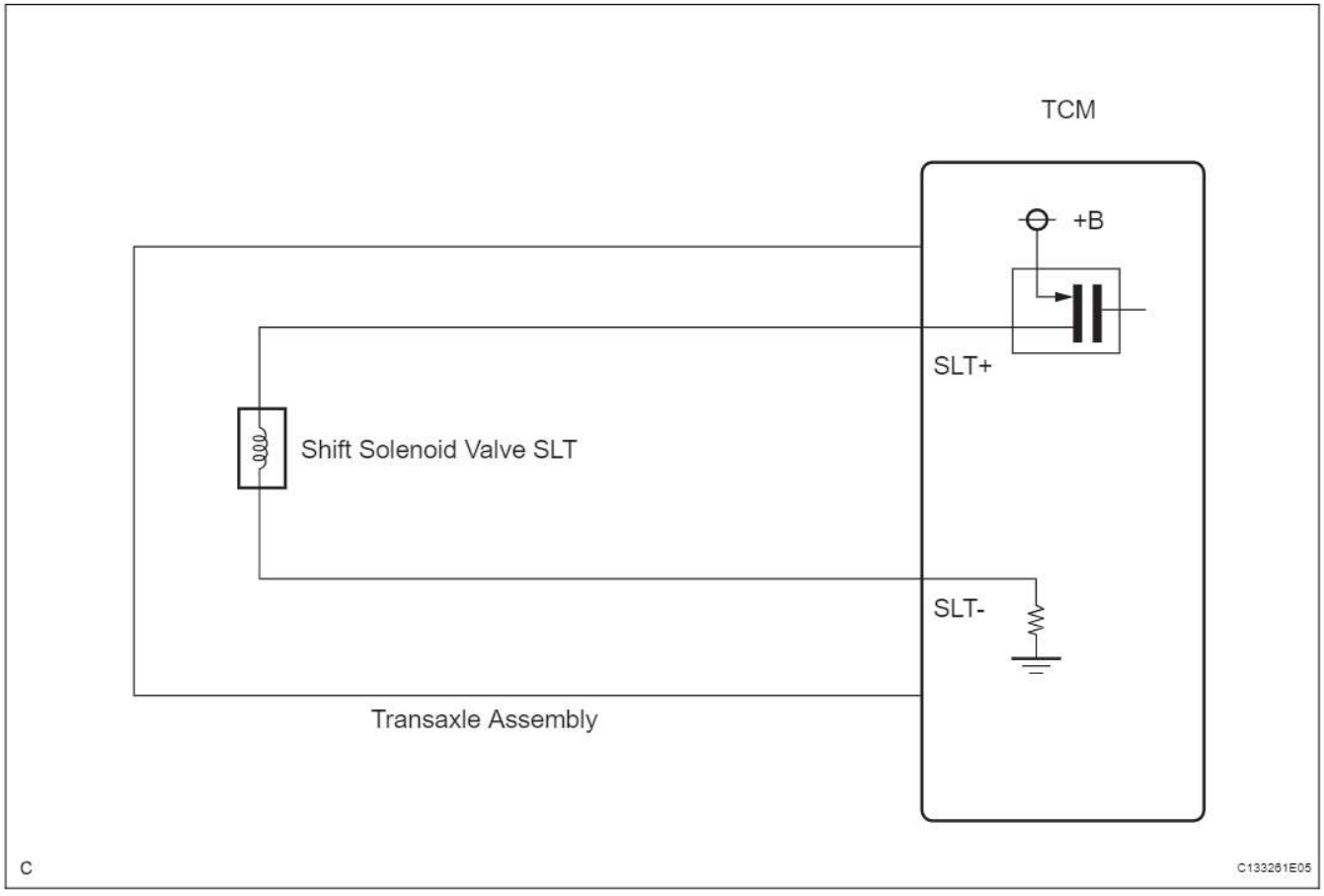
Malfunction (E):

Commanded voltage - Last commanded voltage	0.02 V or more

COMPONENT OPERATING RANGE

Output signal duty	Less than 100%

WIRING DIAGRAM

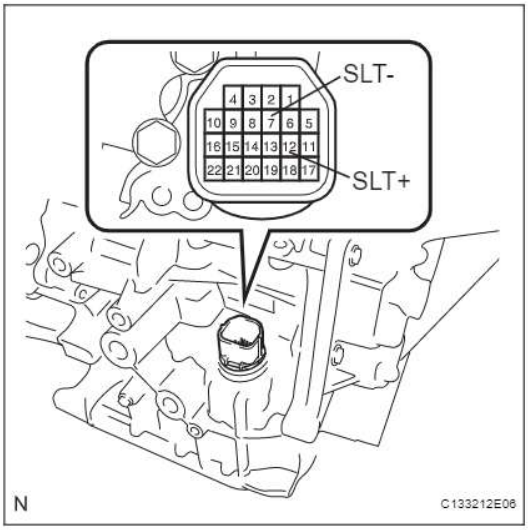


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AX

INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SLT)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
12 (SLT+) - 7 (SLT-)	5.0 to 5.6 Ω

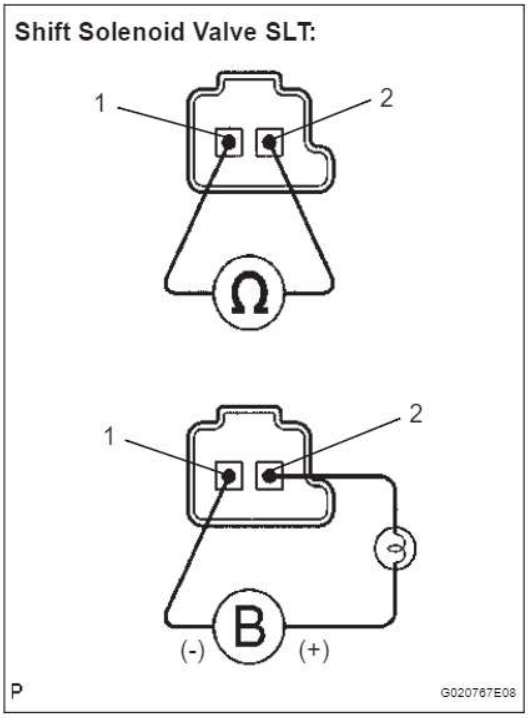
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

Tester Connection	Specified Condition
12 (SLT+) - Body ground	10 kΩ or higher
7 (SLT-) - Body ground	10 kΩ or higher

OK → REPLACE TCM

NG

2 INSPECT SHIFT SOLENOID VALVE SLT



(a) Remove the shift solenoid valve SLT.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

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

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

NG → REPLACE SHIFT SOLENOID VALVE SLT

OK

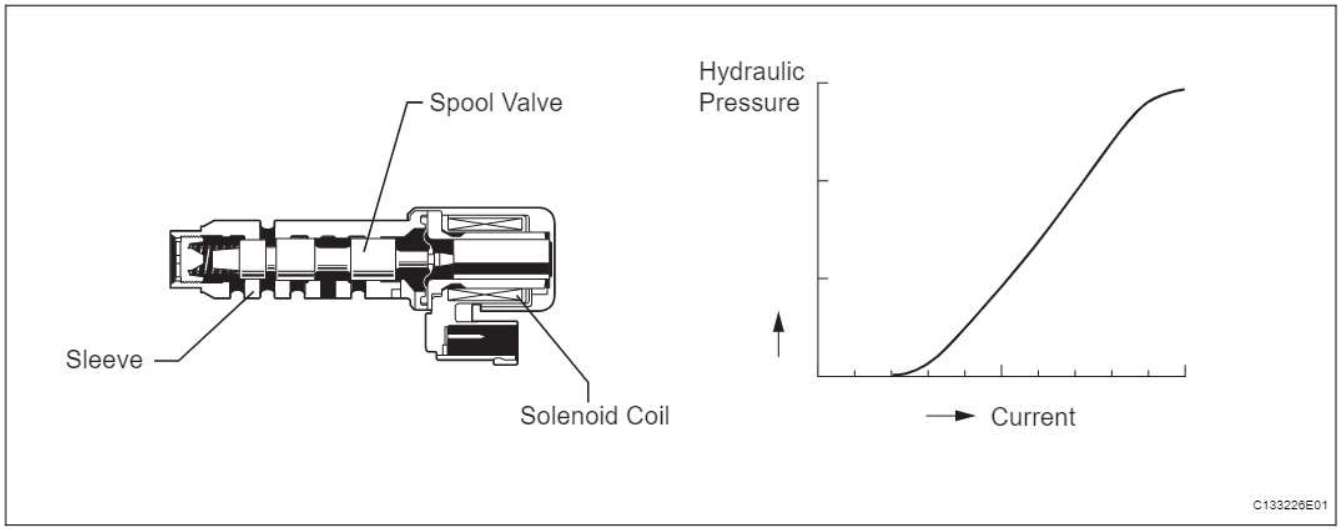
REPLACE TRANSMISSION WIRE

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

SYSTEM DESCRIPTION

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



The TCM compares the engagement condition of the lock-up clutch with the lock-up schedule in the TCM memory to detect shift solenoid valve SLU, valve body and torque converter clutch mechanical problems.

DTC No.	DTC Detection Condition	Trouble Area
P2757	When both of the following are detected (2-trip detection logic): • Lock-up does not occur when requested. • Transmission fluid pressure switch No. 3 is OFF. When both of the following are detected (2-trip detection logic): • Transmission fluid pressure switch No. 3 is ON when lock-up does not occur. • Lock-up occurs when the shift solenoid valve SLU is requested to turn on in the lock-up range.	• Shift solenoid valve SLU remains open or closed • Valve body is blocked • Torque converter clutch • Automatic transaxle (clutch, brake or gear, etc.) • Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the TCM based on the turbine (input) speed sensor NT, output speed sensor NC, engine rpm, engine load, engine temperature, vehicle speed, transmission fluid temperature, and gear selection. The TCM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The TCM calculates the actual transmission gear by comparing input turbine rpm (NT) to output shaft rpm (NC). When conditions are appropriate, the TCM requests "lock-up" by applying control voltage to the shift solenoid SLU. When the SLU is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.
If the TCM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the TCM interprets this as a fault in the shift solenoid valve SLU or lock-up system performance.
The TCM will turn on the MIL and store the DTC.
Example:
When any of the following is met, the system judges it as a malfunction.

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- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up.
  (Engine speed is at least 70 rpm greater than input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up off.
  (The difference between engine speed and input turbine speed is less than 20 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
Frequency of operation	Continuous
Duration	OFF malfunction (A): 3.5 sec. OFF malfunction (B): 0.05 sec. ON malfunction: 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below.

The monitor will run whenever this DTC is not present.	None
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLU circuit	Circuit is not malfunctioning
Knock sensor circuit	Circuit is not malfunctioning
ETCS (Electric throttle control system)	System is not down
Transmission shift position	"D"
ECT (Engine coolant temperature)	40°C (104°F) or more
Spark advance from Max. retard timing by KCS control	0°CA or more
TFT (Transmission fluid temperature)	Above -10°C (5°F)
TCM selected gear	Not 1st
Vehicle speed	15.5 mph (25 km/h) or more
Torque converter clutch circuit	Circuit is not malfunctioning
ECT circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

OFF malfunction (A):

TCM lock-up command	ON
Duration time from lock-up on command	3 sec. or more
Shift solenoid valve SLU	ON malfunction not occuring

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ON malfunction:

TCM lock-up command	OFF (SLU pressure: less than 4 kPa (0.04 kgfcm^2, 0.6 psi)
Duration time from lock-up on command	0.064 sec. or more
Throttle valve opening angle	7% or more
Vehicle speed	Less than 37.3 mph (60 km/h)

AX

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction:

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	70 rpm or more
(b) Transmission fluid pressure switch	OFF

ON malfunction:

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	Less than 35 rpm
(b) Transmission fluid pressure switch	ON

COMPONENT OPERATING RANGE

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

INSPECTION PROCEDURE

1. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save 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 on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
(g) According to the display on the tester, perform "ACTIVE TEST".

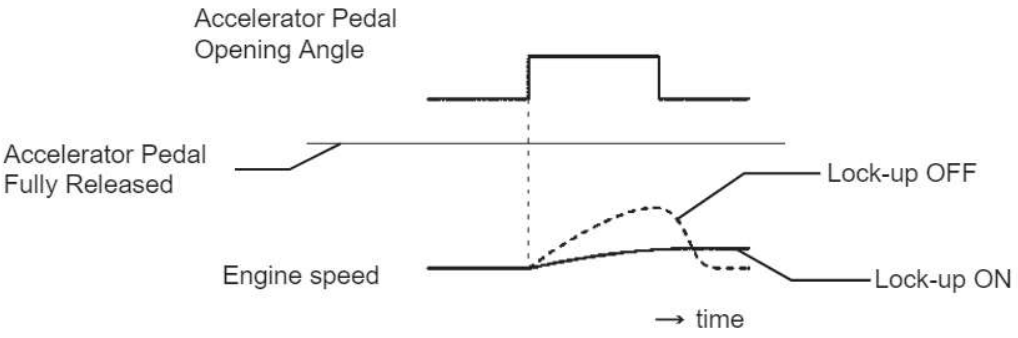
Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transaxle to the lock-up condition. [Vehicle Condition] • Throttle valve opening angle: Less than 35% • Vehicle Speed: 37 mph (60 km/h) or more	Possible to check the SLU operation.

HINT:

- This test can be conducted when the vehicle speed is 36 mph (58 km/h) or more.
- This test can be conducted with the 6th gear.

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(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 release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off automatically.)

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

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

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

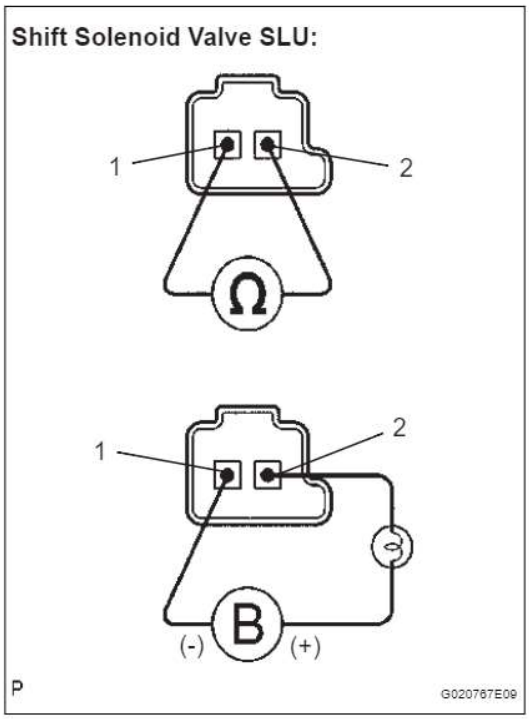
HINT:
If any other codes besides "P2757" are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

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2	INSPECT SHIFT SOLENOID VALVE SLU



(a) Remove the shift solenoid valve SLU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE SLU**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG → **REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Check the torque converter clutch assembly (See page AX-239).

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPLACE AUTOMATIC TRANSMISSION ASSEMBLY

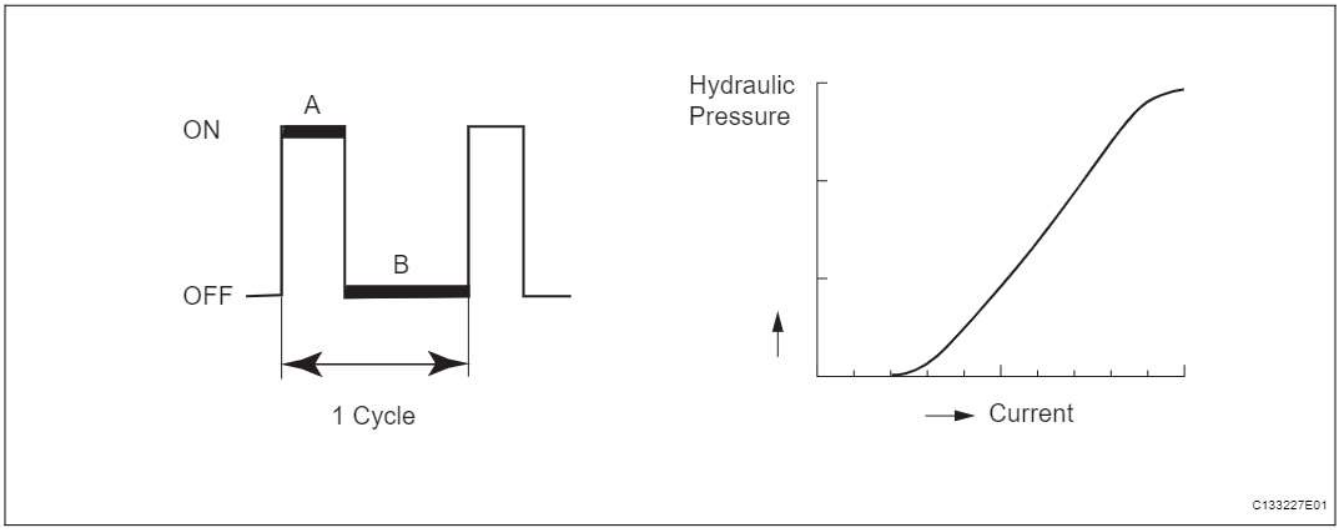
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DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)

AX

DESCRIPTION

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



(*) Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then 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 • TCM

MONITOR DESCRIPTION

When an open or short in a shift solenoid valve (SLU) circuit is detected, the TCM determines there is a malfunction. The TCM will turn on the MIL and store this 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 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

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Malfunction (A):

Battery voltage	12 V or more

Malfunction (A):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

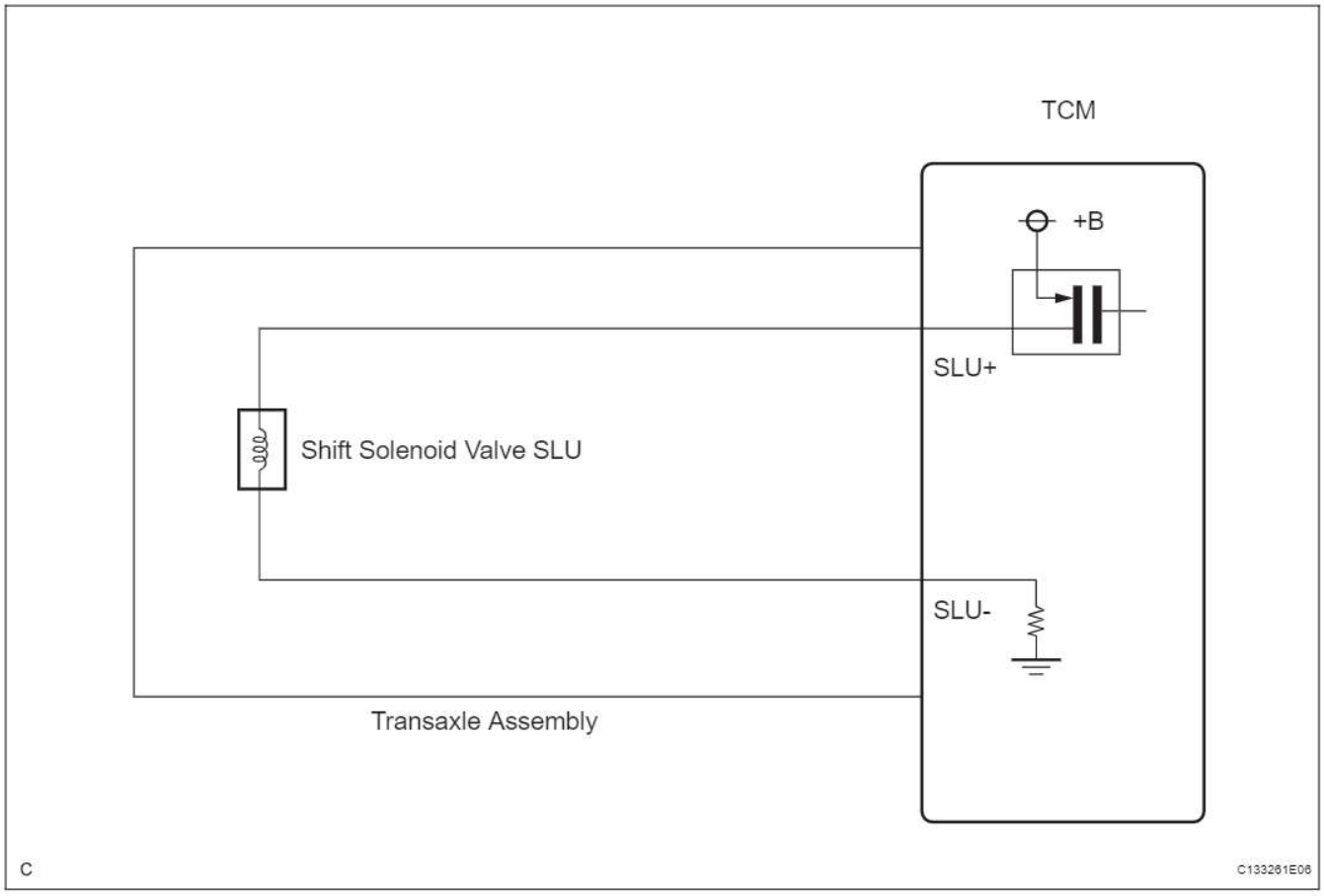
TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more

COMPONENT OPERATING RANGE

Output signal duty	Less than 100%

WIRING DIAGRAM

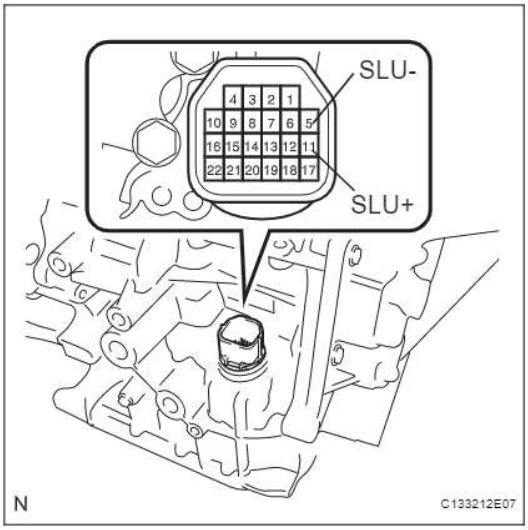


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AX

INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SLU)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
11 (SLU+) - 5 (SLU-)	5.0 to 5.6 Ω

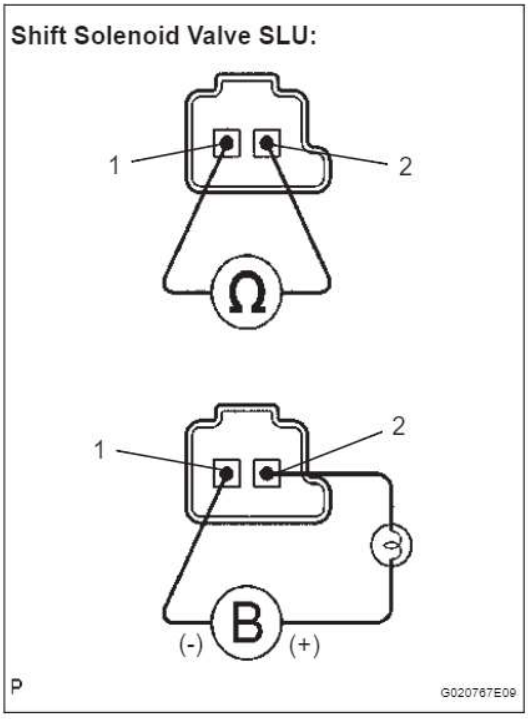
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

Tester Connection	Specified Condition
11 (SLU+) - Body ground	10 kΩ or higher
5 (SLU-) - Body ground	10 kΩ or higher

OK → REPLACE TCM

NG

2 INSPECT SHIFT SOLENOID VALVE SLU



(a) Remove the shift solenoid valve SLU.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

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

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

NG → REPLACE SHIFT SOLENOID VALVE SLU

OK

REPLACE TRANSMISSION WIRE

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DTC	P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)

DTC	P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)

AX

DESCRIPTION

The shift solenoid valve SL is turned ON or OFF by signals from the TCM to control the hydraulic pressure acting on the lock-up relay valve, which then controls operation of the lock-up clutch.

DTC No.	DTC Detection Condition	Trouble Area
P2769	TCM detects a short in the shift solenoid valve SL circuit when the shift solenoid valve SL is operated (2 trip detection logic).	• Short in shift solenoid valve SL circuit • Shift solenoid valve SL • TCM
P2770	TCM detects an open in the shift solenoid valve SL circuit when the shift solenoid valve SL is not operated (2 trip detection logic).	• Open in shift solenoid valve SL circuit • Shift solenoid valve SL • TCM

Fail-safe function:
If the TCM detects a malfunction, it turns the shift solenoid valve SL OFF.

MONITOR DESCRIPTION

Based on the signals from the throttle position sensor, the air flow meter and the crankshaft position sensor, the TCM sends a signal to the solenoid valve SL to regulate the hydraulic pressure and provide smoother torque converter clutch engagement. The shift solenoid valve SL responds to commands from the TCM. The valve controls the lock-up relay valve to perform the torque-converter lock-up function. If the TCM detects an open or short circuit for shift solenoid valve SL, it will illuminate the MIL.

MONITOR STRATEGY

Related DTCs	P2769: Shift solenoid valve SL/Range check (Low resistance) P2770: Shift solenoid valve SL/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SL
Frequency of operation	Continuous
Duration	1 time
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P2769: Range check (Low resistance):

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

P2770: Range check (High resistance):

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

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TYPICAL MALFUNCTION THRESHOLDS

P2769: Range check (Low resistance):

Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less

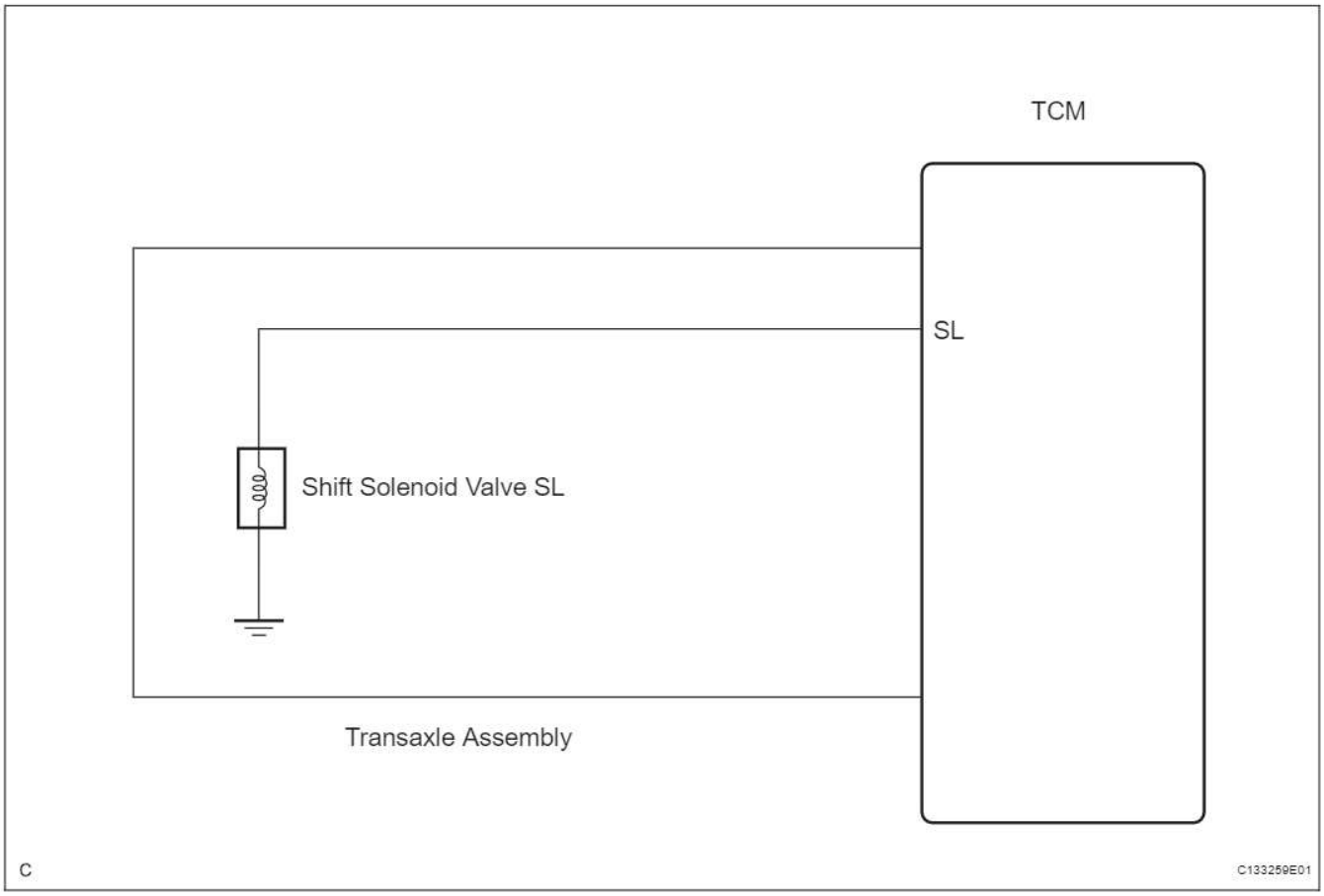
P2770: Range check (High resistance):

Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve SL	Resistance: 11 to 15 Ω at 20°C (68°F)

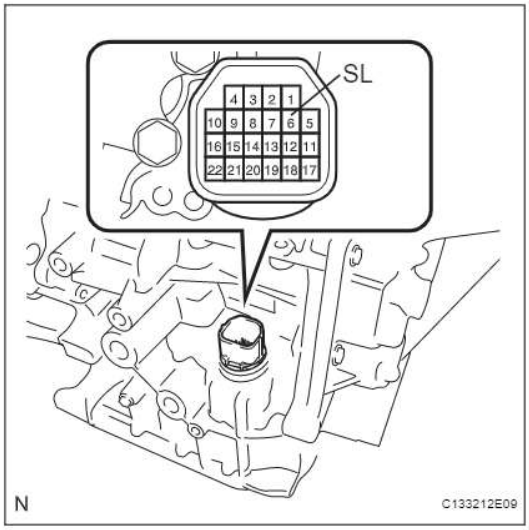
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL)



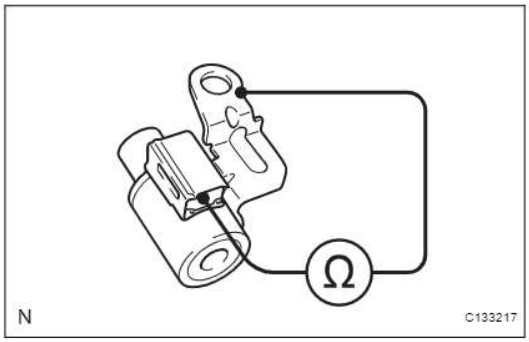
(a) Remove the TCM from the transaxle.
(b) Measure the resistance of the transmission wire.
Standard resistance

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

OK → **REPLACE TCM**

NG

2 INSPECT SHIFT SOLENOID VALVE SL (RESISTANCE)



(a) Remove the shift solenoid valve SL.
(b) Measure the resistance between the solenoid valve terminal and solenoid valve body.
Standard resistance:
11 to 15 Ω at 20°C (68°F)

NG → **REPLACE SHIFT SOLENOID VALVE SL**

OK

REPLACE TRANSMISSION WIRE

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DTC	P2808	Pressure Control Solenoid "D" Performance or Stuck OFF (Shift Solenoid Valve SL4)

DESCRIPTION

AX

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).
Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P2808	The engine revs freely when 3rd or 5th gear is requested. (2-trip detection logic) When any of the following is detected. In addition, the condition that 4th gear is engaged when 4th gear is requested occurs twice. (2-trip detection logic) • When 1st gear is requested, 4th gear is engaged. • When 2nd gear is requested, 4th gear is engaged. • When 6th gear is requested, 4th gear is engaged.	• Shift solenoid valve SL4 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P2808: Shift solenoid valve SL4/OFF malfunction Shift solenoid valve SL4/ON malfunction
Required sensors/Components	Shift solenoid valve SL4, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A): 0.5 sec. OFF malfunction (B): 0.8 sec. ON malfunction: 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
ETC (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Transmission range	"D"
Transmission fluid temperature	Above -10°C (5°F)

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OFF malfunction (A):

TCM select gear	3rd or 5th
Throttle valve opening angle	3% or more

OFF malfunction (B):

TCM select gear	3rd
Throttle valve opening angle	4.5% or more
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (A):

TCM select gear	1st
Time after transmission to 1st gear	0.1 sec. or more
Vehicle speed	1.2 mph (2 km/h) to 25 mph (40 km/h)
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (B):

TCM select gear	2nd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (C):

TCM select gear	6th
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

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ON malfunction (D):

TCM select gear	4th
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition vary with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

AX

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction (A):

Engine speed - Turbine speed x Gear ratio	1,000 rpm or more

OFF malfunction (B):

Turbine speed / Output speed	3.304 to 7.724

ON malfunction (A) and (B):

Turbine speed / Output speed	1.399 to 1.649

ON malfunction (C):

Turbine speed / Output speed	0.705 to 0.836

ON malfunction (D):

Turbine speed / Output speed	0.998 to 1.138

INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2808)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P2808" is output	A
"P2808" and other DTCs	B

HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A → Go to step 3

B

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2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER

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

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
HINT:
While driving, the shift position can be forcibly changed with the intelligent tester.
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-39).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	It is possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown on the DATA LIST/SHIFT display on the intelligent tester.

(d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.
HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	

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Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:

- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)

B → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)

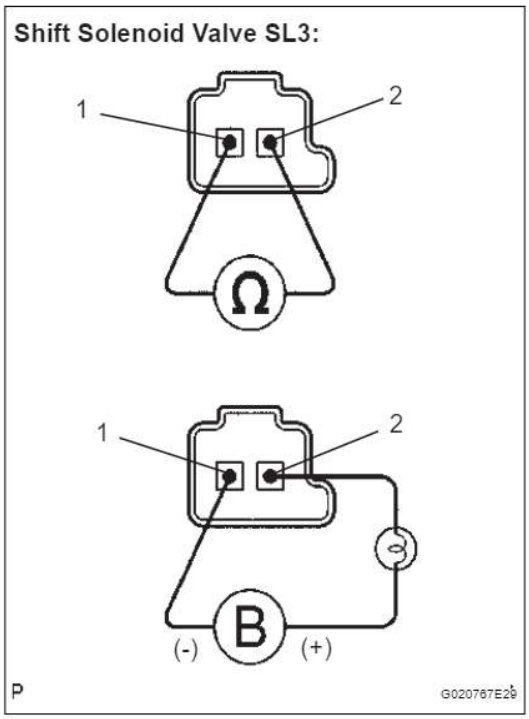
C → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)

E → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)

D

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3	INSPECT SHIFT SOLENOID VALVE SL4



(a) Remove the shift solenoid valve SL4.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SL4**

OK

4	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

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

OK

5	TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

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DTC	P2810	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SL4)

DESCRIPTION

AX

Shifting gears from 1st through 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3 and SL4 which are controlled by the TCM. If an open or short circuit occurs in either of the shift solenoid valve, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detecting Condition	Trouble Area
P2810	The TCM checks for an open or short in the shift solenoid valve SL4 circuit while driving and shifting gears. (1-trip detection logic) • Output signal duty equals to 100%. (NOTE: SL4 output signal duty is less than 100% under normal condition.)	• Open or short in shift solenoid valve SL4 circuit • Shift solenoid valve SL4 • TCM

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. And the TCM performs the fail-safe function and turns the other normal shift solenoid valves on or off (In case of an open or short circuit, the TCM stops sending current to the circuit.)
(See page AX-39).

MONITOR STRATEGY

Related DTCs	P0798: Shift solenoid valve SL3/Range check
Required sensors/Components	Shift solenoid valve SL3
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

Malfunction (B):

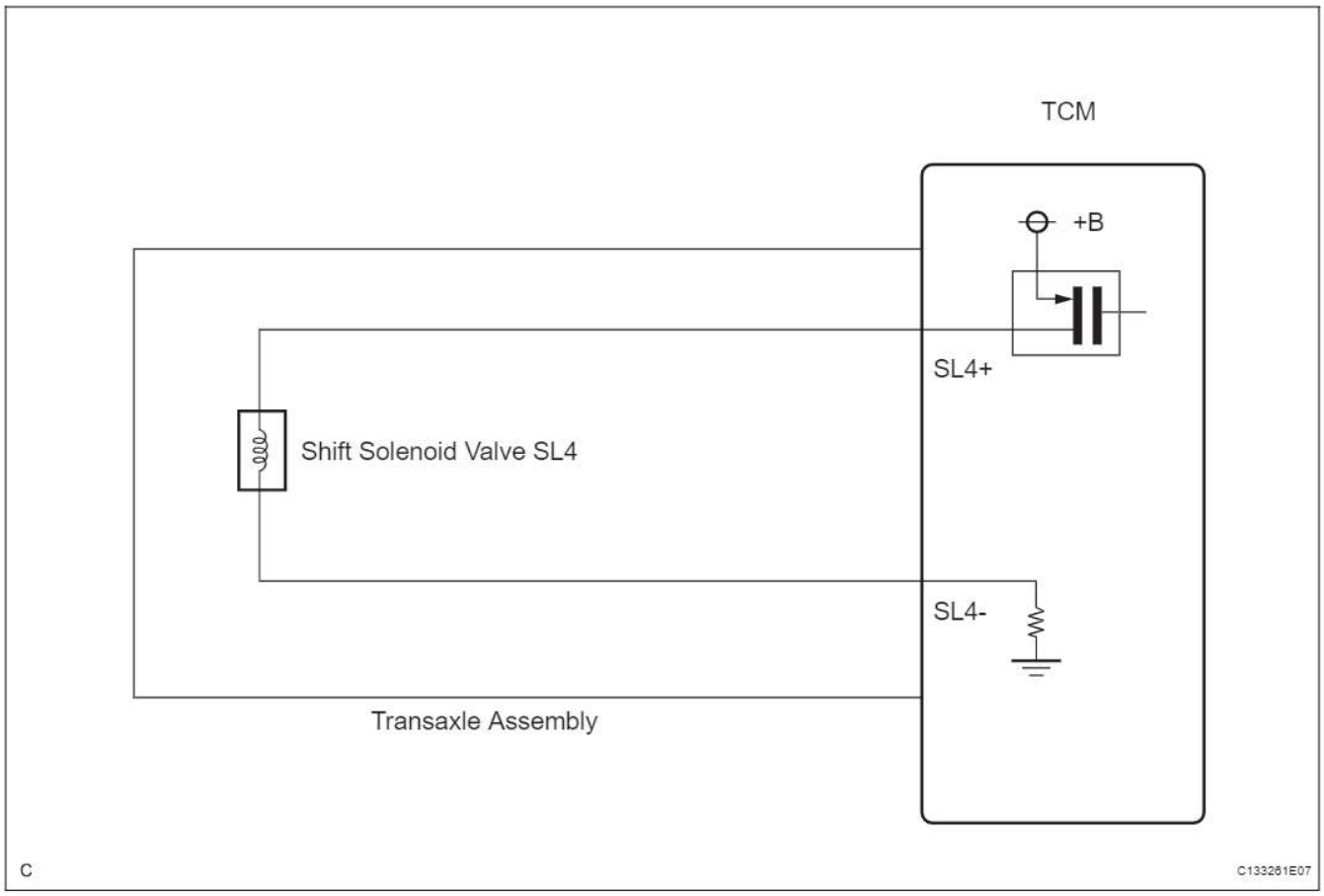
Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more

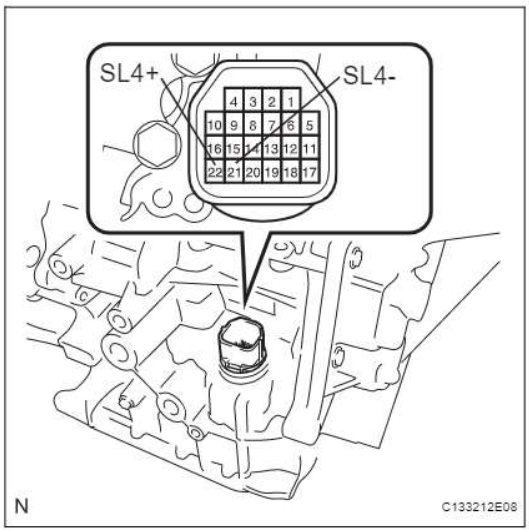
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WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SL4 CIRCUIT)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
22 (SL4+) - 21 (SL4-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

Tester Connection	Specified Condition
22 (SL4+) - Body ground	10 kΩ or higher
21 (SL4-) - Body ground	10 kΩ or higher

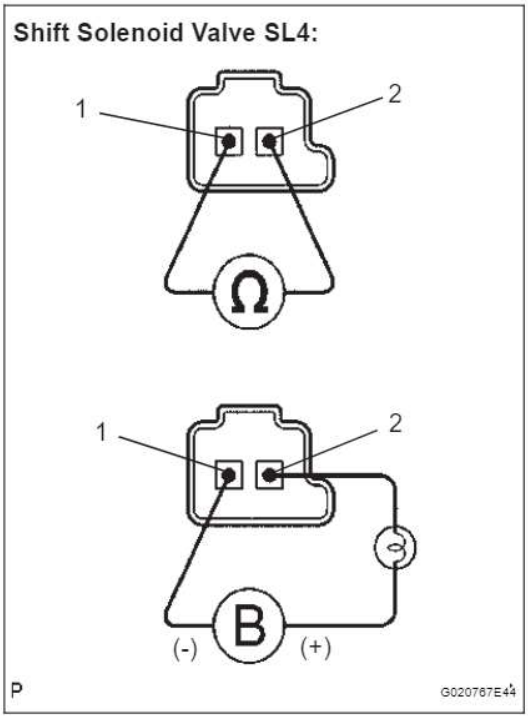
OK	REPLACE TCM

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NG

2	INSPECT SHIFT SOLENOID VALVE SL4

AX



(a) Remove the shift solenoid valve SL4.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SL4**

OK

REPLACE TRANSMISSION WIRE

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DTC	U0100	Lost Communication with ECM/PCM "A"

DESCRIPTION

The engine control unit intercommunicates with the TCM with the Controller Area Network (CAN). If there is a problem in this intercommunication, the TCM sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
U0100	Following conditions are met for 1.25 seconds (1 trip detection logic): • Ignition switch ON (IG) • Battery voltage is 10.5 V or more • No intercommunication between the engine control ECU and TCM	TCM

MONITOR STRATEGY

Related DTCs	U0100: Verify communication
Required Sensors/Components (Main)	TCM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1.25 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Battery Voltage	10.5 V or more
Ignition Switch	ON
Starter	OFF

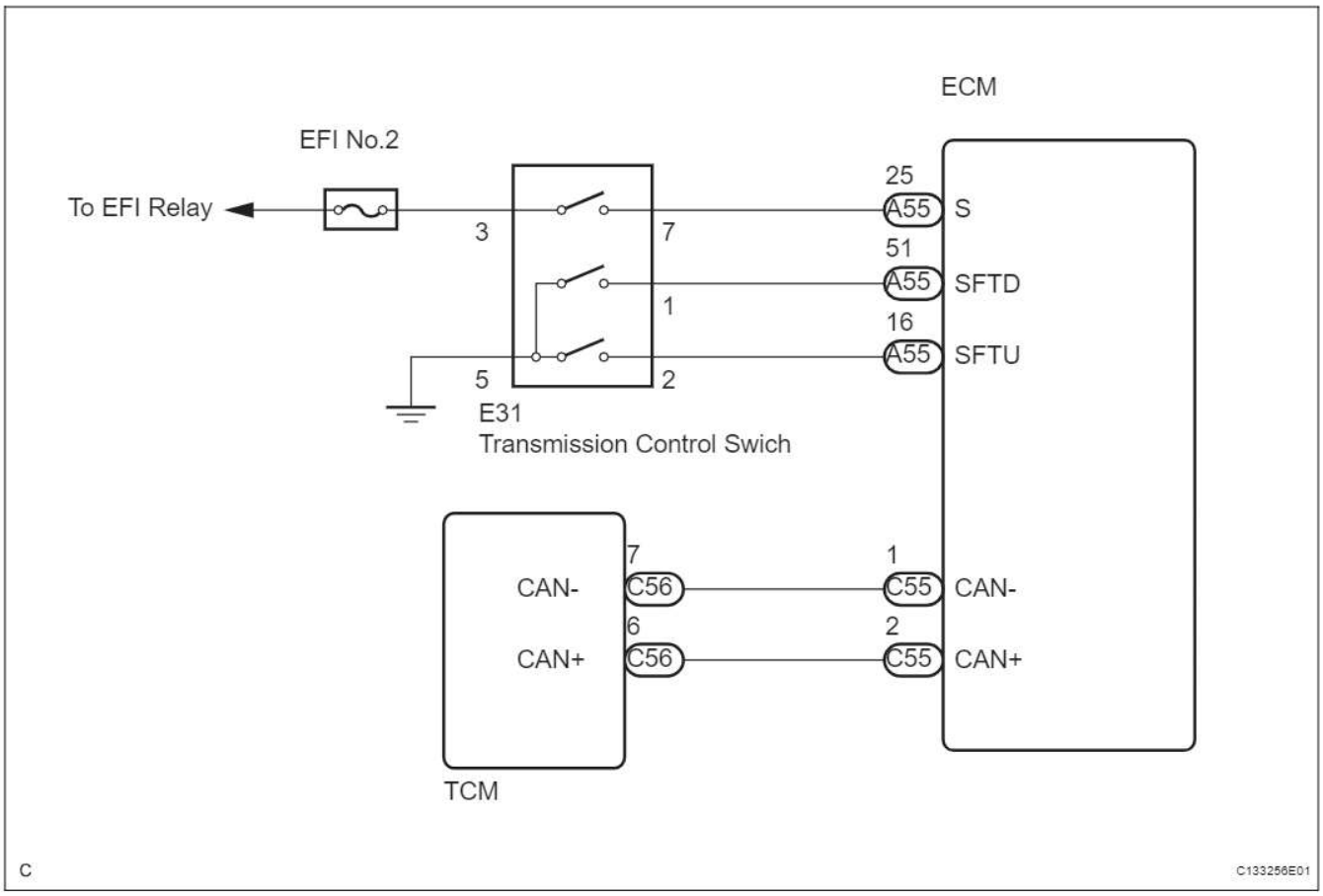
TYPICAL MALFUNCTION THRESHOLDS

Communication between TCM and ECM	No communication

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AX

WIRING DIAGRAM

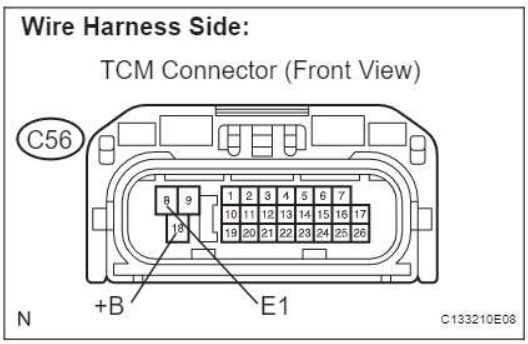


INSPECTION PROCEDURE

HINT:

- Refer to inspection procedure for CAN communication system (See page CA-8).
- If the CAN communication malfunctions, the TCM cannot receive the current data from the ECM. In this case, the freeze frame data output from the TCM has not been updated, so the data will not be useful for the inspection. However, reading the Data List as the first step in troubleshooting is effective to find malfunctions.
- The malfunction area can be checked using the BUS CHECK function on the intelligent tester (See page CA-25).

1	CHECK ECU TERMINAL VOLTAGE (+B AND E1 TERMINALS)



(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage of the TCM connectors.

Standard voltage

Tester Connection	Specified Condition
C56-18 (+B) - C56-8 (E1)	9 to 14 V

(d) Turn the ignition switch off.
(e) Measure the resistance of the TCM connector.

Tester Connection	Specified Condition
C56-8 (E1) - Body ground	Below 1 Ω

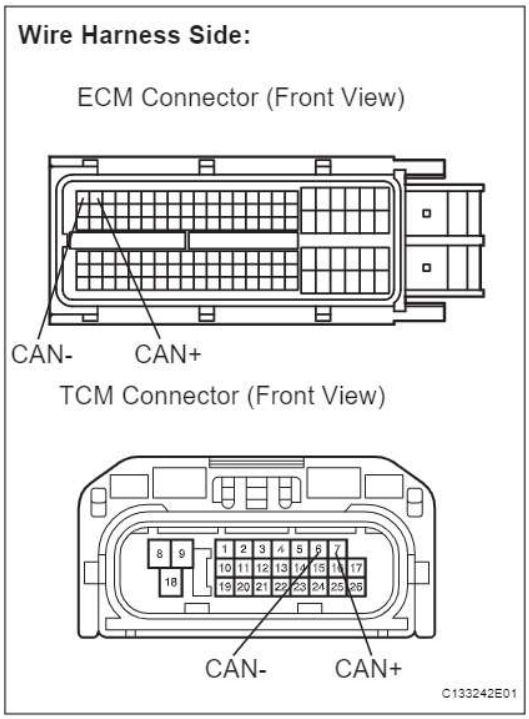
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NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

AX

2 CHECK HARNESS AND CONNECTOR (TCM - ECM)



(a) Disconnect the C56 TCM connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C56-6 (CAN+) - C55-2 (CAN+)	Below 1 Ω
C56-7 (CAN-) - C55-1 (CAN-)	Below 1 Ω
C56-6 (CAN+) or C55-2 (CAN+) - Body ground	1 MΩ or more
C56-7 (CAN-) or C55-1 (CAN-) - Body ground	1 MΩ or more

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK IF DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Clear the DTC.
(c) Replace the TCM.
HINT:
Replace the TCM with a TCM from a normally functioning vehicle of the same model.
(d) Start the engine.
(e) Read the DTCs.

Display (DTC Output)	Proceed to
P0100	A
No DTC	B

B → REPLACE TCM

A

REPLACE ECM

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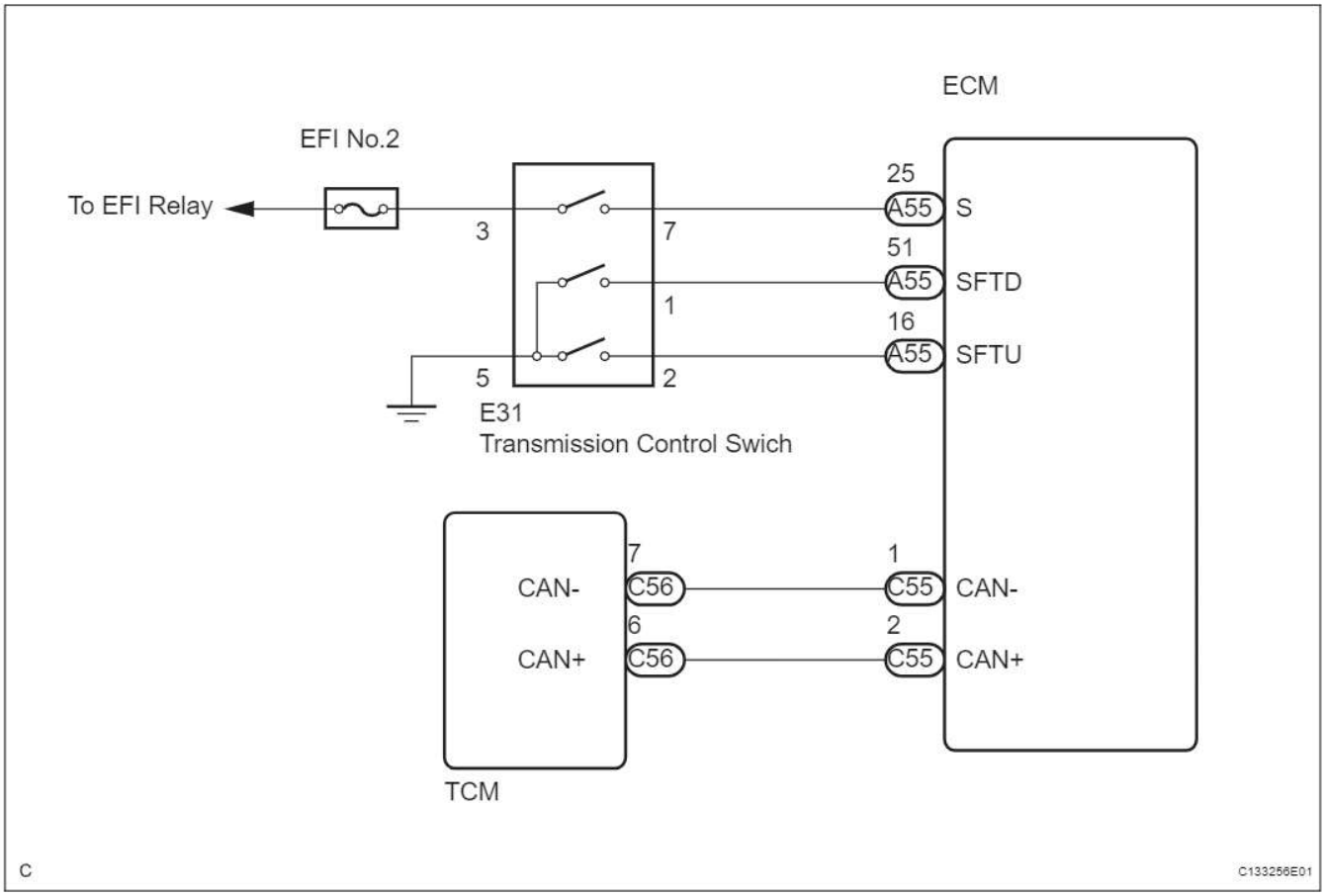
Transmission Control Switch Circuit

DESCRIPTION

When moving the shift lever into the S position using the transmission control switch, it is possible to switch the shift range position between "1" (first range) and "6" (sixth range).
Shifting up "+" once raises one shift range position, and shifting down "-" lowers one shift range position.

AX

WIRING DIAGRAM



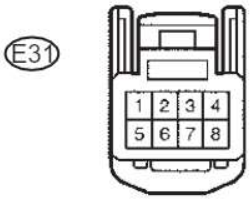
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INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (BATTERY - TRANSMISSION CONTROL SWITCH)

Wire Harness Side:

(Connector Front View):



C110345E22

(a) Disconnect the transmission control switch connector of shift lock control unit assembly.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Switch Condition	Tester Connection	Specified Condition
Ignition switch ON (IG)	3 - Body ground	10 to 14 V
Ignition switch OFF		Below 1 V

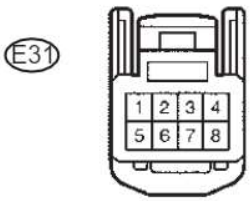
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2	CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - BODY GROUND)

Wire Harness Side:

(Connector Front View):



C110345E22

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

Standard resistance

Tester Connection	Specified Condition
5 - Body ground	Below 1 Ω

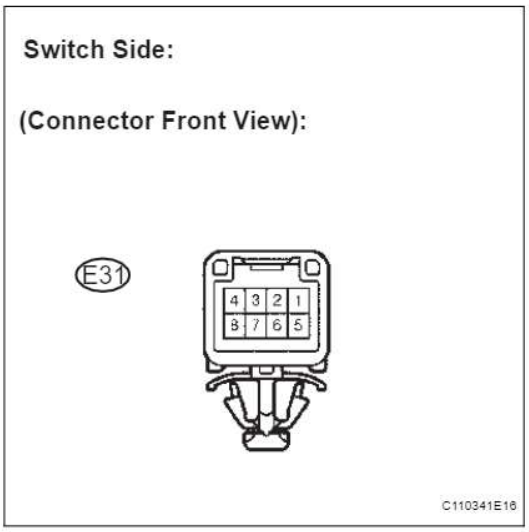
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

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AX

3 INSPECT TRANSMISSION CONTROL SWITCH



(a) Measure the resistance between each terminal of the shift lock control unit assembly when the shift lever is moved to each position.

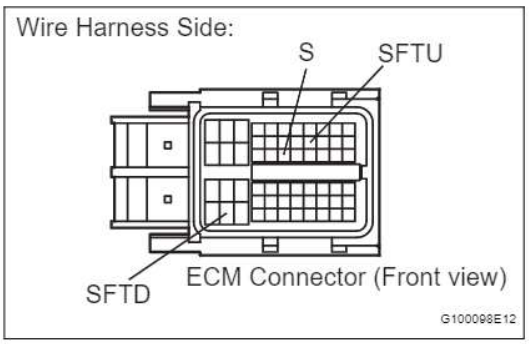
Standard resistance

Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	3 - 7	Below 1 Ω
Except S, "+" and "-"		10 kΩ or higher
Press continuously "+" (Up shift)	2 - 5	Below 1 Ω
S		10 kΩ or higher
Press continuously "-" (Down shift)	1 - 5	Below 1 Ω
S		10 kΩ or higher

NG → REPLACE TRANSMISSION CONTROL SWITCH

OK

4 CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - ECM)



(a) Connect the transmission control switch connector of the shift lock control unit assembly.
(b) Disconnect the A55 ECM connector.
(c) Turn the ignition switch on (IG), and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	A55-25 (S) - Body ground	10 to 14 V
Except S, "+" and "-"		Below 1 V

(d) Turn the ignition switch off.
(e) Disconnect the ECM connector.
(f) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
Press continuously "+" (Up shift)	A55-16 (SFTU) - Body ground	Below 1 Ω
S		10 kΩ or higher
Press continuously "-" (Down shift)	A55-51 (SFTD) - Body ground	Below 1 Ω
S		10 kΩ or higher

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NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

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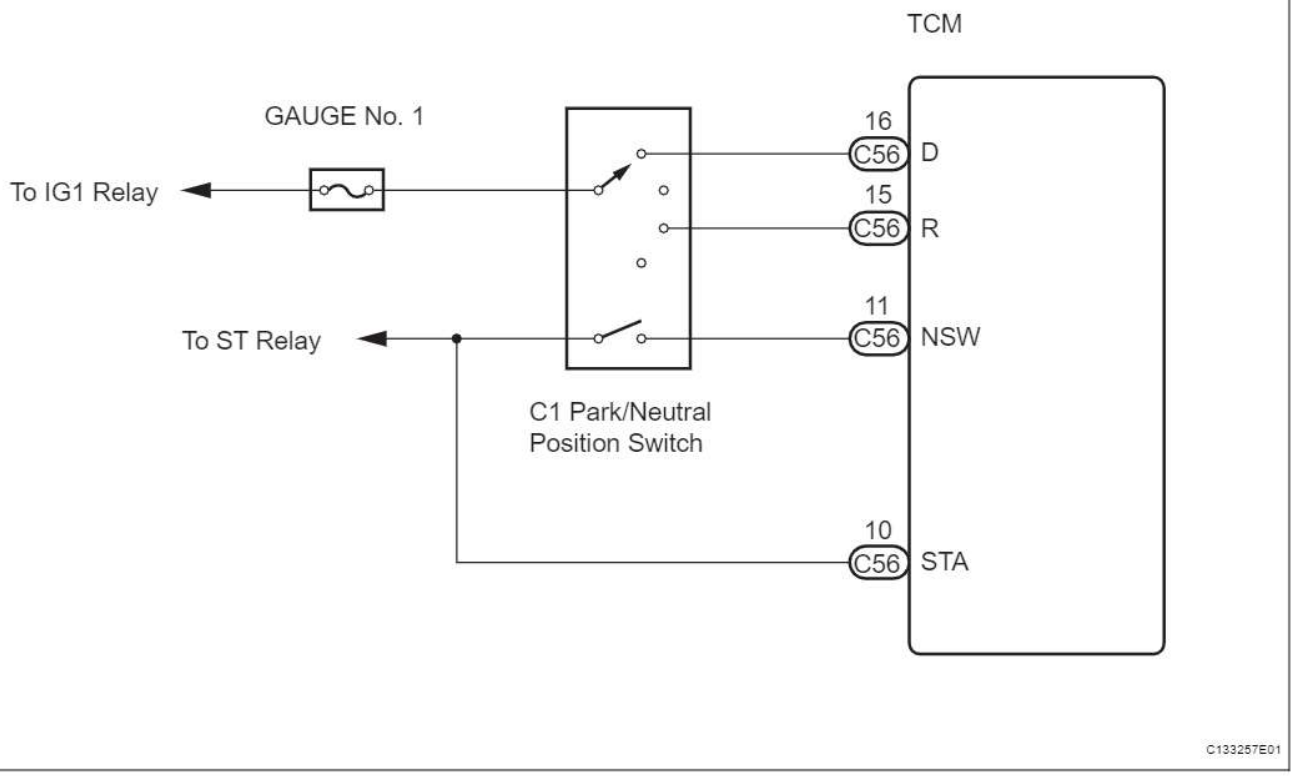
Park / Neutral Position Switch Circuit

DESCRIPTION

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

AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save 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.

(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 on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".

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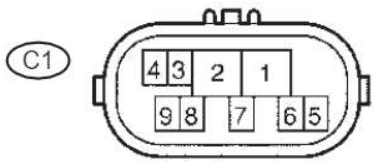
(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP Switch Status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
REVERSE	PNP Switch Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
PARKING	PNP Switch Status/ ON or OFF	Shift lever position is; P: ON Except P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
NEUTRAL	PNP Switch Status/ ON or OFF	Shift lever position is; N: ON Except N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
DRIVE	PNP Switch Status/ ON or OFF	Shift lever position is; D and S: ON Except D and S: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
MODE SELECT SW	Sport Mode Select Switch Status/ ON or OFF	Shift lever position is; S, "+" and "-": ON Except S, "+" and "-": OFF	-

1 INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

Switch Side:

(Connector Front View):



P

C110340E42

(a) Disconnect the park/neutral position switch connector.
(b) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
P	1 - 3 and 4 - 9	Below 1 Ω
Except P		10 kΩ or higher
R	1 - 2	Below 1 Ω
Except R		10 kΩ or higher
N	1 - 8 and 4 - 9	Below 1 Ω
Except N		10 kΩ or higher
D, S, "+" and "-"	1 - 7	Below 1 Ω
Except D, S, "+" and "-"		10 kΩ or higher

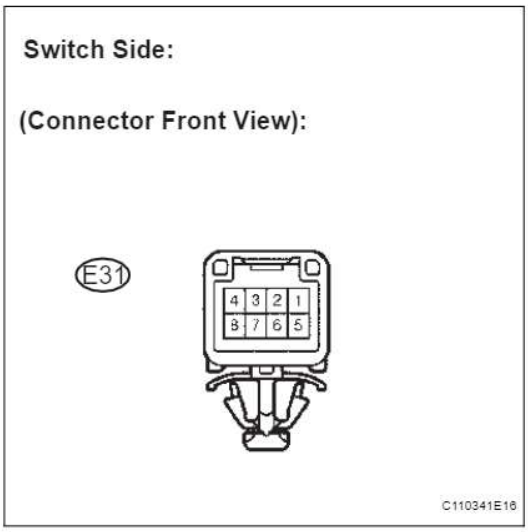
NG → REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

OK

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AX

2 INSPECT TRANSMISSION CONTROL SWITCH



(a) Connect the park/neutral position switch connector.
(b) Disconnect the transmission control switch connector of the shift lock control unit assembly.
(c) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

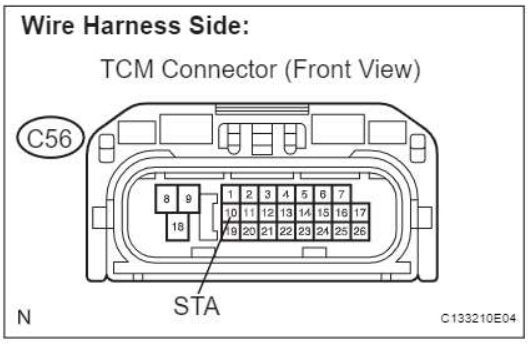
Standard resistance

Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	3 - 7	Below 1 Ω
Except S, "+" and "-"		10 kΩ or higher

NG → REPLACE TRANSMISSION CONTROL SWITCH

OK

3 CHECK ECU TERMINAL VOLTAGE (STA TERMINAL)



(a) Connect the transmission control switch connector of the shift lock control unit assembly.
(b) Measure the voltage according to the value(s) in the table below while cranking the engine.

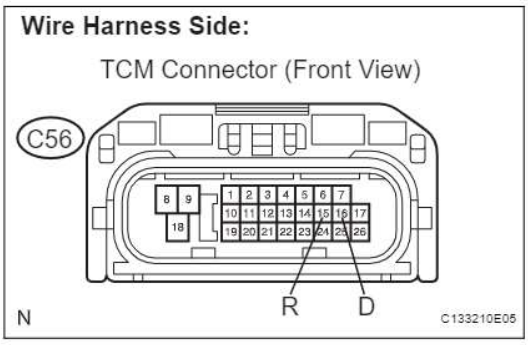
Standard voltage

Tester Connection	Specified Condition
STA (C56-10) - Body ground	9 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (TCM - ECM)

OK

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



(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG), and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
R	R (C56-15) - Body ground	10 to 14 V *
Except R		Below 1 V
D	D (C56-16) - Body ground	10 to 14 V
Except D		Below 1 V

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HINT:
*: The voltage will drop slightly because the back up light is turned on.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (PARK/NEUTRAL POSITION SWITCH - TCM)

OK

REPLACE TCM

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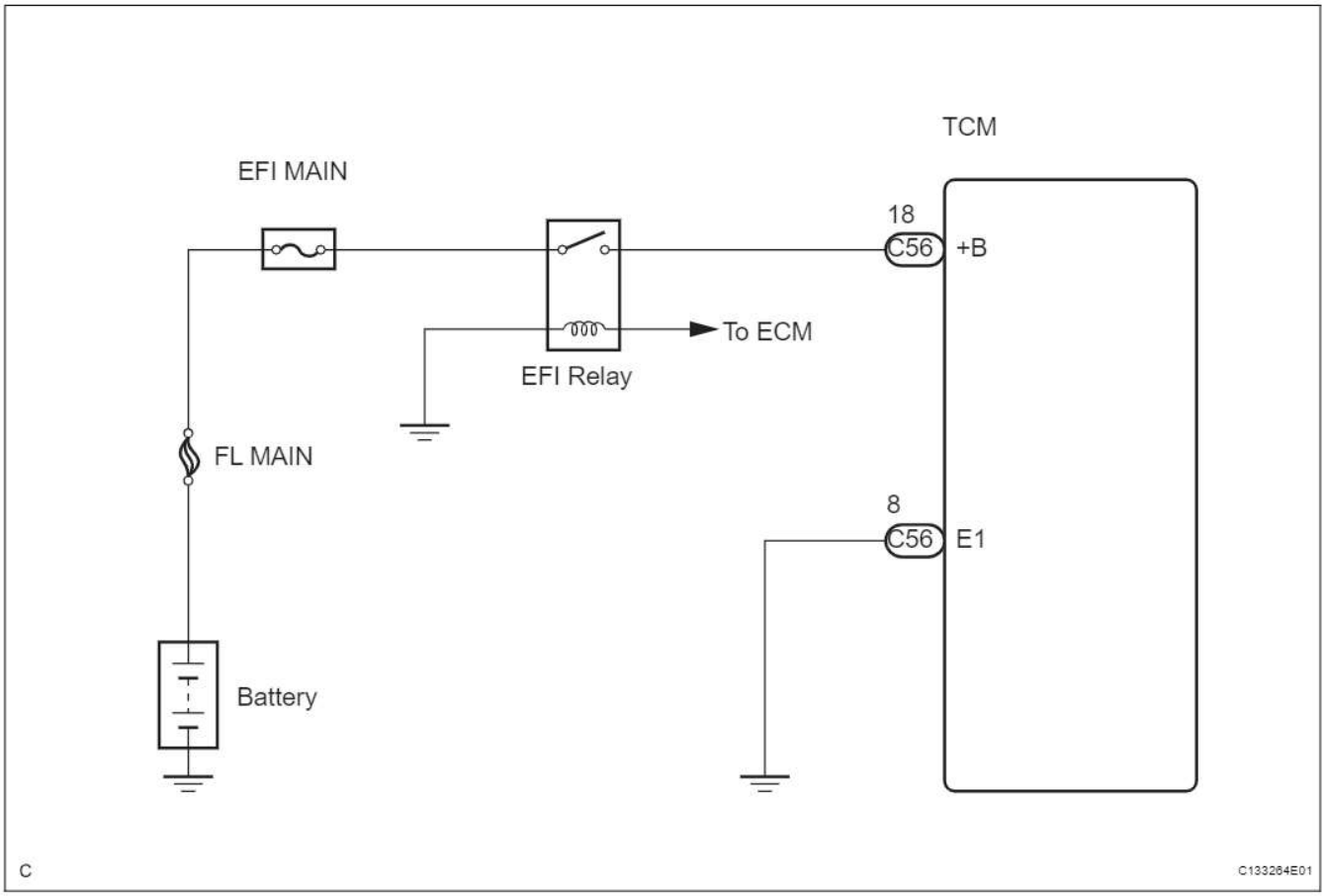
ECU Power Source Circuit

DESCRIPTION

When the ignition switch is turned on (IG), voltage from the ECM's MREL terminal is applied to the EFI relay. This causes the contacts of the EFI relay to close, which supplies power to terminal +B of the TCM.

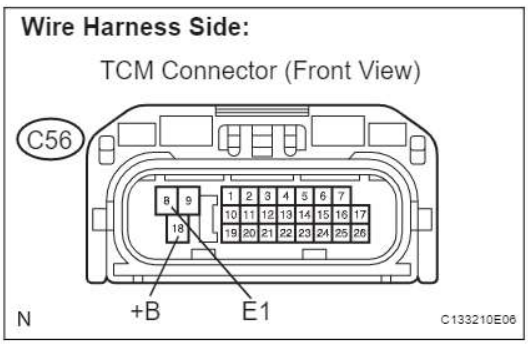
AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ECU TERMINAL VOLTAGE (+B TERMINAL)



(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

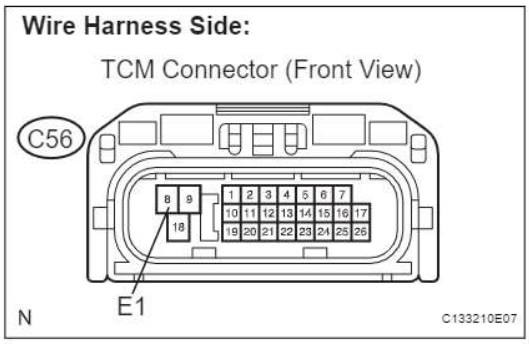
Tester Connection	Specified Condition
+B (C56-18) - E1 (C56-8)	9 to 14 V

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

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2	CHECK HARNESS AND CONNECTOR (TCM - BODY GROUND)



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

Standard resistance

Tester Connection	Specified Condition
E1 (C56-8) - Body ground	Below 1 Ω

(b) Reconnect the TCM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (TCM - BODY GROUND)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (TCM - EFI RELAY)

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AX

AUTOMATIC TRANSAXLE FLUID

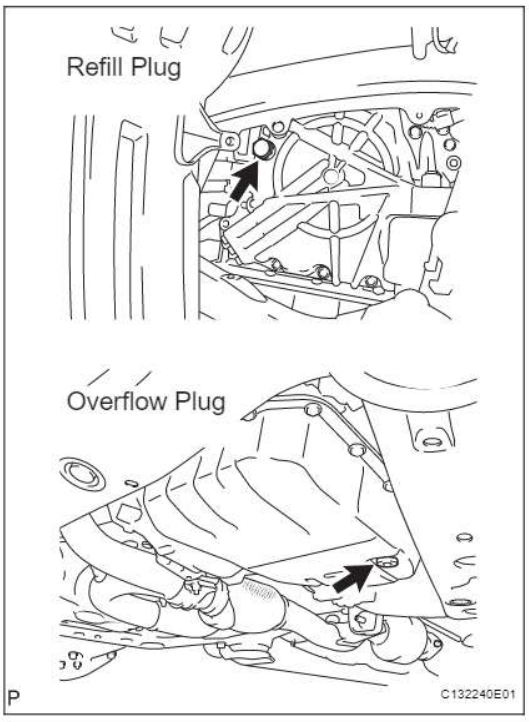
ADJUSTMENT

1. BEFORE FILLING TRANSAXLE WITH FLUID

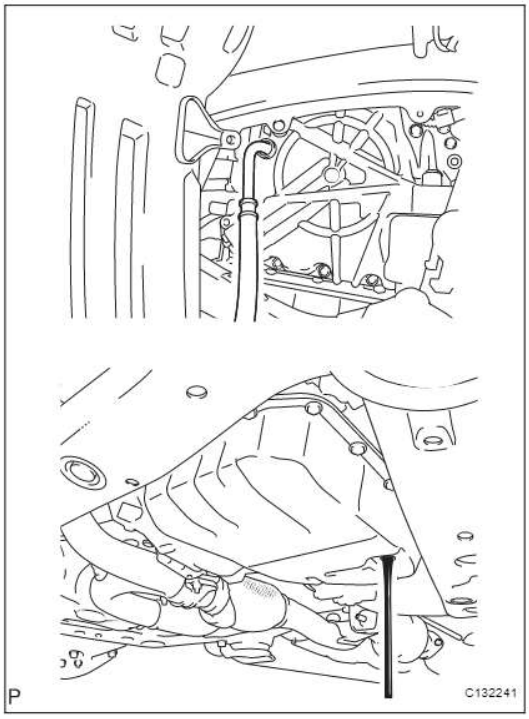
- This transaxle requires Genuine ATF WS transmission fluid.
- After servicing the transaxle, you must refill the transaxle with the correct amount of fluid.
- Maintain the vehicle in a horizontal position while adjusting fluid level.
- Proceed to step 2 if the oil pan, valve body, drive shaft, and/or torque converter has been removed or if the oil seal has been replaced.
- Proceed to step 3 if oil leakage has been repaired and if the oil cooler and cooler hose have been removed.

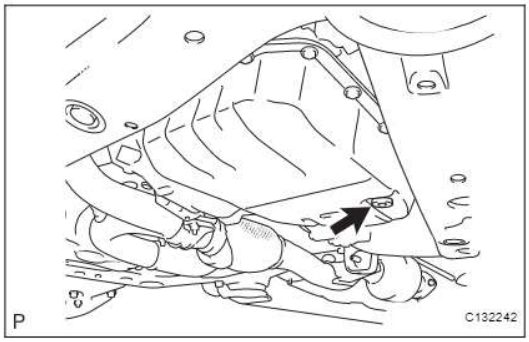
2. FILL TRANSAXLE PAN WITH FLUID

(a) Remove the engine under cover LH.
(b) Remove the engine under cover RH.
(c) Remove the under front fender apron seal RH.
(d) Remove the refill plug and overflow plug.



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(e) Fill the transaxle through the refill hole until fluid begins to trickle out of the overflow tube.

(f) Temporarily install the overflow plug.

3. FILL TRANSAXLE WITH FLUID

(a) Fill the transaxle with the correct amount of fluid as listed in the table below.

Standard capacity

Performed Repair	Fill Amount
Replacement of transaxle (a new torque converter is used)	5.3 liters (5.6 US qts, 4.7 Imp. qts)
Replacement of transaxle (the torque converter is reused)	3.4 liters (3.6 US qts, 3.0 Imp. qts)
Removal & installation of oil pan (including oil drain) Removal & installation of drive shaft	2.8 liters (3.0 US qts, 2.5 Imp. qts)
Removal & installation of valve body	3.2 liters (3.4 US qts, 2.8 Imp. qts)
Removal & installation of torque converter	4.8 liters (5.1 US qts, 4.2 Imp. qts)
Repair of oil leakage and removal of oil cooler and cooler hose	0.5 liters (0.5 US qts, 0.4 Imp. qts)

HINT:

If you cannot add the listed amount of fluid, do the following:

(1) Temporarily install the refill plug.
(2) Allow the engine to idle with the air conditioning OFF.
(3) Move the shift lever through entire gear range to circulate fluid.
(4) Move the shift lever to the P position.
(5) Wait for 30 seconds with the engine idling.
(6) Stop the engine.
(7) Remove the refill plug and add fluid.
(8) Reinstall the refill plug.

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(b) Temporarily install the refill plug to avoid fluid splash.

4. CIRCULATE AUTOMATIC TRANSAXLE FLUID

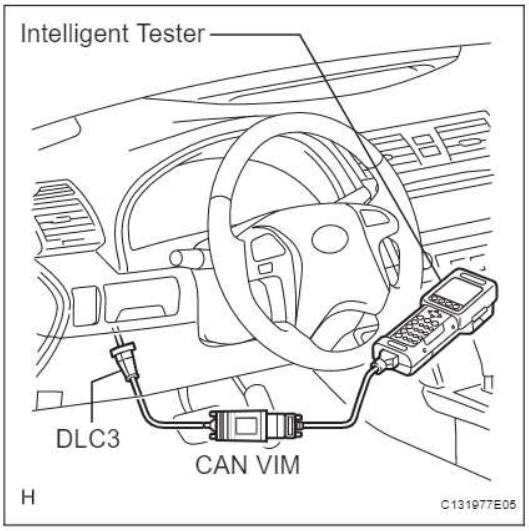
(a) Allow the engine to idle with the air conditioning OFF.

(b) Move the shift lever through entire gear range to circulate the fluid.

5. CHECK FLUID TEMPERATURE

NOTICE:

The fluid temperature should be less than 40°C (104°F) before beginning the fluid temperature check.



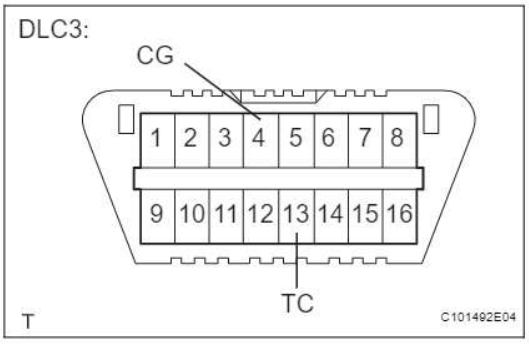
(a) With the intelligent tester:

(1) Connect the intelligent tester to the DLC3.

(2) Select the tester menus: OBD/MOBD, ENGINE, DATA LIST and A/T.

(3) Check A/T OIL TEMP.

(4) Allow the engine to idle until the fluid temperature reaches 39°C (102°F).



(b) Without the intelligent tester (Using D shift indicator):

(1) Connect terminals CG (4) and TC (13) of the DLC3 using SST.
SST 09843-18040

(2) Move the shift lever back and forth between N and D at 1.5 seconds interval for 6 seconds.

(3) The D shift indicator on the combination meter comes on for 2 seconds when the fluid temperature is within the appropriate temperature range.

(4) The D shift indicator will come on again when the fluid temperature reaches 40°C (104°F) and will blink when it exceeds 45°C (113°F).

(5) After confirming that the D shift indicator turns off, move the shift lever to the P position and remove the SST from terminals CG and TC.

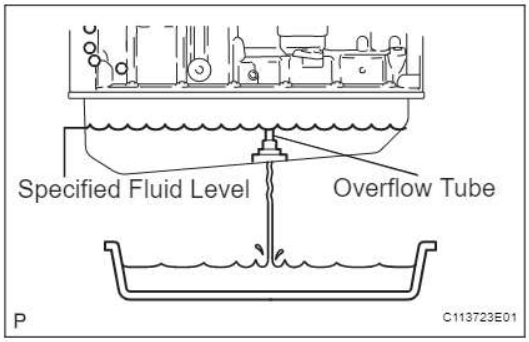
6. CHECK TRANSAXLE FLUID LEVEL

NOTICE:

The fluid temperature must be between 40°C (104°F) and 45°C (113°F) to accurately check the fluid level.

(a) Remove the overflow plug with the engine idling.

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(b) Check that the fluid comes out of the overflow tube.
If fluid does not come out, proceed to step 7.
If fluid comes out, wait until the overflow slows to a trickle and proceed to step 8.

7. ADD FLUID

(a) Install the overflow plug.
(b) Remove the refill plug.
(c) Add the fluid until it comes out of the overflow plug.
(d) Wait until the overflow slows to a trickle.
(e) Install the overflow plug with a new gasket.
(f) Install the refill plug with a new gasket.
(g) Stop the engine.

8. AFTER FILLING TRANSMISSION

(a) Install the overflow plug with a new gasket.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)
(b) Install the refill plug with a new gasket.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
(c) Stop the engine.

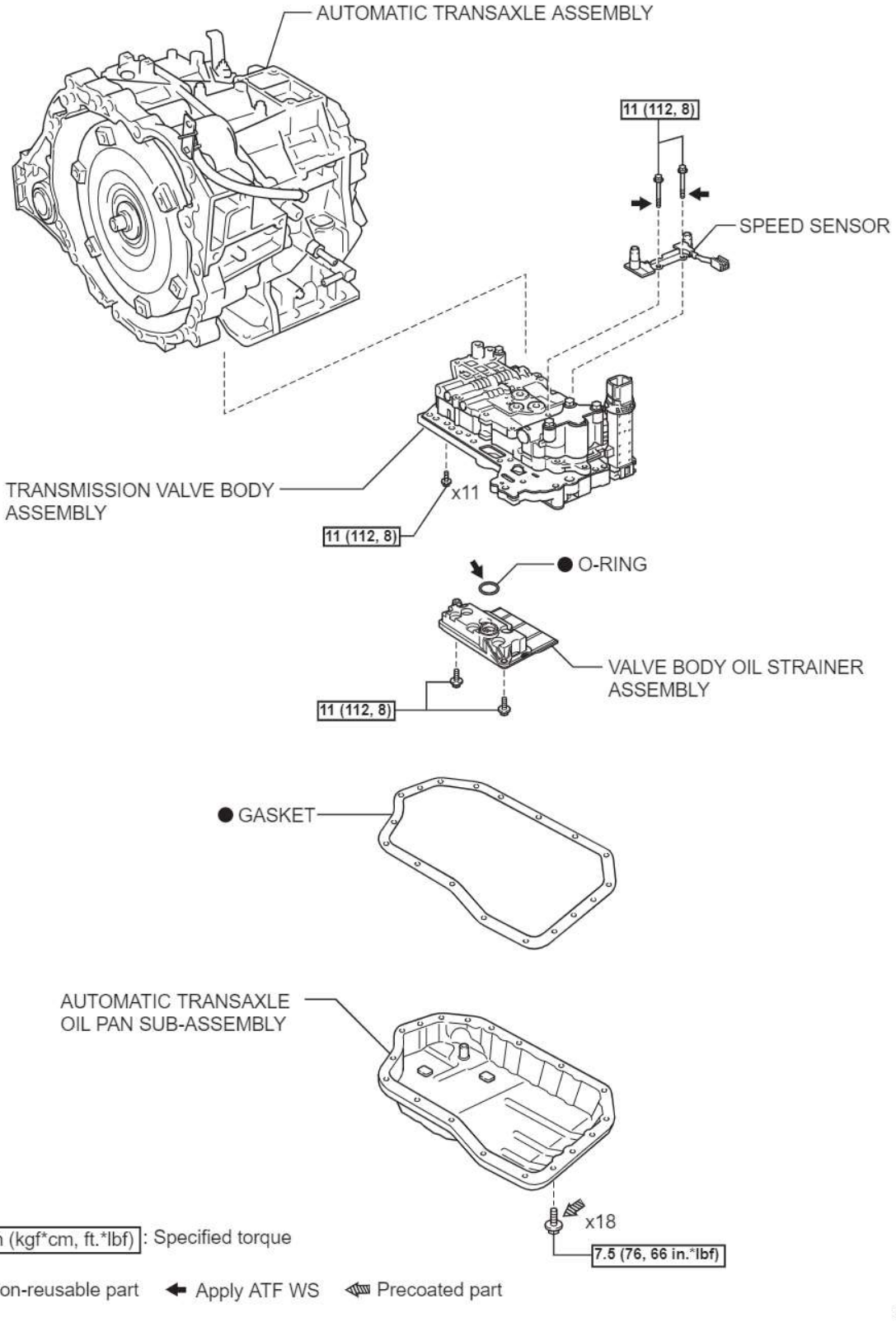
AX

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SPEED SENSOR

COMPONENTS

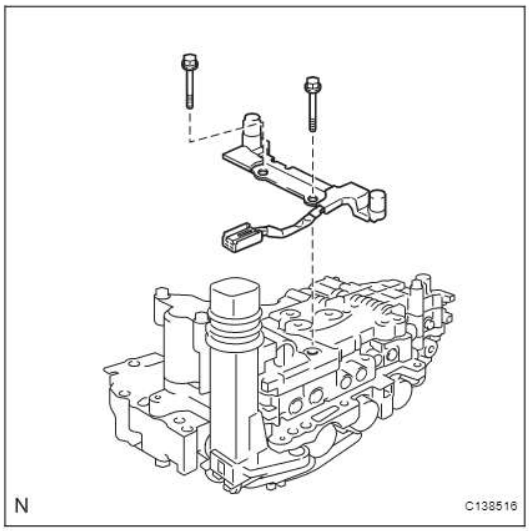
AX

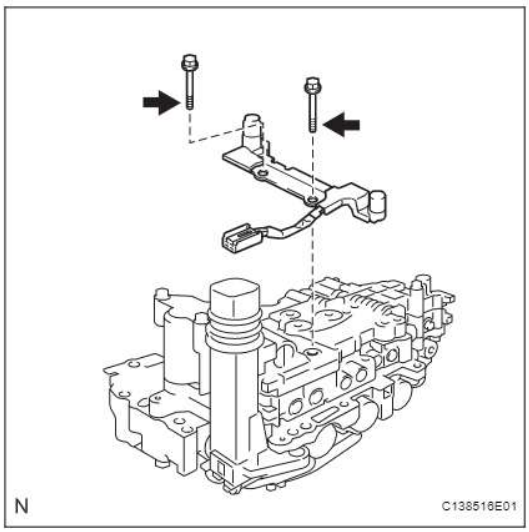


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REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-207)
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-182)**
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-182)**
4. **REMOVE TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
5. **REMOVE SPEED SENSOR**
   (a) Disconnect the connector.
   (b) Remove the 2 bolts and speed sensor from the valve body.





INSTALLATION

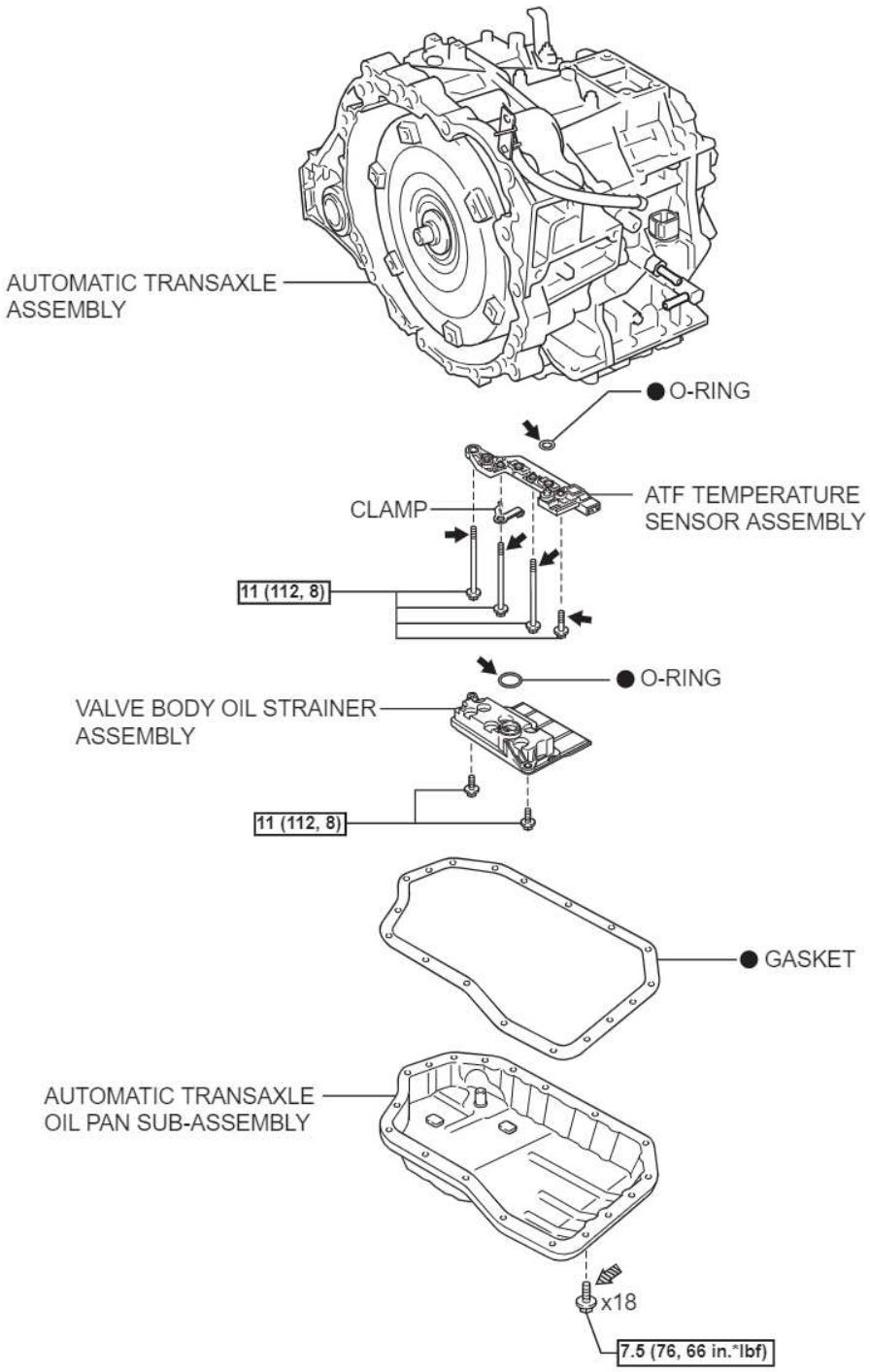
1. **INSTALL SPEED SENSOR**
   (a) Coat the 2 bolts with ATF.
   (b) Install the speed sensor to the valve body with the 2 bolts.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
   (c) Connect the connector.
2. **INSTALL TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
3. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-184)**
4. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-185)**
5. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-214)

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ATF TEMPERATURE SENSOR

COMPONENTS

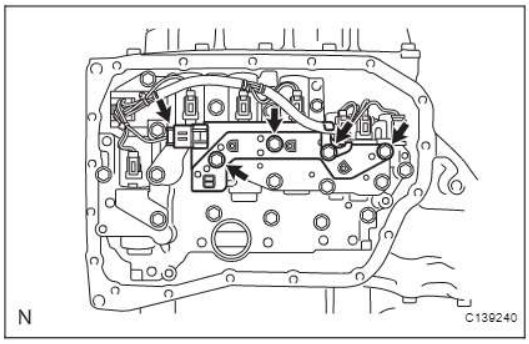
AX



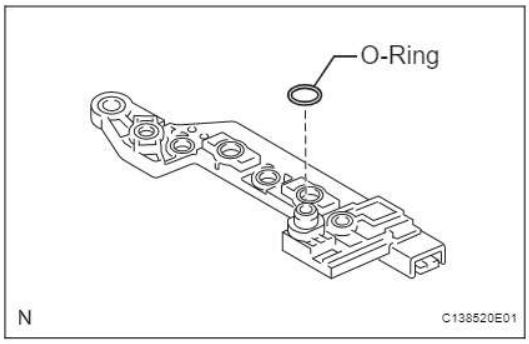
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REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-207)
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-182)**
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-182)**
4. **REMOVE ATF TEMPERATURE SENSOR ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 4 bolts, ATF temperature sensor assembly and clamp from the valve body.



(c) Remove the O-ring from the ATF temperature sensor assembly.



INSPECTION

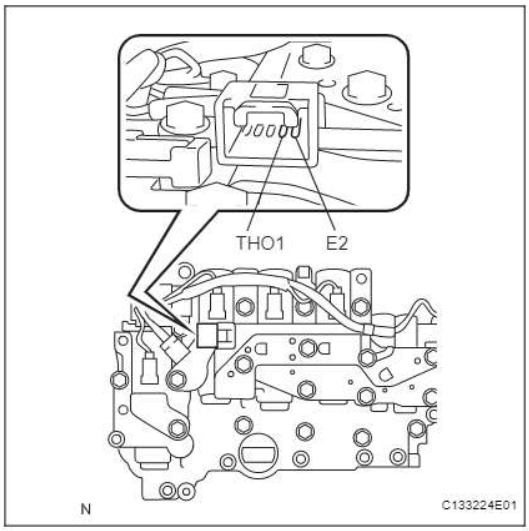
1. **INSPECT ATF TEMPERATURE SENSOR ASSEMBLY**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Specified Condition
E2 - THO1	90 Ω to 156 kΩ
E2 - Body ground	10 kΩ or higher
THO1 - Body ground	10 kΩ or higher

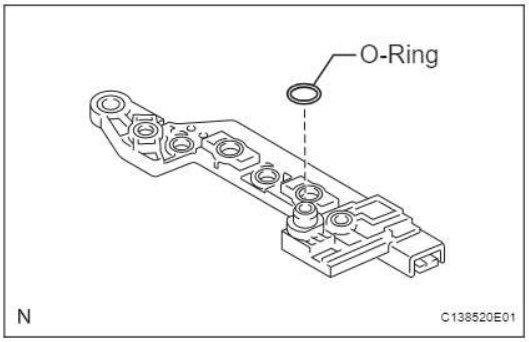
HINT:
If the resistance is out of the specified range with the ATF temperature assembly shown in the table below, the driveability of the vehicle may decrease.
Standard resistance

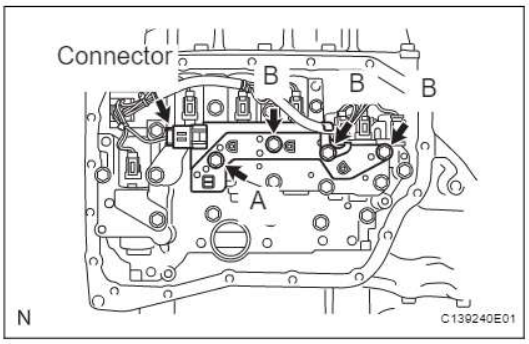
ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

If the result is not specified, replace the ATF temperature sensor assembly.



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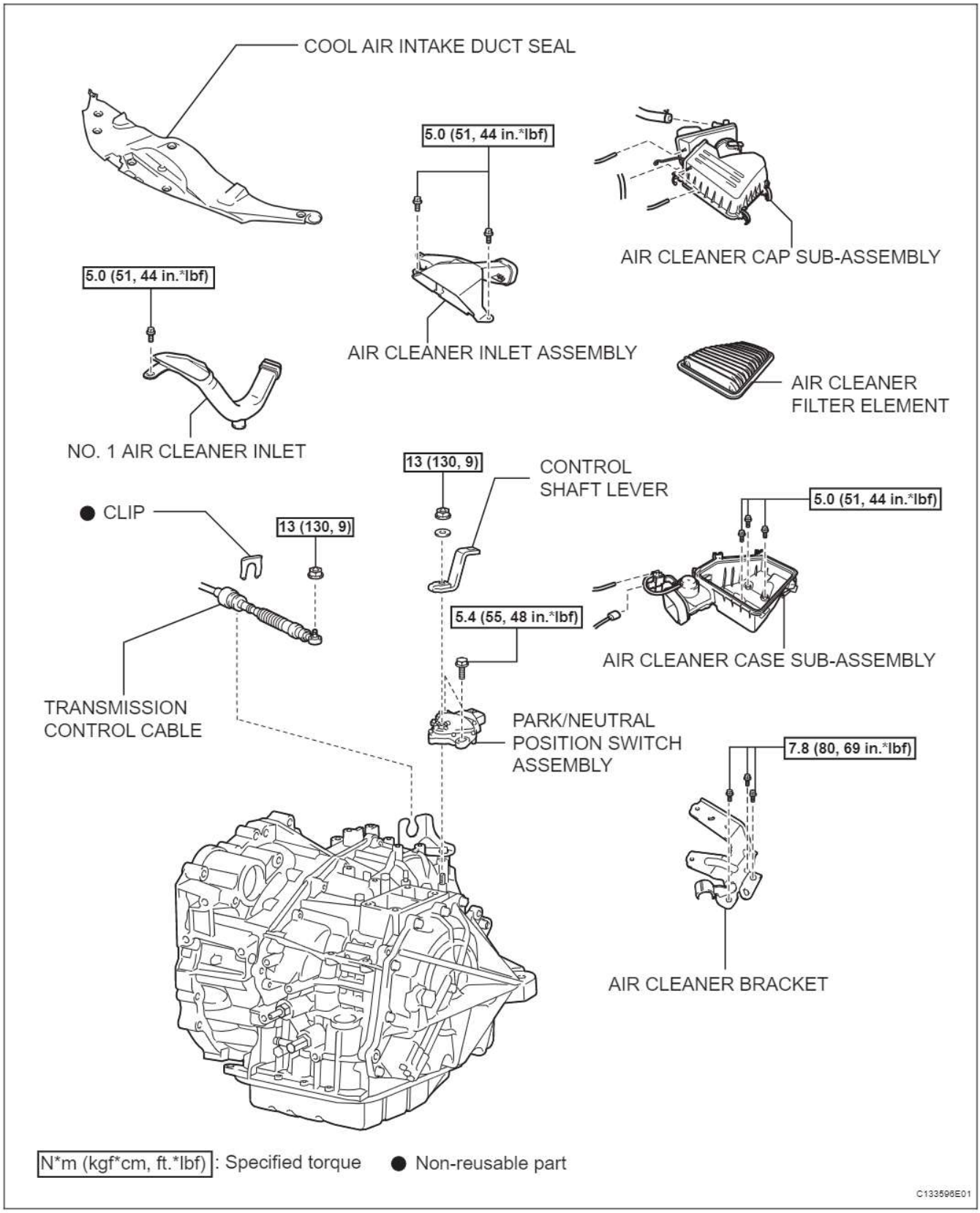
INSTALLATION

1. **INSTALL ATF TEMPERATURE SENSOR ASSEMBLY**
   (a) Coat a new O-ring with ATF and install it to the ATF temperature sensor assembly .
   (b) Coat the 4 bolts with ATF.
   (c) Install the ATF temperature sensor assembly and clamp to the valve body with the 4 bolts.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
   Bolt length:
   Bolt A:
   25 mm (0.98 in.)
   Bolt B:
   85 mm (3.35 in.)
   (d) Connect the connector.
2. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-184)**
3. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-185)**
4. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-214)

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PARK / NEUTRAL POSITION SWITCH

COMPONENTS



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ON-VEHICLE INSPECTION

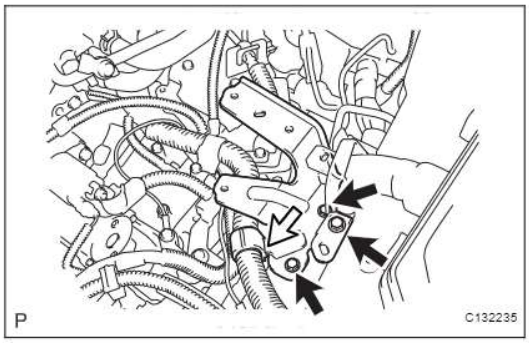
1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY OPERATION

(a) Apply the parking brake.
(b) Turn the ignition switch on (IG).
(c) 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 other positions.
(d) Check that the back-up light comes on and the reverse warning buzzer sounds when the shift lever is set in the R position, but the light and buzzer do not operate in other positions. If a failure is found, check the park/neutral position switch for continuity.

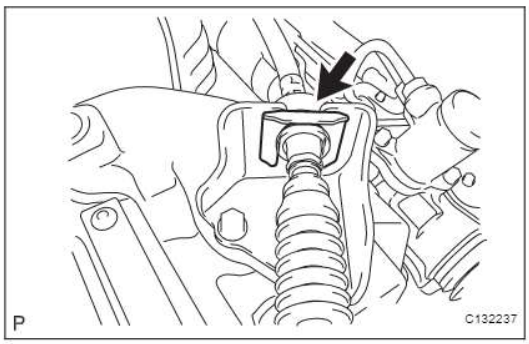
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REMOVAL

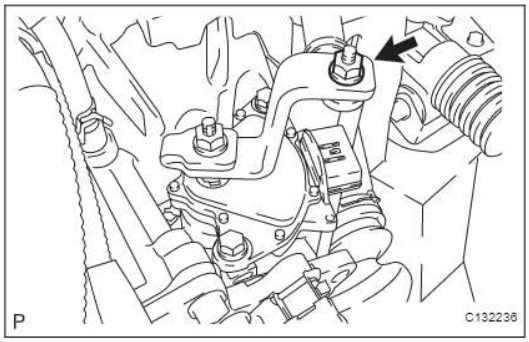
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)
3. REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)
4. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)
5. REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)
6. REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)
7. REMOVE AIR CLEANER BRACKET
   (a) Separate the wire harness clamp.
   (b) Remove the 3 bolts and air cleaner bracket.



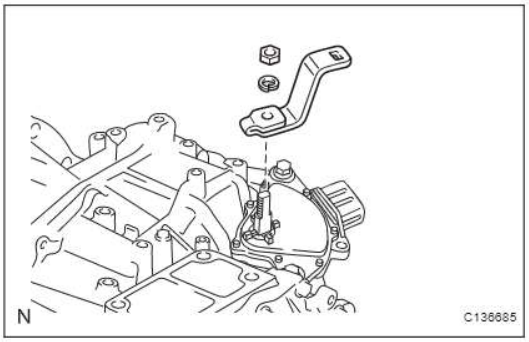
8. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY
   (a) Remove the clip from the transmission cable bracket.



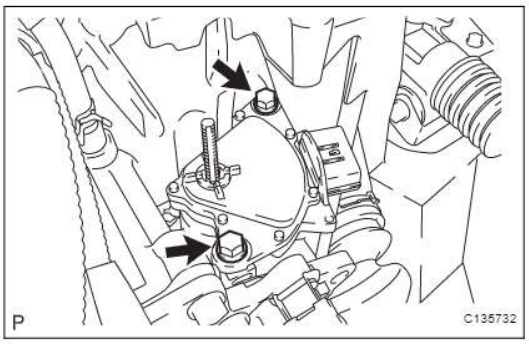
   (b) Remove the nut and transmission control cable from the control shaft lever.
   (c) Disconnect the connector from the park/neutral position switch.



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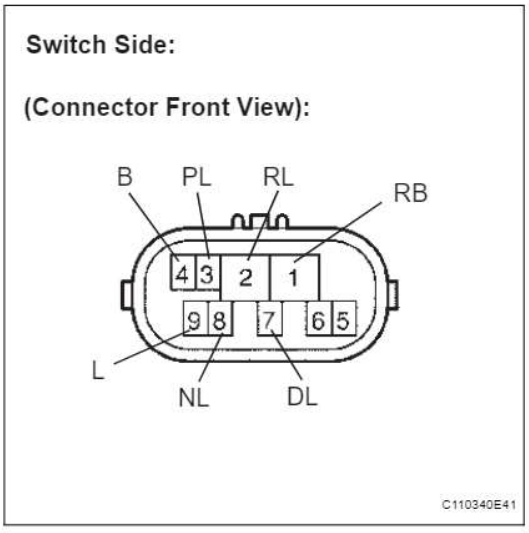
(d) Remove the nut, washer and control shaft lever from the control shaft.



(e) Remove the 2 bolts and park/neutral position switch from the control shaft.

NOTICE:

Before removing the park/neutral position switch, remove any dirt or rust on the installation portion of the control shaft. Be sure to remove the switch straight along the shaft while being careful not to deform the plate spring that supports the shaft. If the plate spring is deformed, the park/neutral switch cannot be reinstalled correctly.



INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance:

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

If operation cannot be done as specified, replace the park/neutral position switch.

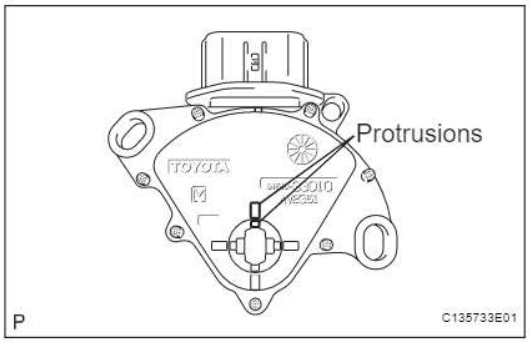
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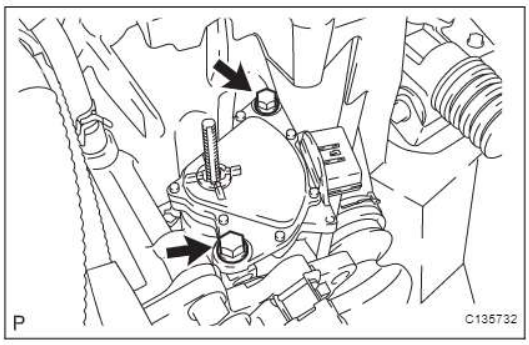
INSTALLATION

1. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

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

(b) Align the protrusions of the park/neutral position switch.



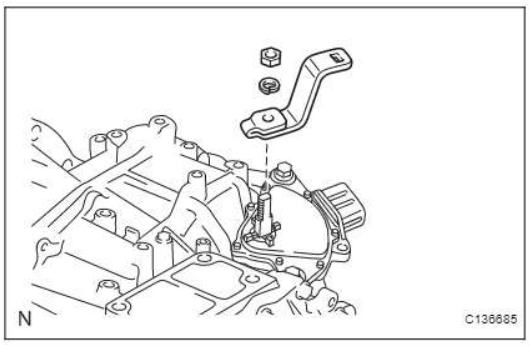


(c) Install the park/neutral position switch to the control shaft with the 2 bolts.

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

NOTICE:

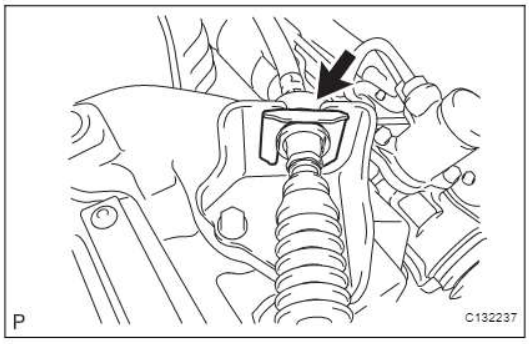
- **Before installing the park/neutral position switch, remove any dirt or rust on the installation portion of the control shaft. Be sure to install the switch straight along the shaft while being careful not to deform the plate spring that supports the shaft. If the plate spring is deformed, the park/neutral switch cannot be reinstalled correctly.**
- **After installing the park/neutral position switch, confirm that the 2 protrusions on the switch are aligned.**



(d) Install the control shaft lever to the control shaft with the nut and washer.

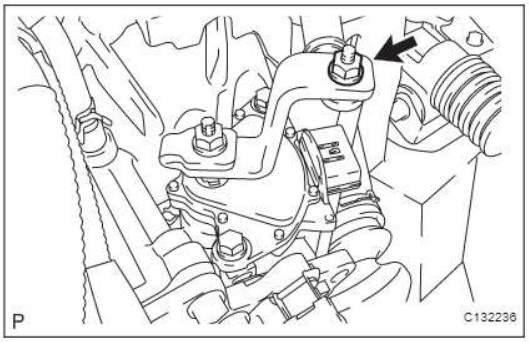
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

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

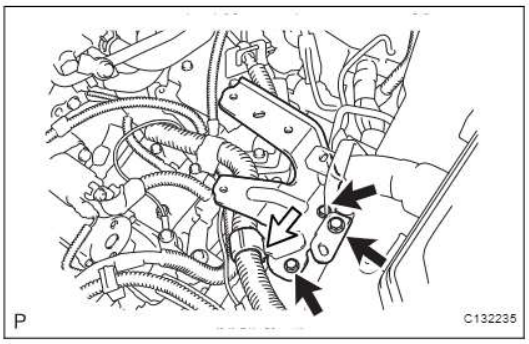


(f) Connect the transmission control cable to the transmission control cable bracket with a new clip.

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(g) Connect the transmission control cable to the control shaft lever with the nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



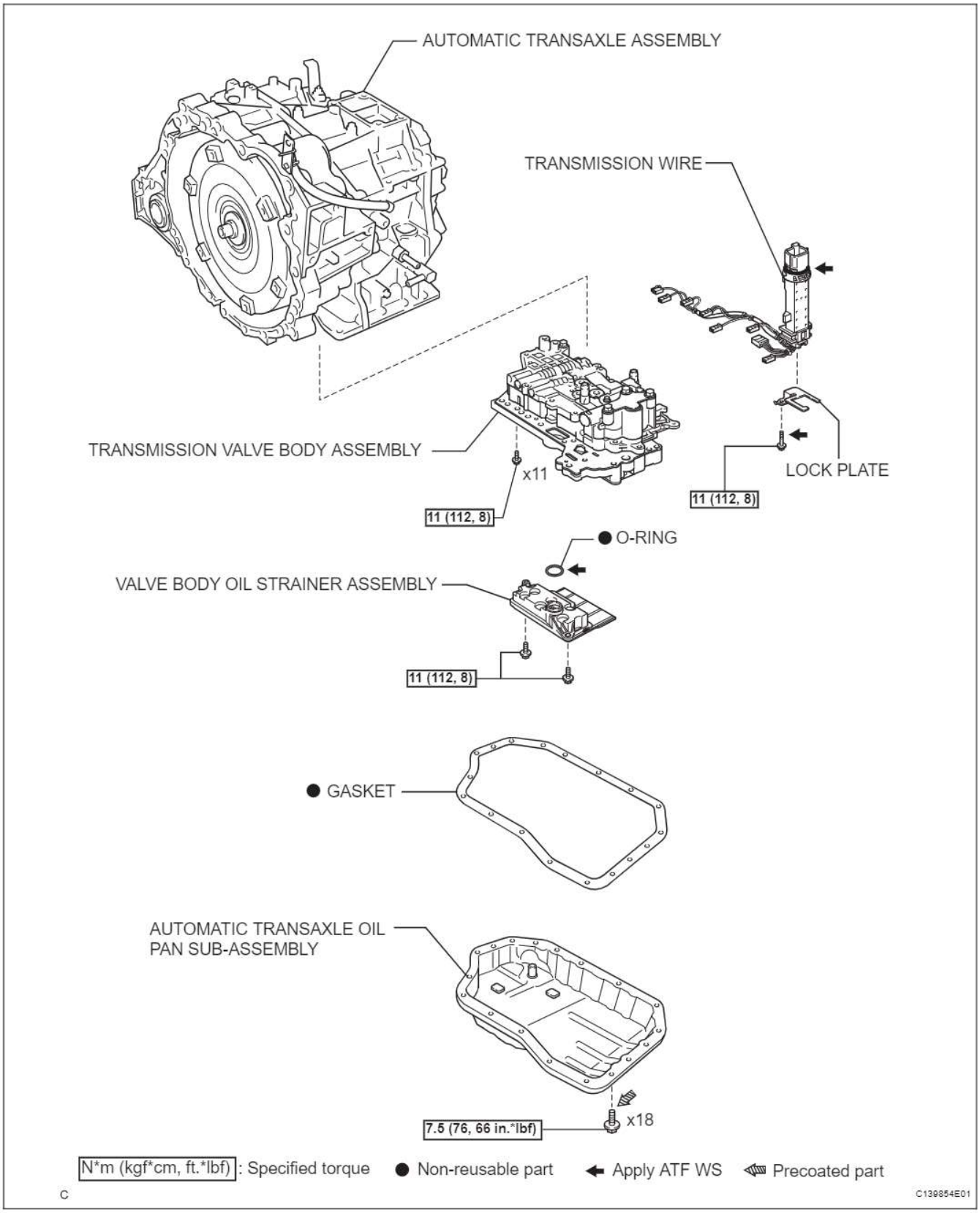
2. **INSTALL AIR CLEANER BRACKET**
   (a) Install the air cleaner bracket with the 3 bolts.
   Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)
   (b) Install the wire harness clamp.
3. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
4. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
5. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
6. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
7. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)**
9. **INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY OPERATION (See page AX-174)**
10. **INSPECT SHIFT LEVER POSITION (See page AX-191)**
11. **ADJUST SHIFT LEVER POSITION (See page AX-191)**

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TRANSMISSION WIRE

COMPONENTS

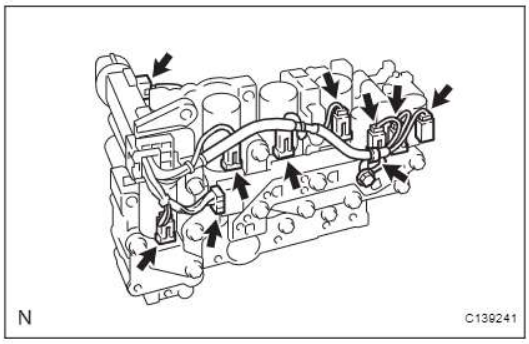
AX

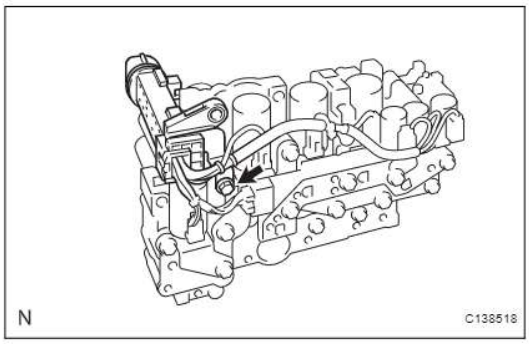


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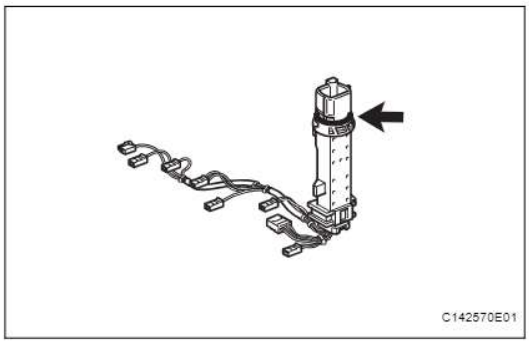
REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-207)
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-182)**
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-182)**
4. **REMOVE TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
5. **REMOVE TRANSMISSION WIRE**
   (a) Disconnect the 9 connectors.
   (b) Remove the transmission wire from the clamp.





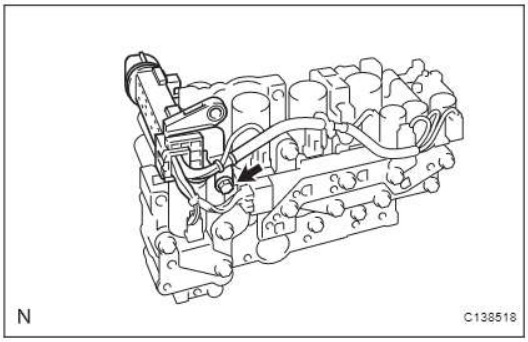
(c) Remove the bolt, lock plate and transmission wire from the valve body.



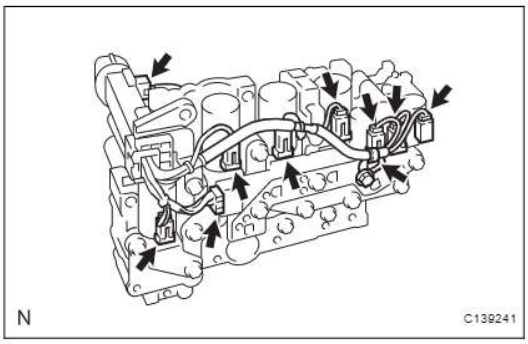
INSTALLATION

1. **INSTALL TRANSMISSION WIRE**
   (a) Coat the O-ring with ATF.
   (b) Coat the bolt with ATF.

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(c) Install the transmission wire and lock plate to the valve body with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



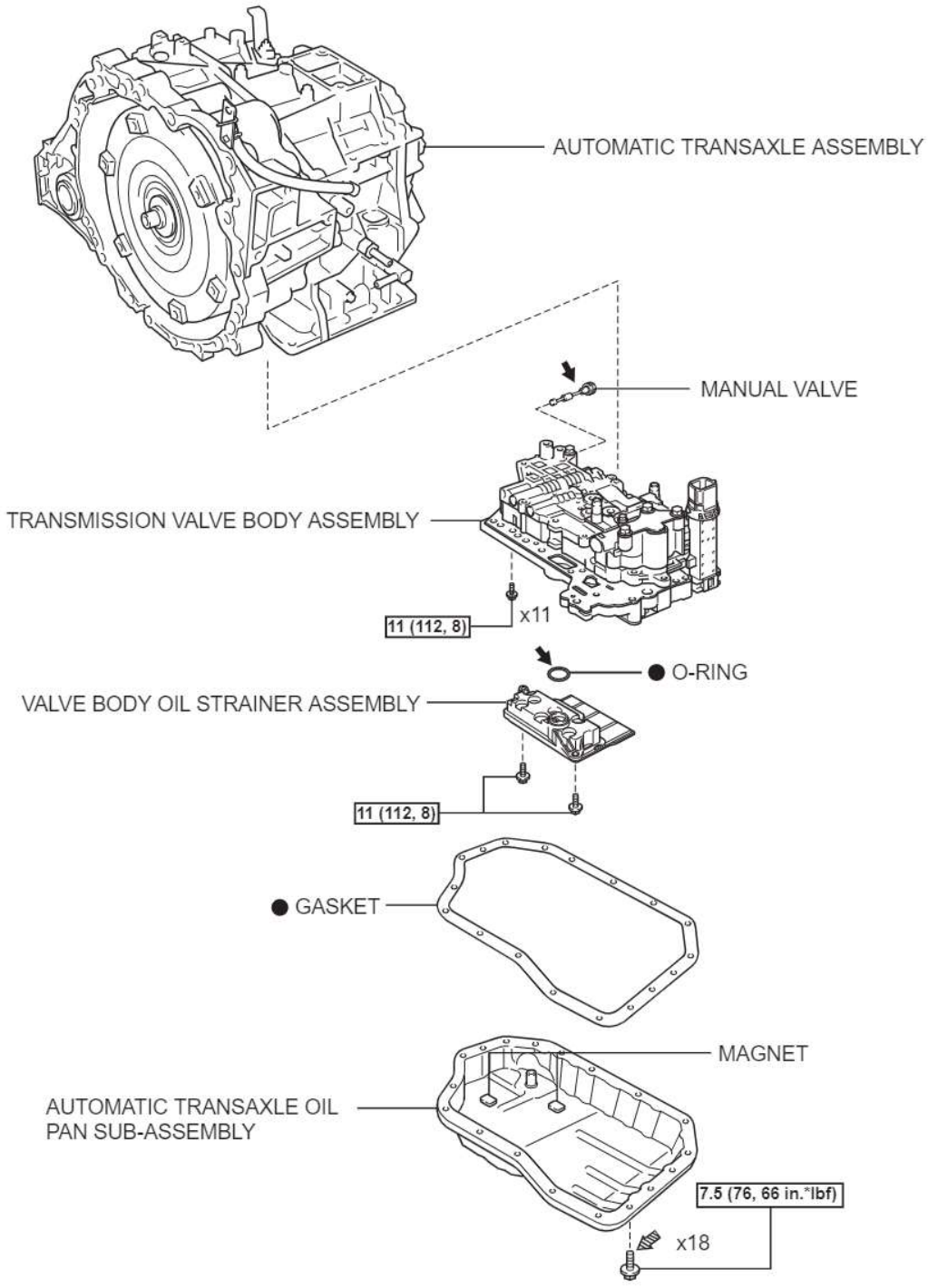
(d) Install the transmission wire to the clamp.
(e) Connect the 9 connectors.

2. **INSTALL TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
3. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-184)**
4. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-185)**
5. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY**
HINT:
(See page AX-214)

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VALVE BODY ASSEMBLY

COMPONENTS



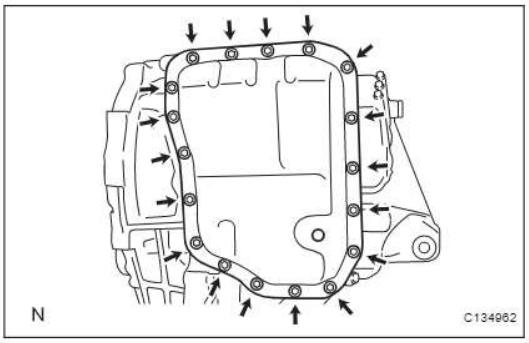
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AX

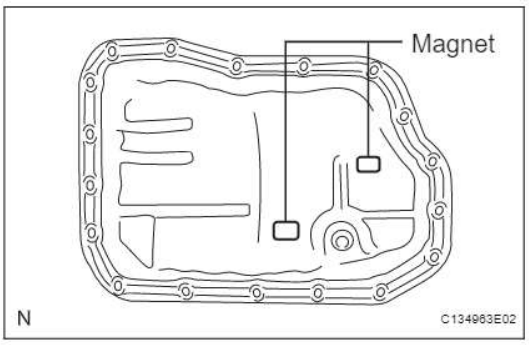
REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-207)

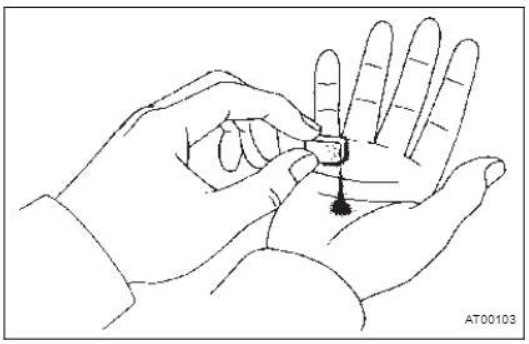
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**
   (a) Remove the 18 bolts and oil pan from the transaxle.
   NOTICE:
   Some fluid will remain in the oil pan. Remove all the pan bolts, and carefully remove the oil pan assembly.
   (b) Remove the gasket from the oil pan.



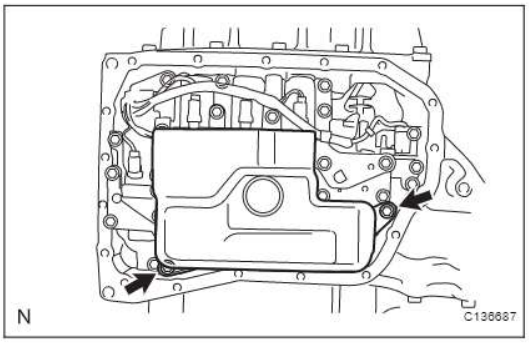
   (c) Remove the 2 magnets from the oil pan.



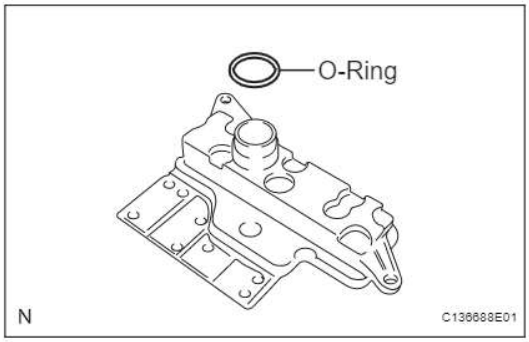
   (d) Examine particles in the oil pan.
   (1) Collect any steel chips with the removed magnets. Lock carefully at the chips and particles in the oil pan and on the magnets to see the type of wear which might be found in the transaxle.
   Result:
   Steel (magnetic):
   Bearing, gear and plate wear
   Brass (non-magnetic):
   Bearing wear



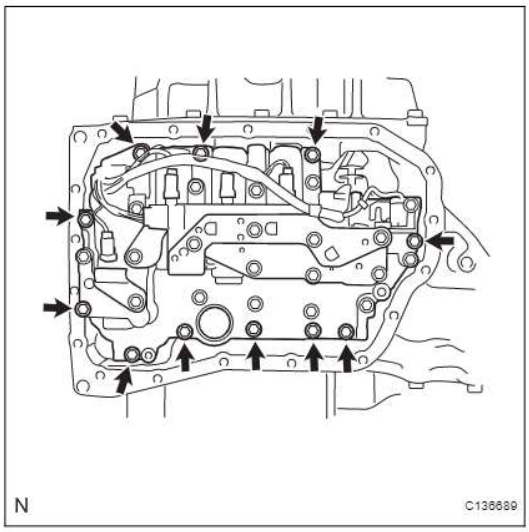
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY**
   (a) Remove the 2 bolts and oil strainer from the valve body.



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(b) Remove the O-ring from the oil strainer.

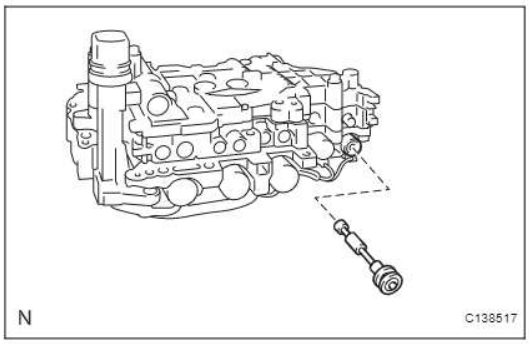


4. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Remove the 11 bolts and valve body from the transaxle.

NOTICE:

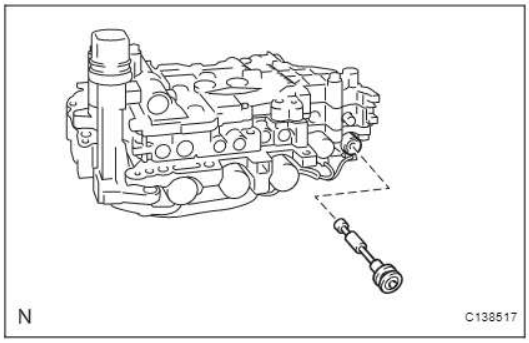
When removing the transmission valve body assembly, be careful not to allow the transmission revolution sensor and the transaxle case to interfere each other.



5. REMOVE MANUAL VALVE

(a) Remove the manual valve from the valve body.

INSTALLATION



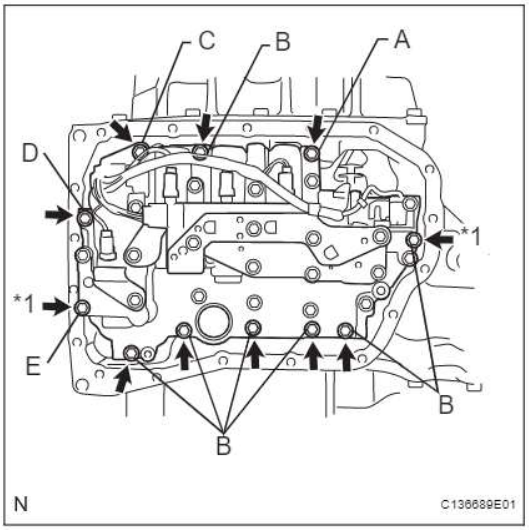
1. INSTALL MANUAL VALVE

(a) Coat the manual valve with ATF and install it to the valve body.

2. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

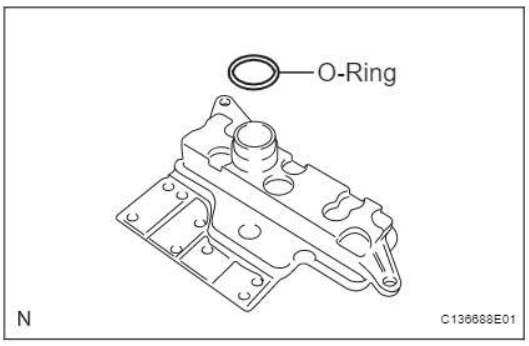
(a) Coat the O-ring of the transmission wire with ATF.

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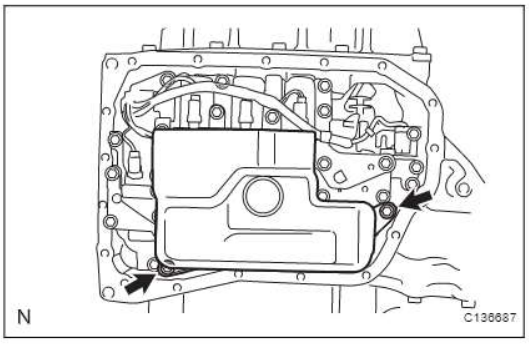


(b) Confirm that the manual valve lever is positioned as shown in the illustration and install the valve body assembly to the transaxle case with the 11 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
Bolt length:
Bolt A:
25 mm (0.98 in.)
Bolt B:
30 mm (1.18 in.)
Bolt C:
35 mm (1.38 in.)
Bolt D:
45 mm (1.77 in.)
Bolt E:
55 mm (2.17 in.)
NOTICE:
- **When installing the transmission valve body assembly, be careful not to allow the transmission revolution sensor and transaxle case to interfere each other.**
- **Be sure to insert the pin of the manual valve lever into the groove on the end of the manual valve.**
- **First, temporarily tighten the bolts marked by (*1) in the illustration because they are positioning bolts.**

3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

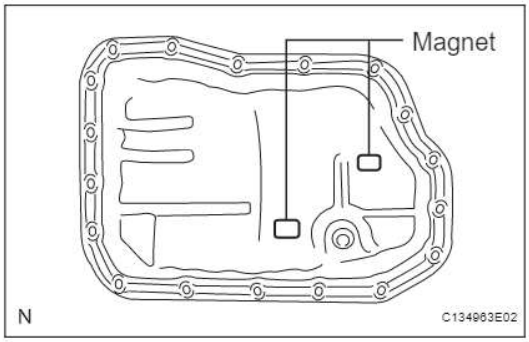


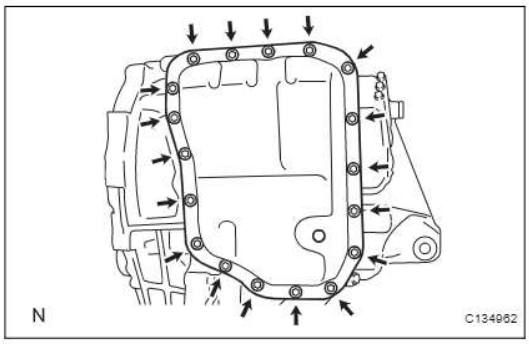
(a) Coat a new O-ring with ATF and install it to the oil strainer.
NOTICE:
Ensure that the O-ring is not twisted or pinched.



(b) Install the oil strainer to the valve body with the 2 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

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4. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets to the oil pan.

(b) Install a new gasket to the oil pan.

(c) Apply sealant to the 18 bolts.

Sealant:

Toyota Genuine Seal Packing 1344, Three Bond 1344 or equivalent.

(d) Install the oil pan from the automatic transaxle with the 18 bolts.

Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

NOTICE:

- **In order to ensure proper sealing of the transmission oil pan bolts, apply sealant to the bolts and install them within 10 minutes of sealant application.**
- **Completely remove any oil or grease from the contact surface of the transaxle case and oil pan sub-assembly with the gasket before installation.**

5. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

HINT:

(See page AX-214)

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AX

SHIFT LOCK SYSTEM

ON-VEHICLE INSPECTION

1. CHECK SHIFT LOCK OPERATION

(a) Move the shift lever to the P position.
(b) Turn the ignition switch off.
(c) Check that the shift lever cannot be moved to any position other than P.
(d) Turn the ignition switch on (IG), depress the brake pedal and check that the shift lever can be moved to another position.
If operation cannot be done as specified, inspect the shift lock control unit.

2. CHECK SHIFT LOCK RELEASE BUTTON OPERATION

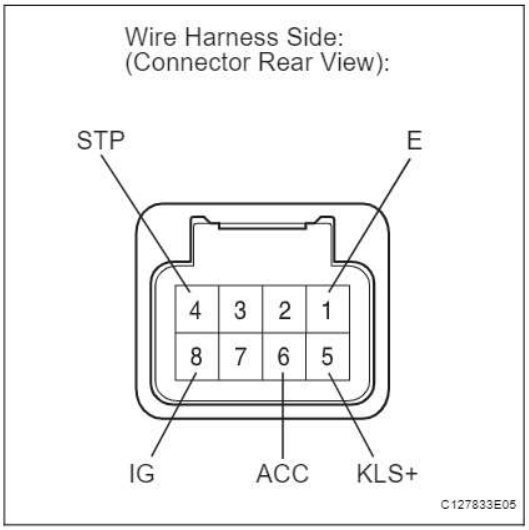
(a) Using a screwdriver, remove the shift lock release cover.
(b) When operating the shift lever with the shift lock release button pressed, check that the lever can be moved to any position other than P.
If operation cannot be done as specified, check the shift lever assembly installation condition.

3. CHECK KEY INTERLOCK OPERATION (w/o Smart Key System)

(a) Turn the ignition switch to the ON position.
(b) Depress the brake pedal and move the shift lever to any position other than P.
(c) Check that the ignition key cannot be turned to the LOCK position.
(d) Move the shift lever to the P position, turn the ignition key to the LOCK position and check that the ignition key can be removed.
If operation cannot be done as specified, inspect the shift lock control unit.

4. INSPECT SHIFT LOCK CONTROL UNIT ASSEMBLY (w/o Smart Key System)

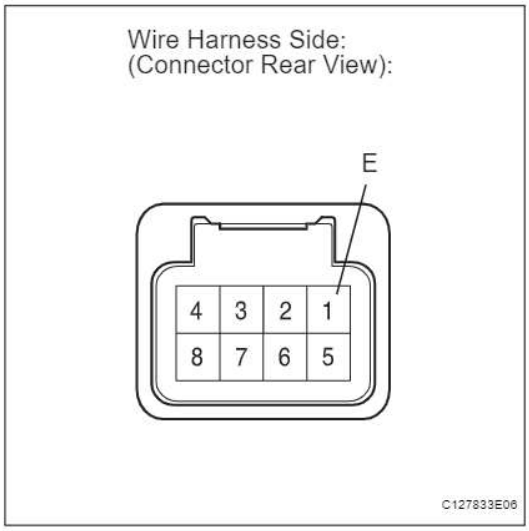
(a) Measure the voltage according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.



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Standard voltage

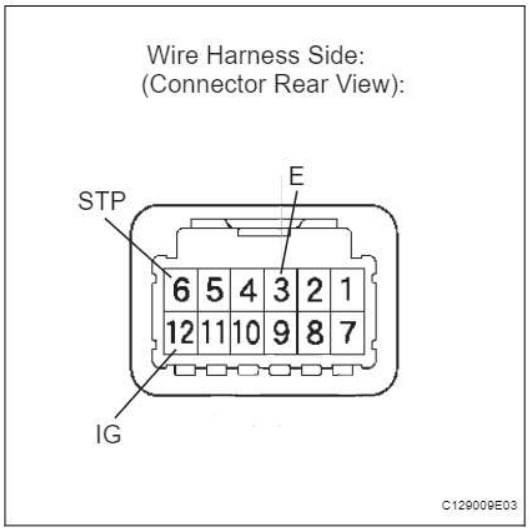
Terminal	Measuring Condition	Voltage (V)
6 (ACC) - 1 (E)	Ignition switch ON	10 to 14
6 (ACC) - 1 (E)	Ignition switch ACC	10 to 14
6 (STP) - 1 (E)	Ignition switch OFF	Below 1
4 (STP) - 1 (E)	Brake pedal depressed	10 to 14
4 (STP) - 1 (E)	Brake pedal released	Below 1
5 (KLS+) - 1 (E)	1. Ignition switch ACC and shift lever P position 2. Ignition switch ACC and shift lever except P position 3. Ignition switch ACC and shift lever P position (After approx. 1 second)	7.5 to 11 Below 1 6 to 9
8 (IG) - 1 (E)	Ignition switch ON	10 to 14
8 (IG) - 1 (E)	Ignition switch OFF	Below 1



(b) Measure the resistance according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.
If the result is not as specified, replace the shift lever assembly.

Standard resistance

Terminal	Measuring Condition	Specified Value
1 (E) - Body ground	Always	Below 1 Ω



5. INSPECT SHIFT LOCK CONTROL UNIT ASSEMBLY (w/ Smart Key System)

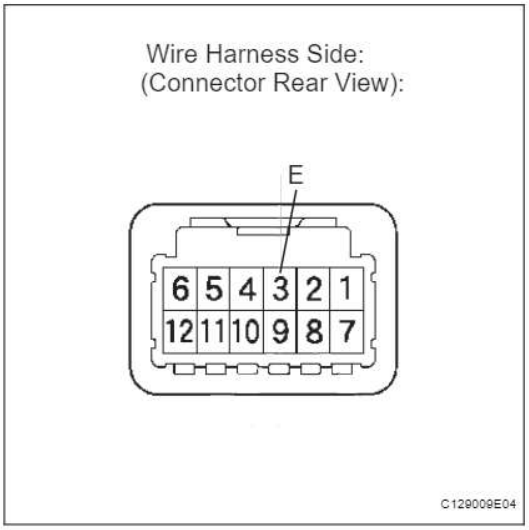
(a) Measure the voltage according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.

Standard voltage

Terminal	Measuring Condition	Voltage (V)
12 (IG) - 3 (E)	Engine switch on (IG)	10 to 14
12 (IG) - 3 (E)	Engine switch off	Below 1
6 (STP) - 3 (E)	Brake pedal depressed	10 to 14

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Terminal	Measuring Condition	Voltage (V)
6 (STP) - 3 (E)	Brake pedal released	Below 1



(b) Measure the resistance according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.
If the result is not done as specified, replace the shift lever assembly.

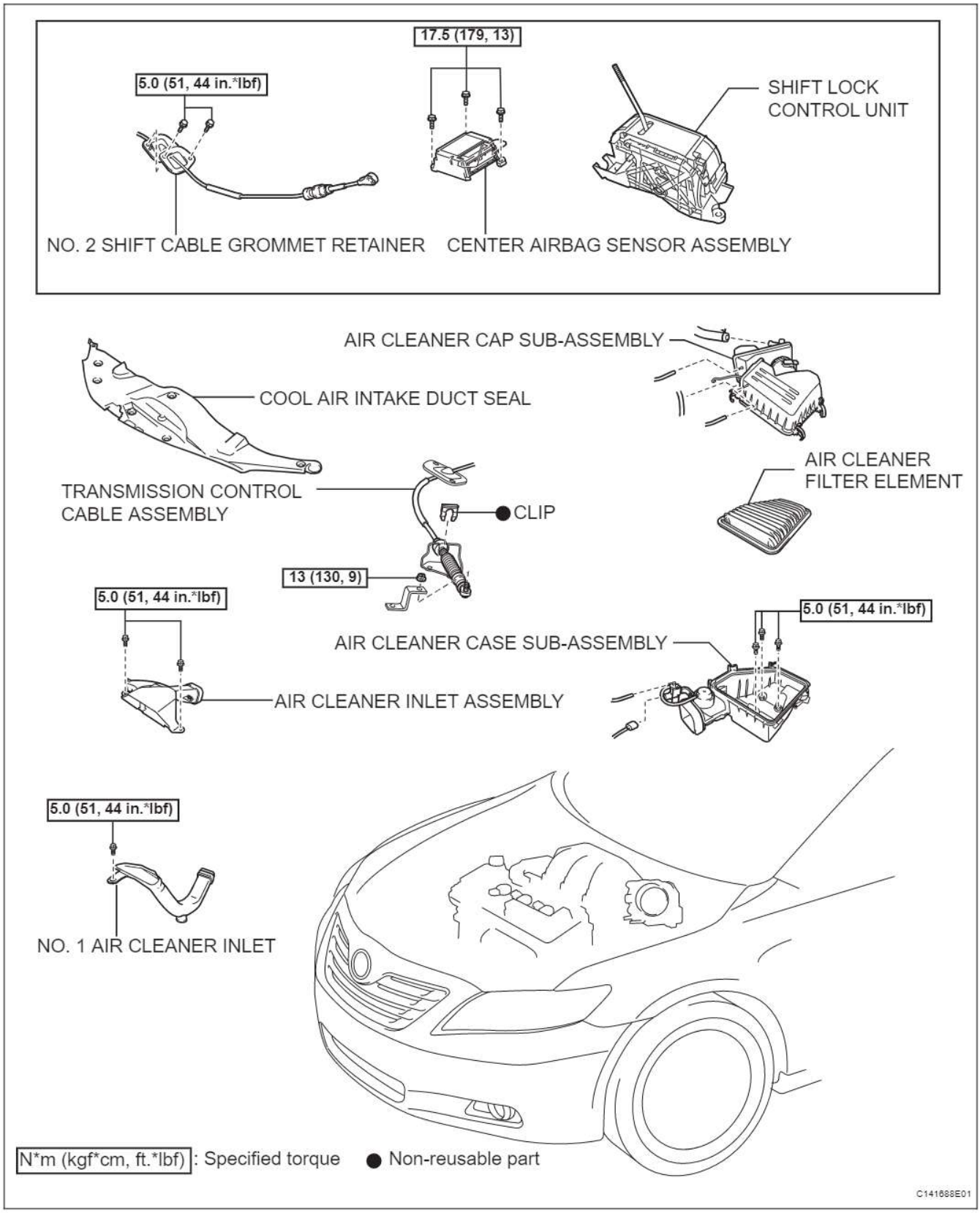
Standard resistance

Terminal	Measuring Condition	Specified Value
3 (E) - Body ground	Always	Below 1 Ω

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TRANSMISSION CONTROL CABLE ASSEMBLY

COMPONENTS

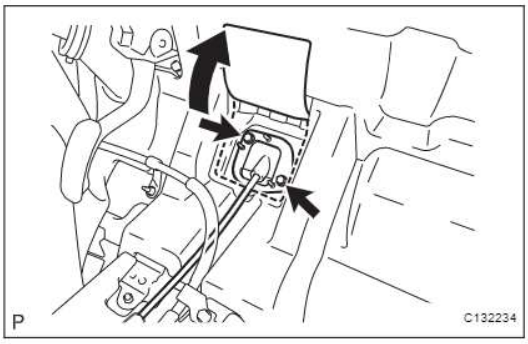


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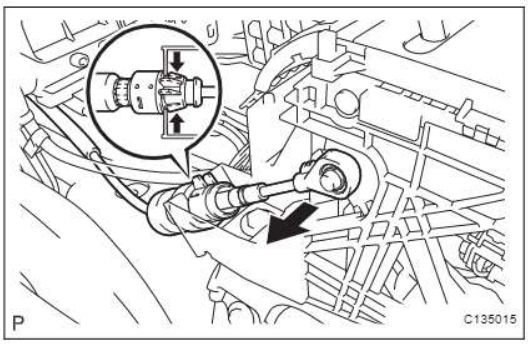
AX

REMOVAL

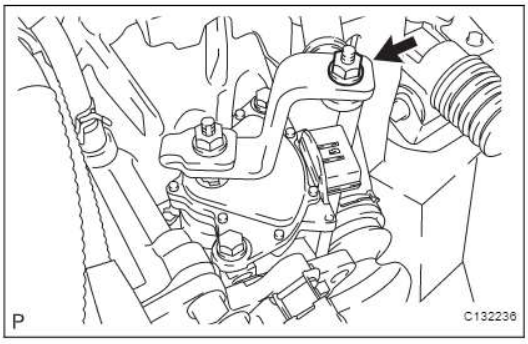
1. **REMOVE AIR CONDITIONING UNIT**
   HINT:
   (See page AC-151)
2. **REMOVE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**
3. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
4. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
5. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
6. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
7. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**



8. **DISCONNECT NO. 2 SHIFT CABLE GROMMET RETAINER**
   (a) Turn back the carpet.
   (b) Remove the 2 bolts and disconnect the No. 2 shift cable grommet retainer.
   (c) Remove the No. 2 shift cable grommet retainer.

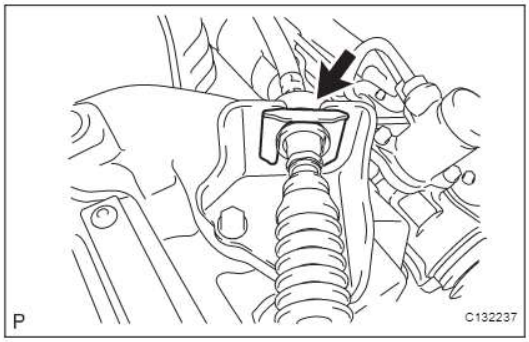


9. **REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Disconnect the end of the transmission control cable assembly from the shift lock control unit.
   (b) Disconnect the transmission control cable assembly from the transmission floor shift assembly while pushing the 2 claws of the floor shift cable.



   (c) Remove the nut and transmission control cable from the control shaft lever.

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(d) Remove the clip and disconnect the transmission control cable assembly from the No. 1 control cable bracket.
(e) Pull out the transmission control cable assembly from the body.

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AX

ADJUSTMENT

1. INSPECT SHIFT LEVER POSITION

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

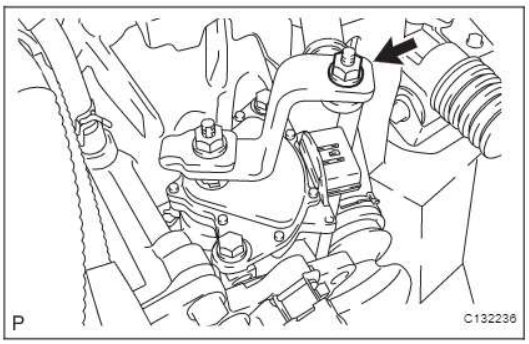
(b) Start the engine and make sure that the vehicle moves forward when shifting from the N to the D position and moves rearward when shifting to the R position.

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

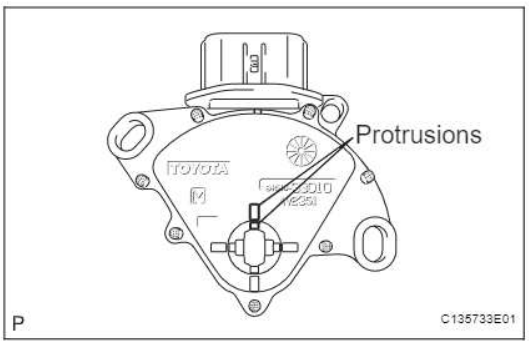
2. ADJUST SHIFT LEVER POSITION

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

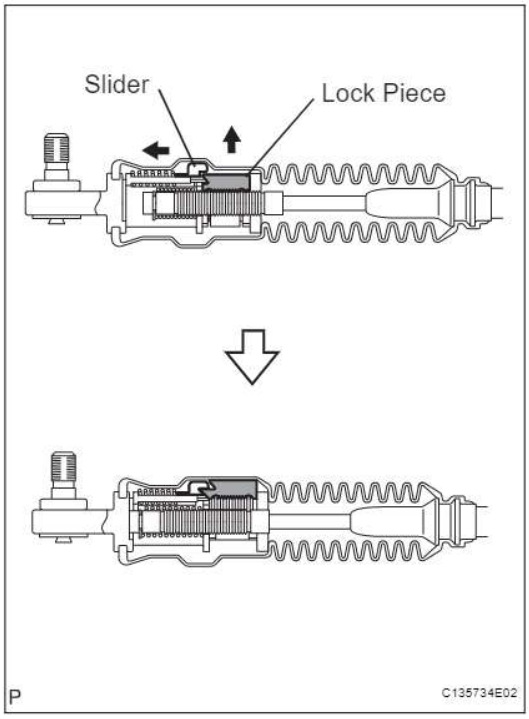
(b) Remove the nut and transmission control cable from the control shaft lever.



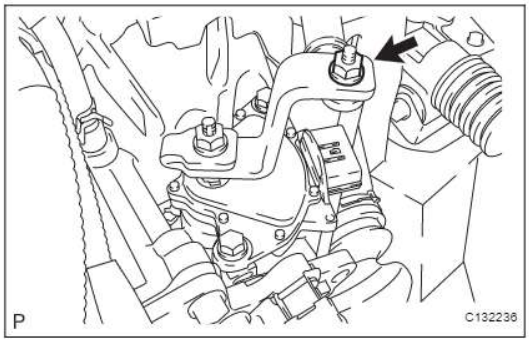
(c) Align the protrusions of the park/neutral position switch.



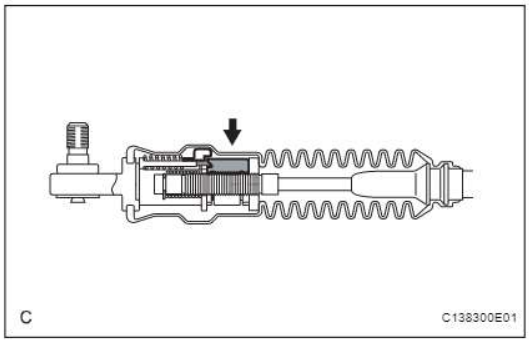
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(d) Move the slider in the directions indicated by the arrows and pull up the lock piece.
NOTICE:
Do not damage the boot.



(e) Install the control cable to the control shaft with the nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)
NOTICE:
- **If the control cable end is excessively pushed up, the shift lever cannot be adjusted.**
- **When tightening the nut, confirm that the control cable is properly stretched.**



(f) Push in the lock piece.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.

(g) Start the engine and make sure that the vehicle moves forward when moving the lever from the N to the D position and moves rearward when moving it to the R position. If it becomes hard to move the shift lever, readjust the shift lever position.

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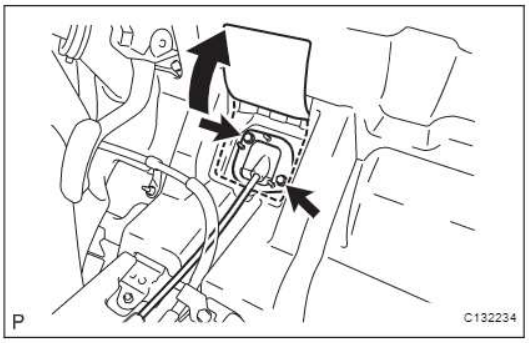
AX

INSTALLATION

1. INSTALL NO. 2 SHIFT CABLE GROMMET RETAINER

(a) Pass the control cable from the cabin to the engine compartment.

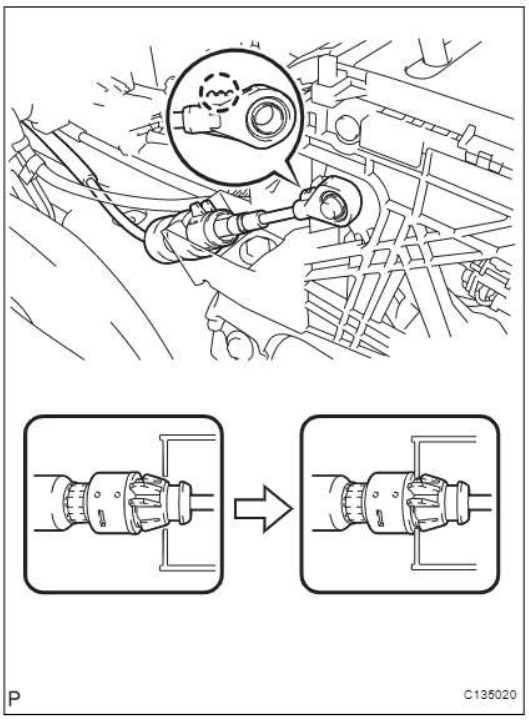
(b) Install the No. 2 shift cable grommet retainer with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



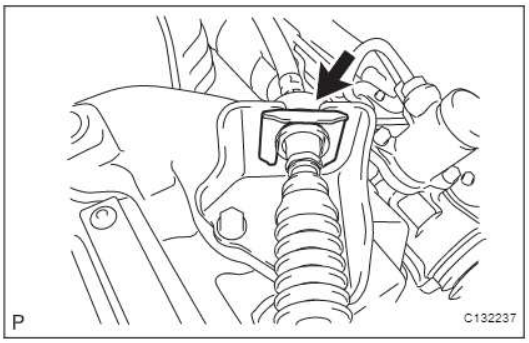
2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

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

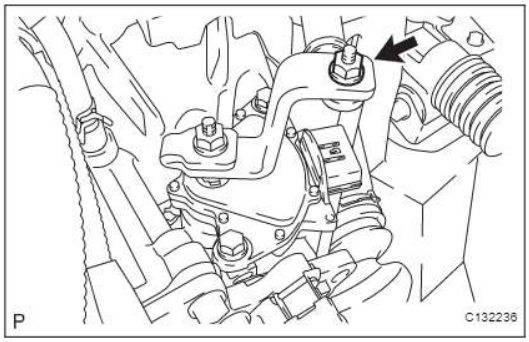
(b) Install the transmission control cable assembly as shown in the illustration.
HINT:
- Install the floor shift cable with the uneven surface facing up.
- Securely engage the claws of the floor shift cable.



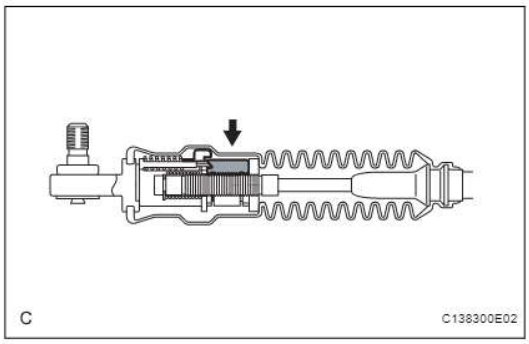
(c) Connect the control cable to the bracket with a new clip.



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(d) Install the control cable to the control shaft lever with the nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



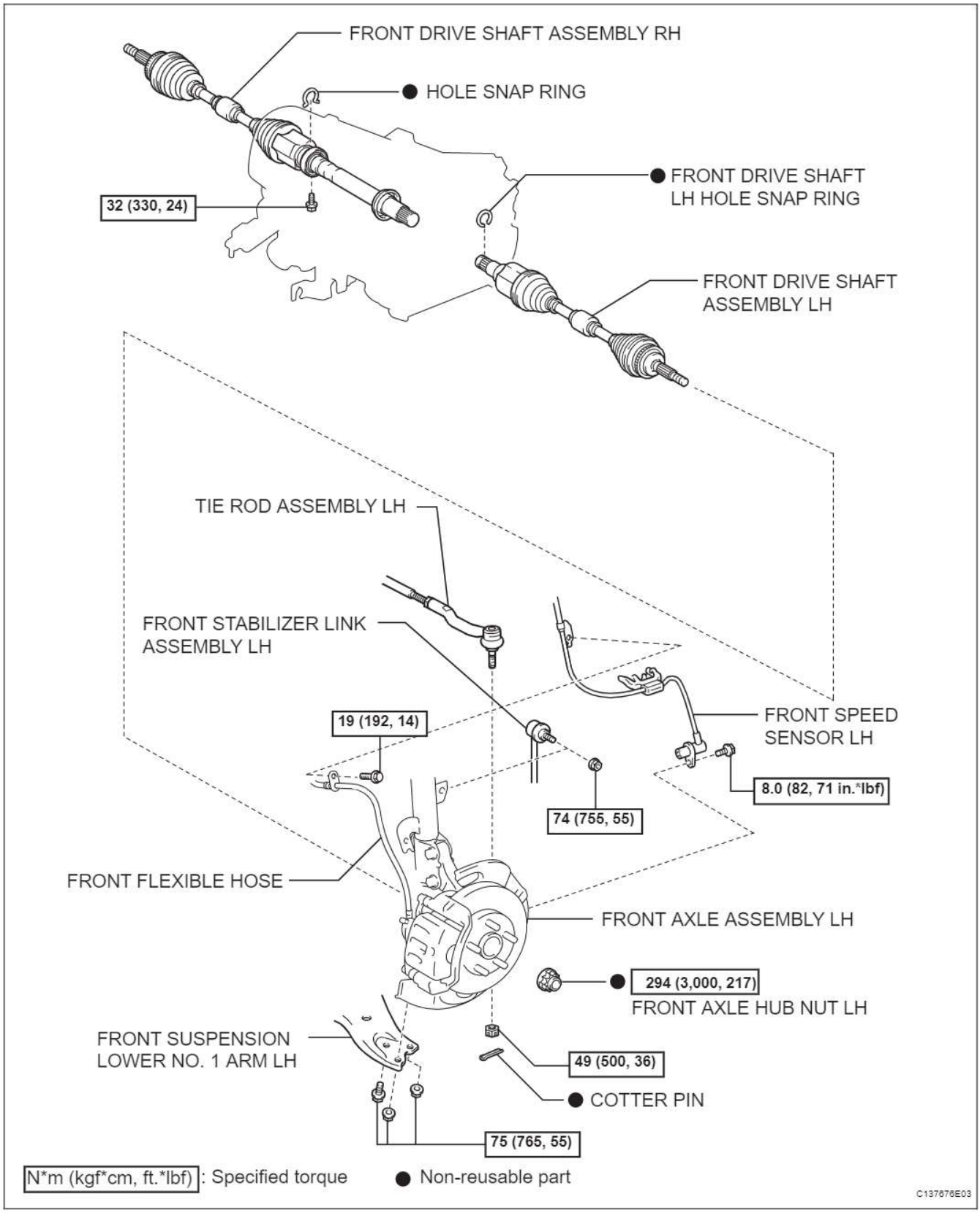
(e) Push in the lock piece of the transmission control cable.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.
HINT:
After pushing in the lock piece, make sure that the boot is not deformed.

3. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**
4. **INSTALL AIR CONDITIONING UNIT**
HINT:
(See page AC-173)
5. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
6. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
7. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
8. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
9. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
10. **INSPECT SHIFT LEVER POSITION (See page AX-191)**
11. **ADJUST SHIFT LEVER POSITION (See page AX-191)**

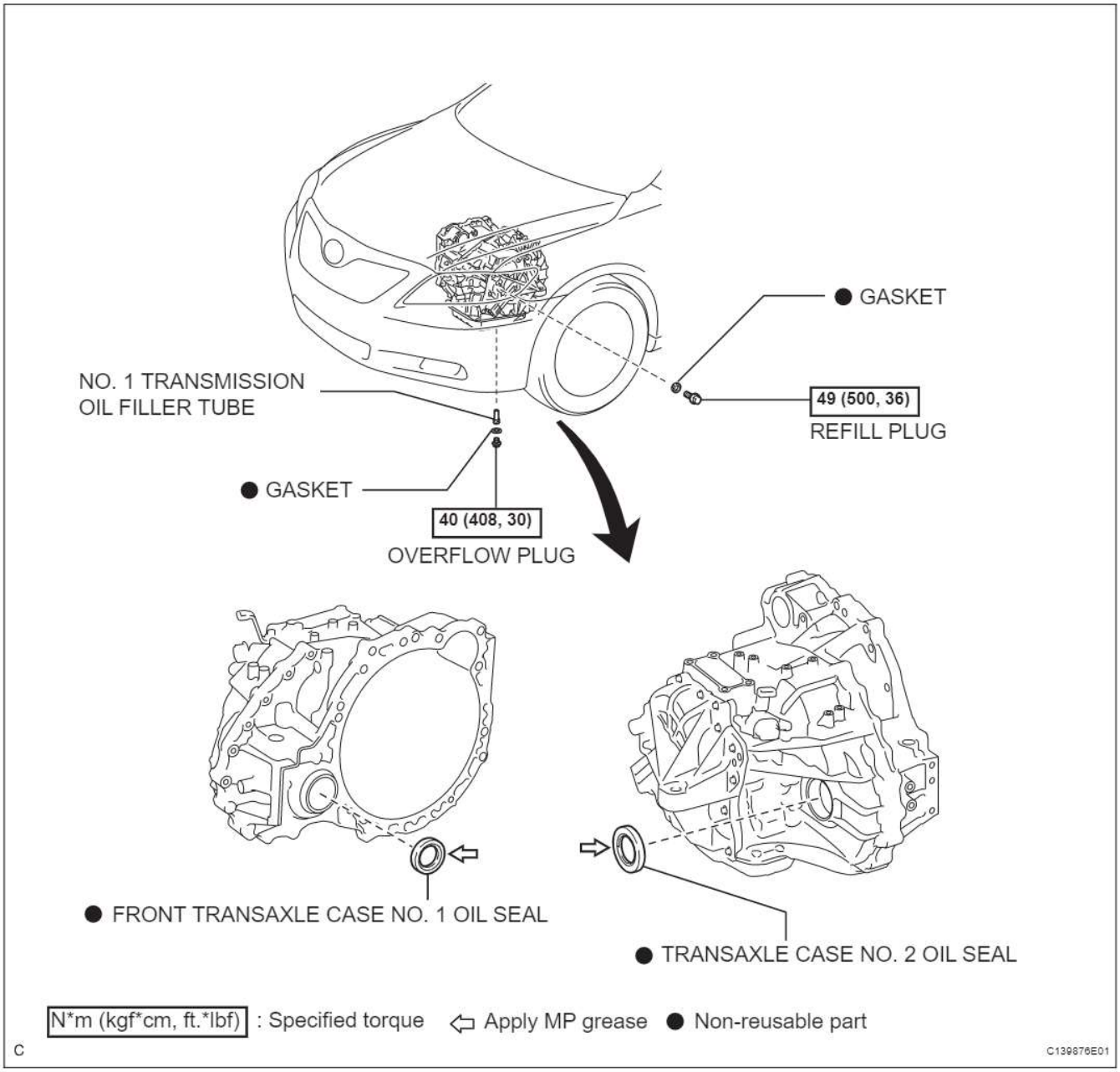
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DIFFERENTIAL OIL SEAL

COMPONENTS



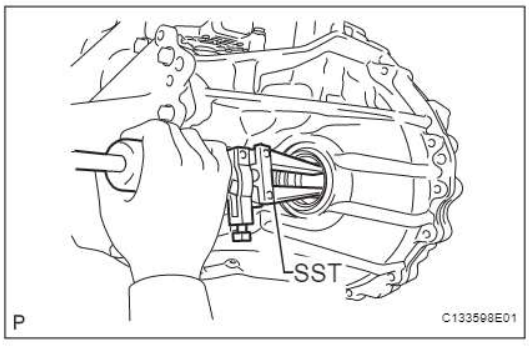
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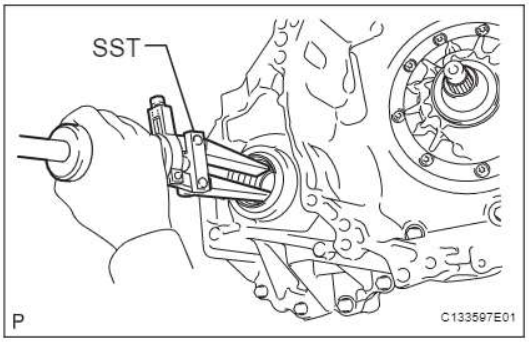
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REMOVAL

1. DRAIN AUTOMATIC TRANSAXLE FLUID (See page AX-207)
2. REMOVE FRONT WHEELS
3. REMOVE FRONT AXLE HUB NUT LH (See page DS-7)
4. REMOVE FRONT AXLE HUB NUT RH (See page EM-28)
5. SEPARATE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)
6. SEPARATE FRONT STABILIZER LINK ASSEMBLY RH (See page EM-29)
7. SEPARATE FRONT SPEED SENSOR LH (See page DS-7)
8. SEPARATE FRONT SPEED SENSOR RH (See page EM-29)
9. SEPARATE TIE ROD ASSEMBLY LH (See page DS-8)
10. SEPARATE TIE ROD ASSEMBLY RH (See page EM-29)
11. SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)
12. SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM RH (See page EM-29)
13. SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)
14. SEPARATE FRONT AXLE ASSEMBLY RH (See page EM-29)
15. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)
16. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)
17. SECURE FRONT AXLE HUB SUB-ASSEMBLY (See page DS-9)
18. REMOVE TRANSAXLE CASE NO. 2 OIL SEAL
    (a) Using SST, remove the oil seal from the transaxle case.
    SST 09308-00010

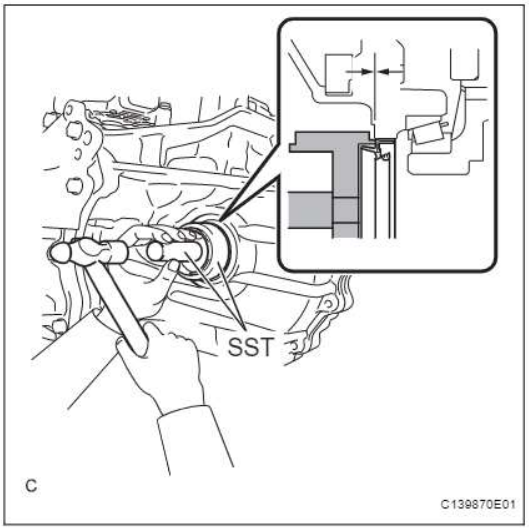


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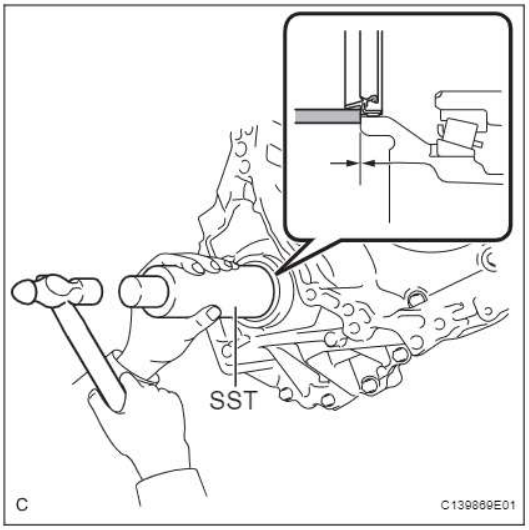


19. **REMOVE FRONT TRANSAXLE CASE NO. 1 OIL SEAL**
    (a) Using SST, remove the oil seal from the transaxle housing.
    SST 09308-00010

INSTALLATION



1. **INSTALL TRANSAXLE CASE NO. 2 OIL SEAL**
    (a) Using SST and a hammer, install a new oil seal to the transaxle case.
    SST 09316-10010, 09950-70010 (09951-07100)
    Oil seal installation depth:
    -0.5 to 0.5 mm (-0.020 to 0.020 in.)
    (b) Coat the lip of the oil seal with MP grease.



2. **INSTALL FRONT TRANSAXLE CASE NO. 1 OIL SEAL**
    (a) Using SST and a hammer, install a new oil seal to the transaxle housing.
    SST 09308-14010
    Oil seal installation depth:
    -0.5 to 0.5 mm (-0.020 to 0.020 in.)
    (b) Coat the lip of the oil seal with MP grease.
3. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)**
4. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)**
5. **INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)**
6. **INSTALL FRONT AXLE ASSEMBLY RH (See page EM-45)**
7. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)**
8. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH (See page EM-45)**
9. **INSTALL TIE ROD ASSEMBLY LH (See page DS-21)**
10. **INSTALL TIE ROD ASSEMBLY RH (See page EM-45)**
11. **INSTALL FRONT SPEED SENSOR LH (See page DS-21)**

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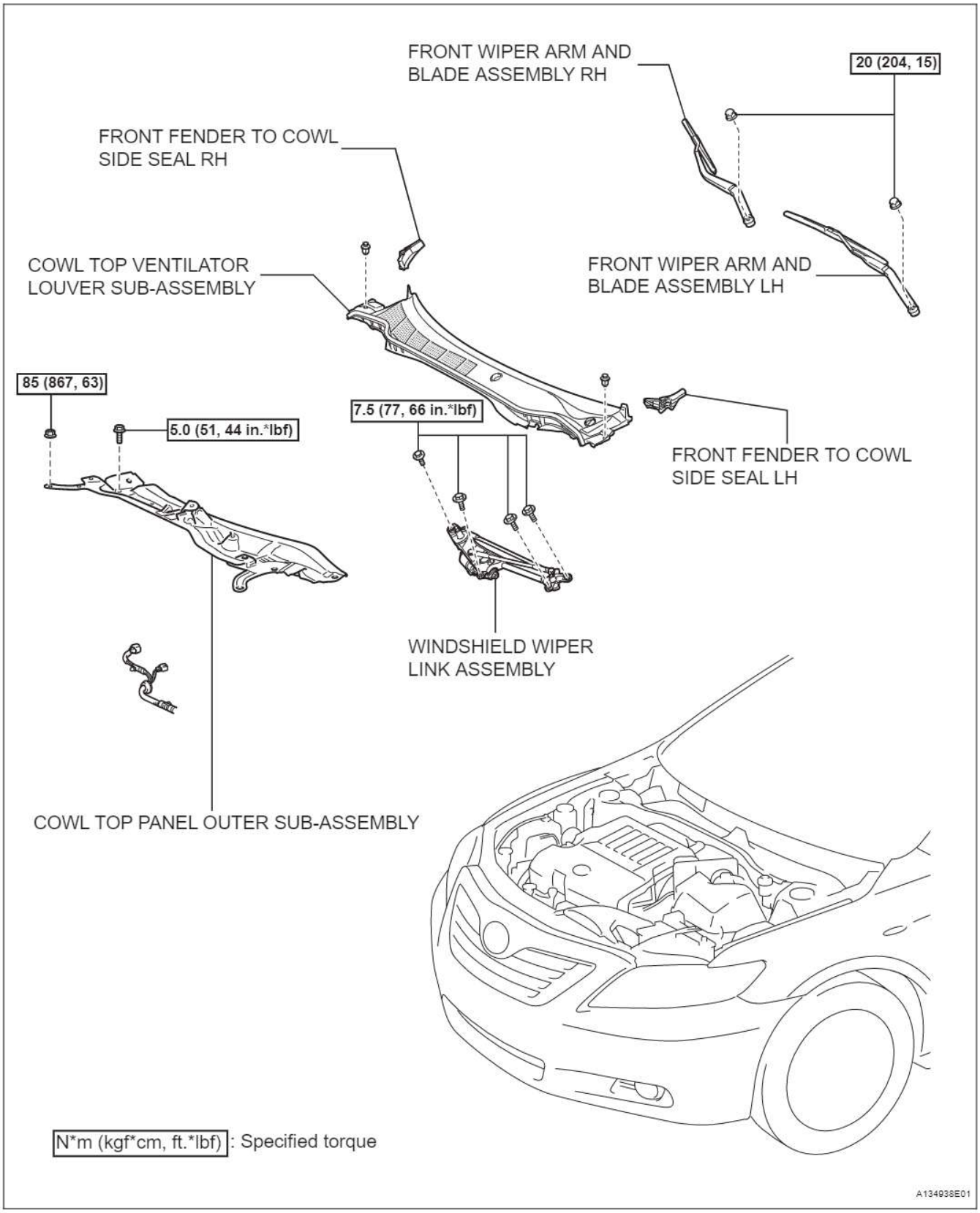
12. **INSTALL FRONT SPEED SENSOR RH (See page EM-45)**
13. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)**
14. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH (See page EM-45)**
15. **INSTALL FRONT AXLE HUB NUT LH (See page DS-22)**
16. **INSTALL FRONT AXLE HUB NUT RH (See page EM-45)**
17. **INSTALL FRONT WHEELS (See page EM-51)**
18. **ADD AUTOMATIC TRANSAXLE FLUID**
    HINT:
    (See page AX-164)
19. **ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    (See page SP-4)
20. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) ABS: BC-11
    (b) VSC (for BOSCH): BC-290
    (c) VSC (for ADVICS): BC-123

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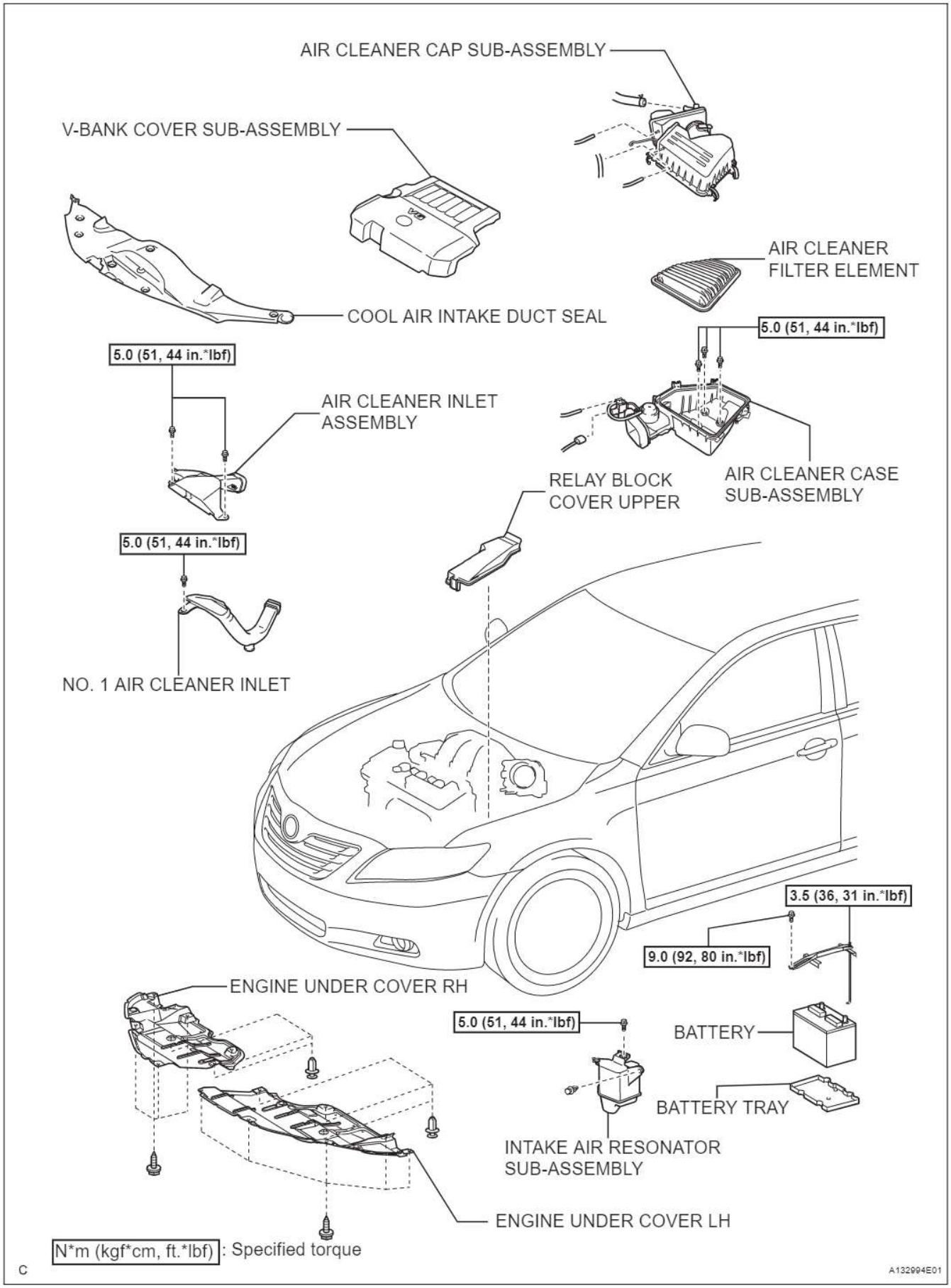
AUTOMATIC TRANSAXLE ASSEMBLY

COMPONENTS

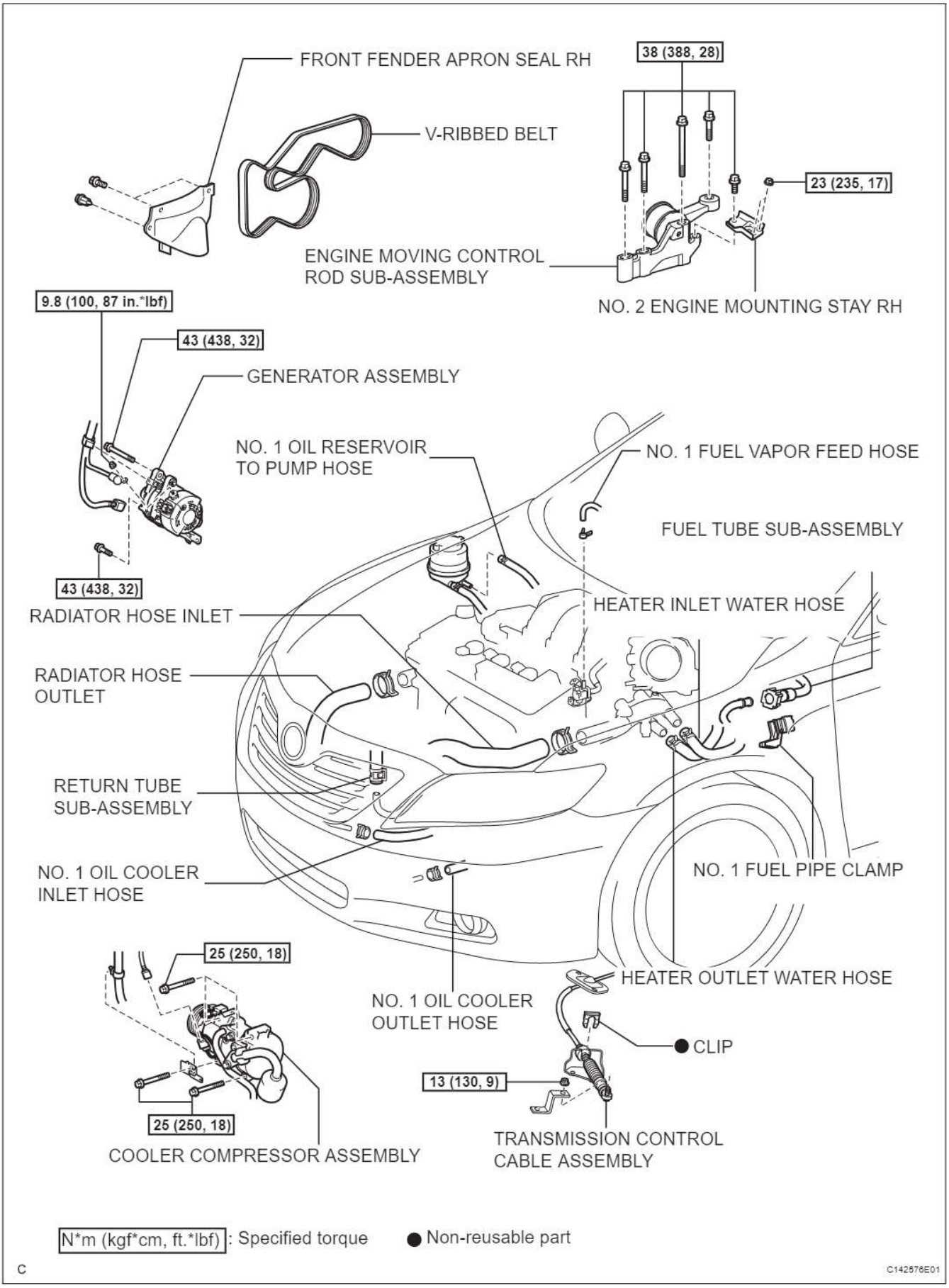
AX



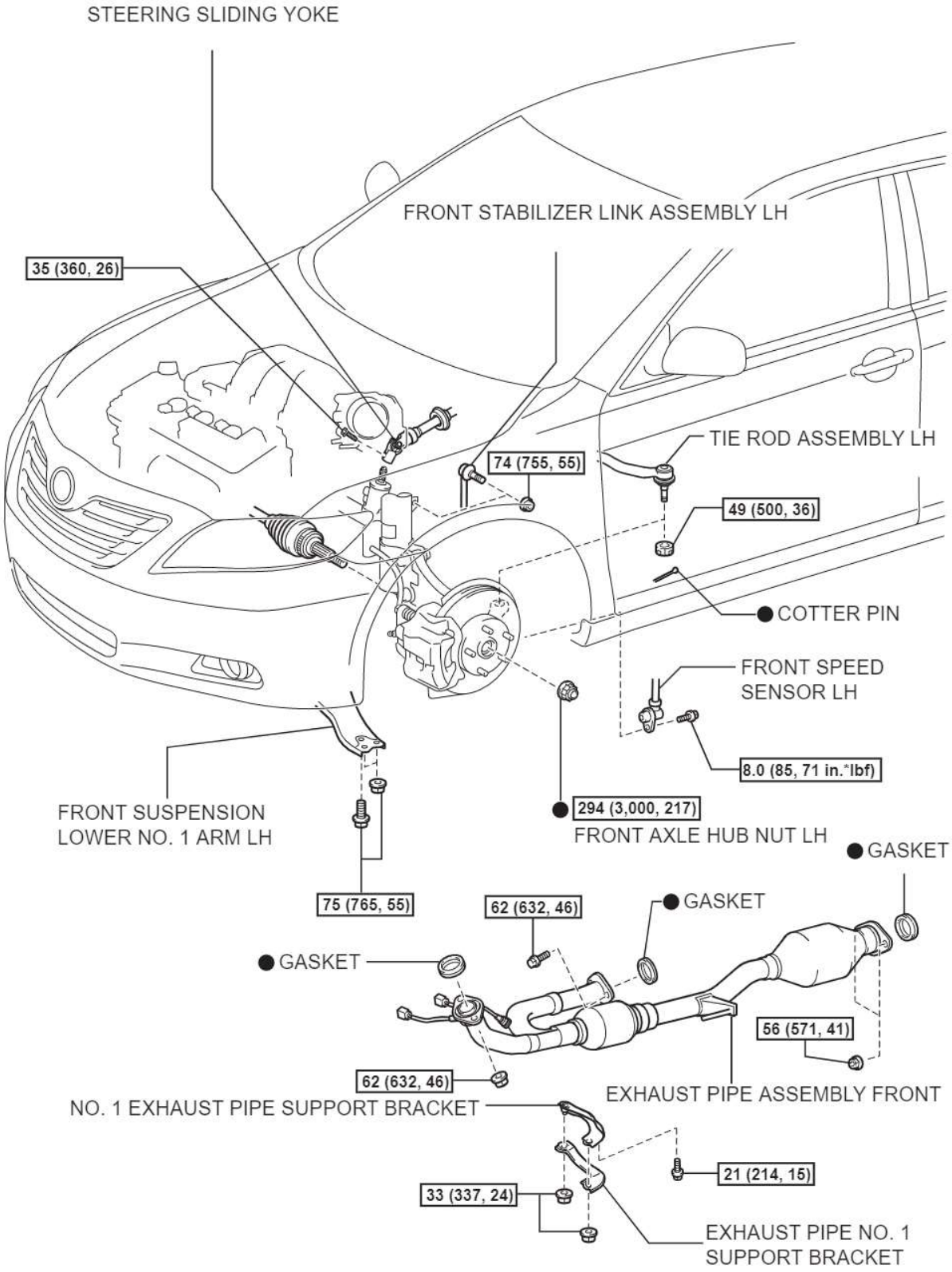
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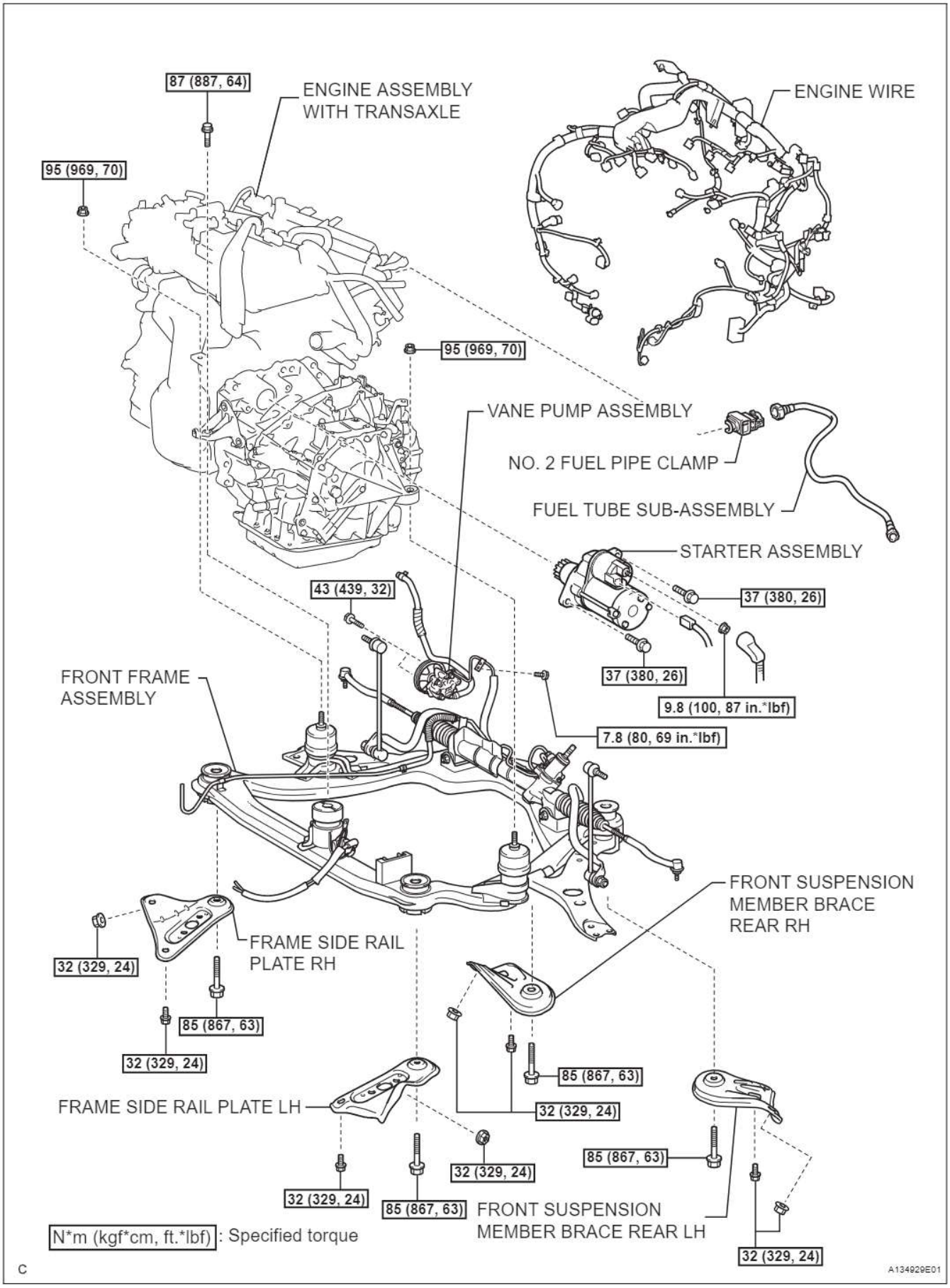
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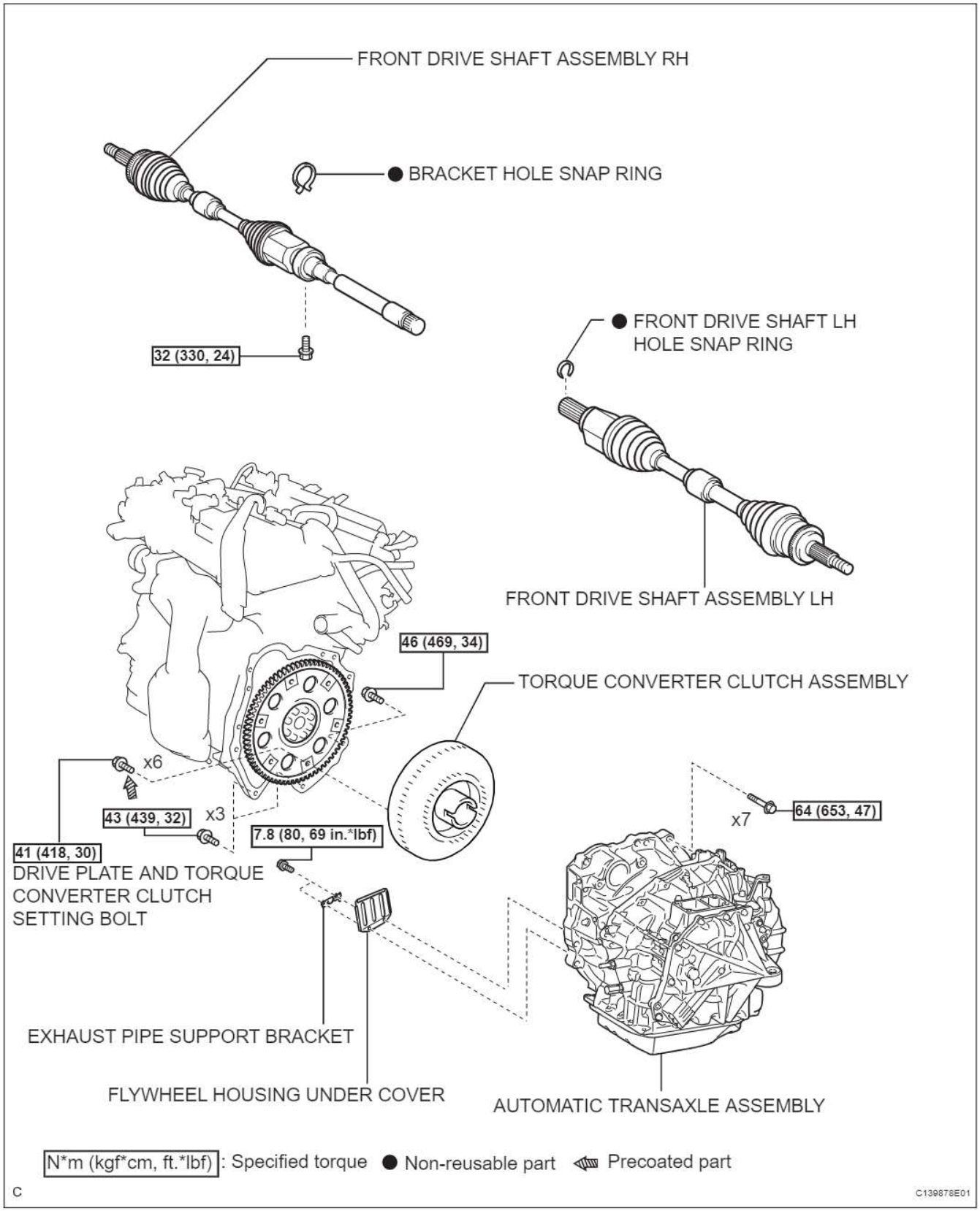
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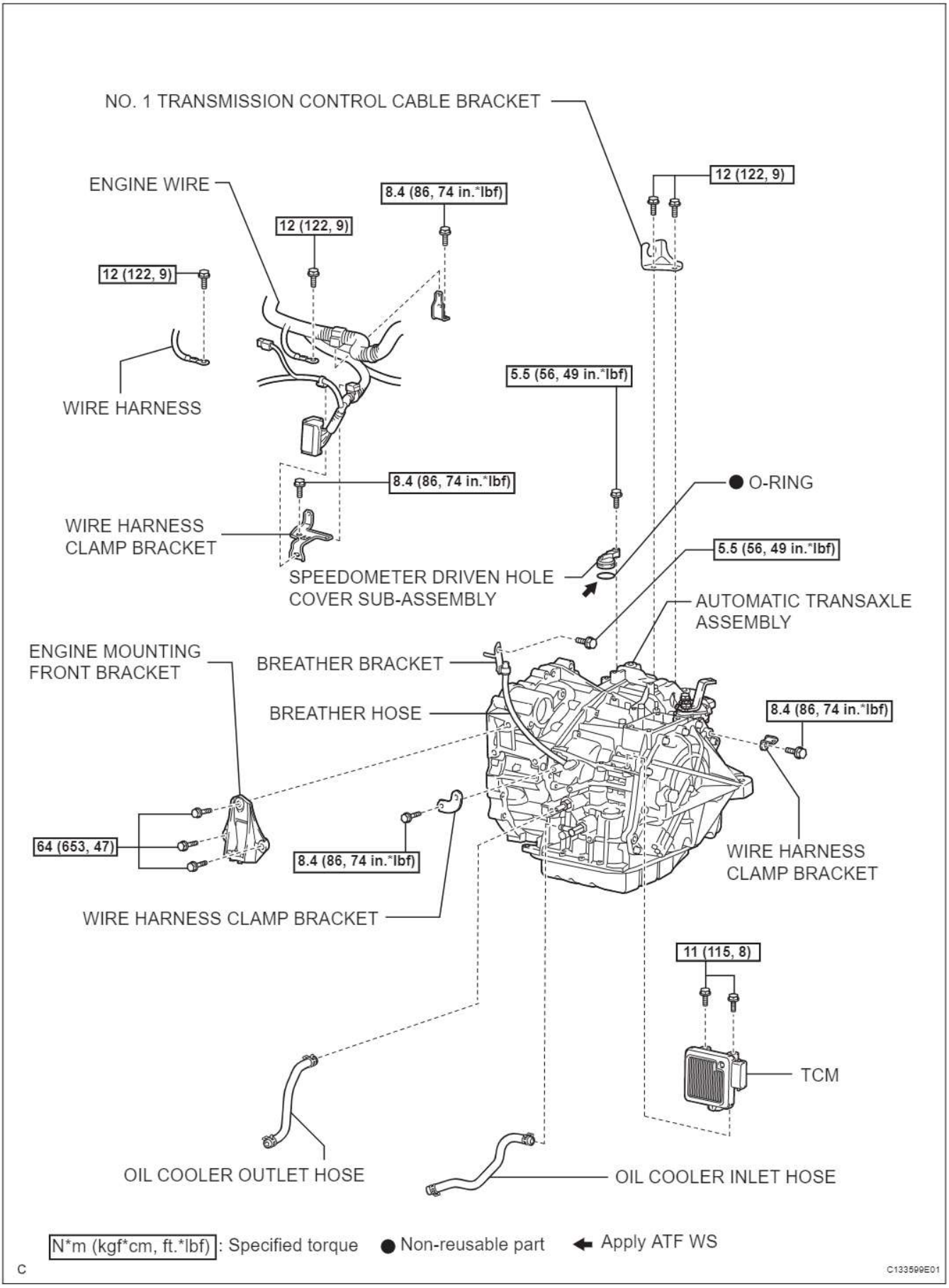


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AX



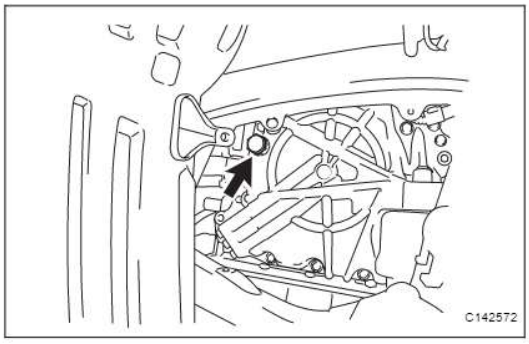
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REMOVAL

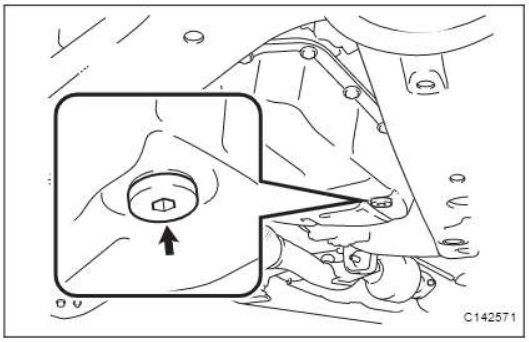
NOTICE:

- **When the automatic transaxle is replaced, the transaxle's compensation code must be input into the TCM (See page AX-19).**
- **When the TCM is replaced, the existing transaxle compensation codes must be input into the new TCM (See page AX-22).**
- **If the following parts have been replaced, initialize the TCM and perform a road test to allow the TCM to learn (See page AX-25).**
  - **Valve body assembly**
  - **Shift solenoid SL3**
  - **Shift solenoid SL4**
- **If the following parts have been replaced, perform a road test to allow the TCM to learn (See page AX-25).**
  - **Shift solenoid SL1**
  - **Shift solenoid SL2**
- **If the TCM or transaxle has been replaced, register the transmission compensation code in the TCM (See page AX-19).**
- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assembly, engine assembly or ECM (See page AX-25).**

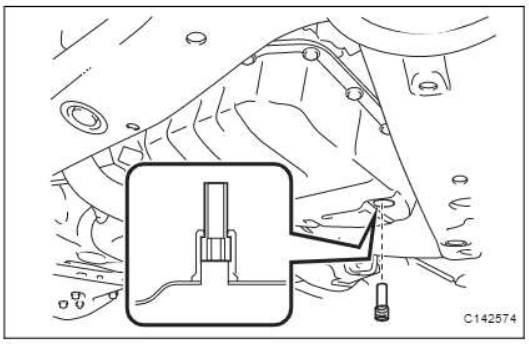
1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   (See page FU-1)
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **REMOVE FRONT FENDER APRON SEAL RH**
8. **DRAIN ENGINE OIL**
9. **DRAIN ENGINE COOLANT (See page CO-5)**
10. **DRAIN AUTOMATIC TRANSAXLE FLUID**
    (a) Remove the refill plug and gasket.



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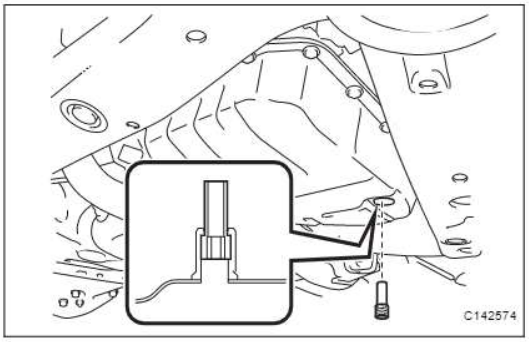


(b) Using a 6 mm socket hexagon wrench, remove the overflow plug and gasket.

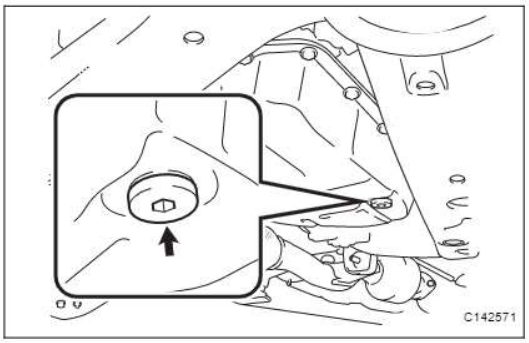


(c) Using a 6 mm socket hexagon wrench, remove the No. 1 transmission oil filler tube.

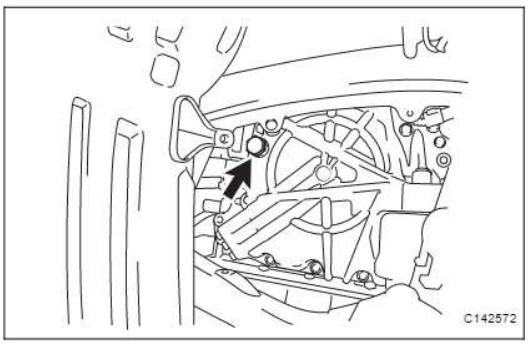
(d) Drain the automatic transaxle fluid.



(e) Using a 6 mm socket hexagon wrench, install the No. 1 transmission oil filler tube.
Torque: 1.7 N*m (17 kgf*cm, 15 in.*lbf)



(f) Using a 6 mm socket hexagon wrench, install the overflow plug with a new gasket.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)



(g) Install the refill plug with a new gasket.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

11. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY**
HINT:
(See page WW-9)

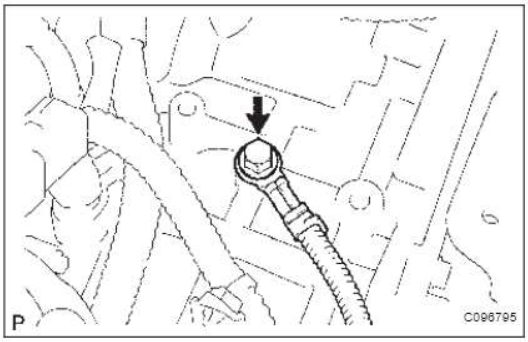
12. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-481)**

13. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**

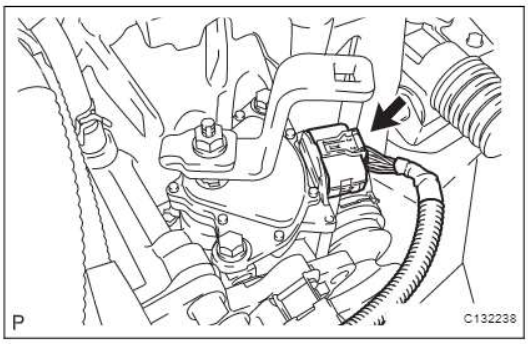
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14. REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)
15. REMOVE V-RIBBED BELT (See page EM-6)
16. REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)
17. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)
18. REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)
19. REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)
20. REMOVE BATTERY (See page EM-24)
21. REMOVE INTAKE AIR RESONATOR SUB-ASSEMBLY (See page EM-25)
22. REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-25)
23. REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-25)
24. DISCONNECT NO. 1 FUEL VAPOR FEED HOSE (See page EM-25)
25. DISCONNECT CHECK VALVE TO BRAKE BOOSTER HOSE (See page EM-25)
26. REMOVE RADIATOR HOSE INLET (See page EM-26)
27. REMOVE RADIATOR HOSE OUTLET (See page EM-26)
28. DISCONNECT NO. 1 OIL COOLER INLET HOSE (See page EM-26)
29. DISCONNECT NO. 1 OIL COOLER OUTLET HOSE (See page EM-26)
30. DISCONNECT HEATER INLET WATER HOSE (See page EM-26)
31. DISCONNECT HEATER OUTLET WATER HOSE (See page EM-26)
32. REMOVE ECM (See page ES-518)
33. REMOVE RELAY BLOCK COVER UPPER
34. DISCONNECT ENGINE WIRE (See page EM-27)

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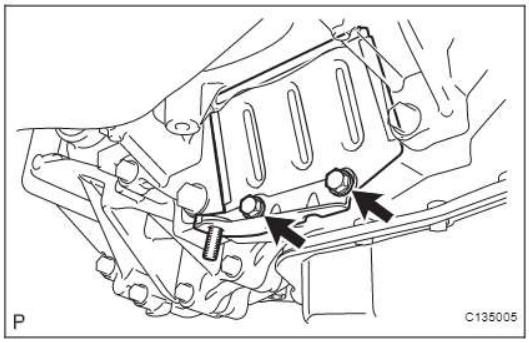
35. **SEPARATE WIRE HARNESS**
    (a) Remove the bolt and disconnect the wire harness.

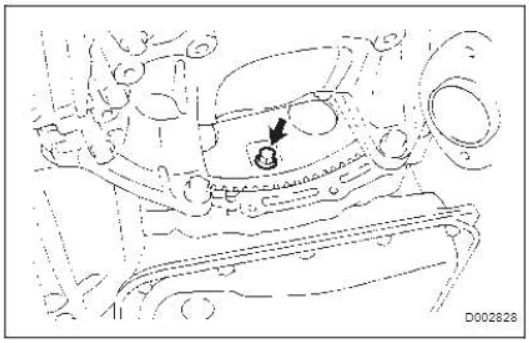


36. **DISCONNECT CONNECTOR**
    (a) Disconnect the park/neutral position switch connector.
37. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (See page EM-27)**
38. **SEPARATE FUEL TUBE SUB-ASSEMBLY (See page EM-28)**
39. **DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE (See page EM-28)**
40. **DISCONNECT RETURN TUBE SUB-ASSEMBLY (See page EM-28)**
41. **REMOVE EXHAUST PIPE NO. 1 SUPPORT BRACKET (See page EX-3)**
42. **REMOVE EXHAUST PIPE ASSEMBLY FRONT (See page EX-3)**
43. **REMOVE FRONT AXLE HUB NUT LH (See page DS-7)**
44. **REMOVE FRONT AXLE HUB NUT RH (See page EM-28)**
45. **DISCONNECT FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)**
46. **DISCONNECT FRONT STABILIZER LINK ASSEMBLY RH (See page EM-29)**
47. **DISCONNECT FRONT SPEED SENSOR LH (See page DS-7)**
48. **DISCONNECT FRONT SPEED SENSOR RH (See page EM-29)**
49. **DISCONNECT TIE ROD ASSEMBLY LH (See page DS-8)**
50. **DISCONNECT TIE ROD ASSEMBLY RH (See page EM-29)**
51. **DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)**
52. **DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM RH (See page EM-29)**

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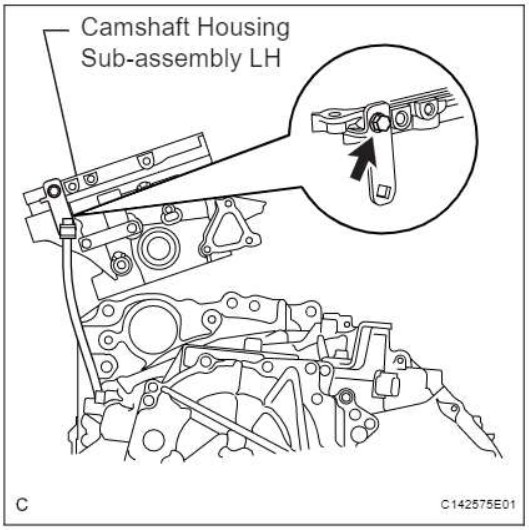
53. SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)
54. SEPARATE FRONT AXLE ASSEMBLY RH (See page EM-29)
55. REMOVE NO. 1 EXHAUST PIPE SUPPORT BRACKET (See page EM-29)
56. REMOVE FLYWHEEL HOUSING UNDER COVER
    (a) Remove the 2 bolts, exhaust pipe support bracket and flywheel housing under cover.





57. REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT
    (a) Turn the crankshaft to gain access and remove the 6 bolts while holding the crankshaft pulley bolt with a wrench.
58. DISCONNECT STEERING SLIDING YOKE (See page PS-40)
59. REMOVE GENERATOR ASSEMBLY (See page CH-14)
60. SEPARATE COOLER COMPRESSOR ASSEMBLY (See page EM-29)
61. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-29)
62. REMOVE VANE PUMP ASSEMBLY (See page EM-30)
63. INSTALL ENGINE HANGERS (See page EM-30)
64. REMOVE FRONT FRAME ASSEMBLY (See page EM-30)
65. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)
66. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)
67. REMOVE ENGINE WIRE
68. REMOVE STARTER ASSEMBLY (See page ST-141)

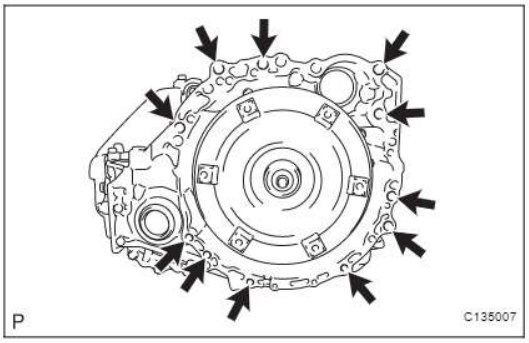
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69. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

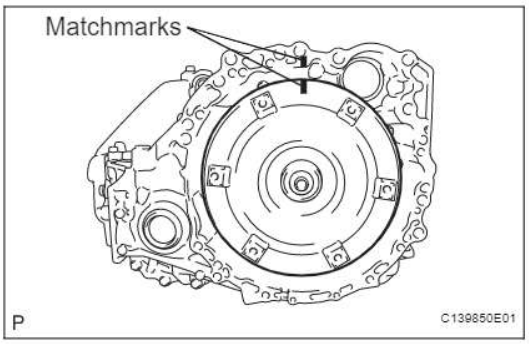
(a) Remove the bolt and breather bracket from the camshaft housing sub-assembly LH.

(b) Remove the breather hose from the breather bracket.



(c) Remove the 11 bolts.

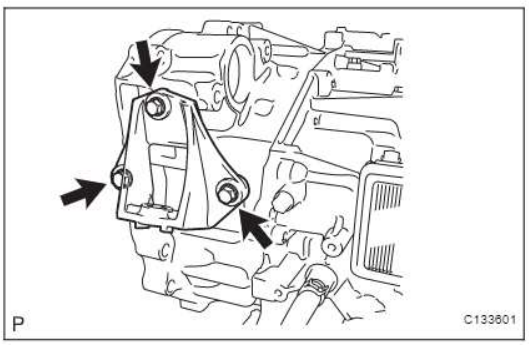
(d) Separate and remove the automatic transaxle.



70. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Put matchmarks on the transaxle housing and torque converter clutch assembly.

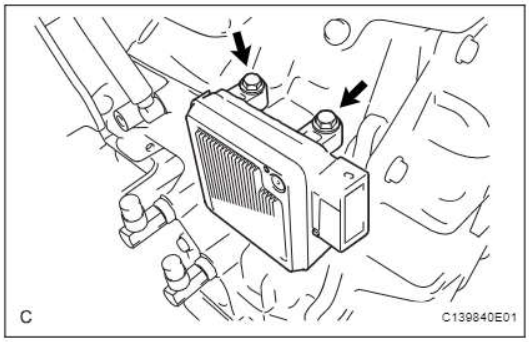
(b) Remove the torque converter clutch assembly from the automatic transaxle assembly.



71. REMOVE ENGINE MOUNTING FRONT BRACKET

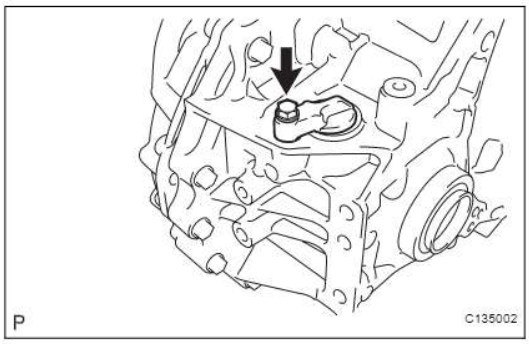
(a) Remove the 3 bolts and engine mounting front bracket.

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72. REMOVE TCM

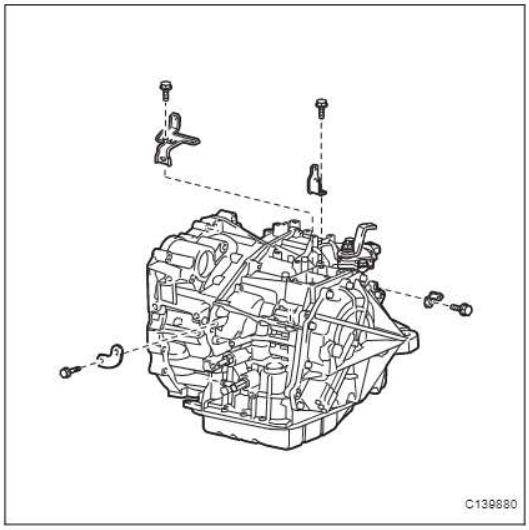
(a) Remove the 2 bolts and TCM from the transaxle.



73. REMOVE SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

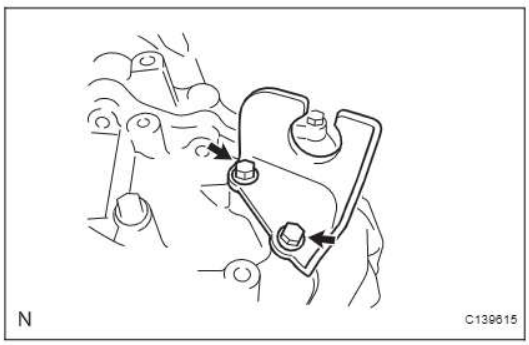
(a) Remove the bolt and hole cover from the transaxle case.

(b) Remove the O-ring from the hole cover.



74. REMOVE WIRE HARNESS CLAMP BRACKET

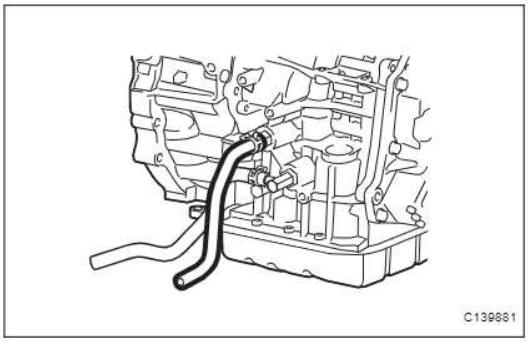
(a) Remove the 4 bolts and 4 clamp brackets.



75. REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET

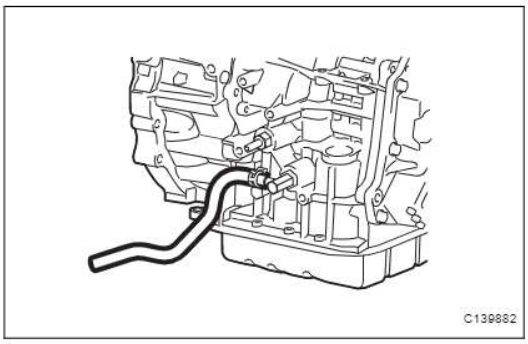
(a) Remove the 2 bolts and No.1 transmission control cable bracket.

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76. SEPARATE OIL COOLER OUTLET HOSE

(a) Separate the oil cooler outlet hose.



77. SEPARATE OIL COOLER INLET HOSE

(a) Separate the oil cooler inlet hose.

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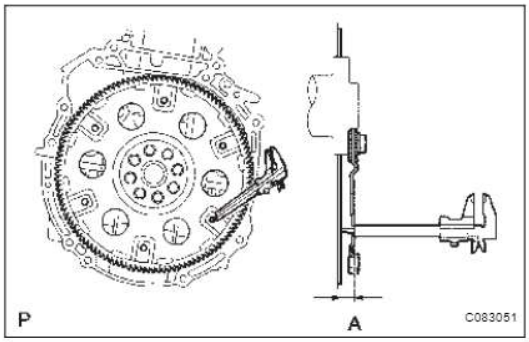
INSTALLATION

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

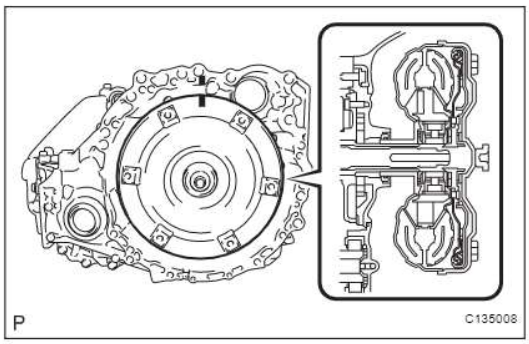
HINT:

(See page AX-239)

2. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY



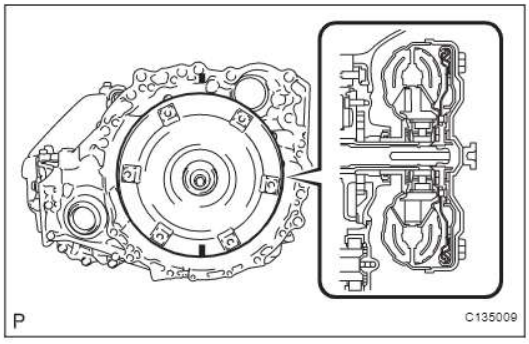
(a) Using vernier calipers and a straightedge, measure dimension "A" between the transaxle fitting part of the engine and the converter fitting part of the drive plate (#).



(b) Aligning the matchmarks on the transaxle case and torque converter clutch assembly, engage the splines of the input shaft and turbine runner.

NOTICE:

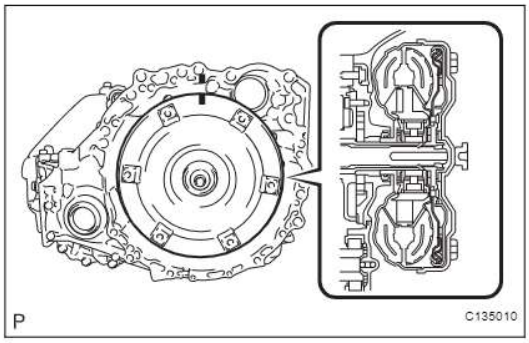
Do not push on the torque converter when aligning the matchmarks.



(c) Engage the splines of the stator shaft and the stator while turning the torque converter clutch assembly.

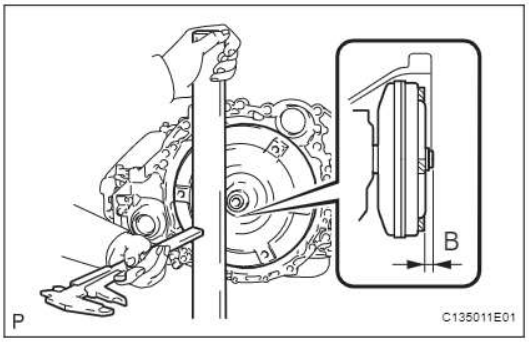
HINT:

Turn the torque converter clutch assembly approximately 180°.

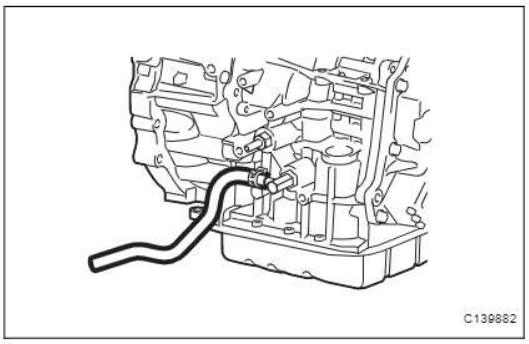


(d) Turn the torque converter clutch assembly and align the matchmarks on the torque converter clutch assembly and transaxle case to engage the key of the oil pump drive gear into the slot on the torque converter clutch assembly.

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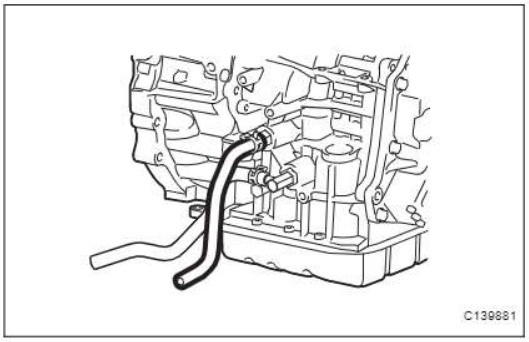


(e) Using vernier calipers and a straightedge, measure dimension "B" shown in the illustration and check that "B" is greater than "A" (measured in step (#)).
Standard:
A + 1 mm (0.04 in.) or more
NOTICE:
Make sure to deduct the thickness of the straightedge.



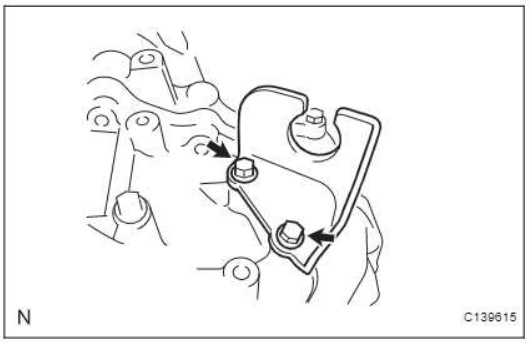
3. INSTALL OIL COOLER INLET HOSE

(a) Install the oil cooler inlet hose.



4. INSTALL OIL COOLER OUTLET HOSE

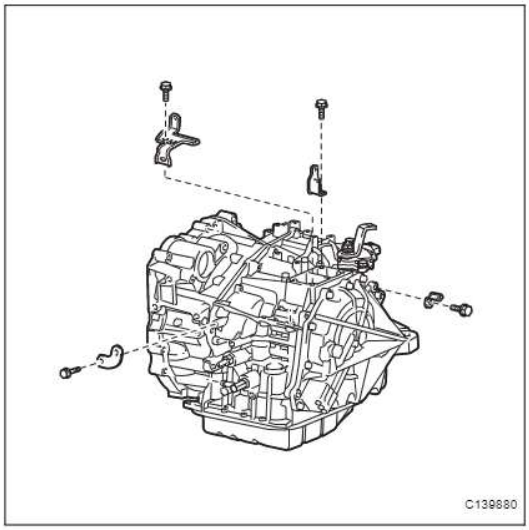
(a) Install the oil cooler outlet hose.



5. INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET

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

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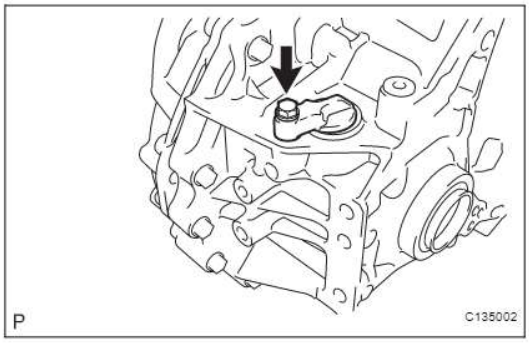


6. INSTALL WIRE HARNESS CLAMP BRACKET

(a) Install the 4 clamp brackets and 4 bolts.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

7. INSTALL SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

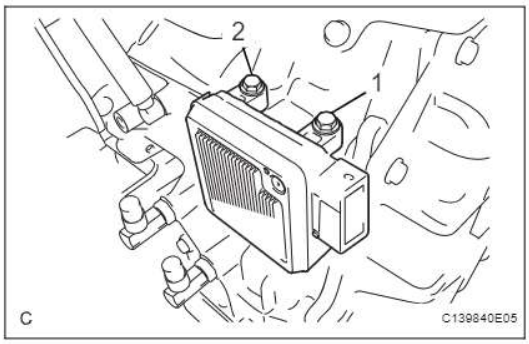
(a) Coat a new O-ring with ATF, and install it to the hole cover.



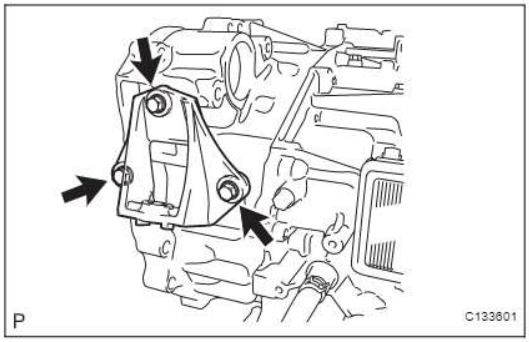
(b) Install the hole cover to the transaxle case with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

8. INSTALL TCM

(a) Install the TCM to the transaxle.



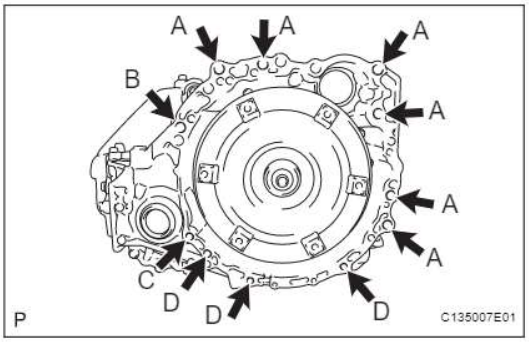
(b) Install and tighten the 2 bolts in the order shown in the illustration.
Torque: 11 N*m (112 kgf*cm, 9 ft.*lbf)



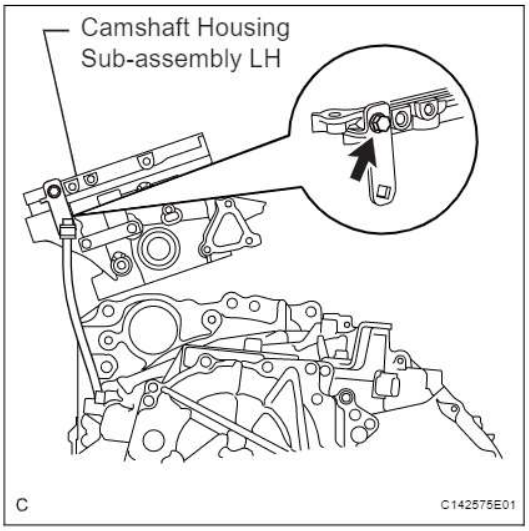
9. INSTALL ENGINE MOUNTING FRONT BRACKET

(a) Install the engine mounting front bracket to the automatic transaxle with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

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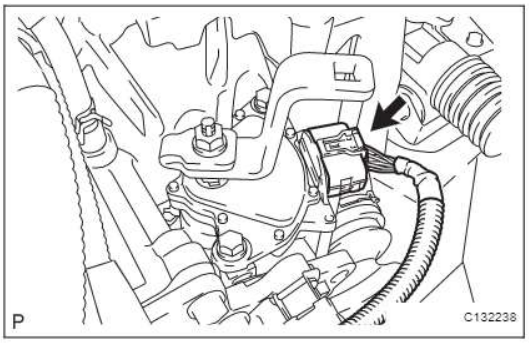


10. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY**
    (a) Install the automatic transaxle to the engine with the 11 bolts.
    Torque: Bolt A
    64 N*m (653 kgf*cm, 47 ft.*lbf)
    Bolt B
    64 N*m (653 kgf*cm, 47 ft.*lbf)
    Bolt C
    46 N*m (469 kgf*cm, 34 ft.*lbf)
    Bolt D
    43 N*m (439 kgf*cm, 32 ft.*lbf)

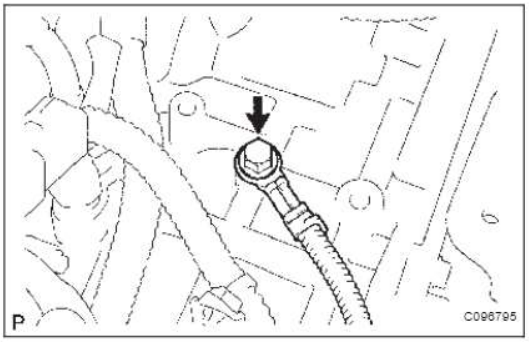


    (b) Install the breather bracket to the camshaft housing sub-assembly LH with the bolt.
    Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
    (c) Install the breather hose to the breather bracket.

11. **INSTALL STARTER ASSEMBLY (See page ST-148)**



12. **CONNECT CONNECTOR**
    (a) Connect the park/neutral position switch connector.



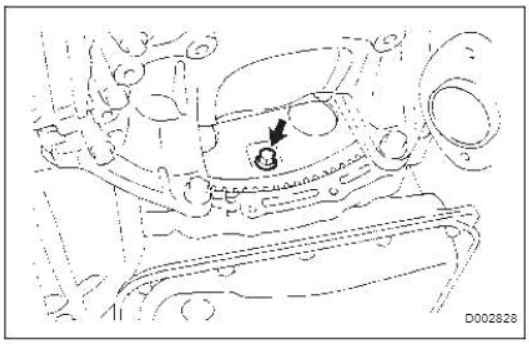
13. **INSTALL WIRE HARNESS**
    (a) Connect the wire harness with the bolt.
    Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)
14. **INSTALL ENGINE WIRE**
15. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)**
16. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)**
17. **INSTALL FRONT FRAME ASSEMBLY (See page EM-43)**
18. **INSTALL VANE PUMP ASSEMBLY (See page EM-44)**
19. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-44)**

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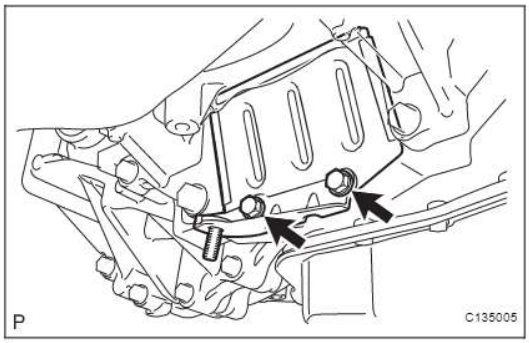
20. **INSTALL COOLER COMPRESSOR ASSEMBLY (See page EM-45)**

21. **INSTALL GENERATOR ASSEMBLY (See page CH-22)**

22. **INSTALL STEERING SLIDING YOKE (See page PS-65)**



23. **INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT**
    (a) Apply a few drops of adhesive to 2 threads on the tip of the 6 torque converter clutch mounting bolts.
    Sealant:
    Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent
    (b) Install the 6 torque converter clutch mounting bolts.
    Torque: 41 N*m (418 kgf*cm, 30 ft.*lbf)
    NOTICE:
    First install the black colored bolt, and then the remaining 5 bolts.



24. **INSTALL FLYWHEEL HOUSING UNDER COVER**
    (a) Install the flywheel housing under cover and exhaust pipe support bracket to the automatic transaxle with the 2 bolts.
    Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

25. **INSTALL NO. 1 EXHAUST PIPE SUPPORT BRACKET (See page EM-45)**

26. **INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)**

27. **INSTALL FRONT AXLE ASSEMBLY RH (See page EM-45)**

28. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)**

29. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH (See page EM-45)**

30. **INSTALL TIE ROD ASSEMBLY LH (See page DS-21)**

31. **INSTALL TIE ROD ASSEMBLY RH (See page EM-45)**

32. **INSTALL FRONT SPEED SENSOR LH (See page DS-21)**

33. **INSTALL FRONT SPEED SENSOR RH (See page EM-45)**

34. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)**

35. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH (See page EM-45)**

36. **INSTALL FRONT AXLE HUB NUT LH (See page DS-22)**

37. **INSTALL FRONT AXLE HUB NUT RH (See page EM-45)**

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38. INSTALL EXHAUST PIPE ASSEMBLY FRONT (See page EX-4)
39. INSTALL EXHAUST PIPE NO. 1 SUPPORT BRACKET (See page EM-45)
40. CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE (See page EM-46)
41. CONNECT RETURN TUBE SUB-ASSEMBLY (See page EM-46)
42. CONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-46)
43. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (See page EM-46)
44. CONNECT ENGINE WIRE (See page EM-47)
45. INSTALL RELAY BLOCK COVER UPPER
46. INSTALL ECM (See page ES-519)
47. CONNECT HEATER INLET WATER HOSE (See page EM-47)
48. CONNECT HEATER OUTLET WATER HOSE (See page EM-47)
49. CONNECT NO. 1 OIL COOLER INLET HOSE (See page EM-48)
50. CONNECT NO. 1 OIL COOLER OUTLET HOSE (See page EM-48)
51. INSTALL RADIATOR HOSE INLET (See page EM-48)
52. INSTALL RADIATOR HOSE OUTLET (See page EM-48)
53. CONNECT CHECK VALVE TO BRAKE BOOSTER HOSE (See page EM-48)
54. CONNECT NO. 1 FUEL VAPOR FEED HOSE (See page EM-48)
55. INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-49)
56. INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-49)
57. INSTALL INTAKE AIR RESONATOR SUB-ASSEMBLY (See page EM-49)
58. INSTALL BATTERY (See page EM-49)
59. INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)
60. INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)
61. INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)

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62. INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)
63. CONNECT VACUUM HOSES (See page EM-51)
64. INSTALL V-RIBBED BELT (See page EM-7)
65. INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-485)
66. INSTALL WINDSHIELD WIPER LINK ASSEMBLY
    HINT:
    (See page WW-13)
67. INSTALL FRONT WHEELS (See page EM-51)
68. ADD ENGINE OIL
69. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)
70. ADD ENGINE COOLANT (See page CO-6)
71. ADD AUTOMATIC TRANSAXLE FLUID
    HINT:
    (See page AX-164)
72. ADD POWER STEERING FLUID
73. BLEED POWER STEERING FLUID (See page PS-7)
74. CHECK FOR FUEL LEAKS (See page FU-8)
75. CHECK FOR ENGINE OIL LEAKS
76. CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)
77. CHECK FOR EXHAUST GAS LEAKS
78. CHECK SHIFT LEVER POSITION (See page AX-224)
79. CHECK AND ADJUST FRONT WHEEL ALIGNMENT
    HINT:
    (See page SP-4)
80. CHECK IGNITION TIMING (See page EM-1)
81. CHECK ENGINE IDLE SPEED (See page EM-2)
82. CHECK CO/HC (See page EM-4)
83. CHECK FUNCTION OF THROTTLE BODY (See page ES-503)
84. INSTALL FRONT FENDER APRON SEAL RH
85. INSTALL ENGINE UNDER COVER LH
86. INSTALL ENGINE UNDER COVER RH
87. INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)
88. INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)
89. CHECK ABS SPEED SENSOR SIGNAL
    (a) ABS: BC-11

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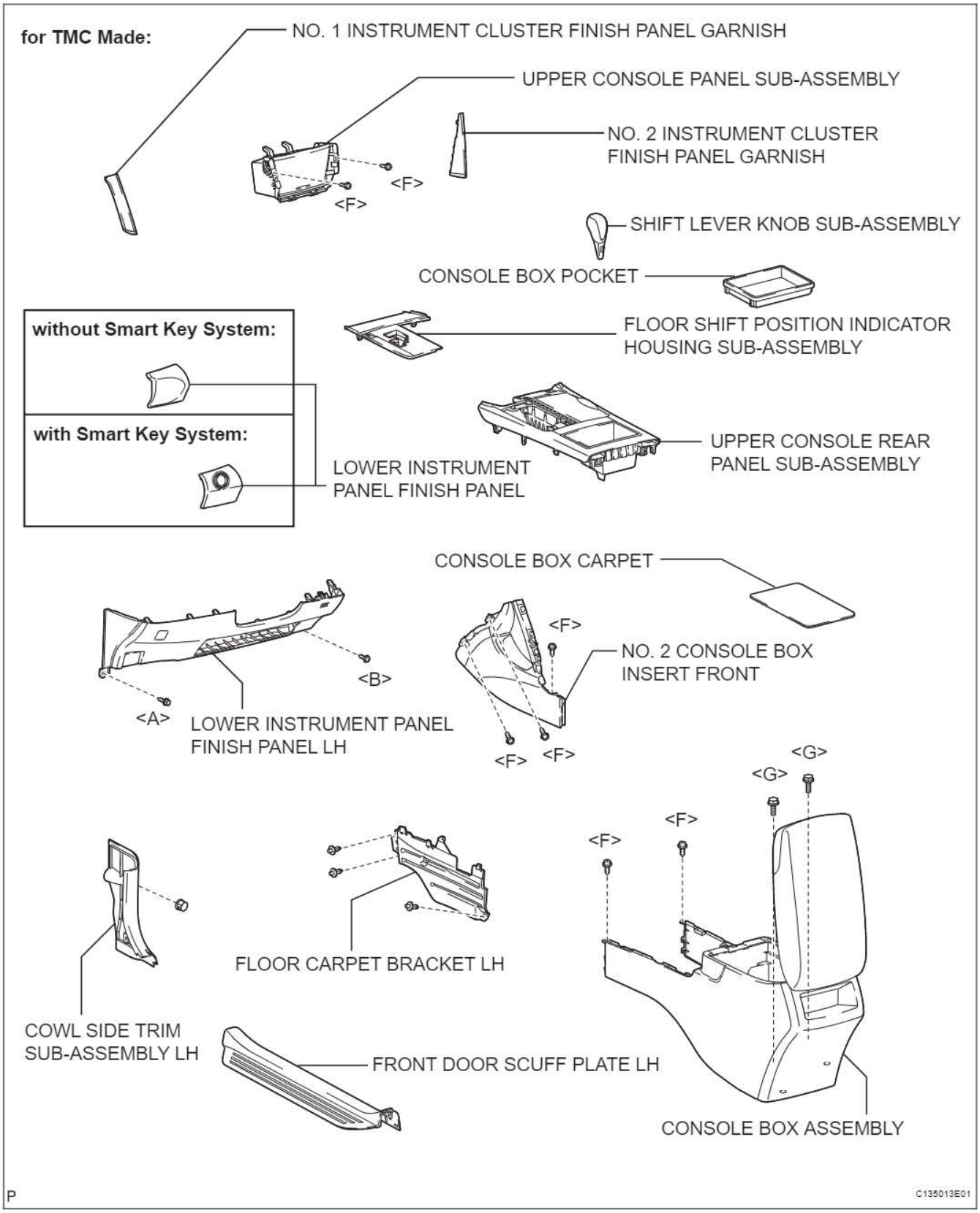
(b) VSC (for BOSCH): BC-290
(c) VSC (for ADVICS): BC-123

AX

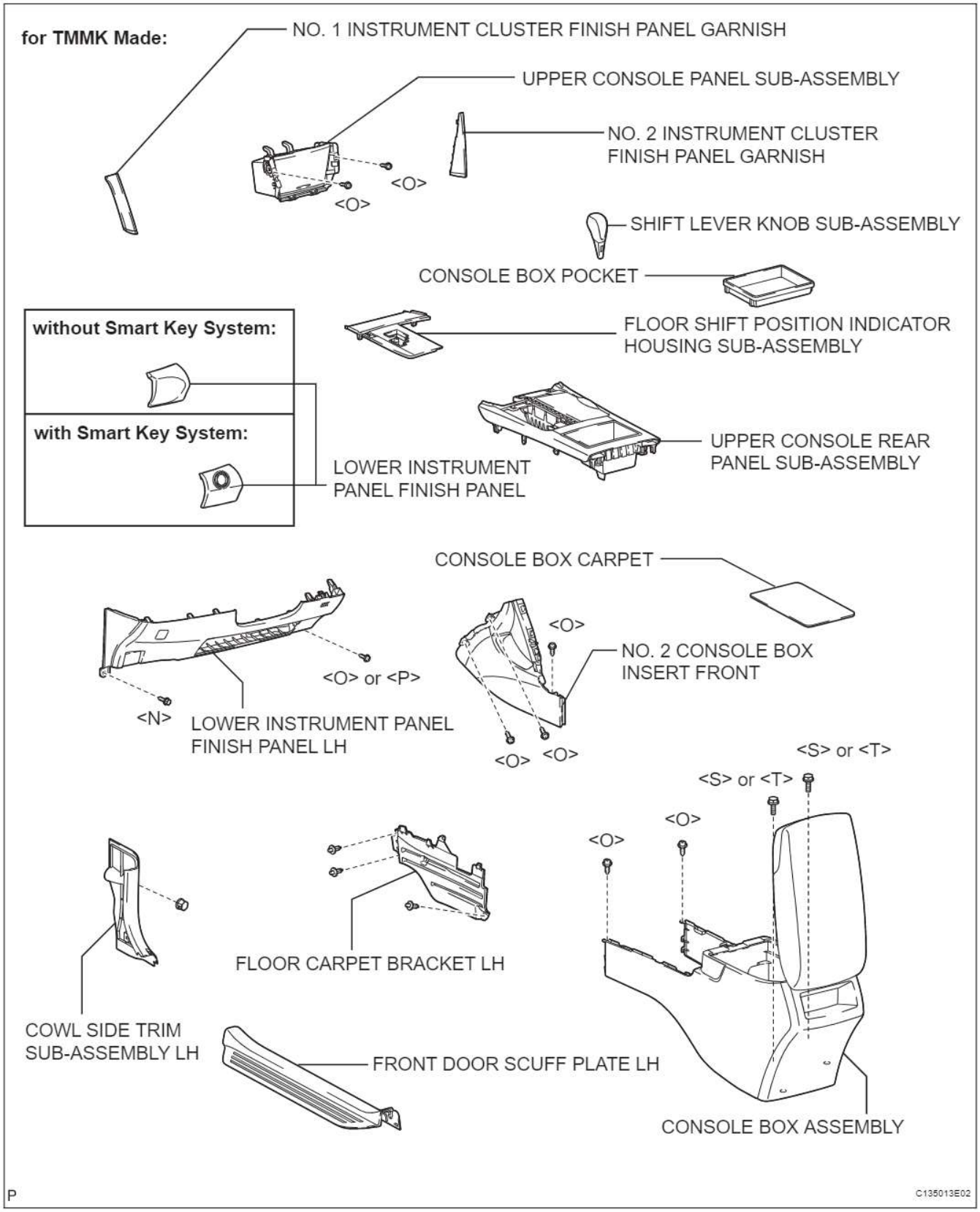
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SHIFT LEVER

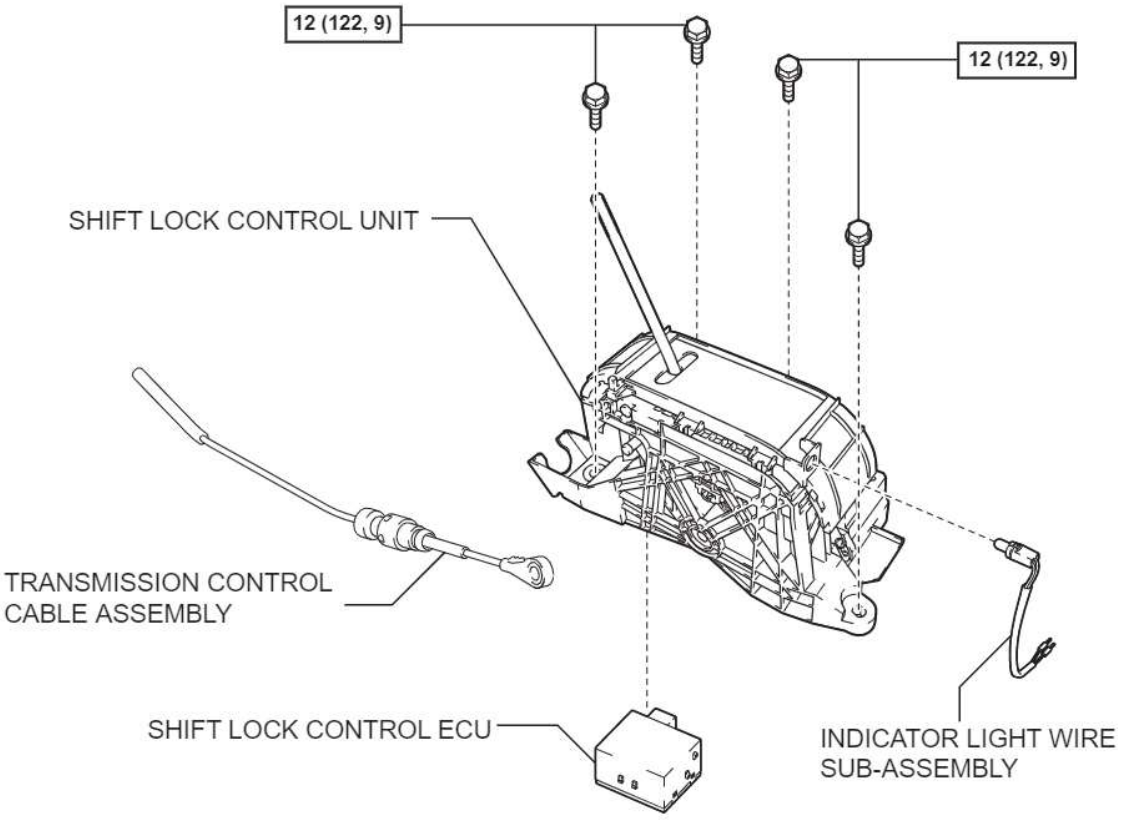
COMPONENTS



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ON-VEHICLE INSPECTION

1. INSPECT SHIFT LEVER POSITION

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

(b) Start the engine and make sure that the vehicle moves forward when shifting from the N to the D position and moves rearward when shifting to the R position. If operation cannot be done as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

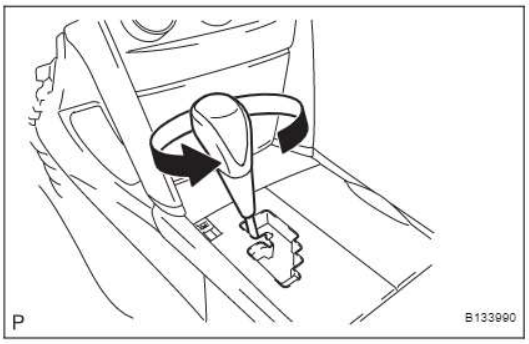
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AX

REMOVAL

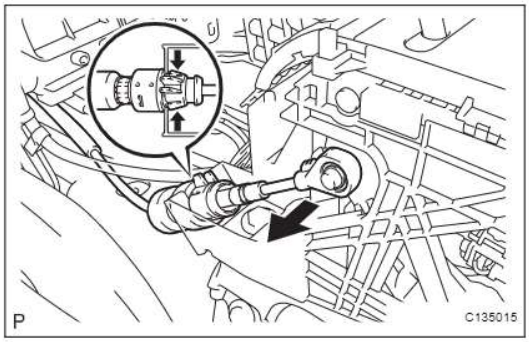
HINT:
(See page IP-1)

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)
3. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)
4. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)
5. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)
6. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (without Smart Key System) (See page IP-22)
7. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (with Smart Key System) (See page IP-22)
8. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY
   (a) Turn the shift lever knob counterclockwise and remove the shift lever knob sub-assembly.



9. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)
10. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)
11. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-25)
12. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-26)
13. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)
14. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)
15. REMOVE CONSOLE BOX POCKET (See page IP-28)
16. REMOVE CONSOLE BOX CARPET (See page IP-28)
17. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)
18. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)
19. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)
20. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
21. REMOVE FLOOR CARPET BRACKET LH (See page AC-155)

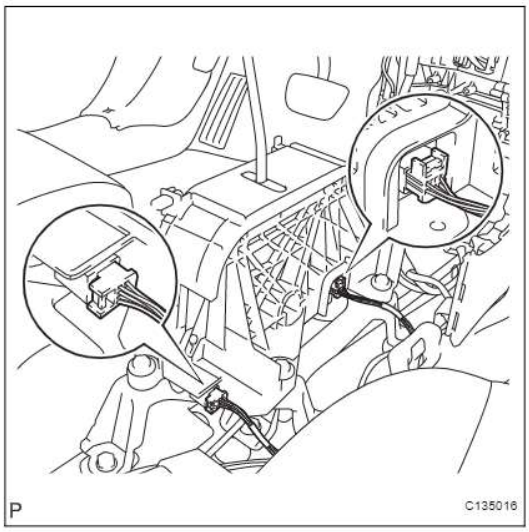
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22. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

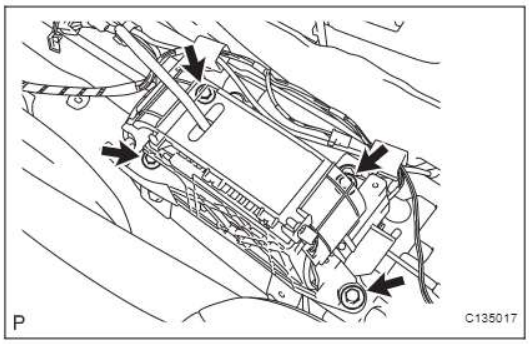
(a) Disconnect the end of the transmission control cable from the shift lock control unit.

(b) Disconnect the transmission control cable assembly from the transmission floor shift assembly while pushing the 2 claws of the floor shift cable.



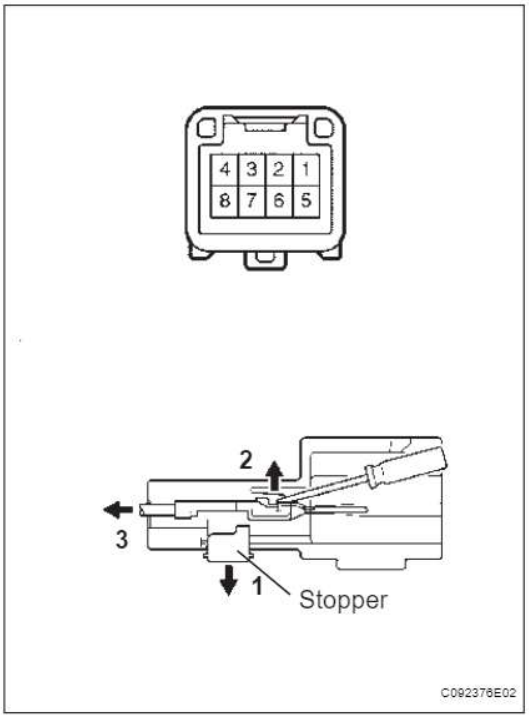
23. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY

(a) Disconnect the shift lock control ECU connector and indicator light wire connector.



(b) Remove the 4 bolts and shift control unit assembly.

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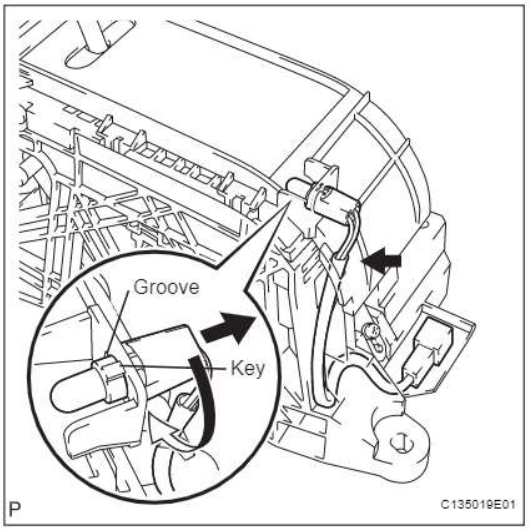


DISASSEMBLY

1. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Using a screwdriver, release the stopper.

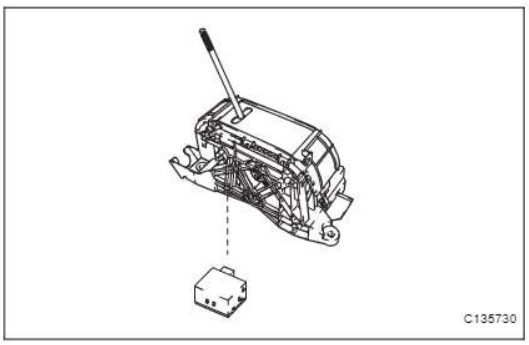
(b) Using a screwdriver, disengage the locking lug of terminals (4) and (8), and pull the terminals out from the rear of the connector.



(c) Release the indicator light wire from the clamp on the shift lock control unit assembly.

(d) Turn the indicator light guide counterclockwise.

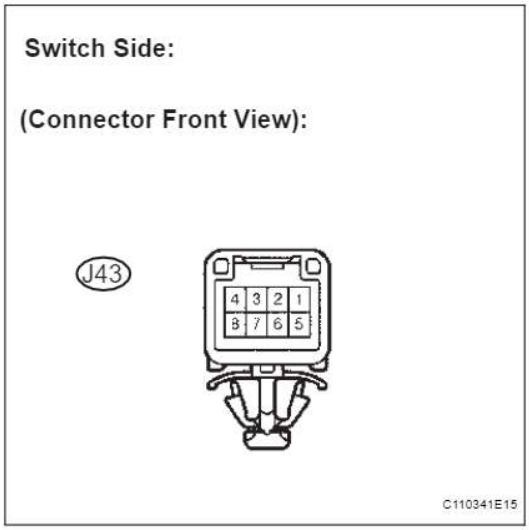
(e) Align the indicator light guide key with the groove on the shift lock control unit to remove the indicator light wire.



2. REMOVE SHIFT LOCK CONTROL ECU

(a) Remove the shift lock control ECU from the shift lock control unit assembly.

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INSPECTION

1. INSPECT TRANSMISSION CONTROL SWITCH

(a) Measure resistance between each terminal of the shift lock control unit assembly when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	3 - 7	Below 1 Ω
Except S, "+" and "-"	3 - 7	10 kΩ or higher
Press continuously "+" (Up shift)	2 - 5	Below 1 Ω
S	2 - 5	10 kΩ or higher
Press continuously "-" (Down shift)	1 - 5	Below 1 Ω
S	1 - 5	10 kΩ or higher

If the resistance value is not as specified, replace the shift lock control ECU.

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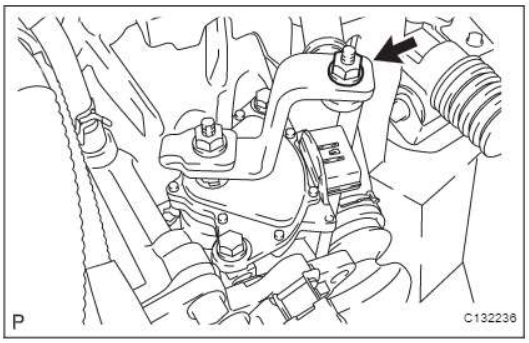
AX

ADJUSTMENT

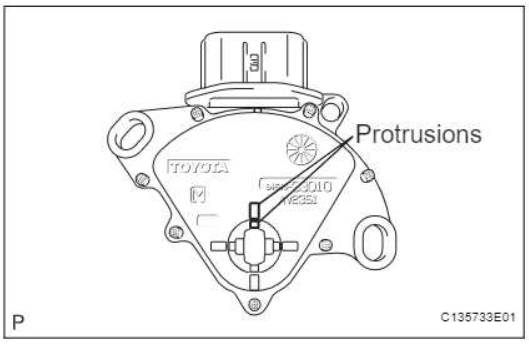
1. ADJUST SHIFT LEVER POSITION

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

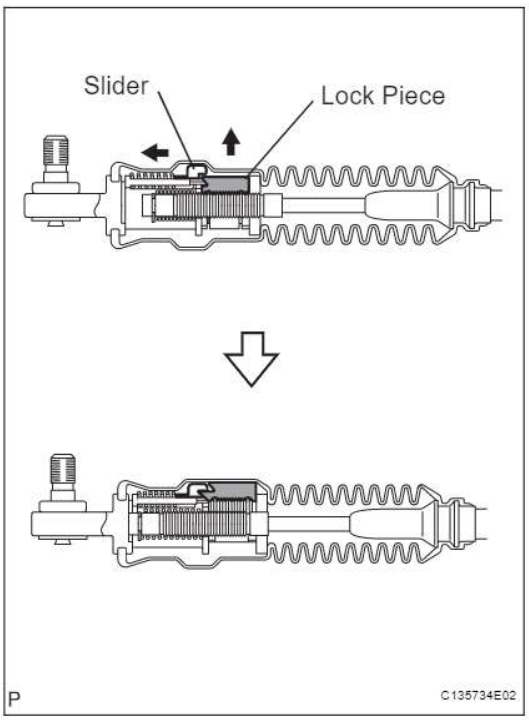
(b) Remove the nut and transmission control cable from the control shaft lever.



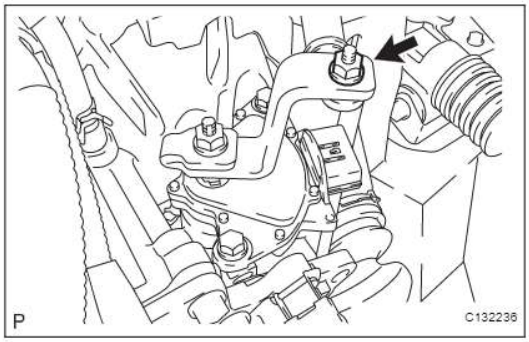
(c) Align the protrusions of the park/neutral position switch.



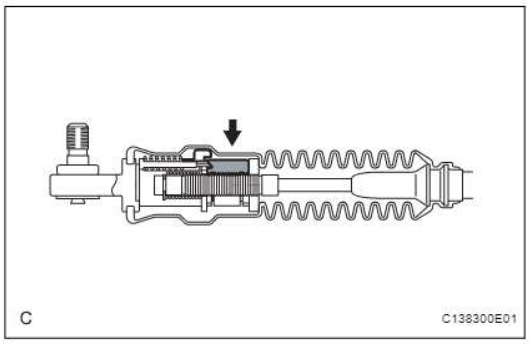
(d) Move the slider in the directions indicated by the arrows and pull up the lock piece.
NOTICE:
Do not damage the boot.



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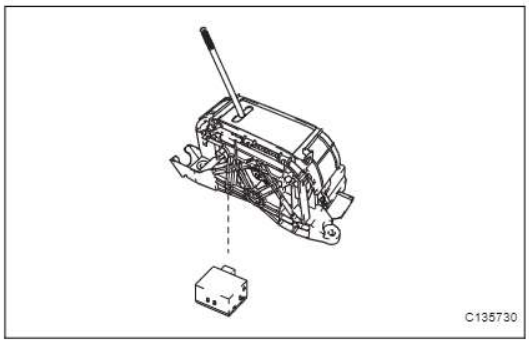


(e) Connect the transmission control cable assembly to the control shaft lever with the nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



(f) Push in the lock piece.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.

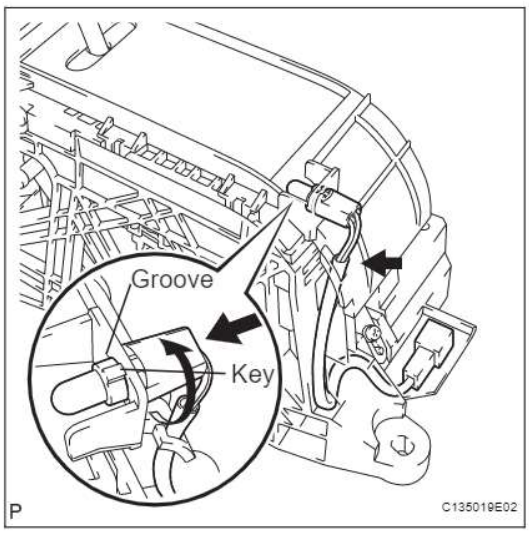
(g) Start the engine and make sure that the vehicle moves forward when moving the lever from the N to the D position and moves rearward when moving it to the R position.
If it becomes hard to move the shift lever, readjust the shift lever position.



REASSEMBLY

1. INSTALL SHIFT LOCK CONTROL ECU

(a) Install the shift lock control ECU to the shift lever.



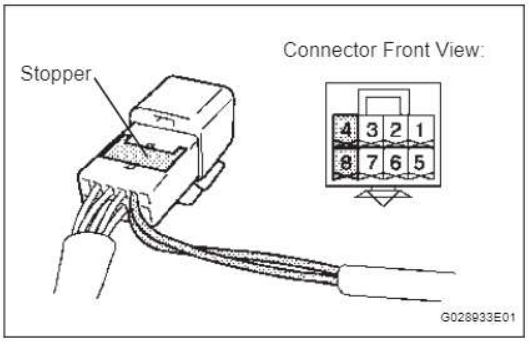
2. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Insert the indicator light wire into the shift lock control unit while aligning the groove on the unit with the indicator light guide key.

(b) Install the indicator light guide by turning it clockwise until it securely locks.

(c) Install the indicator light wire to the clamp on the shift lock control unit.

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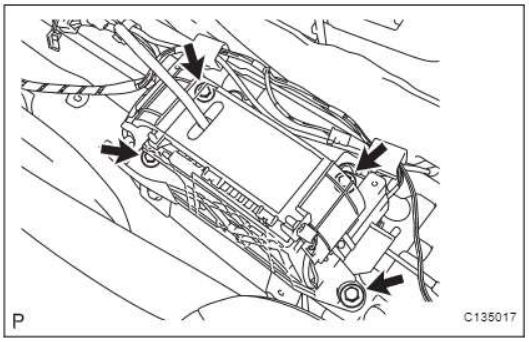


(d) Connect terminals (4) and (8) of the indicator light wire.
(e) Push the stopper.

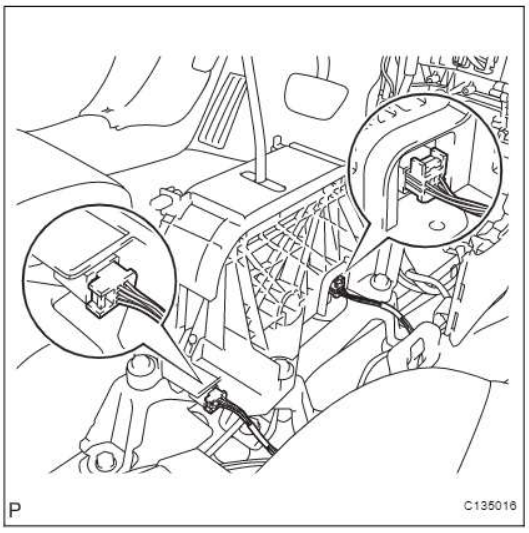
INSTALLATION

1. INSTALL SHIFT LOCK CONTROL UNIT

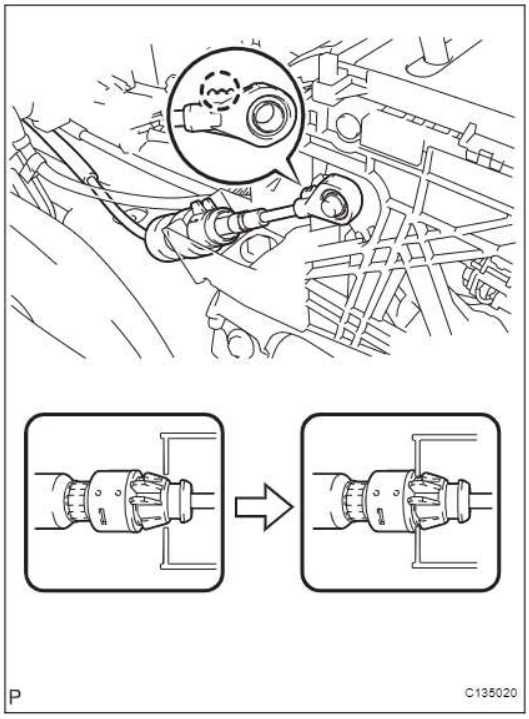
(a) Install the 4 bolts and shift lock control unit.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



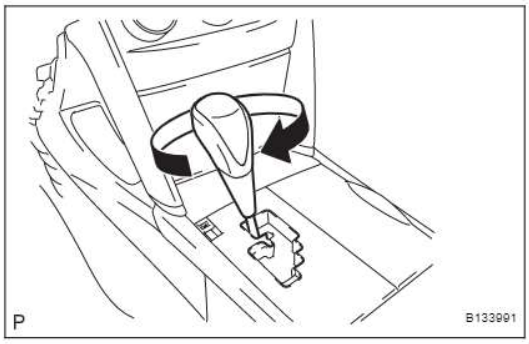
(b) Connect the shift lock ECU connector and transmission control switch wire connector.



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2. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Install the transmission control cable assembly as shown in the illustration.
   HINT:
   - Install the floor shift cable with the uneven surface facing up.
   - Securely engage the claws of the floor shift cable.
3. **INSTALL FLOOR CARPET BRACKET LH**
4. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)**
5. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
6. **INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)**
7. **INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)**
8. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
9. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
10. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)**
11. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)**
12. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)**
13. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**
14. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
15. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**



16. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY**
    (a) Install the shift lever knob sub-assembly.
17. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (without Smart Key System) (See page IP-57)**
18. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (with Smart Key System) (See page IP-57)**
19. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
20. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
21. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**

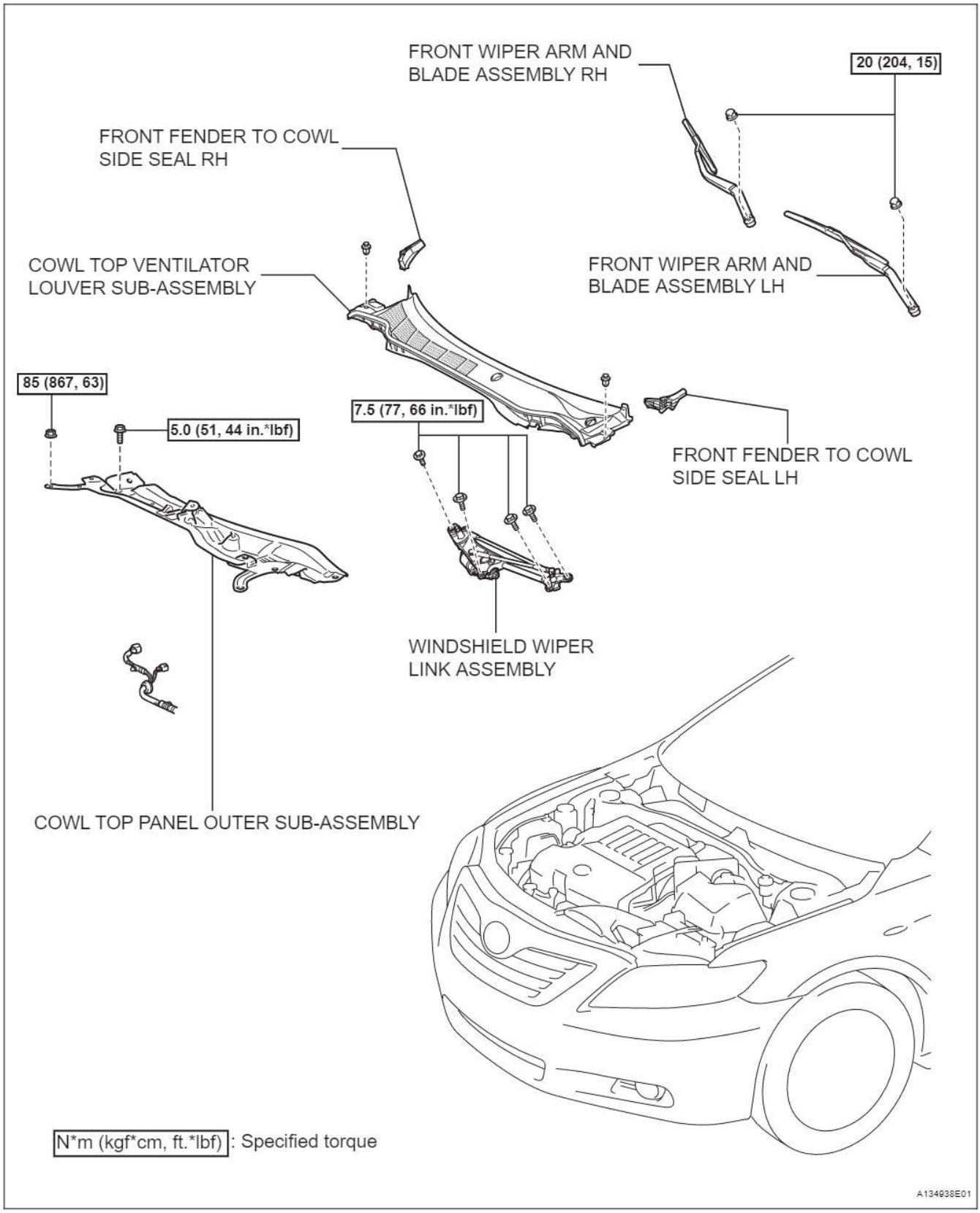
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22. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
23. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)
24. INSPECT SHIFT LEVER POSITION (See page AX-191)
25. ADJUST SHIFT LEVER POSITION (See page AX-191)

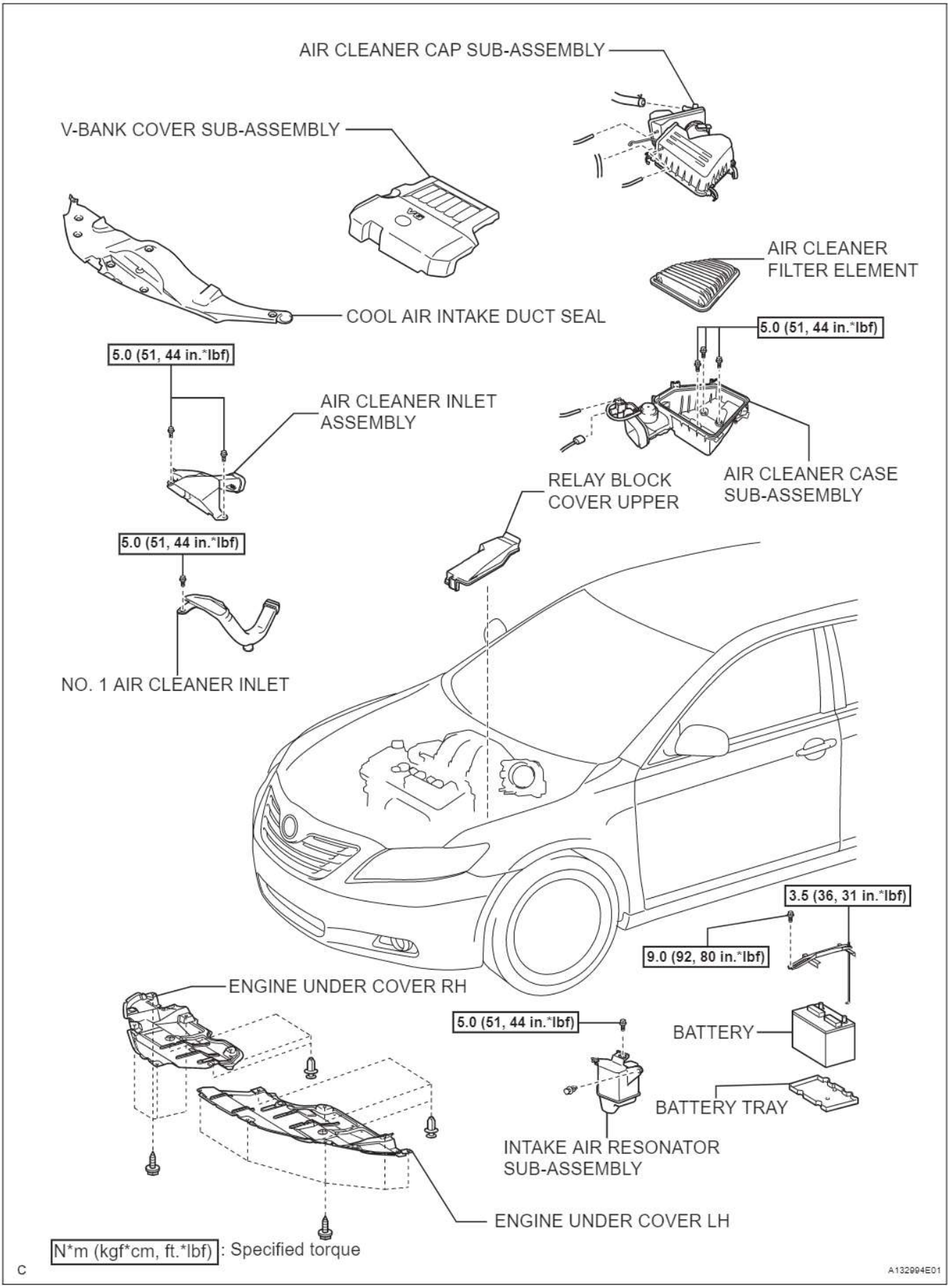
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TORQUE CONVERTER CLUTCH AND DRIVE PLATE

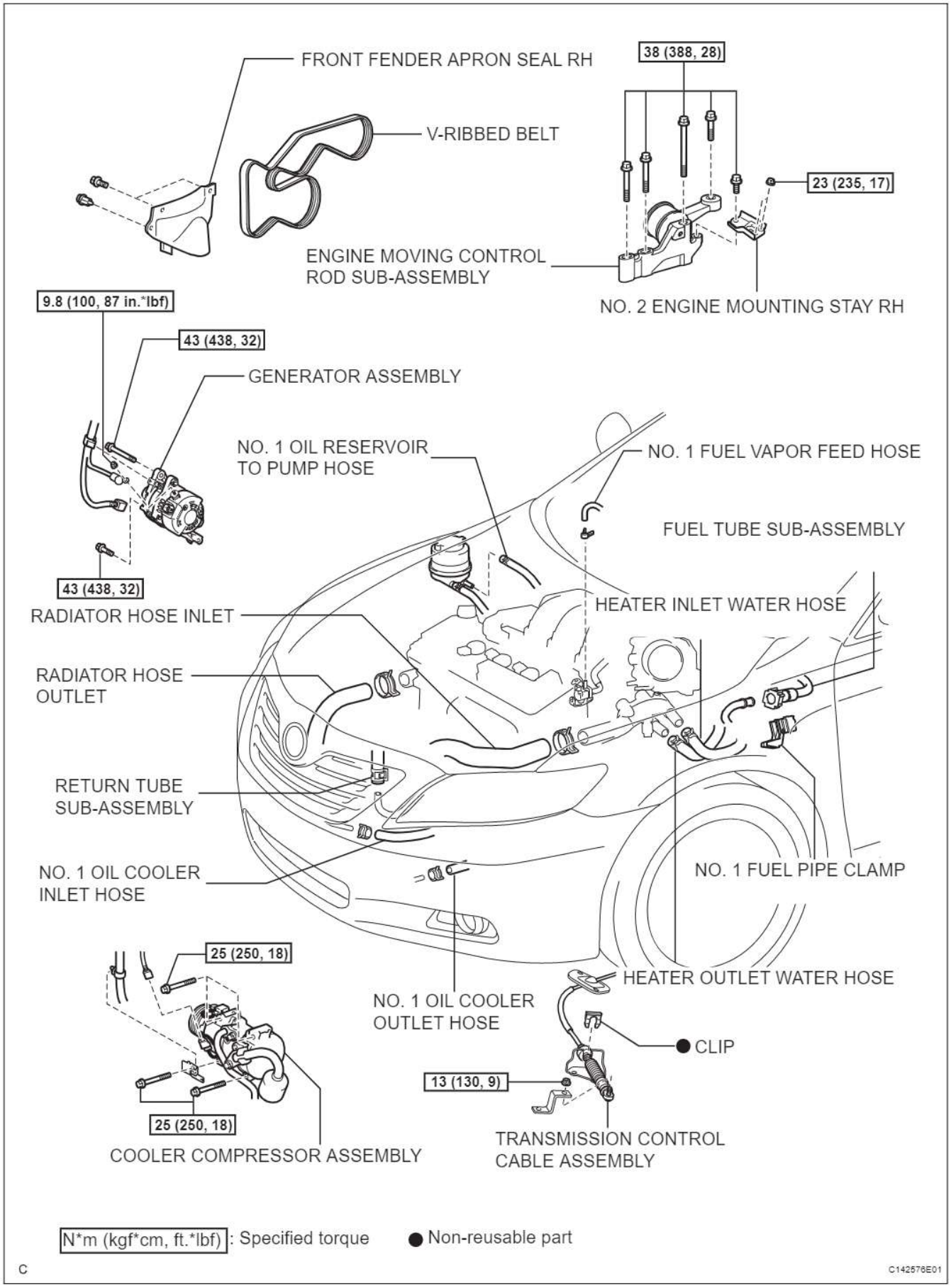
COMPONENTS



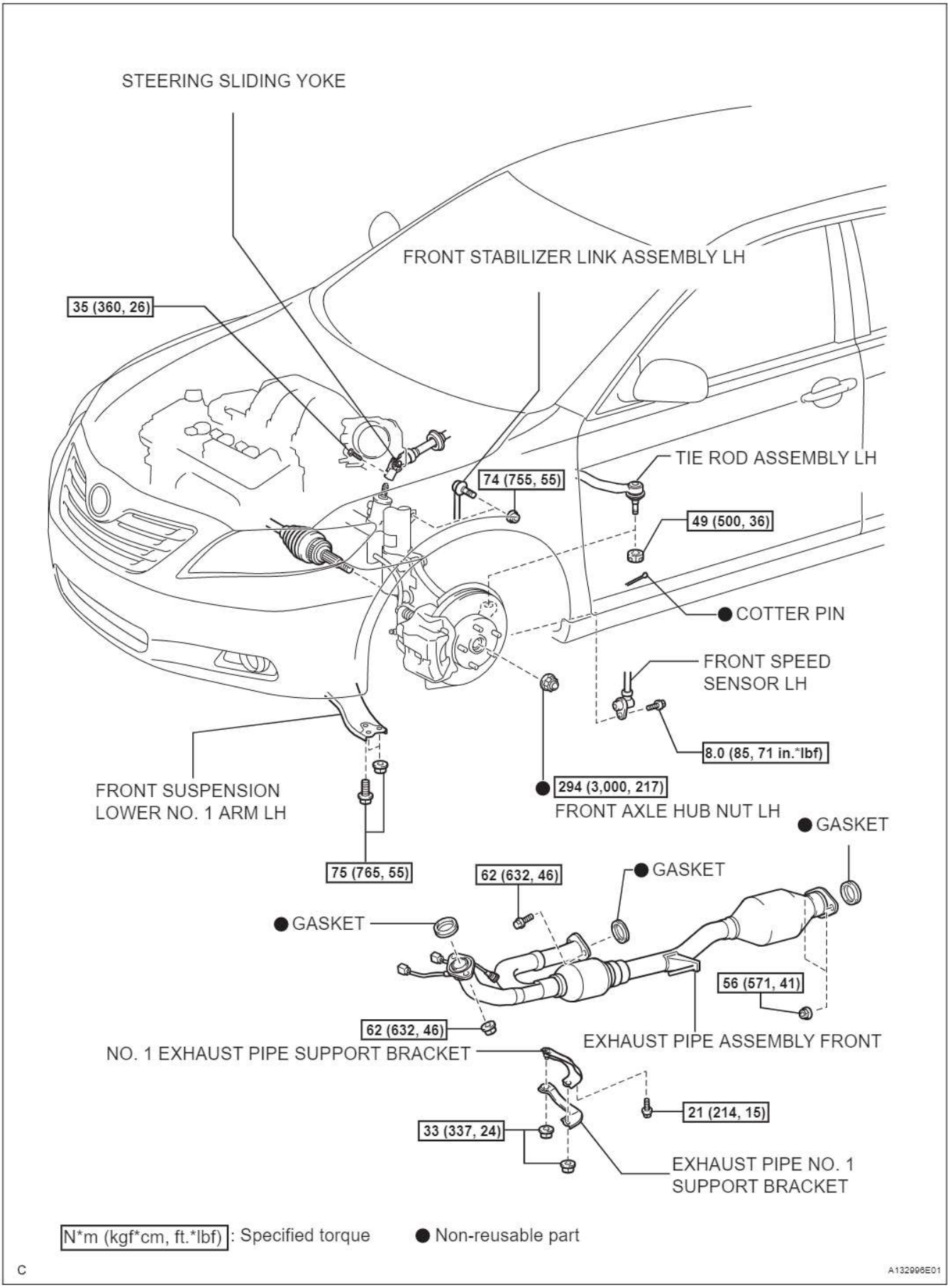
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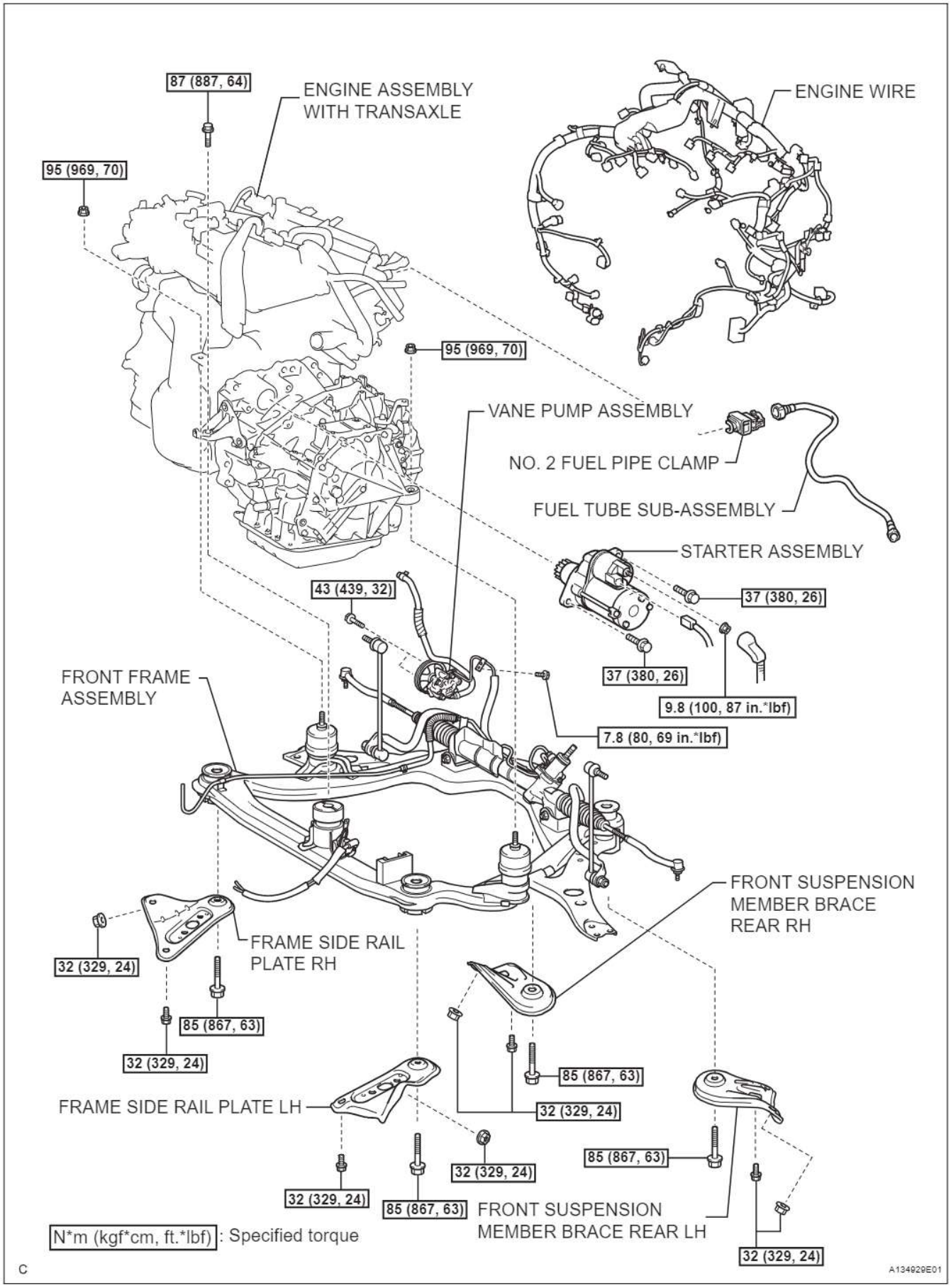
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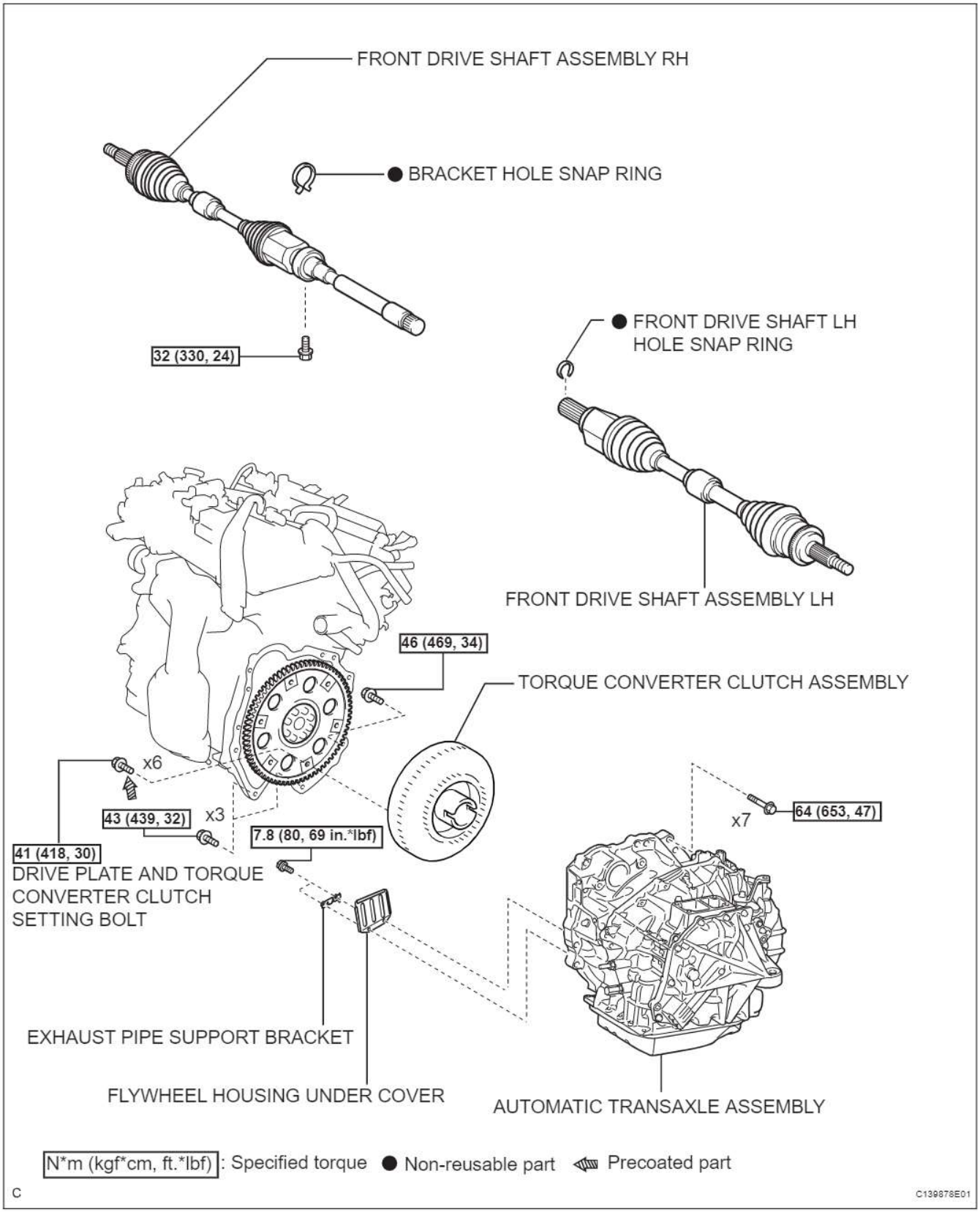
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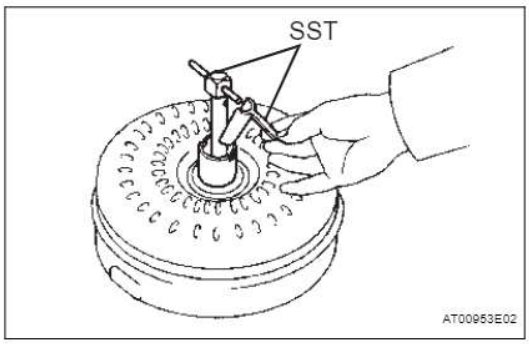
REMOVAL

1. **REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY**

HINT:

(See page AX-207)

INSPECTION



1. **INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY**

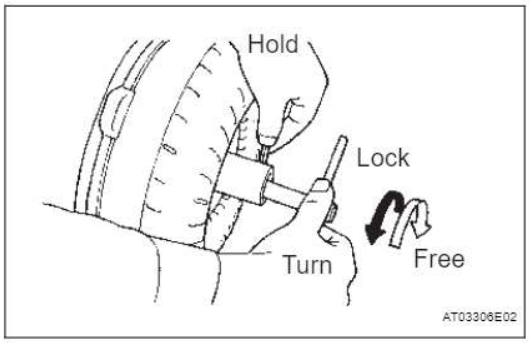
(a) Inspect the one-way clutch.

(1) Set SST into the inner race of the one-way clutch.

SST 09350-32014 (09351-32010)

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

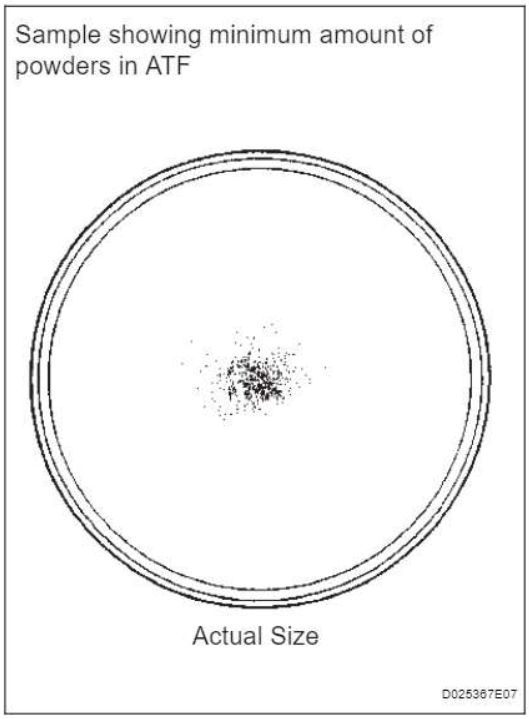
SST 09350-32014 (09351-32010, 09351-32020)



(3) Stand the torque converter up and turn the SST.

Standard:

If the one-way clutch is turned clockwise, it rotates freely and if turned counterclockwise, it locks.



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

(1) If the inspection result of the torque converter clutch assembly satisfies the following conditions, replace the torque converter clutch assembly.

Malfunction item:

A metallic sound is emitted from the torque converter clutch assembly during the stall test or when the shift lever is moved to the N position.

The one-way clutch is free or locked in both directions.

The amount of powder in the ATF is greater than the sample shown in the illustration (see the sample).

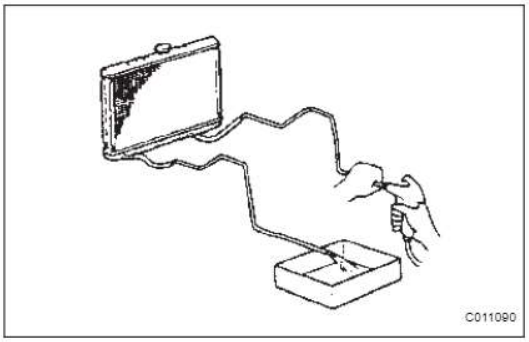
HINT:

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

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

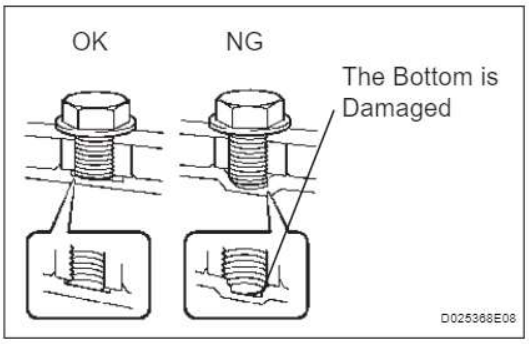
(1) If the ATF is discolored and/or has a foul odor, completely stir the ATF in the torque converter clutch and drain it.

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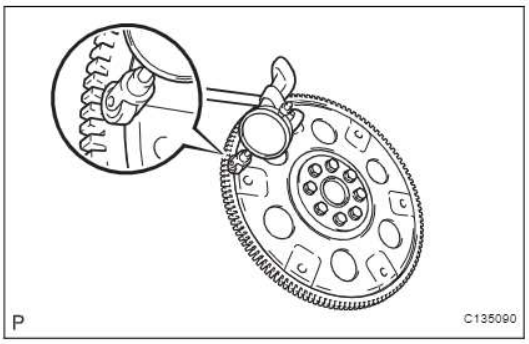


(d) Clean and check the oil cooler and oil pipe line.
(1) If the torque converter clutch is inspected or the ATF is exchanged, clean the oil cooler and oil pipe line.
HINT:
- Spray compressed air of 196 kPa (2 kgf/cm, 28 psi) from the inlet hose.
- If plenty of fine powders are identified in the ATF,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

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



(e) Prevent deformation of the torque converter clutch and damage to the oil pump gear.
(1) When there is any damage to the end of the bolt for the torque converter clutch and to the bottom of the bolt hole, replace the bolt and the torque converter clutch.
(2) All of the bolts must be the same length.
(3) Bolts with washers must be used.



2. INSPECT DRIVE PLATE & RING GEAR SUB-ASSEMBLY

(a) Set up a dial indicator with a roller instrument and measure the drive plate runout.
Maximum runout:
0.20 mm (0.0079 in.)

(b) Check for damage of the ring gear.
If runout is not within specification or the ring gear is damaged, replace the drive plate.

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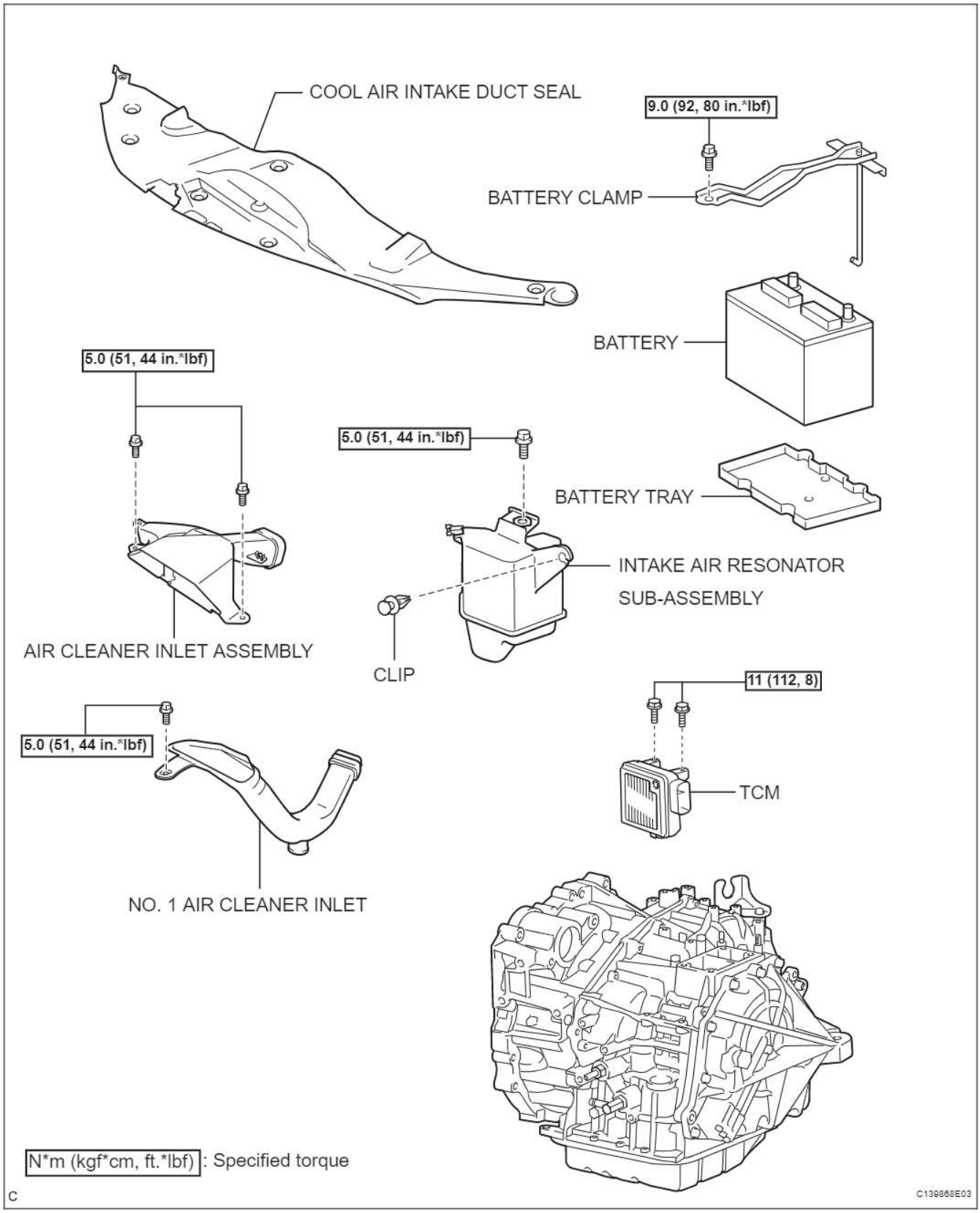
INSTALLATION

1. **INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY**
   HINT:
   (See page AX-214)

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TCM

COMPONENTS



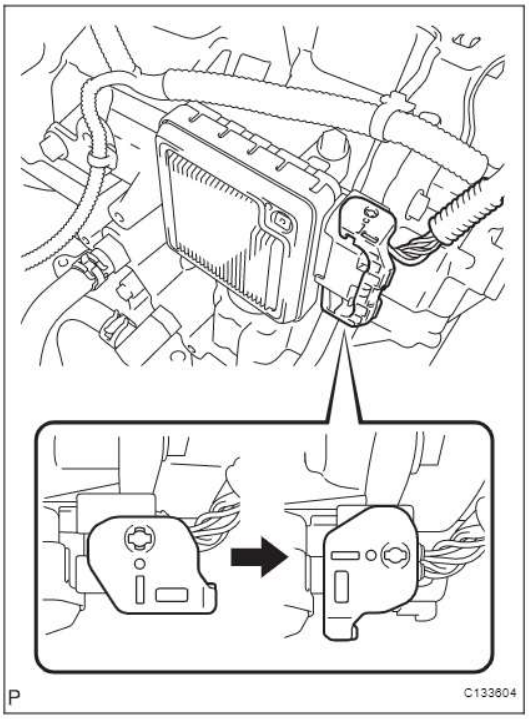
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AX

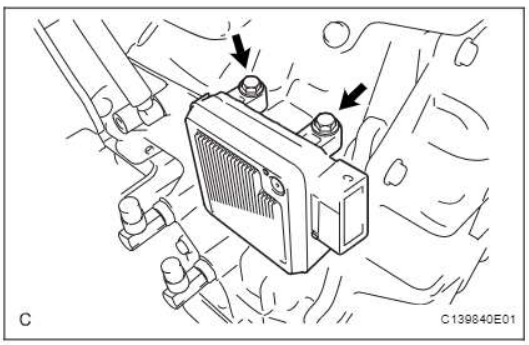
REMOVAL

NOTICE:
When the TCM is replaced, the existing transaxle compensation codes must be input into the new TCM (See page AX-22).

1. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
2. **REMOVE BATTERY (See page EM-24)**
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
4. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
5. **REMOVE INTAKE AIR RESONATOR SUB-ASSEMBLY (See page EM-25)**
6. **REMOVE TCM**
   (a) Turn the lock lever and disconnect the connector from the TCM.



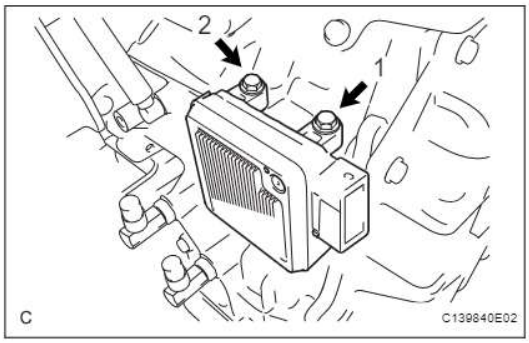
(b) Remove the 2 bolts and TCM from the transaxle.

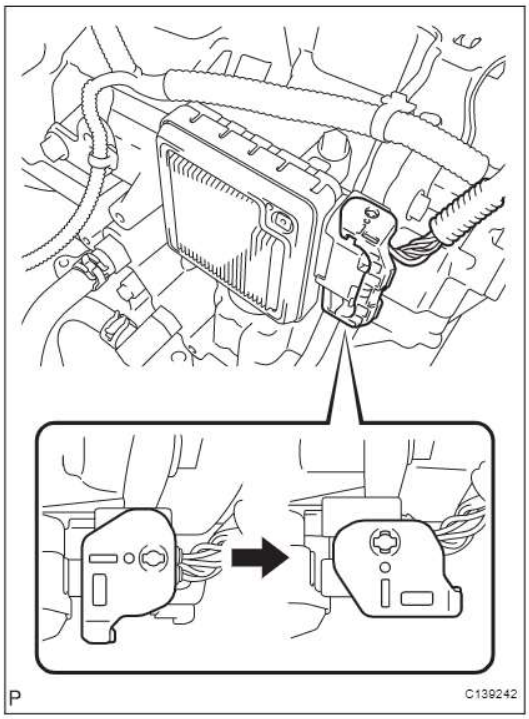


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INSTALLATION

1. **INSTALL TCM**
   (a) Install the TCM to the transaxle.
   (b) Install and tighten the 2 bolts in the order shown in the illustration.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)





   (c) Connect the connector to the TCM.
   (d) Turn the lock lever and secure the connector with the lock lever.

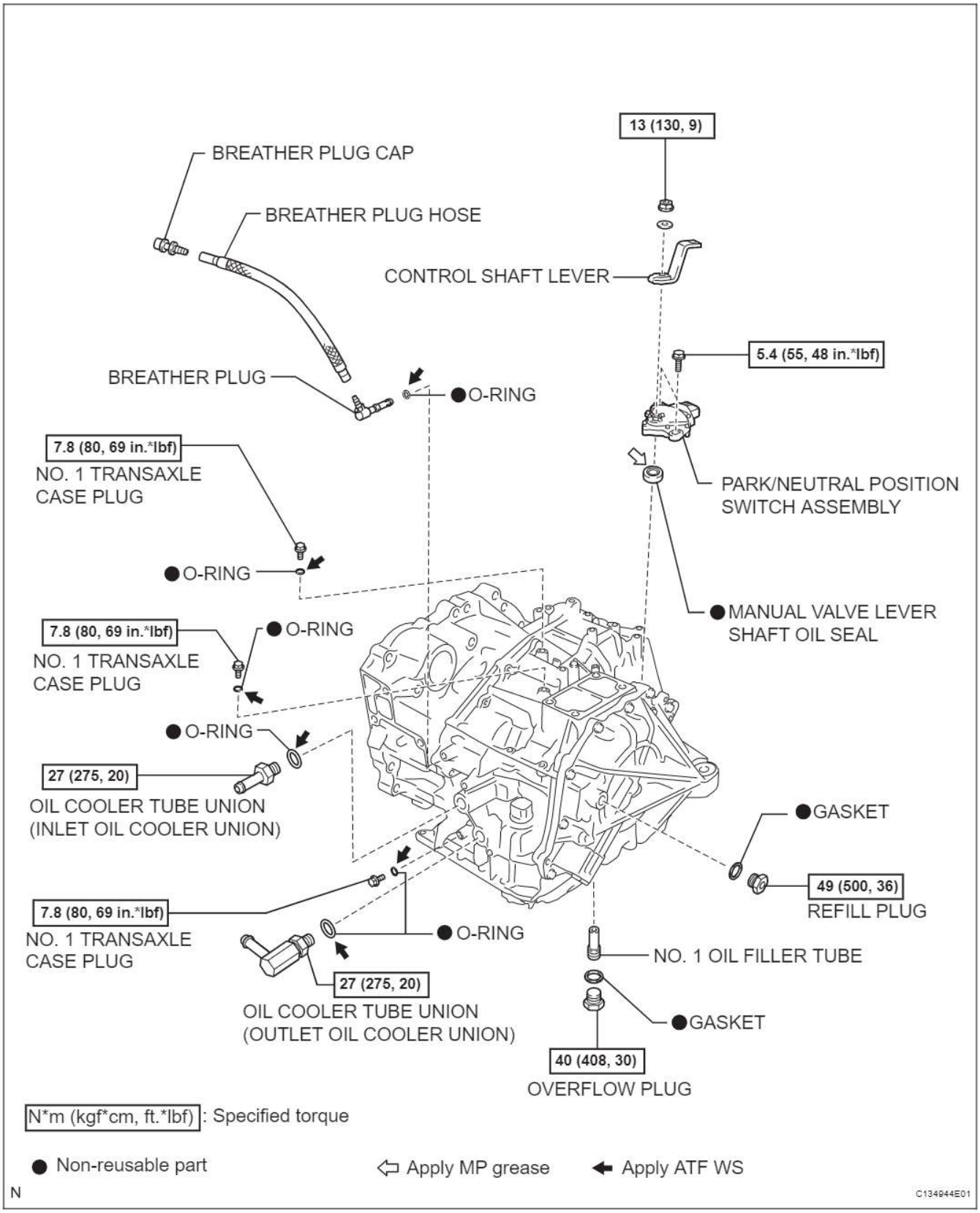
2. **INSTALL INTAKE AIR RESONATOR SUB-ASSEMBLY (See page EM-49)**
3. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
4. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
5. **INSTALL BATTERY (See page EM-49)**
6. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
7. **PERFORM TCM REGISTRATION**
   HINT:
   (See page AX-19)

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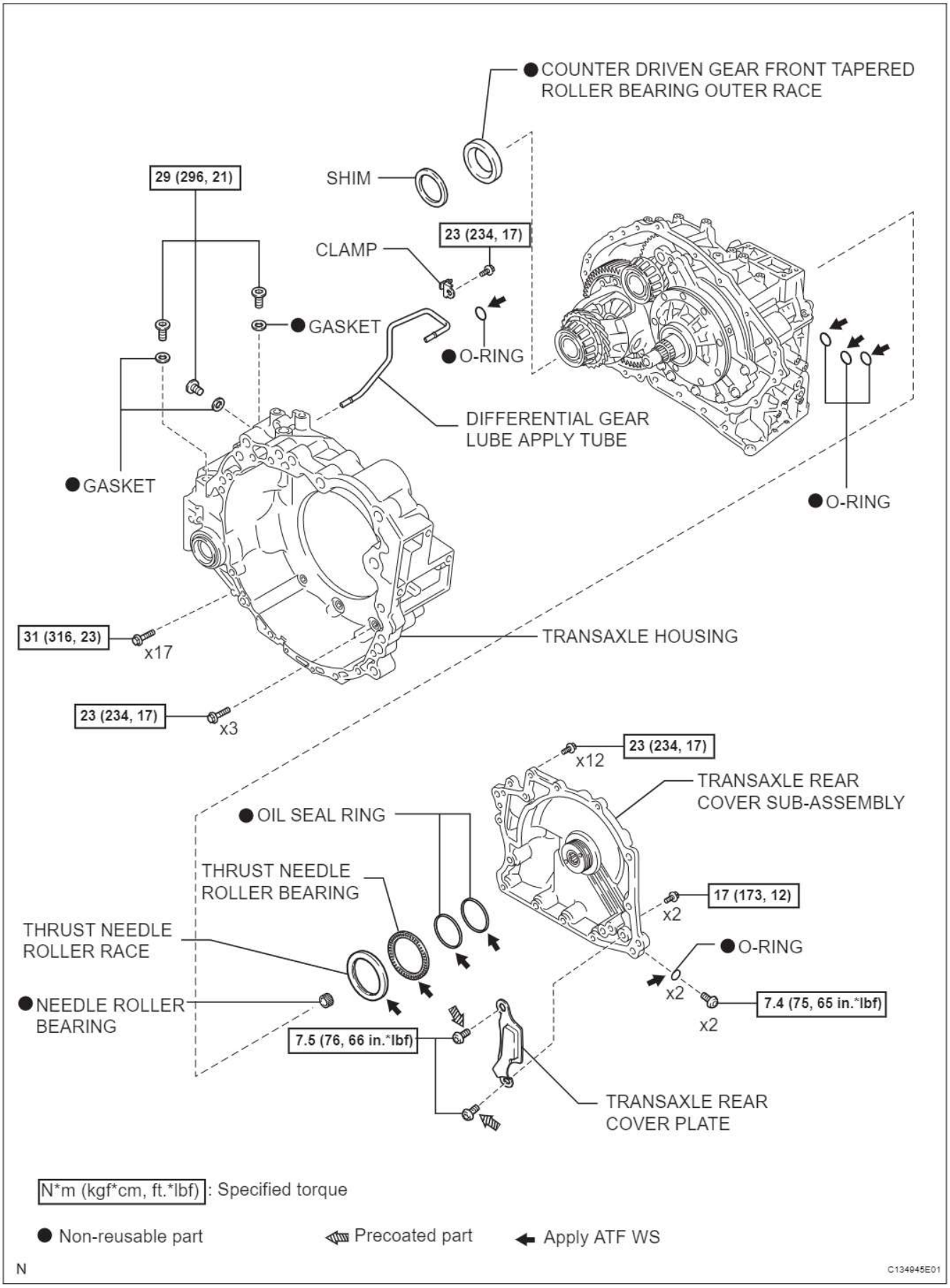
AUTOMATIC TRANSAXLE UNIT

COMPONENTS

AX

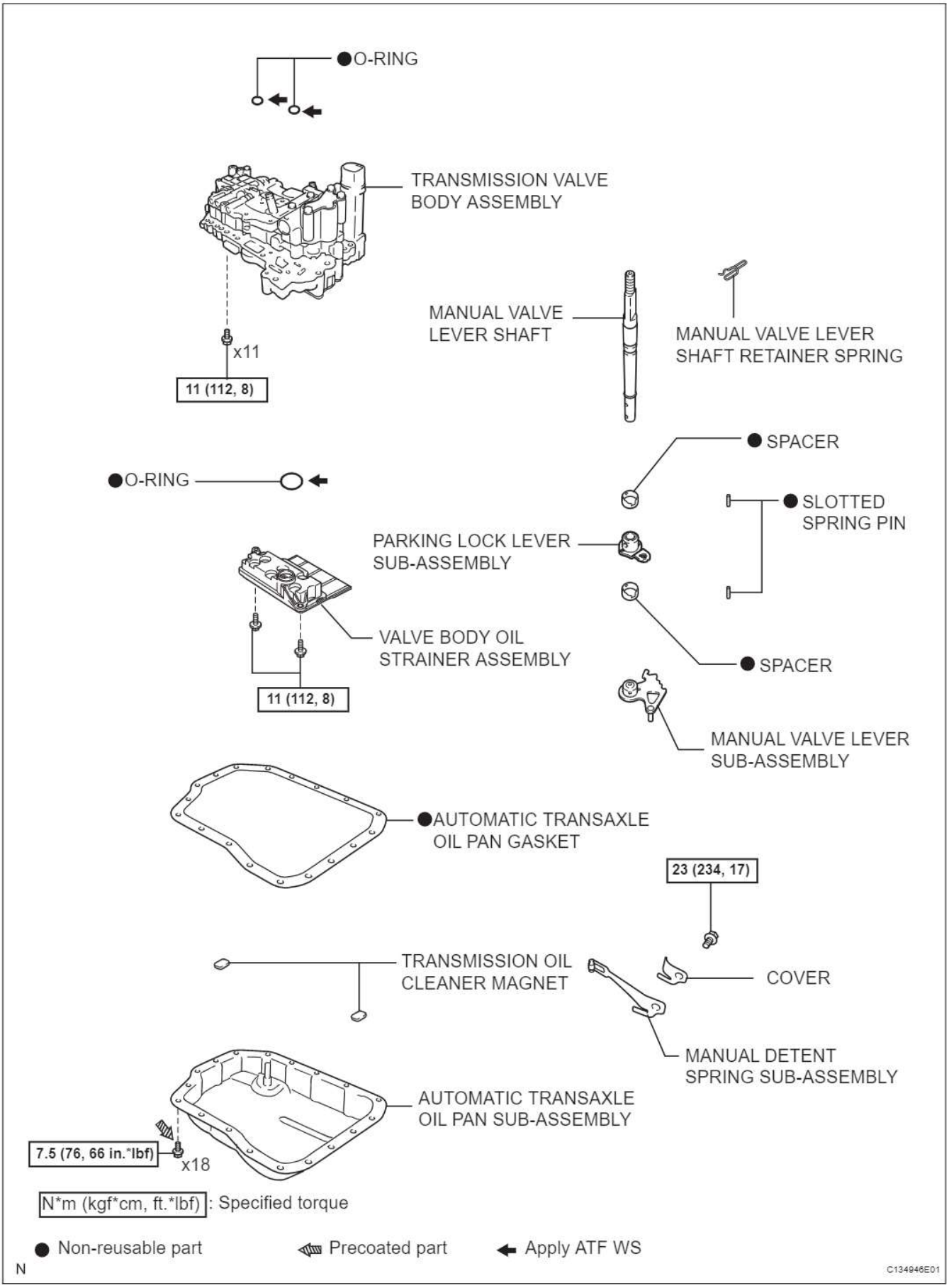


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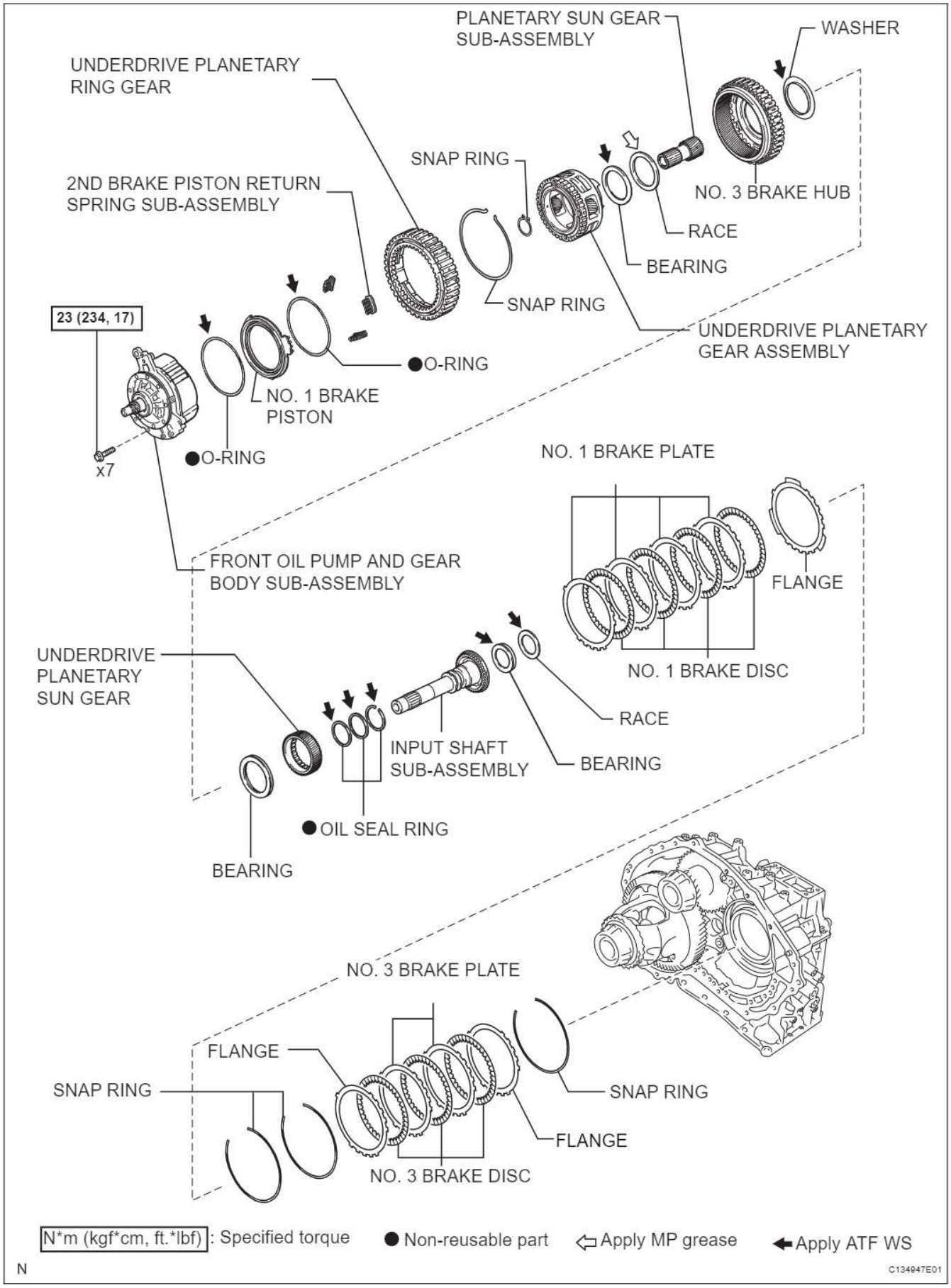


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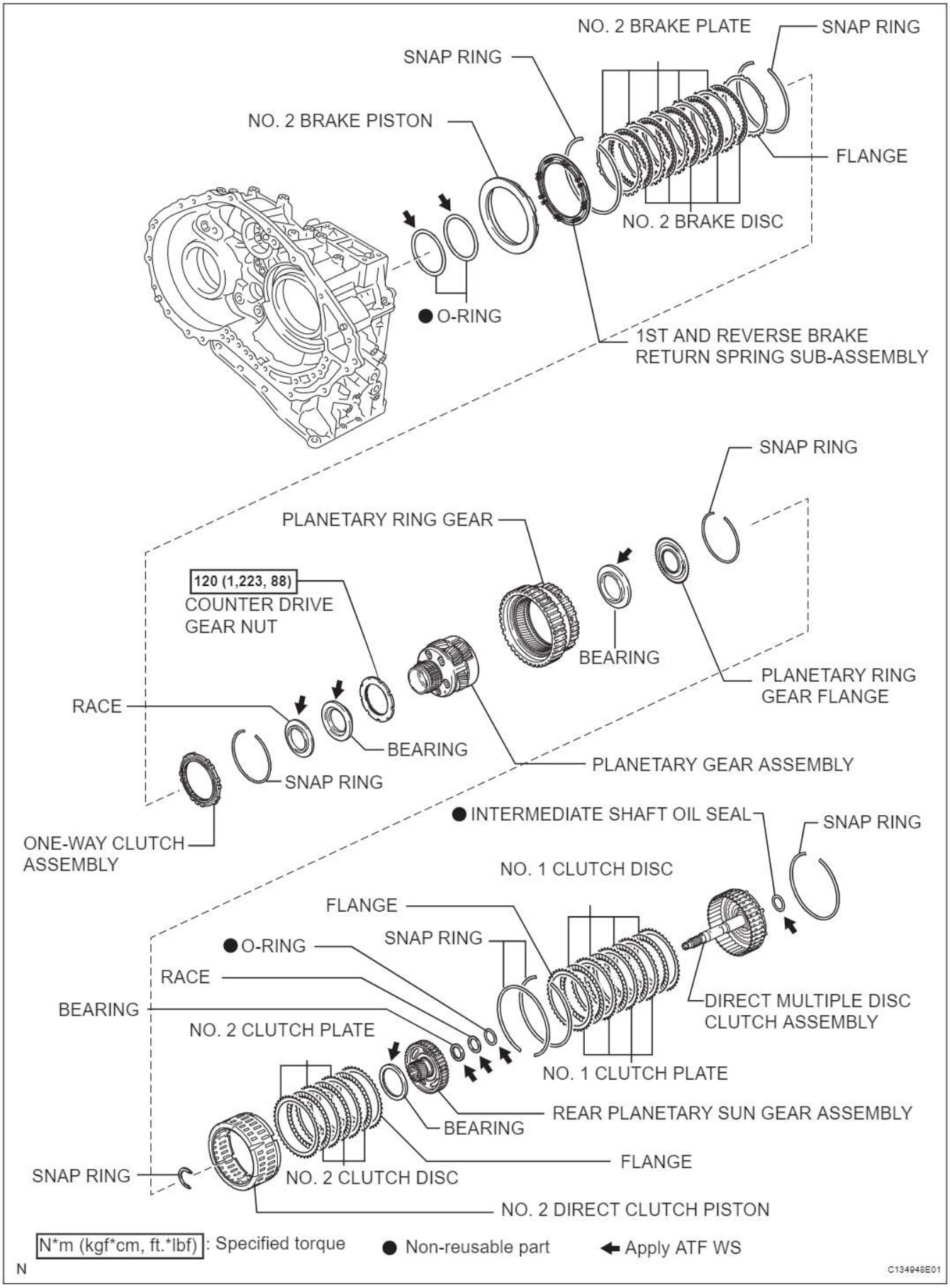
AX



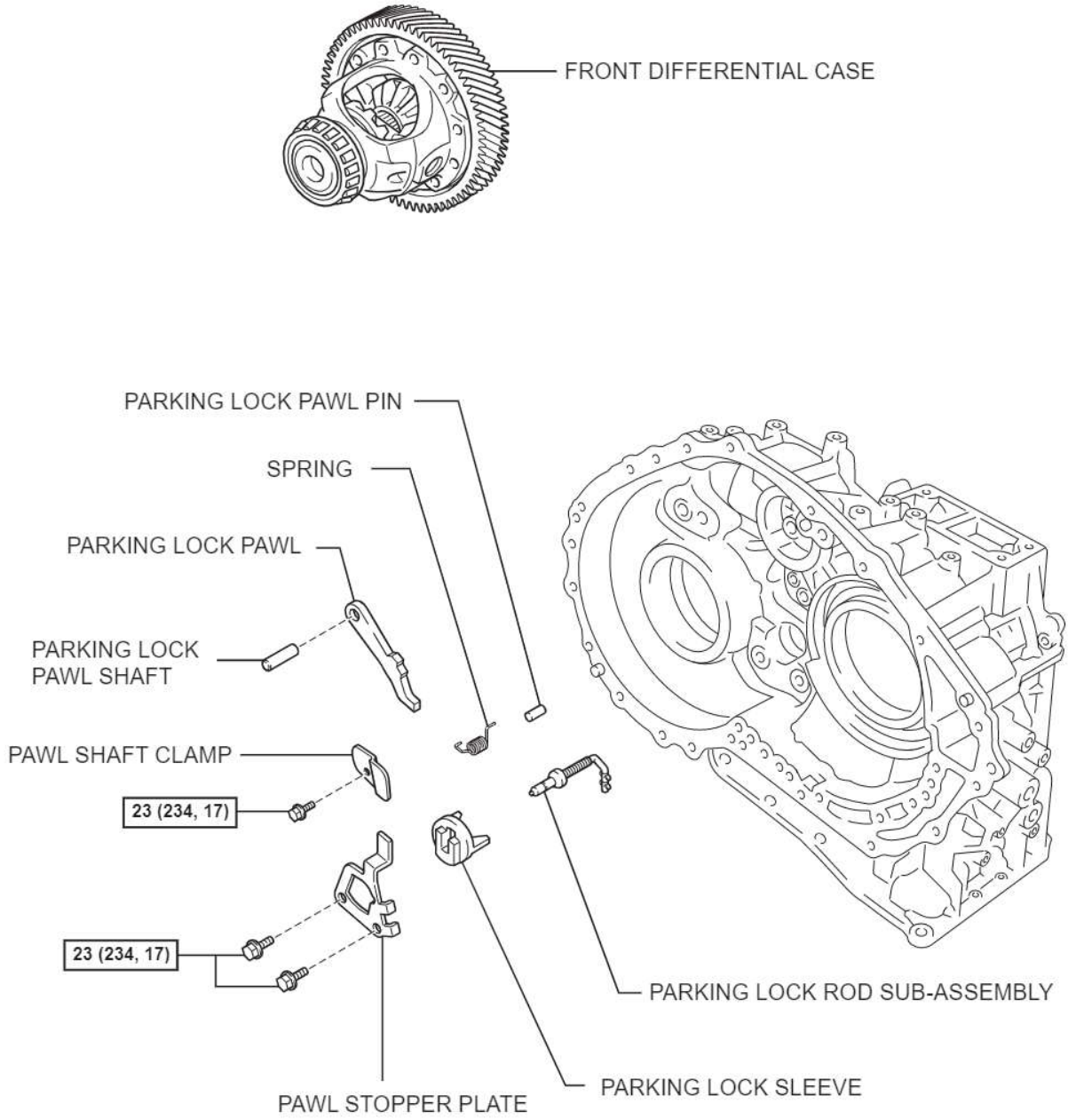
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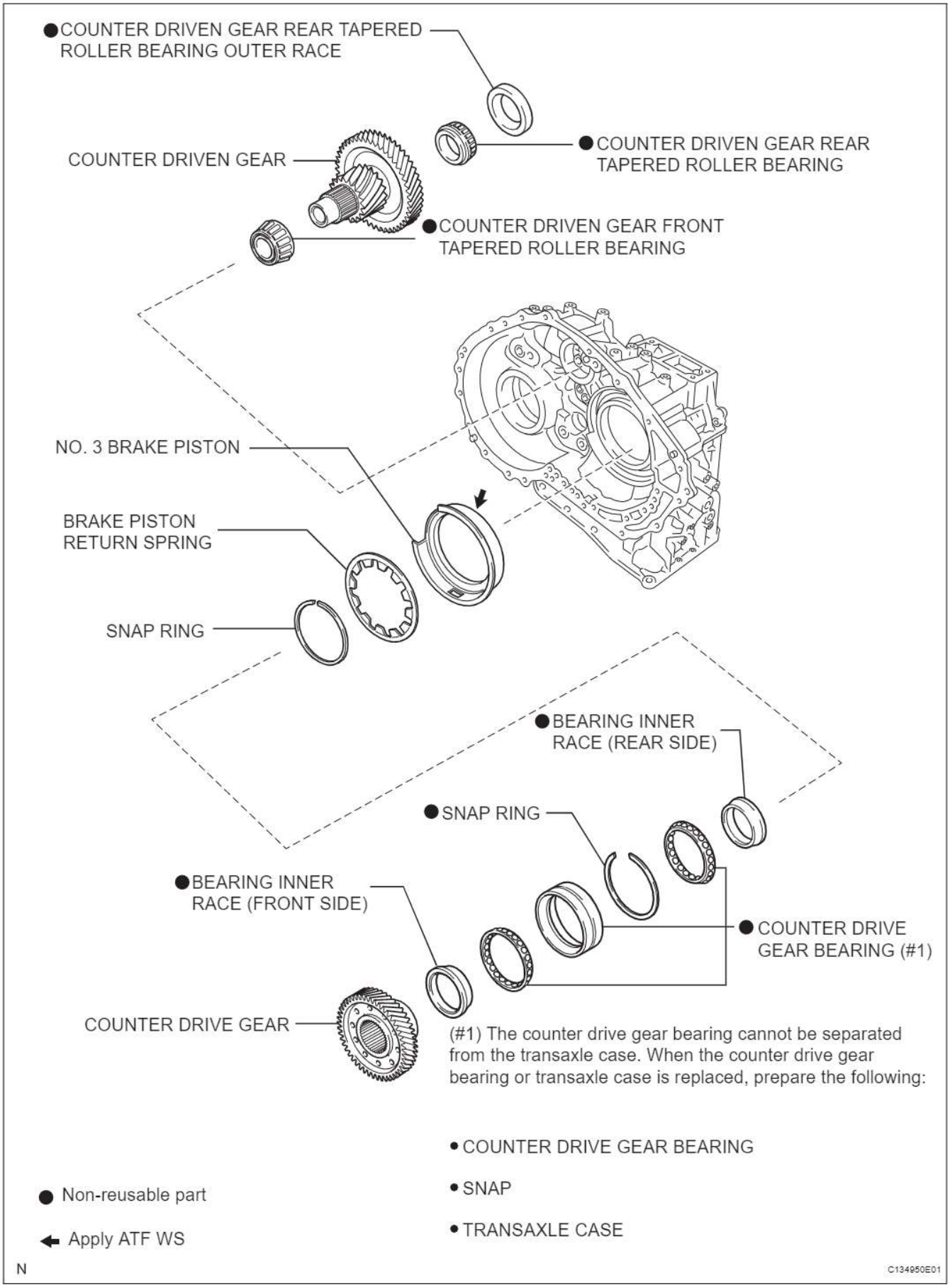


N*m (kgf*cm, ft.*lbf): Specified torque

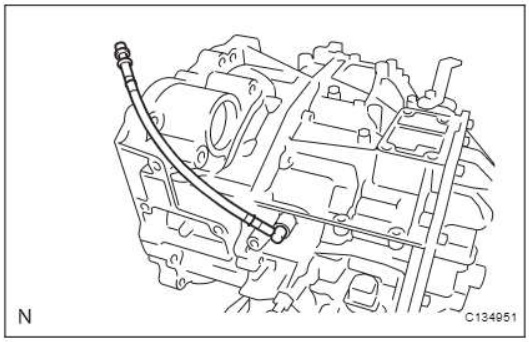
N

C134949E01

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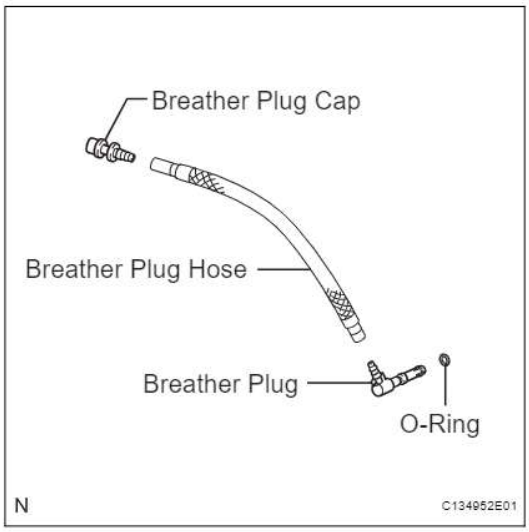
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DISASSEMBLY

1. REMOVE NO. 2 BREATHER PLUG

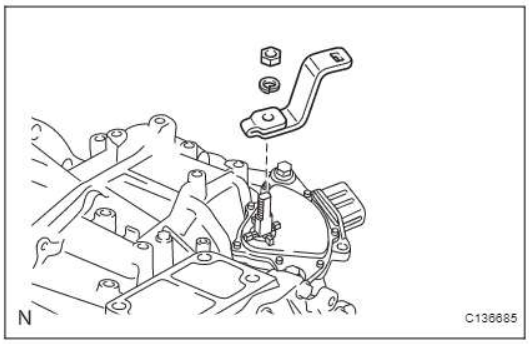
(a) Using a screwdriver, remove the breather plug hose from the transaxle case.

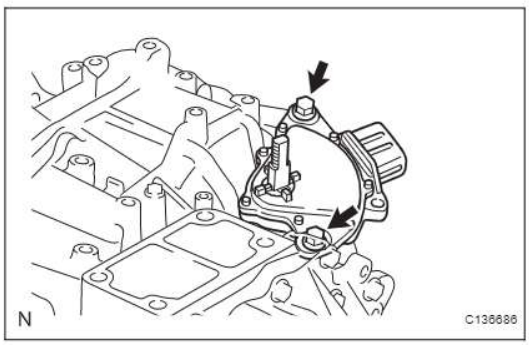


(b) Using a screwdriver, remove the breather plug from the breather plug hose.
(c) Using a screwdriver, remove the O-ring from the breather plug.
(d) Using a screwdriver, remove the breather plug cap from the breather breather plug hose.

2. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

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



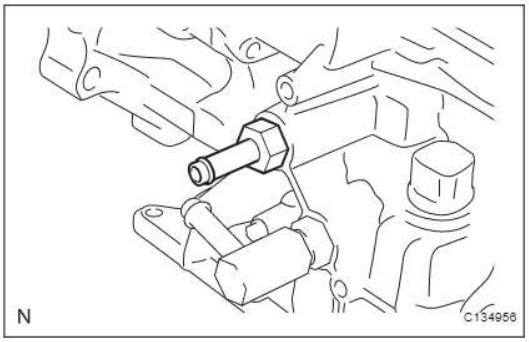


(b) Remove the 2 bolts and the park/neutral position switch assembly from the transaxle case.

NOTICE:

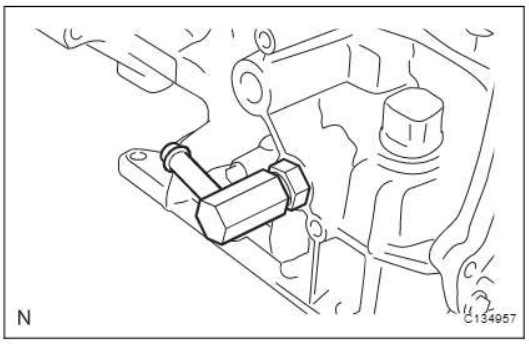
Before removing the park/neutral position switch, remove any dirt or rust on the installation portion of the control shaft. Be sure to remove the switch straight along the shaft while being careful not to deform the plate spring that supports the shaft. If the plate spring is deformed, the park/neutral switch cannot be reinstalled correctly.

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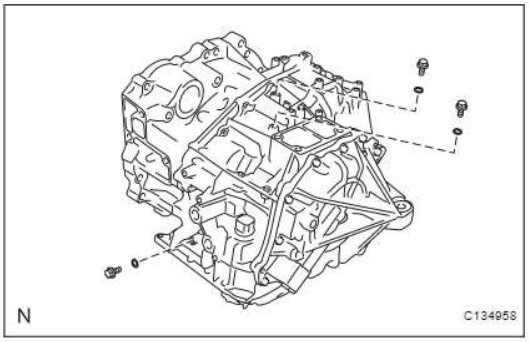
3. REMOVE OIL COOLER TUBE UNION (INLET OIL COOLER UNION)

(a) Loosen the nut while holding the oil cooler tube union (inlet oil cooler union).
(b) Remove the oil cooler tube union (inlet oil cooler union) from the transaxle case.
(c) Remove the O-ring from the oil cooler tube union (inlet oil cooler union).



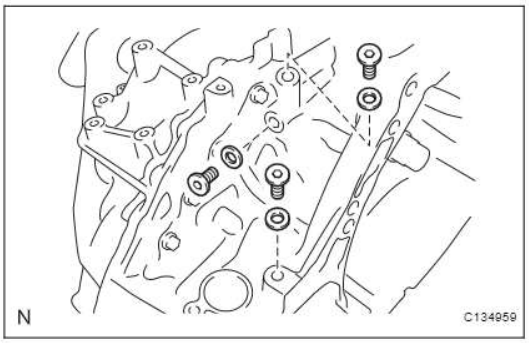
4. REMOVE OIL COOLER TUBE UNION (OUTLET OIL COOLER UNION)

(a) Loosen the nut while holding the oil cooler tube union (outlet oil cooler union).
(b) Remove the oil cooler tube union (outlet oil cooler union) from the transaxle case.
(c) Remove the O-ring from the oil cooler tube union (outlet oil cooler union).

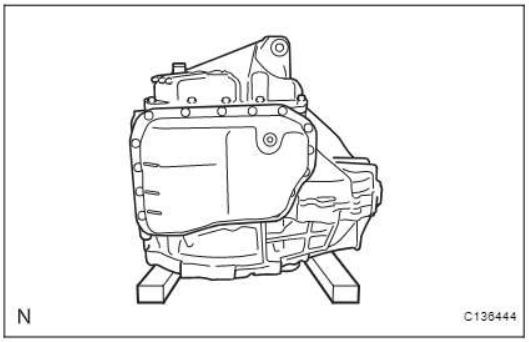


5. REMOVE NO. 1 TRANSAXLE CASE PLUG

(a) Remove the 3 No. 1 transaxle case plugs from the transaxle case.
(b) Using a screwdriver, remove the 3 O-rings from the 3 No. 1 transaxle case plugs.



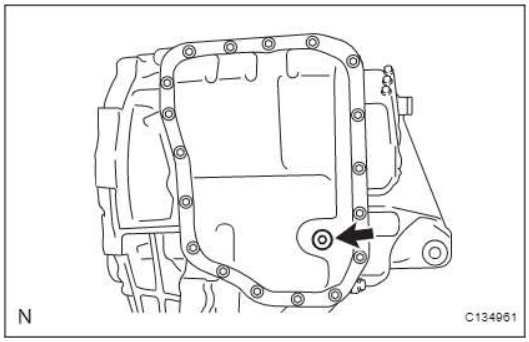
(c) Using a hexagon wrench (6 mm), remove the 3 hexagon bolts from the transaxle housing.
(d) Remove the 3 gaskets from the 3 hexagon bolts.



6. FIX AUTOMATIC TRANSAXLE ASSEMBLY

(a) Secure the transaxle assembly on wooden blocks.

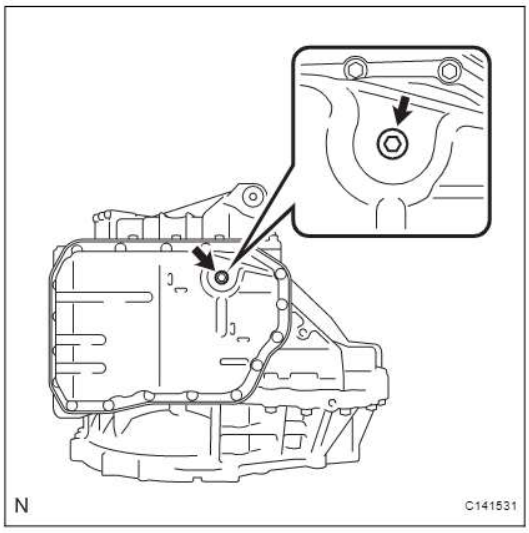
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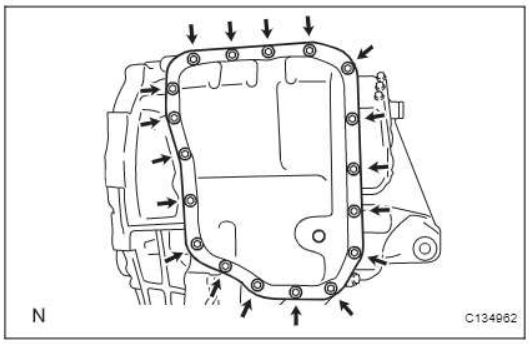
7. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Using a hexagon wrench (6 mm), remove the overflow plug from the automatic transaxle oil pan sub-assembly.

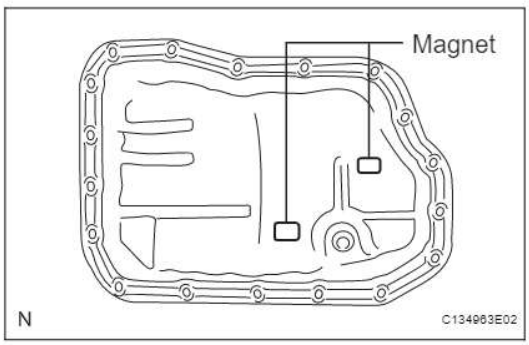
(b) Remove the gasket from the overflow plug.



(c) Using a hexagon wrench (6 mm), remove the No. 1 oil filler tube from the automatic transaxle assembly.



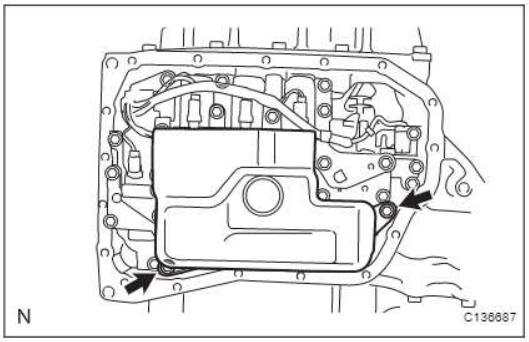
(d) Remove the 18 bolts, automatic transaxle oil pan sub-assembly, and gasket from the automatic transaxle assembly.



(e) Remove the 2 magnets from the automatic transaxle oil pan sub-assembly.

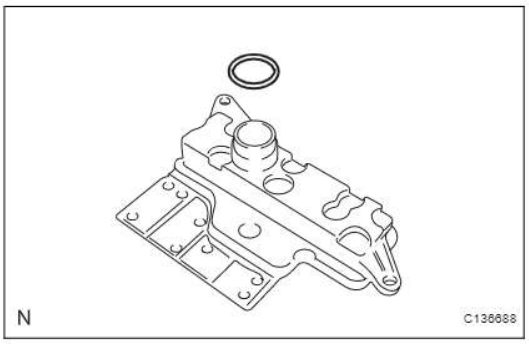
8. INSPECT TRANSMISSION OIL CLEANER MAGNET (See page AX-274)

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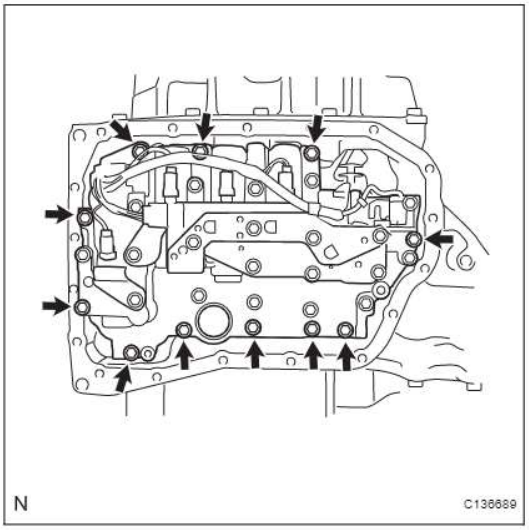


9. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

(a) Remove the 2 bolts and oil strainer assembly from the valve body assembly.



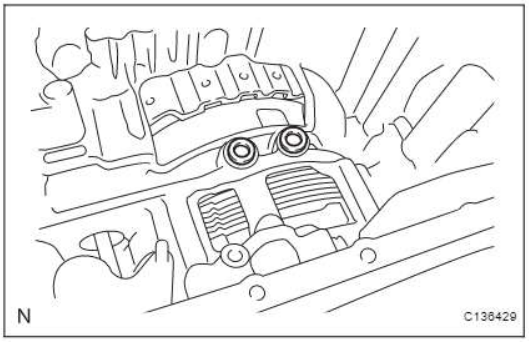
(b) Remove the O-ring from the oil strainer assembly.



10. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Remove the 11 bolts and valve body assembly from the transaxle case.

NOTICE:
When removing the transmission valve body assembly, be careful not to allow the transmission revolution sensor and the transaxle case to interfere each other.

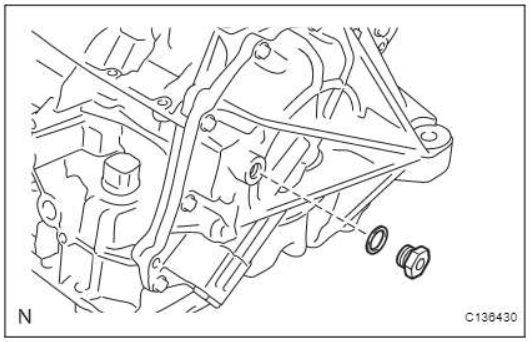


11. REMOVE TRANSAXLE CASE GASKET

(a) Remove the 2 gaskets from the transaxle case.

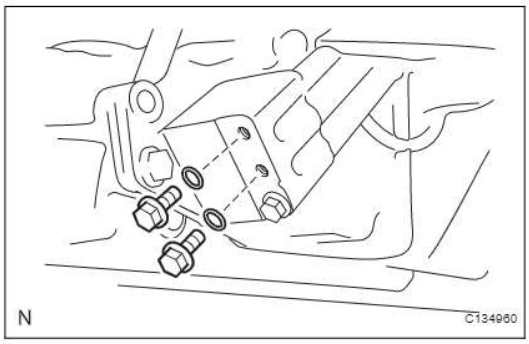
12. INSPECT INPUT SHAFT SUB-ASSEMBLY (See page AX-274)

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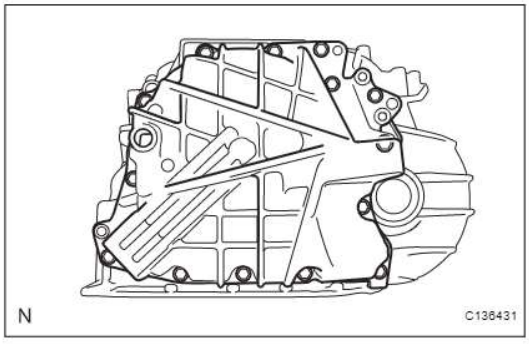


13. REMOVE TRANSAXLE REAR COVER SUB-ASSEMBLY

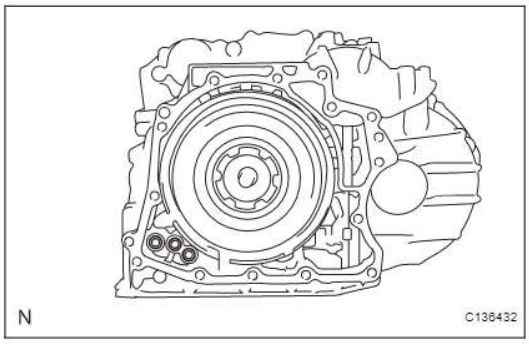
(a) Remove the refill plug from the transaxle rear cover.
(b) Remove the gasket from the refill plug.



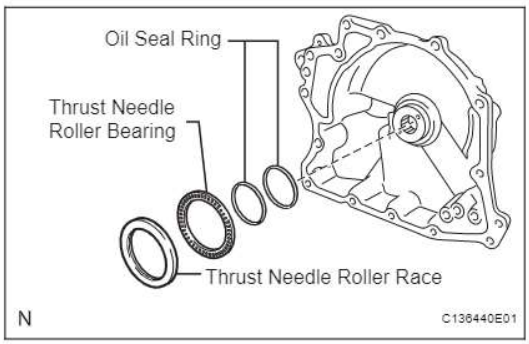
(c) Remove the 2 No. 1 automatic transaxle case plugs from the transaxle rear cover.
(d) Using a screwdriver, remove the 2 O-rings from the 2 No. 1 automatic transaxle case plugs.



(e) Remove the 14 bolts from the transaxle rear cover.
(f) Using a brass bar and hammer, tap on the circumference of the rear transaxle cover, to remove the transaxle rear cover from the transaxle case.

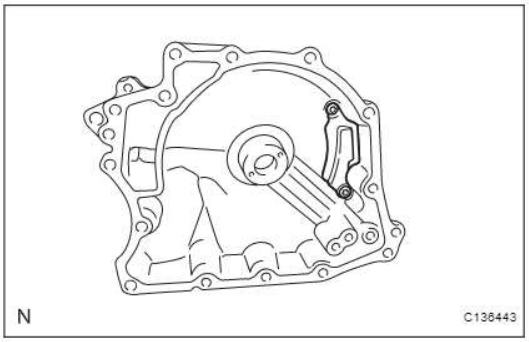


(g) Using a screwdriver, remove the 3 O-rings from the transaxle case.

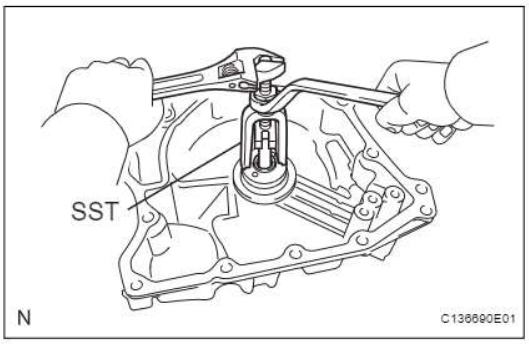


(h) Using a screwdriver, remove the 2 oil seal rings from the transaxle rear cover.
(i) Remove the thrust needle roller bearing and thrust needle roller race from the transaxle rear cover.

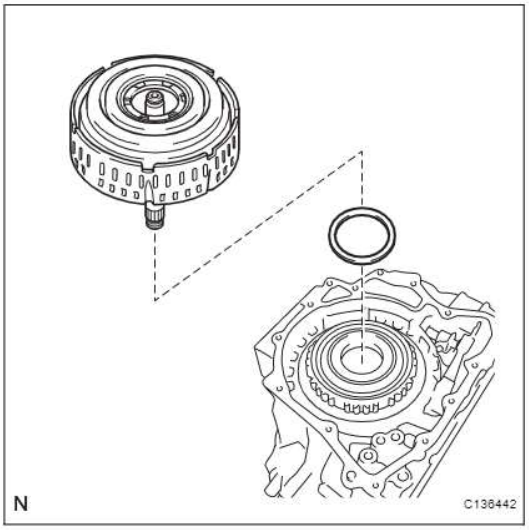
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(j) Using a "TORX" wrench (T30), remove the 2 "TORX" screws and transaxle rear cover plate from the transaxle rear cover.

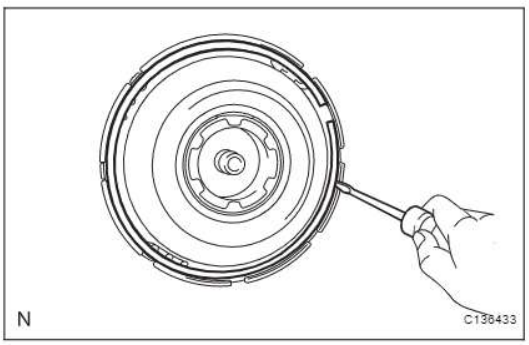


(k) Using SST, remove the needle roller bearing from the transaxle rear cover.
SST 09319-60020



14. REMOVE DIRECT MULTIPLE DISC CLUTCH ASSEMBLY

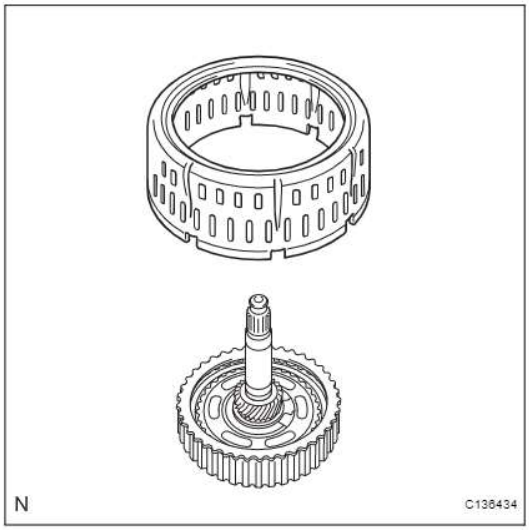
(a) Remove the direct multiple disc clutch assembly from the transaxle case.
(b) Remove the thrust needle roller bearing from the direct multiple disc clutch assembly.



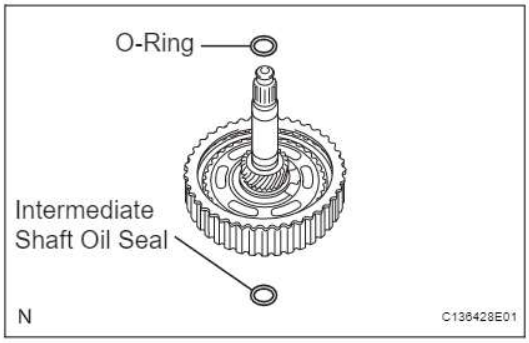
15. REMOVE DIRECT MULTIPLE DISC CLUTCH SNAP RING

(a) Using 2 screwdrivers, remove the snap ring from the direct multiple disc clutch assembly.

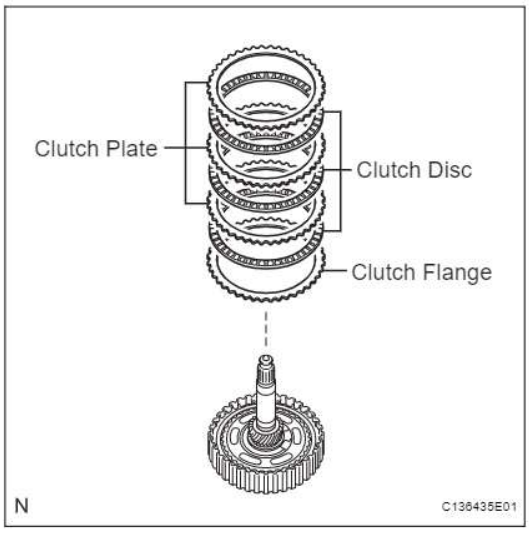
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(b) Remove the No. 2 direct clutch piston from the direct multiple disc clutch assembly.



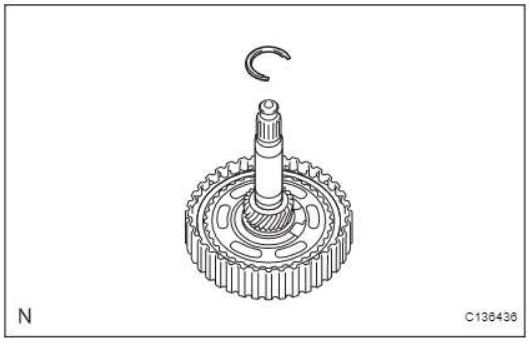
(c) Using a screwdriver, remove the intermediate shaft oil seal ring from the direct No. 2 direct clutch piston.
(d) Using a screwdriver, remove the O-ring from the direct multiple disc clutch assembly.



16. REMOVE NO. 2 DIRECT MULTIPLE DISC CLUTCH FLANGE

(a) Remove the flange, 3 clutch discs and 3 clutch plates from the direct multiple disc clutch assembly.

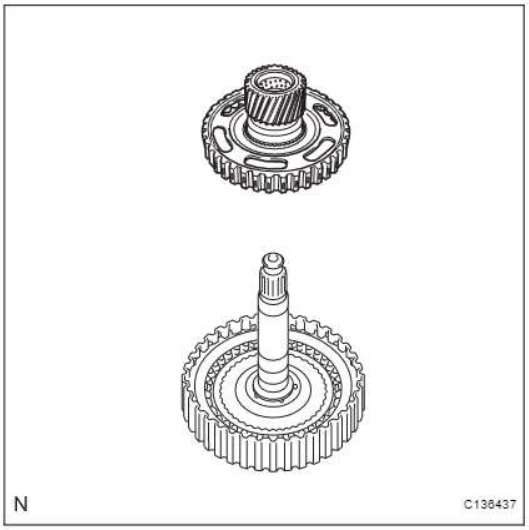
17. INSPECT NO. 2 CLUTCH DISC (See page AX-274)



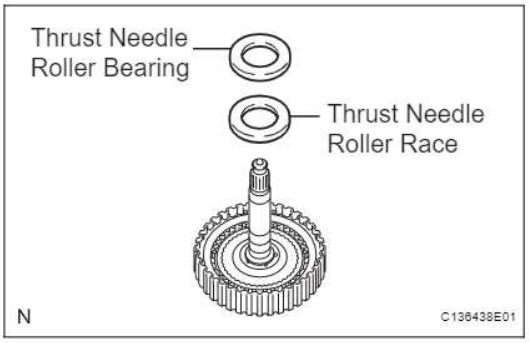
18. REMOVE REAR PLANETARY SUN GEAR ASSEMBLY

(a) Using a snap ring expander, remove the snap ring from the direct multiple disc clutch assembly.

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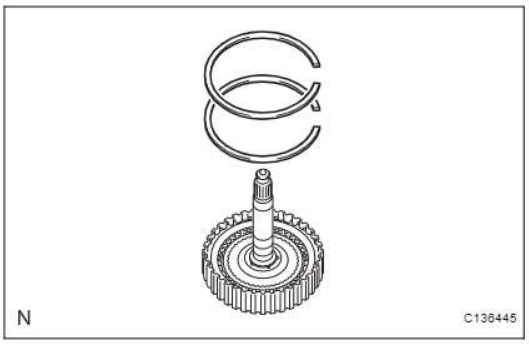


(b) Remove the rear planetary sun gear from the direct multiple disc clutch assembly.



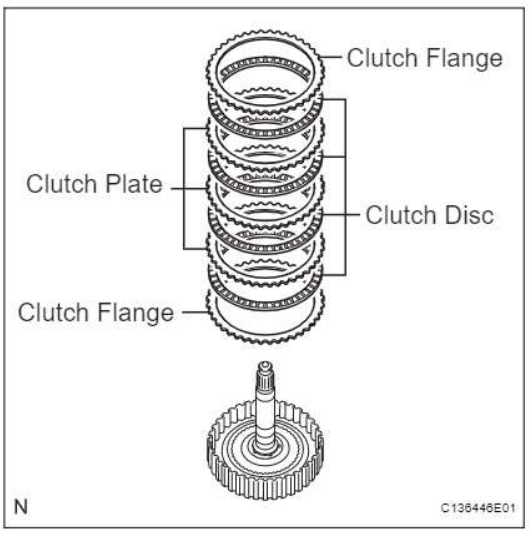
(c) Remove the thrust needle roller bearing and thrust needle roller race from the direct multiple disc clutch assembly.

19. INSPECT REAR PLANETARY SUN GEAR ASSEMBLY (See page AX-276)



20. REMOVE NO. 1 DIRECT MULTIPLE DISC CLUTCH FLANGE

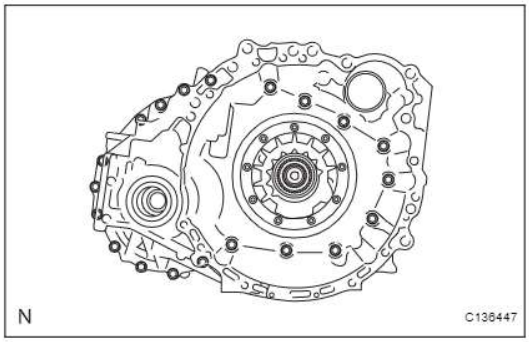
(a) Using 2 screwdrivers, remove the 2 snap rings from the direct multiple disc clutch assembly.



(b) Remove the flange, 4 clutch discs, and 4 clutch plates from the direct multiple disc clutch assembly.

21. INSPECT NO. 1 CLUTCH DISC (See page AX-275)

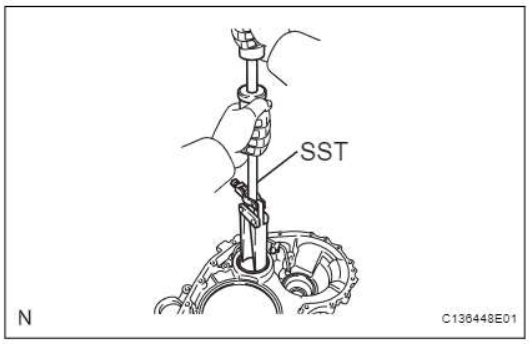
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22. REMOVE TRANSAXLE HOUSING

(a) Remove the 20 bolts from the transaxle housing.

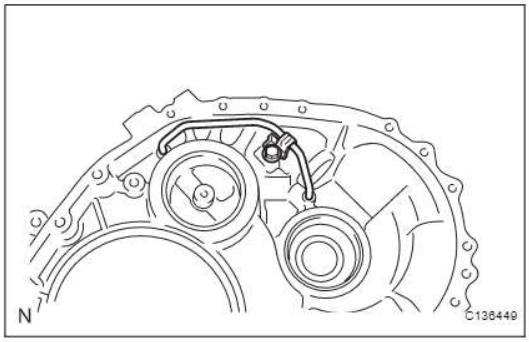
(b) Using a brass bar and hammer, tap on the circumference of the transaxle housing to remove the transaxle housing from the transaxle case.



23. REMOVE COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING OUTER RACE

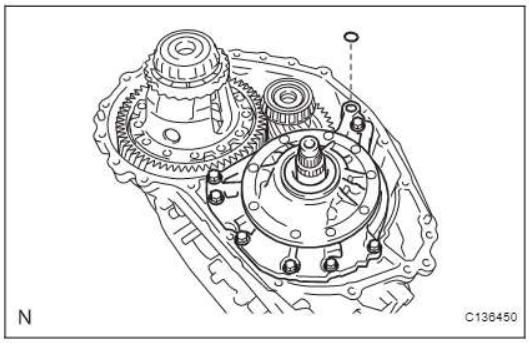
(a) Using SST, remove the counter driven gear front tapered roller bearing outer race and shim from the transaxle housing.

SST 09308-00010



24. REMOVE DIFFERENTIAL GEAR LUBE APPLY TUBE

(a) Remove the bolt, clamp, and differential gear lube apply tube from the transaxle housing.

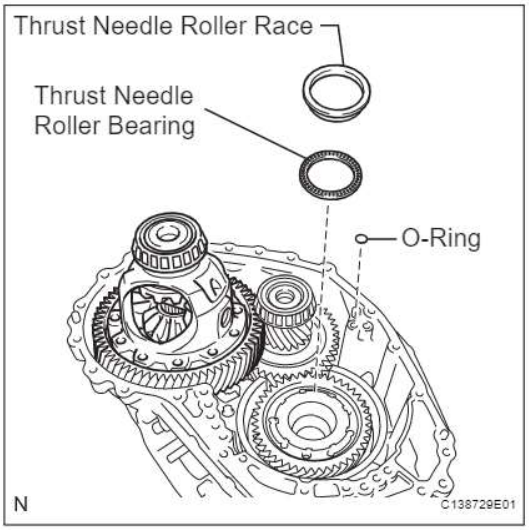


25. REMOVE FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

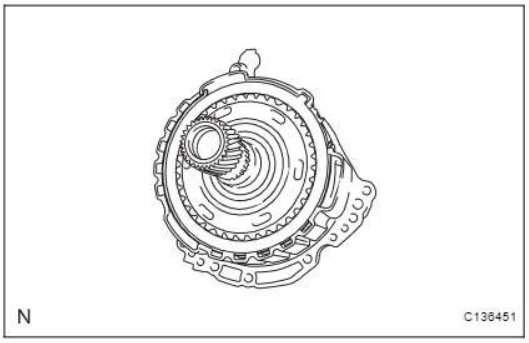
(a) Remove the 7 bolts and oil pump from the transaxle case.

(b) Remove the O-ring from the oil pump assembly.

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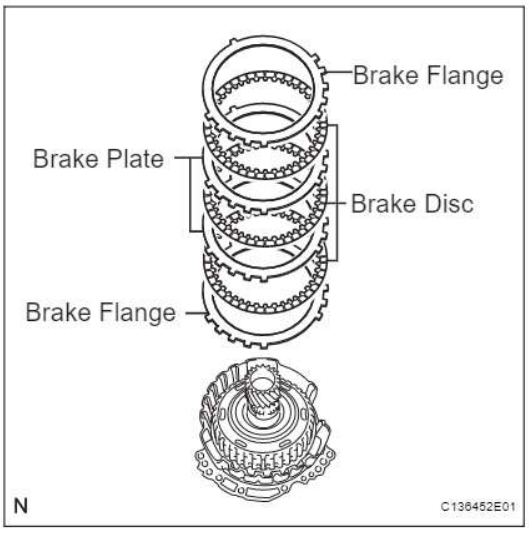


(c) Remove the thrust needle roller bearing and thrust needle roller race from the carrier lock nut.
(d) Remove the O-ring from the transaxle case.



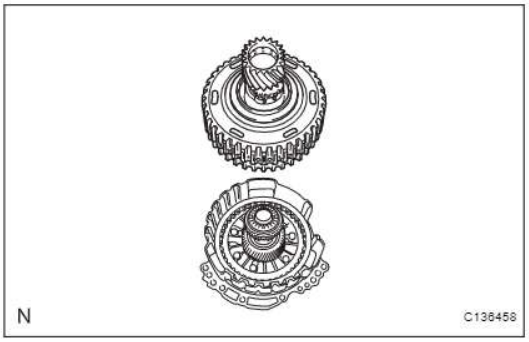
26. REMOVE NO. 3 BRAKE DISC

(a) Using a screwdriver, remove the snap ring from the oil pump assembly.



(b) Remove the 2 brake flanges, 3 brake discs, and 2 brake plates from the oil pump assembly.

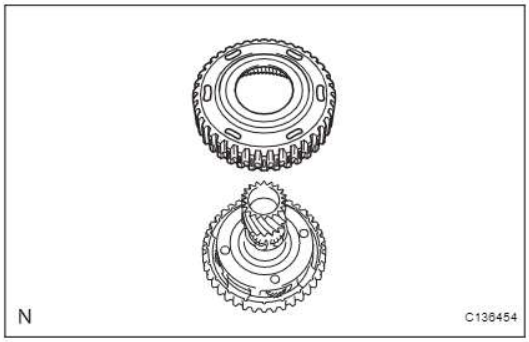
27. INSPECT NO. 3 BRAKE DISC (See page AX-275)



28. REMOVE UNDERDRIVE PLANETARY GEAR ASSEMBLY

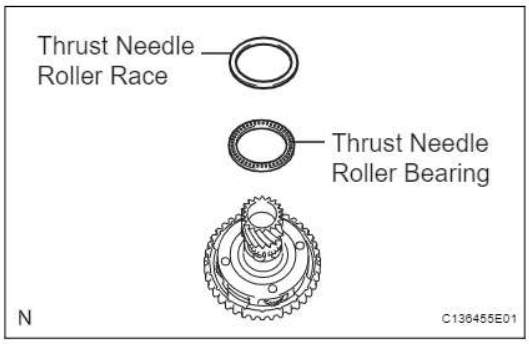
(a) Remove the underdrive planetary gear assembly from the oil pump assembly.

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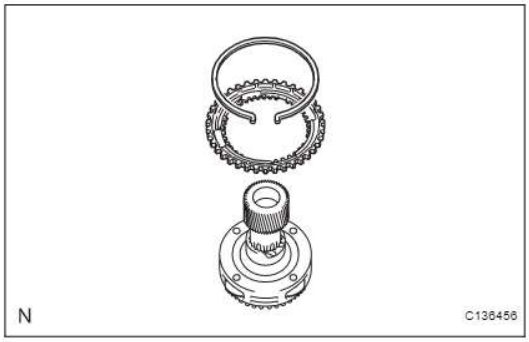


29. REMOVE NO. 3 BRAKE HUB

(a) Remove the No. 3 brake hub from the underdrive planetary gear assembly.



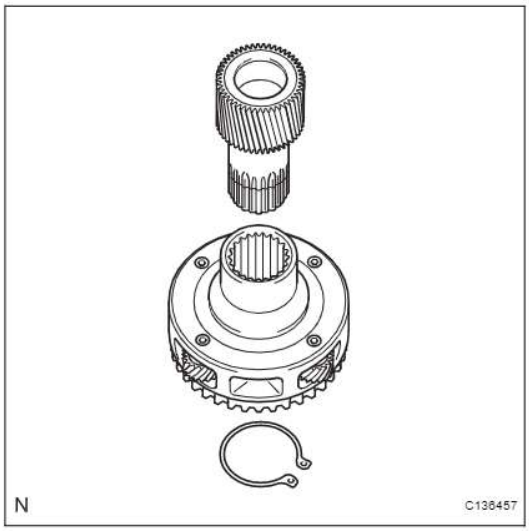
(b) Remove the thrust needle roller bearing and thrust needle roller race from the underdrive planetary gear assembly.



30. REMOVE UNDERDRIVE PLANETARY RING GEAR

(a) Using needle-nose pliers, remove the snap ring from the underdrive planetary ring gear.

(b) Remove the underdrive planetary ring gear from the underdrive planetary gear assembly.



31. REMOVE PLANETARY SUN GEAR SUB-ASSEMBLY

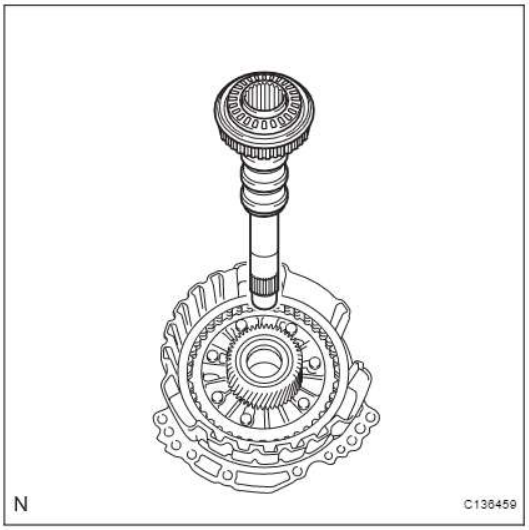
(a) While expanding the snap ring with snap ring pliers, remove the front planetary sun gear from the underdrive planetary gear assembly.

(b) Remove the snap ring from the underdrive planetary gear assembly.

32. INSPECT UNDERDRIVE PLANETARY GEAR ASSEMBLY (See page AX-276)

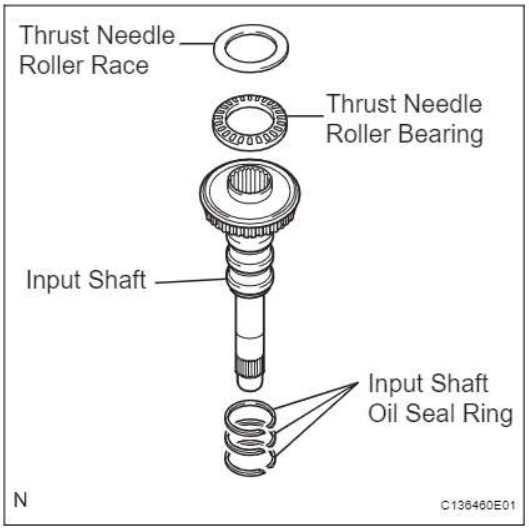
33. INSPECT PLANETARY SUN GEAR SUB-ASSEMBLY (See page AX-275)

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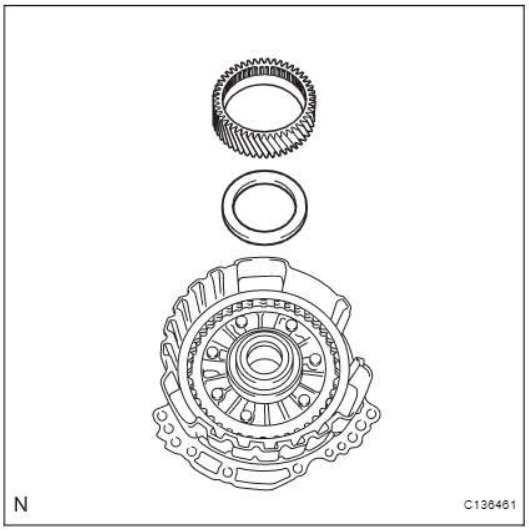
34. REMOVE INPUT SHAFT SUB-ASSEMBLY

(a) Remove the input shaft from the oil pump assembly.



(b) Remove the thrust needle roller bearing and thrust needle roller race from the input shaft.

(c) Using a screwdriver, remove the 3 input shaft oil seal rings from the input shaft.

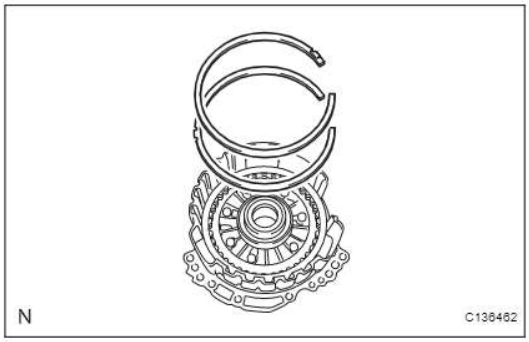


35. REMOVE UNDERDRIVE PLANETARY SUN GEAR

(a) Remove the underdrive planetary sun gear from the oil pump assembly.

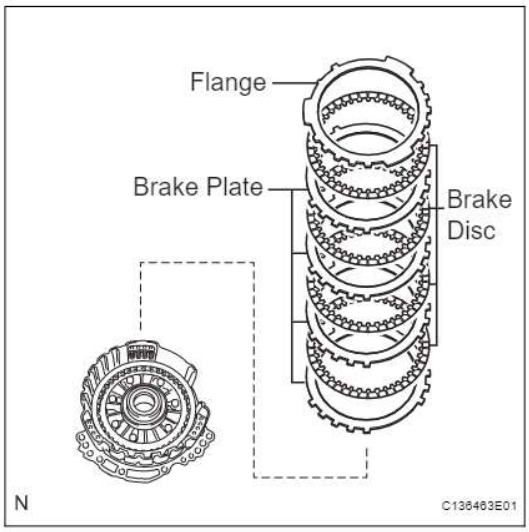
(b) Remove the thrust needle roller bearing from the oil pump assembly.

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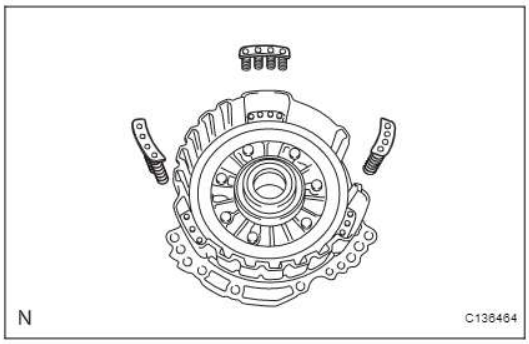
36. REMOVE NO. 1 BRAKE DISC

(a) Using a screwdriver, remove the 2 snap rings from the oil pump assembly.



(b) Remove the flange, 4 brake discs, and 4 brake plates from the oil pump assembly.

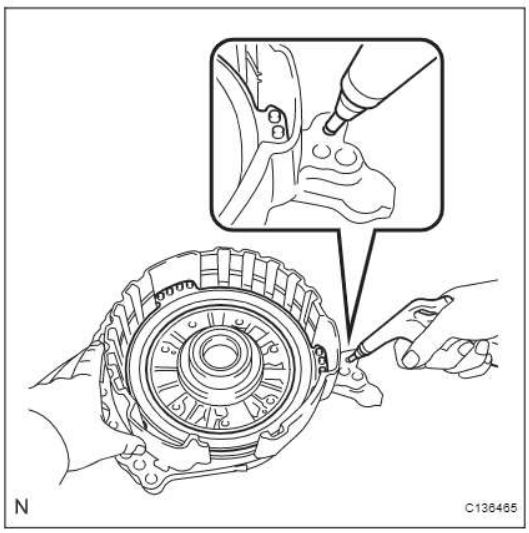
37. INSPECT NO. 1 BRAKE DISC (See page AX-276)



38. REMOVE 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

(a) Remove the 3 2nd brake piston return springs from the oil pump assembly.

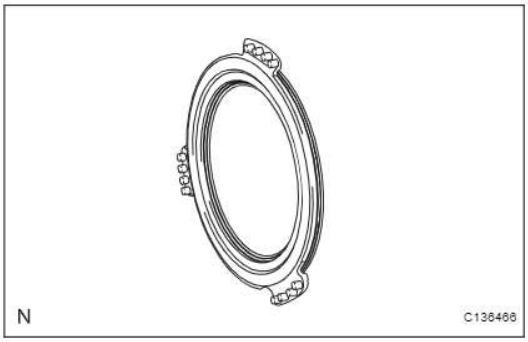
39. INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY (See page AX-277)



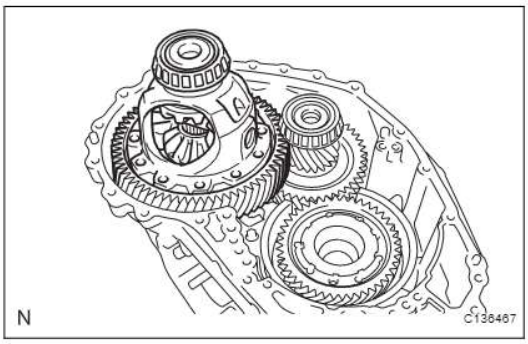
40. REMOVE NO. 1 BRAKE PISTON

(a) Holding the oil pump assembly by hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil pump assembly to remove the No. 1 brake piston.

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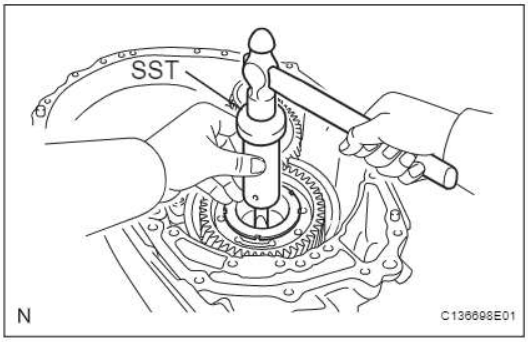


(b) Using a screwdriver, remove the 2 O-rings from the No. 1 brake piston.



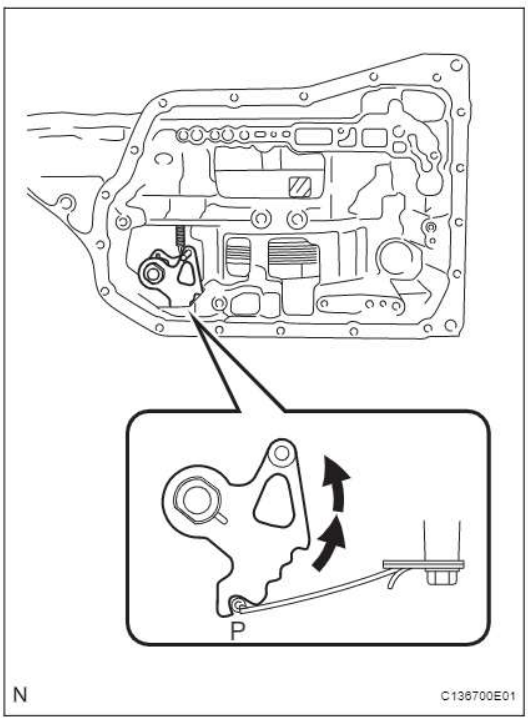
41. REMOVE FRONT DIFFERENTIAL CASE

(a) Remove the differential case sub-assembly from the transaxle case.



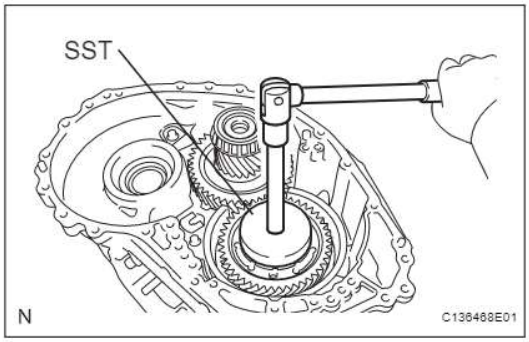
42. REMOVE COUNTER DRIVE GEAR NUT

(a) Using a SST and hammer, unstake the nut.
SST 09930-00010

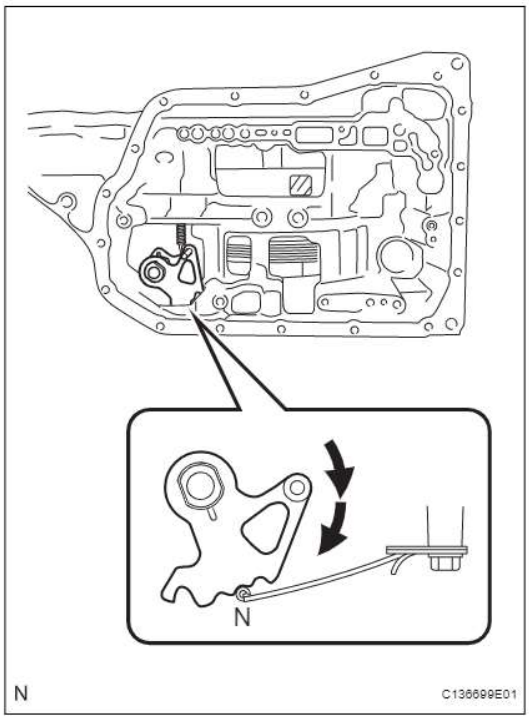


(b) Turn the manual valve lever 2 notches counterclockwise to set it in the P position as shown in the illustration.

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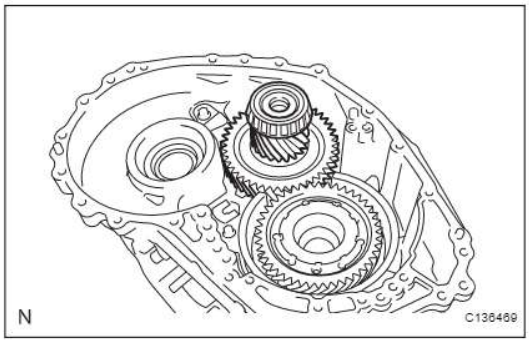


(c) Using SST, remove the nut from the planetary gear assembly.
SST 09387-00130

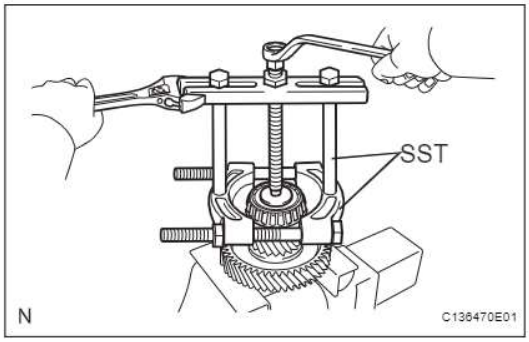


43. REMOVE COUNTER DRIVEN GEAR

(a) Turn the manual valve lever 2 notches clockwise to set it in the N position as shown in the illustration.



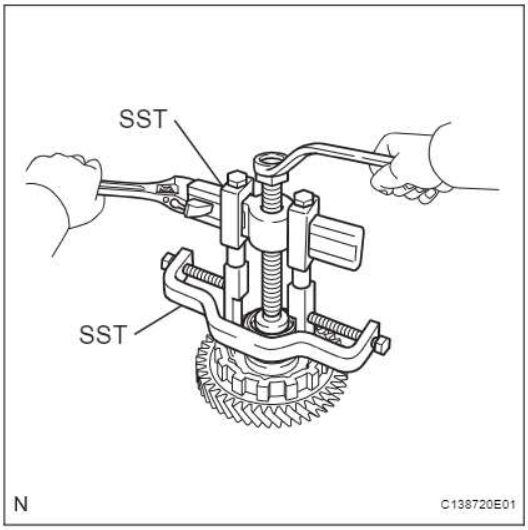
(b) Remove the counter driven gear sub-assembly from the transaxle case.



44. REMOVE COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING

(a) Using SST, remove the counter driven gear front tapered roller bearing from the counter driven gear sub-assembly.
SST 09950-00020, 09950-00030, 09950-60010 (09951-00400)

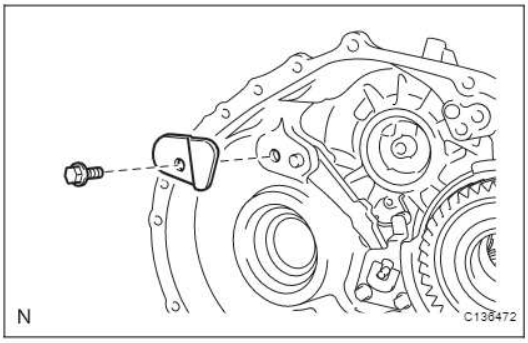
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45. REMOVE COUNTER DRIVEN GEAR REAR TAPERED ROLLER BEARING

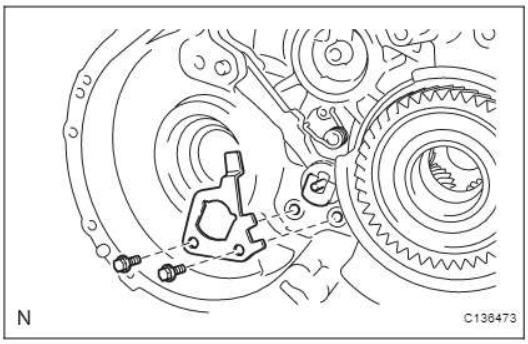
(a) Using SST, remove the counter driven gear rear tapered roller bearing and differential drive pinion from the counter driven gear.

SST 09950-40011 (09951-04010, 09952-04010, 09954-04010, 09953-04020, 09955-04071, 09957-04010, 09958-04011), 09950-60010 (09951-00320)



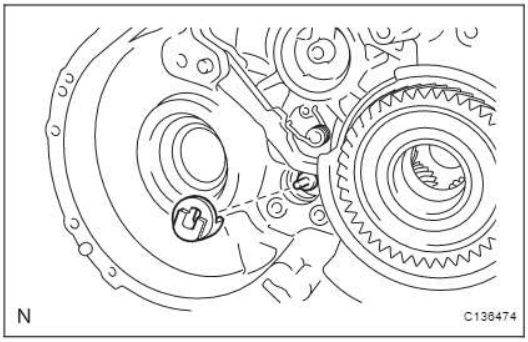
46. REMOVE PAWL SHAFT CLAMP

(a) Remove the bolt and pawl shaft clamp from the transaxle case.



47. REMOVE PAWL STOPPER PLATE

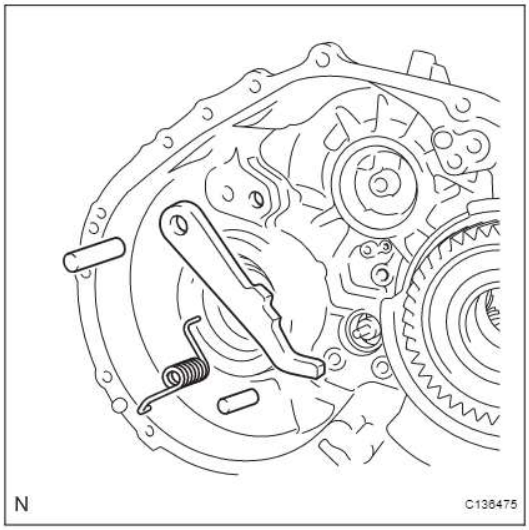
(a) Remove the 2 bolts and pawl stopper plate from the transaxle case.



48. REMOVE PARKING LOCK SLEEVE

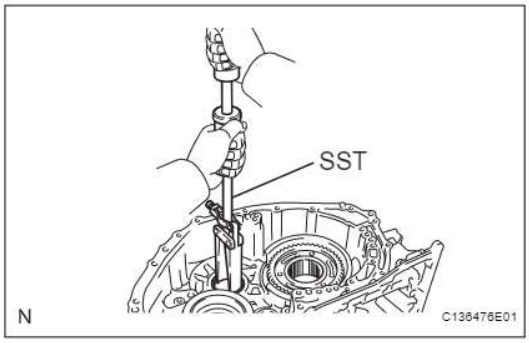
(a) Remove the parking lock sleeve from the transaxle case.

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49. REMOVE PARKING LOCK PAWL

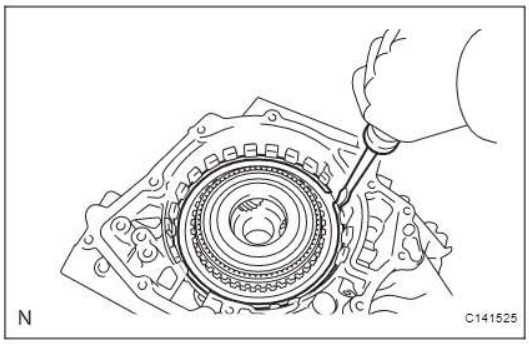
(a) Remove the spring, parking lock pawl pin, parking lock pawl shaft, and parking lock pawl from the transaxle case.



50. REMOVE COUNTER DRIVEN GEAR REAR TAPERED ROLLER BEARING OUTER RACE

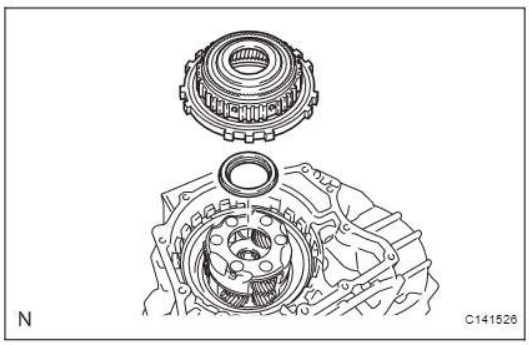
(a) Using SST, remove the counter driven gear rear tapered roller bearing outer race from the transaxle case.

SST 09308-00010



51. REMOVE ONE-WAY CLUTCH ASSEMBLY

(a) Using a screwdriver, remove the snap ring from the transaxle case.

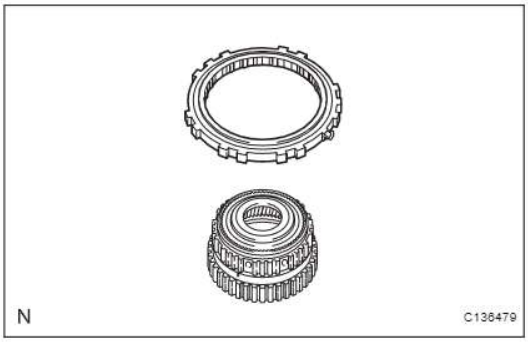


(b) Remove the one-way clutch assembly with planetary ring gear from the transaxle case.

(c) Remove the thrust needle roller bearing from the transaxle case.

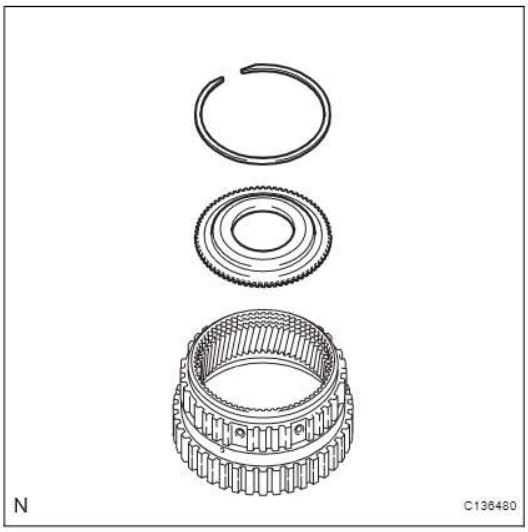
52. INSPECT ONE-WAY CLUTCH ASSEMBLY (See page AX-277)

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53. REMOVE PLANETARY RING GEAR

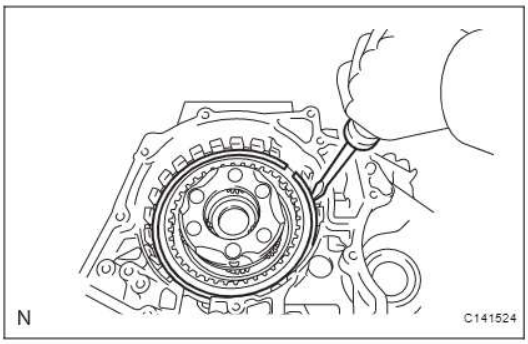
(a) Remove the planetary ring gear from the one-way clutch assembly.



54. REMOVE PLANETARY RING GEAR FLANGE

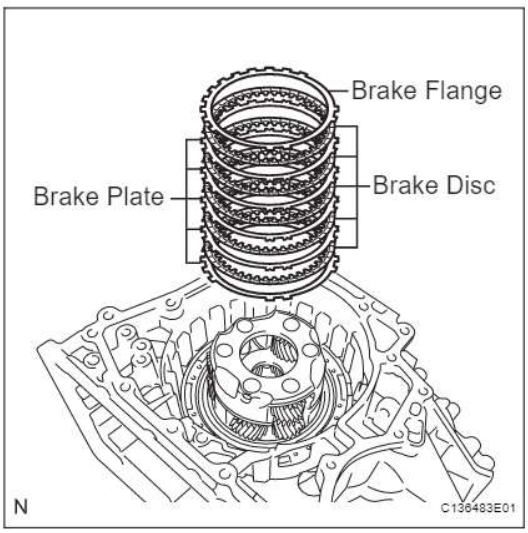
(a) Using a screwdriver, remove the snap ring from the planetary ring gear.

(b) Remove the planetary ring gear flange from the planetary ring gear.



55. REMOVE NO. 2 BRAKE DISC

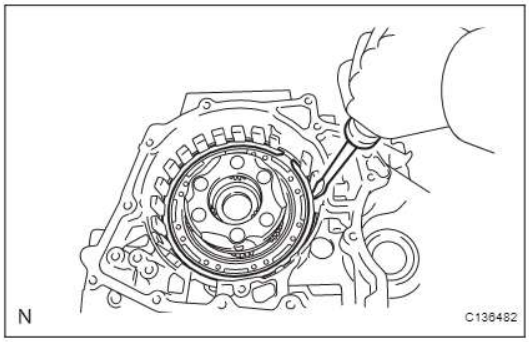
(a) Using a screwdriver, remove the snap ring from the transaxle case.



(b) Remove the brake flange, 5 brake discs, and 5 brake plates from the transaxle case.

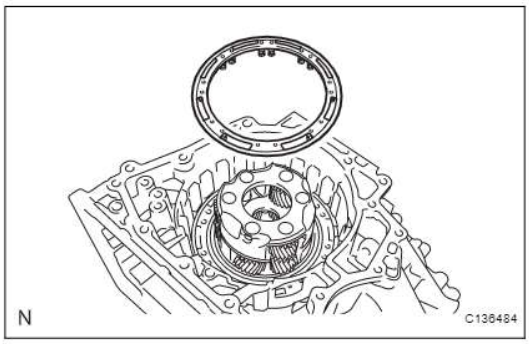
56. INSPECT NO. 2 BRAKE DISC (See page AX-277)

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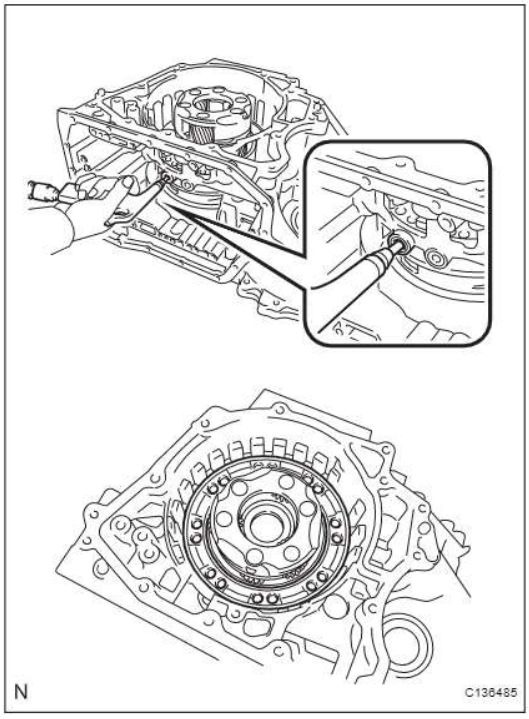
57. REMOVE 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using a screwdriver, remove the snap ring from the transaxle case.



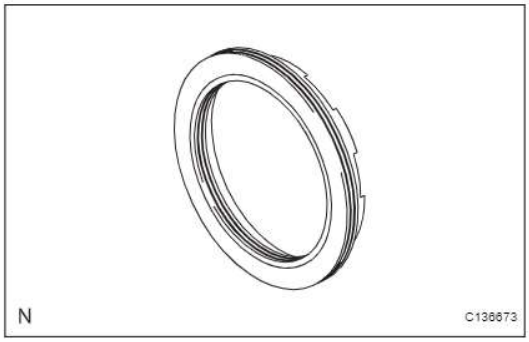
(b) Remove the 1st and reverse brake return spring from the transaxle case.

58. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY (See page AX-278)



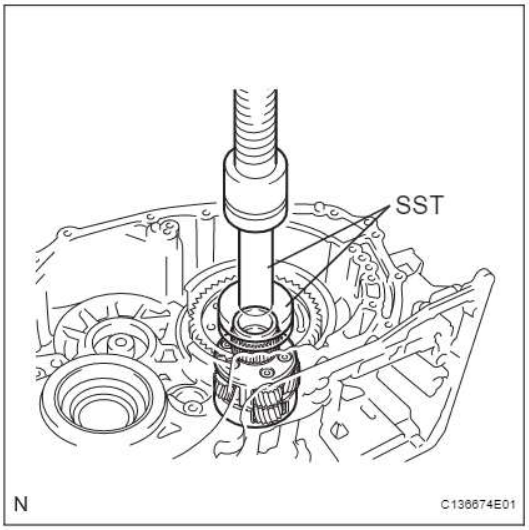
59. REMOVE NO. 2 BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the ATF hole indicated by the arrow to remove the No. 2 brake piston assembly from the transaxle case.



(b) Using a screwdriver, remove the 2 O-rings from the No. 2 brake piston.

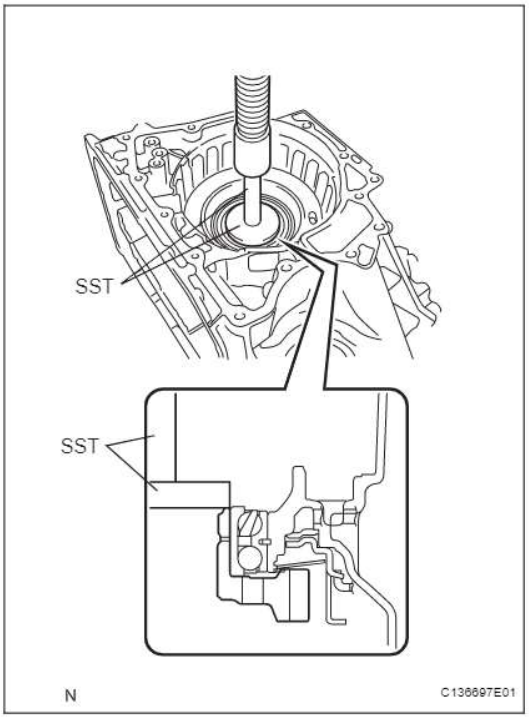
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60. REMOVE PLANETARY GEAR ASSEMBLY

(a) Using SST and a press, remove the planetary gear assembly from the transaxle case.

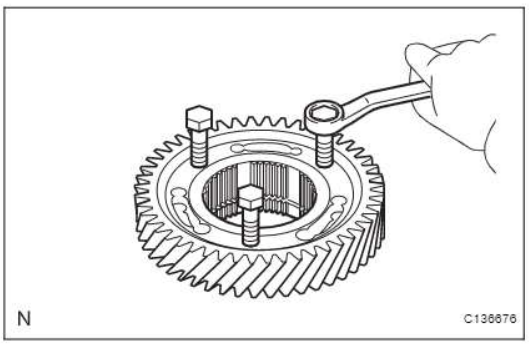
SST 09950-60010 (09951-00580), 09950-70010 (09951-07100)



61. REMOVE COUNTER DRIVE GEAR

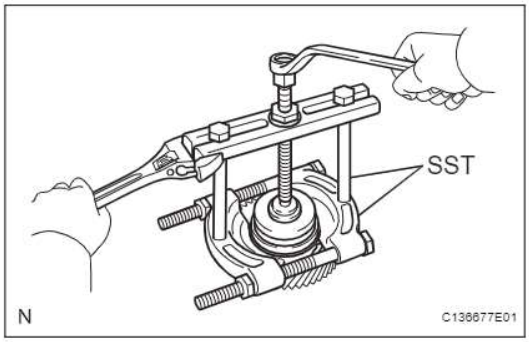
(a) Using SST and a press, remove the counter drive gear and bearing inner race (rear side) from the transaxle case.

SST 09950-60020 (09951-00710), 09950-70010 (09951-07100)

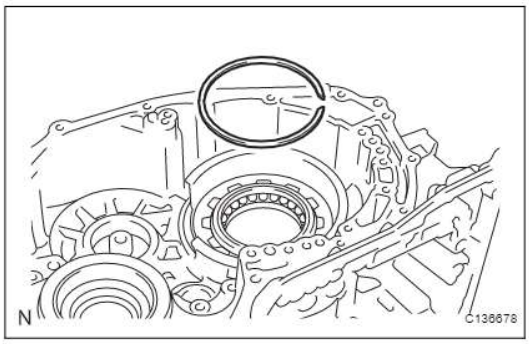


(b) As shown in the illustration, tighten the 3 bolts evenly and leave a clearance of approximately 20.0 mm (0.797 in.) between the counter drive gear and inner race.

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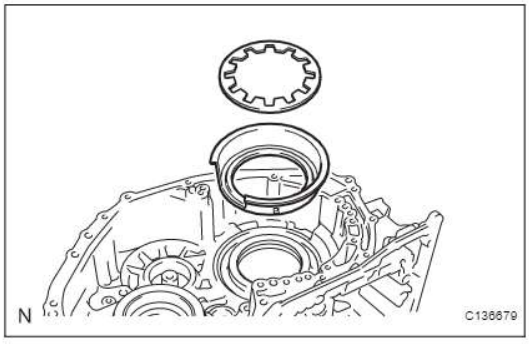


(c) Using SST, remove the bearing inner race (front side) from the counter drive gear.
SST 09950-00020, 09950-00030, 09950-60020 (09951-00710)



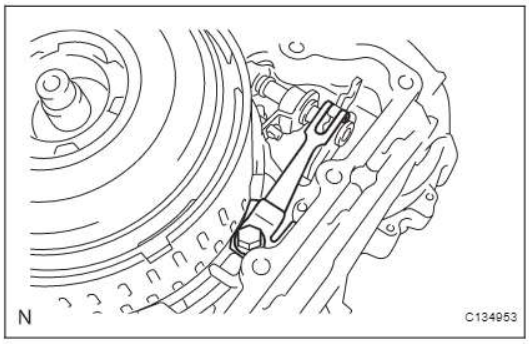
62. REMOVE NO. 3 BRAKE PISTON

(a) Using a screwdriver, remove the snap ring from the transaxle case.



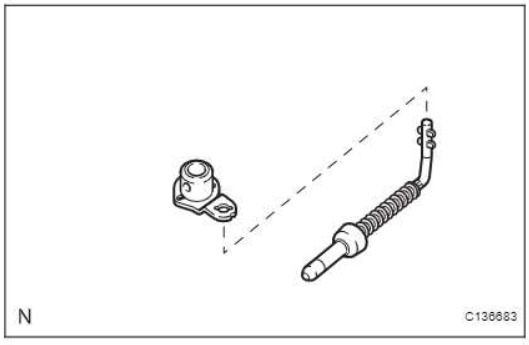
(b) Remove the brake piston return spring from the transaxle case.

(c) Remove the No. 3 brake piston from the transaxle case.



63. REMOVE MANUAL DETENT SPRING SUB-ASSEMBLY

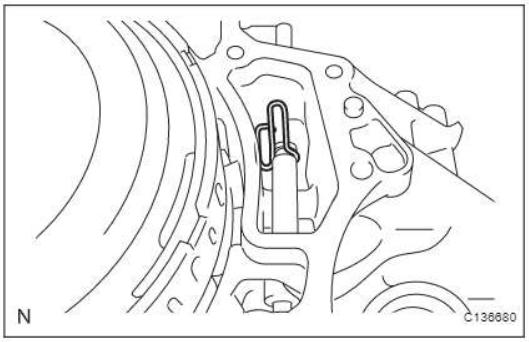
(a) Remove the bolt, cover, and manual detent spring sub-assembly from the transaxle case.



64. REMOVE PARKING LOCK ROD SUB-ASSEMBLY

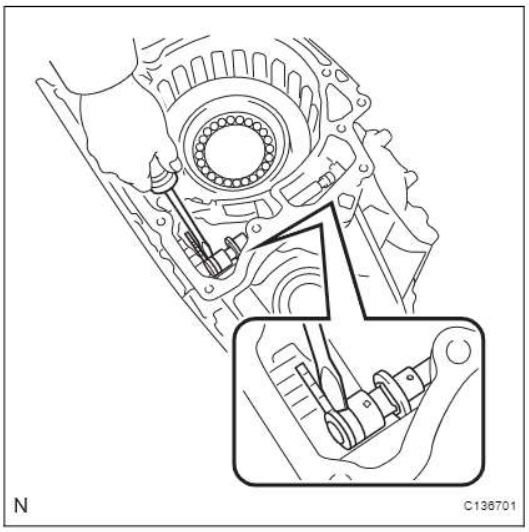
(a) Remove the parking lock rod sub-assembly from the parking lock lever sub-assembly.
HINT:
Align the dial with the notches on the parking lock lever sub-assembly to remove the parking lock rod sub-assembly.

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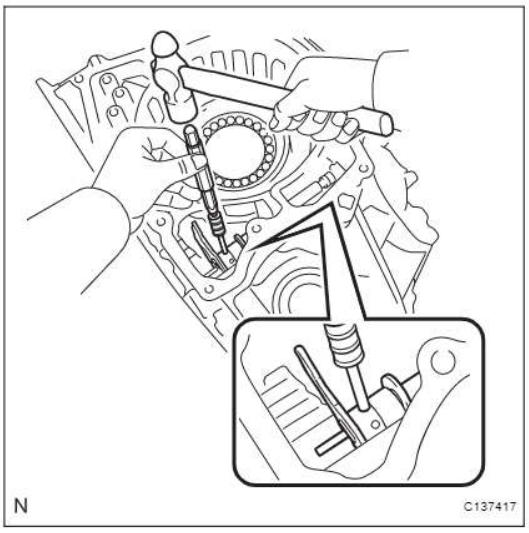


65. REMOVE MANUAL VALVE LEVER SHAFT

(a) Using needle-nose pliers, remove the manual valve lever shaft retainer spring from the transaxle case.

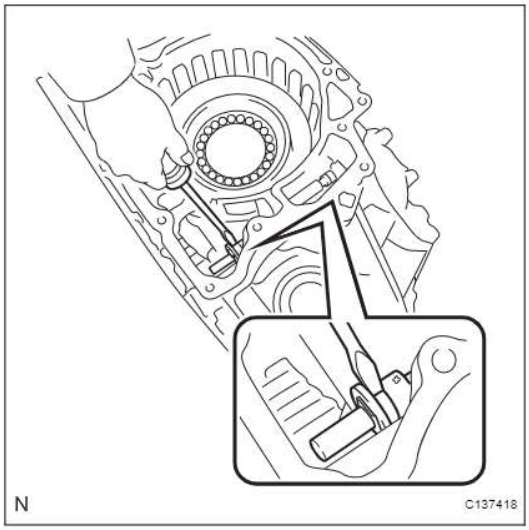


(b) Using a screwdriver, slide the spacer of the manual valve lever sub-assembly.

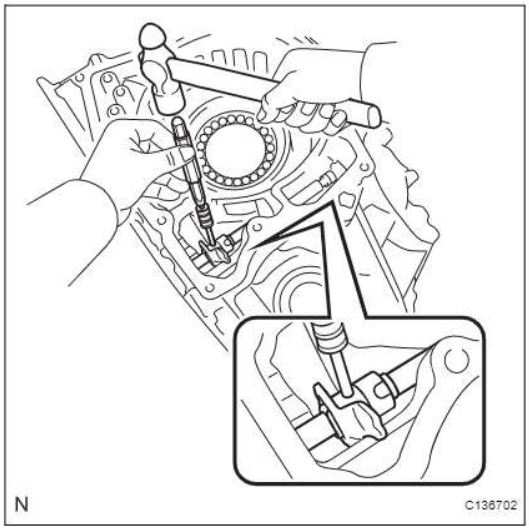


(c) Using a pin punch (3 mm) and hammer, drive out the slotted spring pin from the manual valve lever sub-assembly.
HINT:
Slowly drive out the pin so that it will not fall into the transaxle case.

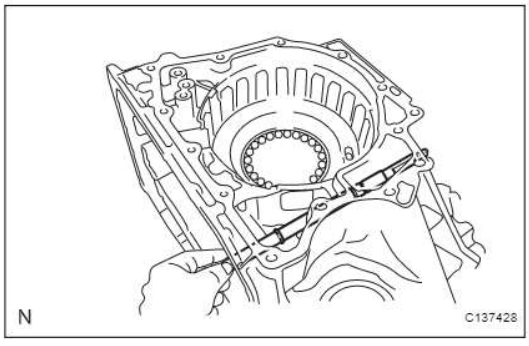
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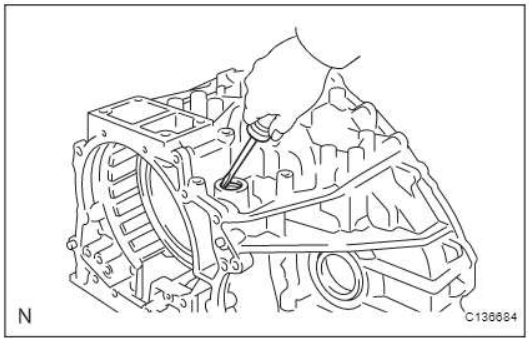
(d) Using a screwdriver, slide the spacer of the parking lock lever sub-assembly.



(e) Using a pin punch (3 mm) and hammer, drive out the slotted spring pin from the parking lock lever sub-assembly.
HINT:
Slowly drive out the pin so that it will not fall into the transaxle case.



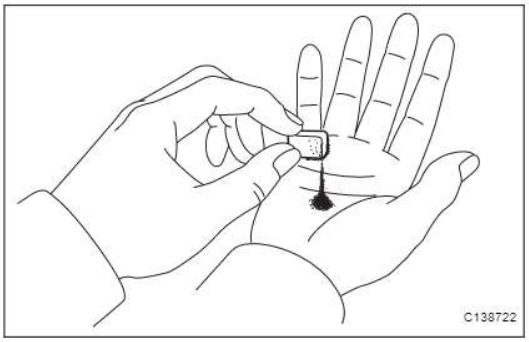
(f) Remove the manual valve lever shaft, manual valve lever sub-assembly, parking lock lever sub-assembly and 2 spacers from the transaxle case.



66. REMOVE MANUAL VALVE LEVER SHAFT OIL SEAL

(a) Using a screwdriver, remove the manual valve lever shaft oil seal from the transaxle case.

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INSPECTION

1. INSPECT TRANSMISSION OIL CLEANER MAGNET

(a) Use the removed magnets to collect any steel chips. Examine the chips and particles in the pan and on the magnets to determine what type of wear has occurred in the transaxle:

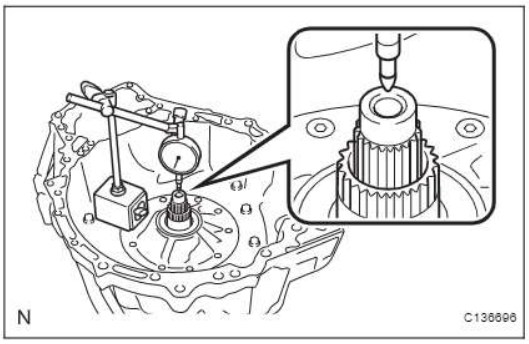
Result:

Steel (magnetic):

Bearing, gear and plate wear

Brass (non-magnetic):

Bearing wear

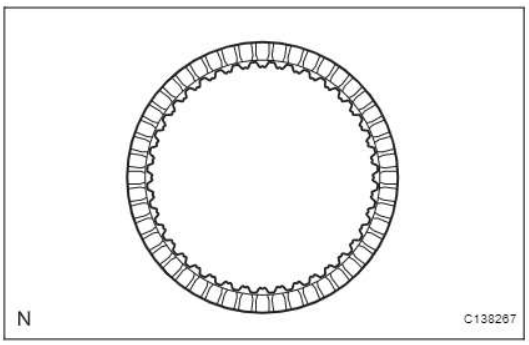


2. INSPECT INPUT SHAFT SUB-ASSEMBLY

(a) Using a dial indicator, measure the input shaft end play.

End play:

0.012 to 1.250 mm (0.0005 to 0.0492 in.)



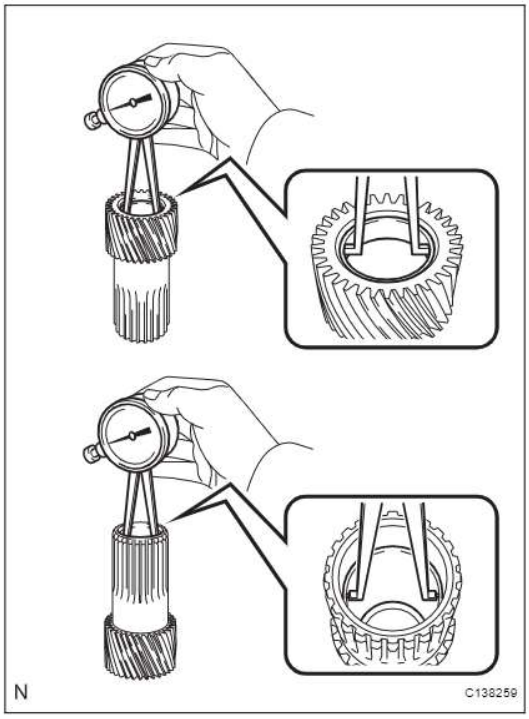
3. INSPECT NO. 2 CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:

If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.

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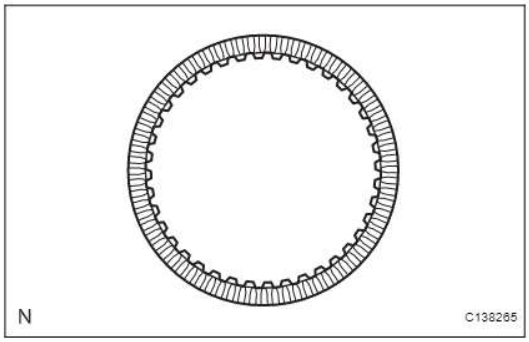
4. INSPECT PLANETARY SUN GEAR SUB-ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the bushings of the planetary sun gear.

Standard inside diameter:
25.525 to 25.546 mm (1.0049 to 1.0057 in.)

Maximum inside diameter:
25.546 mm (1.0057 in.)

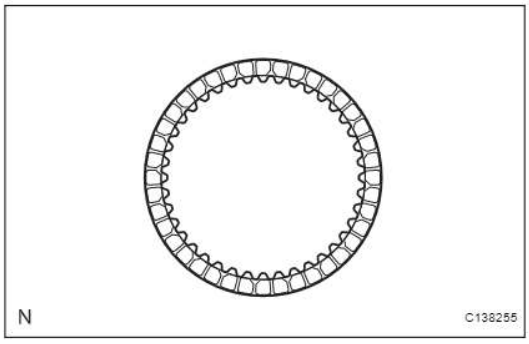
If the inside diameter is greater than the maximum, replace the planetary gear sun gear.



5. INSPECT NO. 1 CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:
If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.

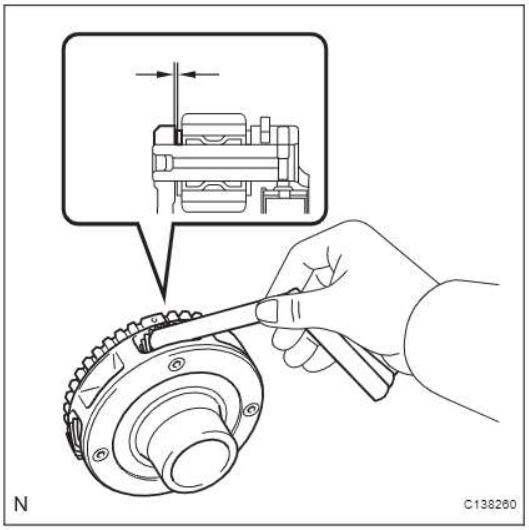


6. INSPECT NO. 3 BRAKE DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:
If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.

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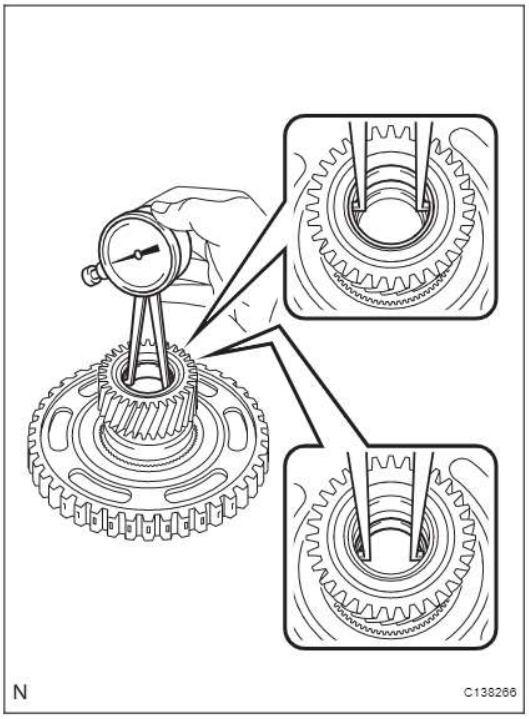
7. INSPECT UNDERDRIVE PLANETARY GEAR ASSEMBLY

(a) Using a feeler gauge, measure the clearance between the underdrive planetary gear and the pinion gear at 4 points.

Standard clearance:

0.18 to 0.54 mm (0.0071 to 0.0213 in.)

If the clearance is greater than the standard clearance, replace the underdrive planetary gear sun gear.



8. INSPECT REAR PLANETARY SUN GEAR ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the bushing of the rear planetary sun gear sub-assembly.

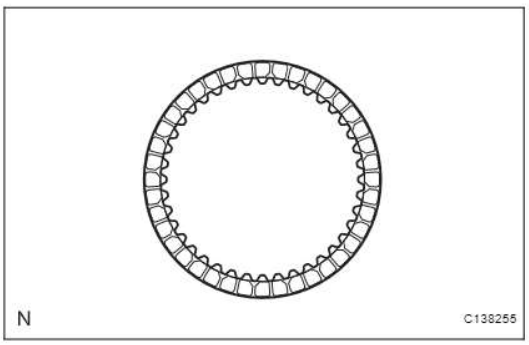
Standard inside diameter:

25.580 to 25.601 mm (1.0071 to 1.0079 in.)

Maximum inside diameter:

25.601 mm (1.0079 in.)

If the inside diameter is greater than the maximum, replace the rear planetary sun gear sub-assembly.



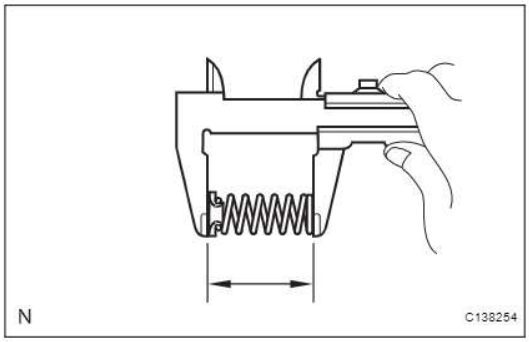
9. INSPECT NO. 1 BRAKE DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:

If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.

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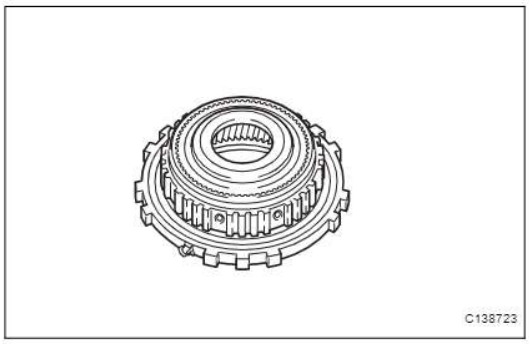


10. INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the 3 2nd brake piston return springs including the spring seats.

Standard free length:
23.85 mm (0.9390 in.)

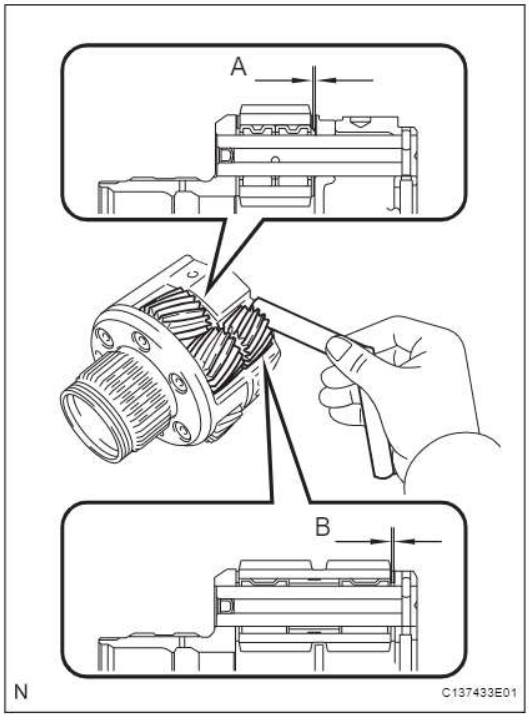
If the free length is shorter than the standard free length, replace the 2nd brake piston return spring.



11. INSPECT ONE-WAY CLUTCH ASSEMBLY

(a) Temporarily install the one-way clutch assembly to the planetary ring gear.

(b) Rotate the one-way clutch assembly to check the rotating direction for lock or free operation.
If the one-way clutch assembly does not operate normally, replace it.

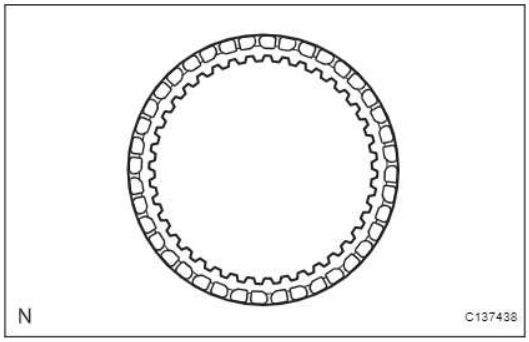


12. INSPECT PLANETARY GEAR ASSEMBLY

(a) Using a feeler gauge, measure the clearance between the planetary gear case and each pinion gear at points A and B.

-	Standard Clearance
A point	0.23 to 0.59 mm (0.0091 to 0.0232 in.)
B point	0.16 to 0.66 mm (0.0063 to 0.02598 in.)

If the clearance is greater than the standard clearance, replace the planetary gear assembly.

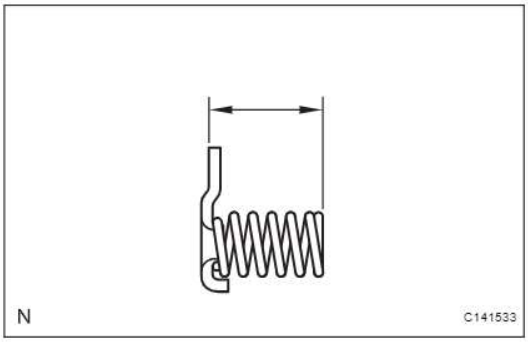


13. INSPECT NO. 2 BRAKE DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:
If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.

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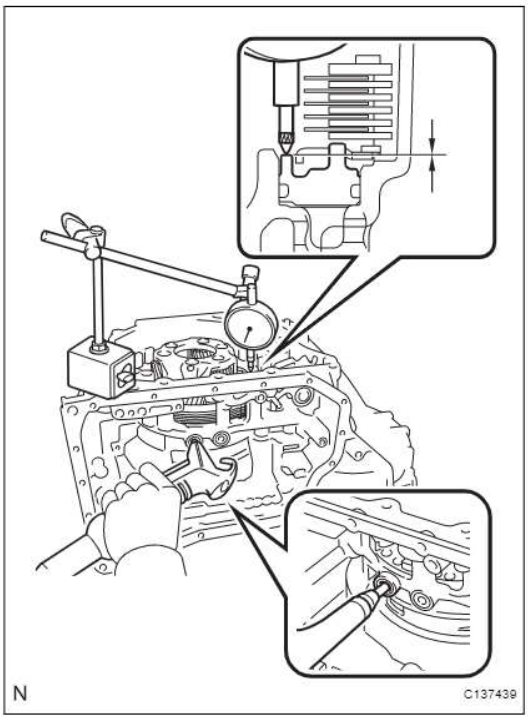
14. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the 1st and reverse brake return spring together with the spring seat.

Standard free length:

15.79 mm (0.6217 in.)

If the free length is shorter than the standard free length, replace the 1st and reverse brake return spring.



15. INSPECT CLEARANCE OF NO. 2 BRAKE

(a) Using a dial indicator, measure the clearance of the No. 2 brake while applying compressed air (200 kPa, 2.0 kgf/cm^2, 29 psi).

Standard clearance:

0.884 to 1.196 mm (0.0348 to 0.0471 in.)

HINT:

Measure the clearance at 3 points where the brake piston diameter is approximately 140 mm (5.51 in.) and calculate the average.

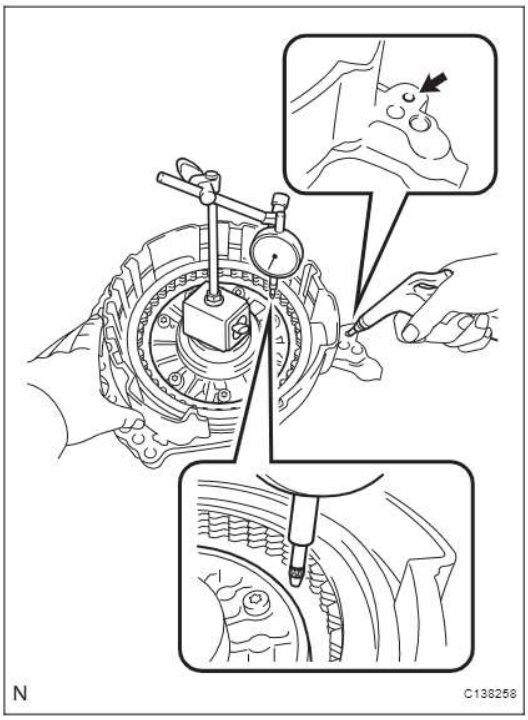
If the clearance is not as specified, select an appropriate No. 2 brake flange so that the clearance will be within the specified range.

HINT:

There are 5 different thicknesses of flanges available.

No. 2 brake flange thickness: mm (in.)

Thickness	Thickness
4.0 (0.157)	4.3 (0.169)
4.1 (0.161)	4.4 (0.173)
4.2 (0.165)	-



16. INSPECT CLEARANCE OF NO. 1 BRAKE

(a) Using a dial indicator, measure the clearance of the No. 1 brake while applying compressed air (200 kPa, 2.0 kgf/cm^2, 29 psi).

Standard clearance:

0.807 to 0.974 mm (0.0318 to 0.0383 in.)

HINT:

Measure the clearance at 3 points where the brake piston diameter is approximately 140 mm (5.51 in.) and calculate the average.

If the clearance is not as specified, select an appropriate No. 1 brake flange so that the clearance will be within the specified range.

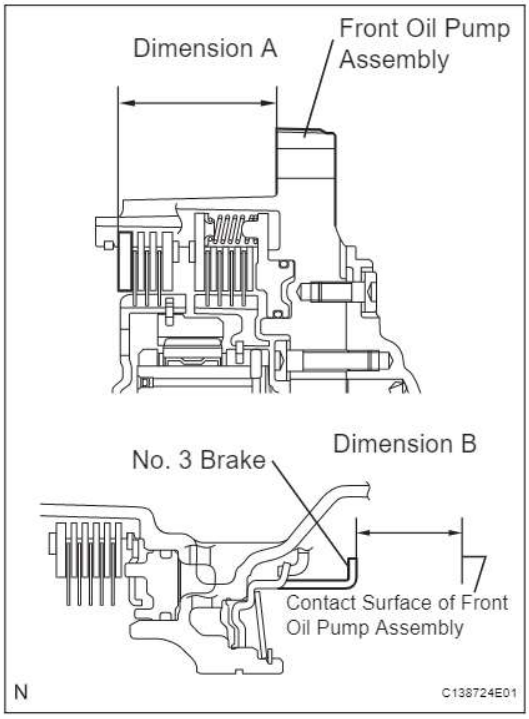
HINT:

There are 6 different thicknesses of flanges available.

No. 1 brake flange thickness: mm (in.)

Thickness	Thickness
3.0 (0.118)	3.3 (0.130)
3.1 (0.122)	3.4 (0.134)
3.2 (0.126)	3.5 (0.138)

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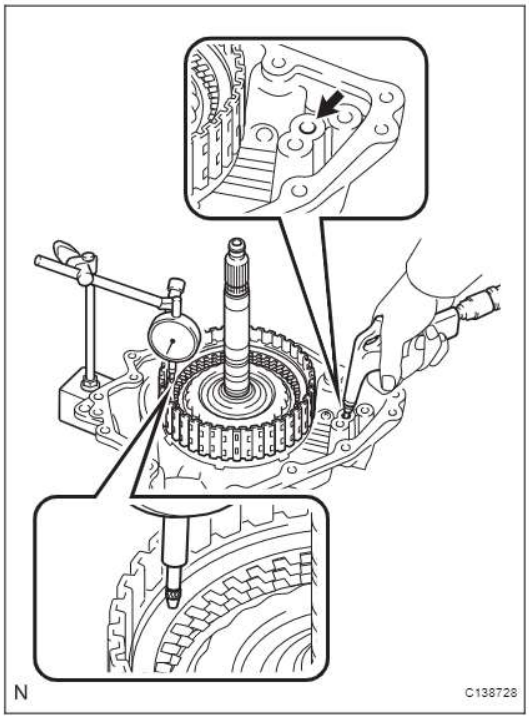
17. INSPECT CLEARANCE OF NO. 3 BRAKE

(a) Using vernier calipers and a straight edge, measure the distance shown in the illustration (Dimension A) while a load of 500 N (51 kgf, 112 lbf) is being applied to the flange.
HINT:
Measure dimension A at 3 points where the flange diameter is approximately 166 mm (6.54 in.) and calculate the average.

(b) Using vernier calipers and a straight edge, measure the distance shown in the illustration. (Dimension B).
HINT:
Measure dimension B at 3 points where the No. 3 brake diameter is approximately 166 mm (6.54 in.) and calculate the average.

(c) Calculate the clearance value using the following formula:
clearance = Dimension B - Dimension A
Standard clearance:
0.599 to 0.761 mm (0.0236 to 0.0300 in.)
If the clearance is not as specified, select an appropriate brake flange so that the clearance will be within the specified range.
HINT:
There are 6 different thicknesses of flanges available.
No. 3 brake flange thickness: mm (in.)

Thickness	Thickness
3.80 (0.150)	4.10 (0.161)
3.90 (0.154)	4.20 (0.165)
4.00 (0.157)	4.30 (0.169)



18. INSPECT CLEARANCE OF NO. 1 CLUTCH DISC

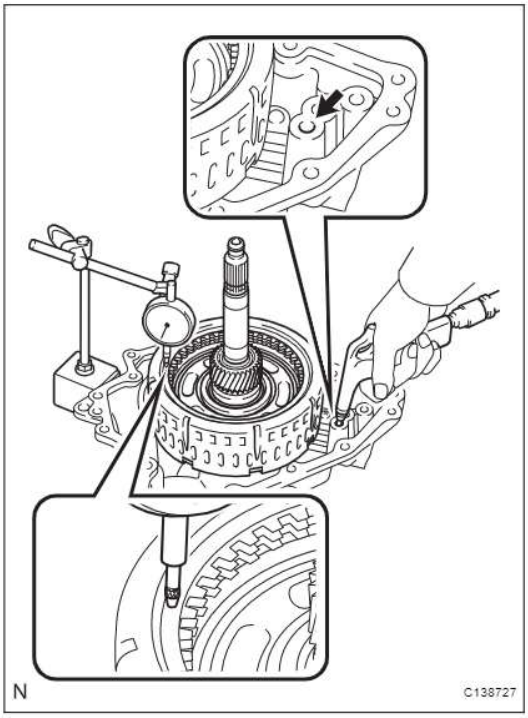
(a) Install the direct multiple disc clutch assembly onto the transaxle rear cover.

(b) Using a dial indicator, measure the No. 1 clutch pack clearance while applying and releasing compressed air (200 kPa, 2.0 kgf/cm^2, 29 psi).
HINT:
Measure the clearance at 3 points where the flange diameter is approximately 152 mm (5.98 in.) and calculate the average.
Pack clearance:
0.806 to 0.974 mm (0.0317 to 0.0383 in.)
If the pack clearance is not as specified, inspect the discs, plates and flange.
HINT:
There are 6 different thicknesses of flanges available.
No. 1 clutch flange thickness: mm (in.)

Thickness	Thickness
3.0 (0.118)	3.3 (0.130)
3.1 (0.122)	3.4 (0.134)

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Thickness	Thickness
3.2 (0.126)	3.5 (0.138)



19. INSPECT CLEARANCE OF NO. 2 CLUTCH DISC

(a) Install the direct multiple disc clutch assembly onto the transaxle rear cover.

(b) Using a dial indicator, measure the No. 2 clutch pack clearance while applying and releasing compressed air (200 kPa, 2.0 kgf/cm^2, 29 psi).

HINT:

Measure the clearance at 3 points where the diameter of the No. 2 direct multiple clutch piston is approximately 152 mm (5.98 in.) and calculate the average.

Pack clearance:

0.544 to 0.744 mm (0.0214 to 0.0293 in.)

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

HINT:

There are 6 different thicknesses of flanges available.

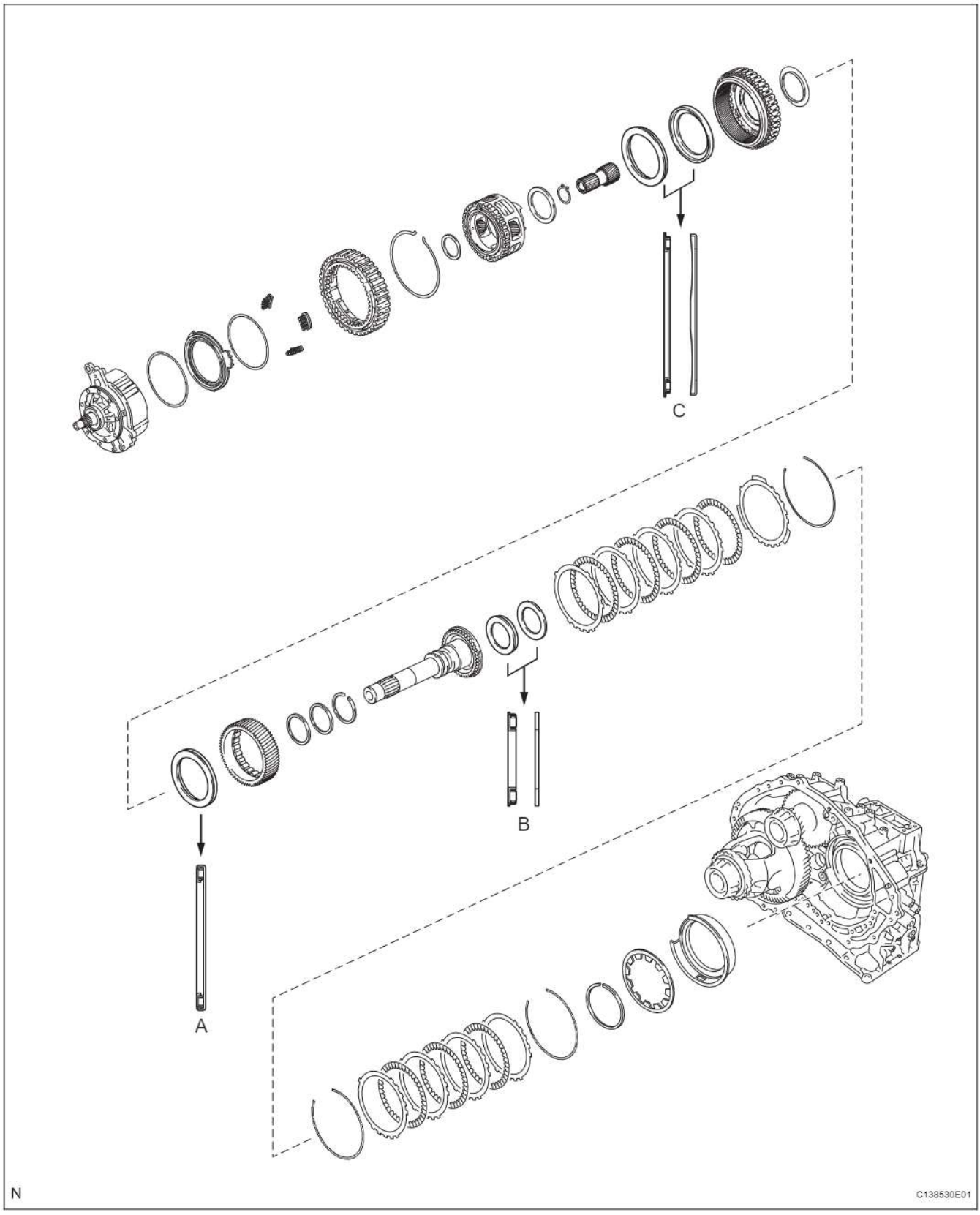
No. 2 clutch flange thickness: mm (in.)

Thickness	Thickness
3.0 (0.118)	3.3 (0.130)
3.1 (0.122)	3.4 (0.134)
3.2 (0.126)	3.5 (0.138)

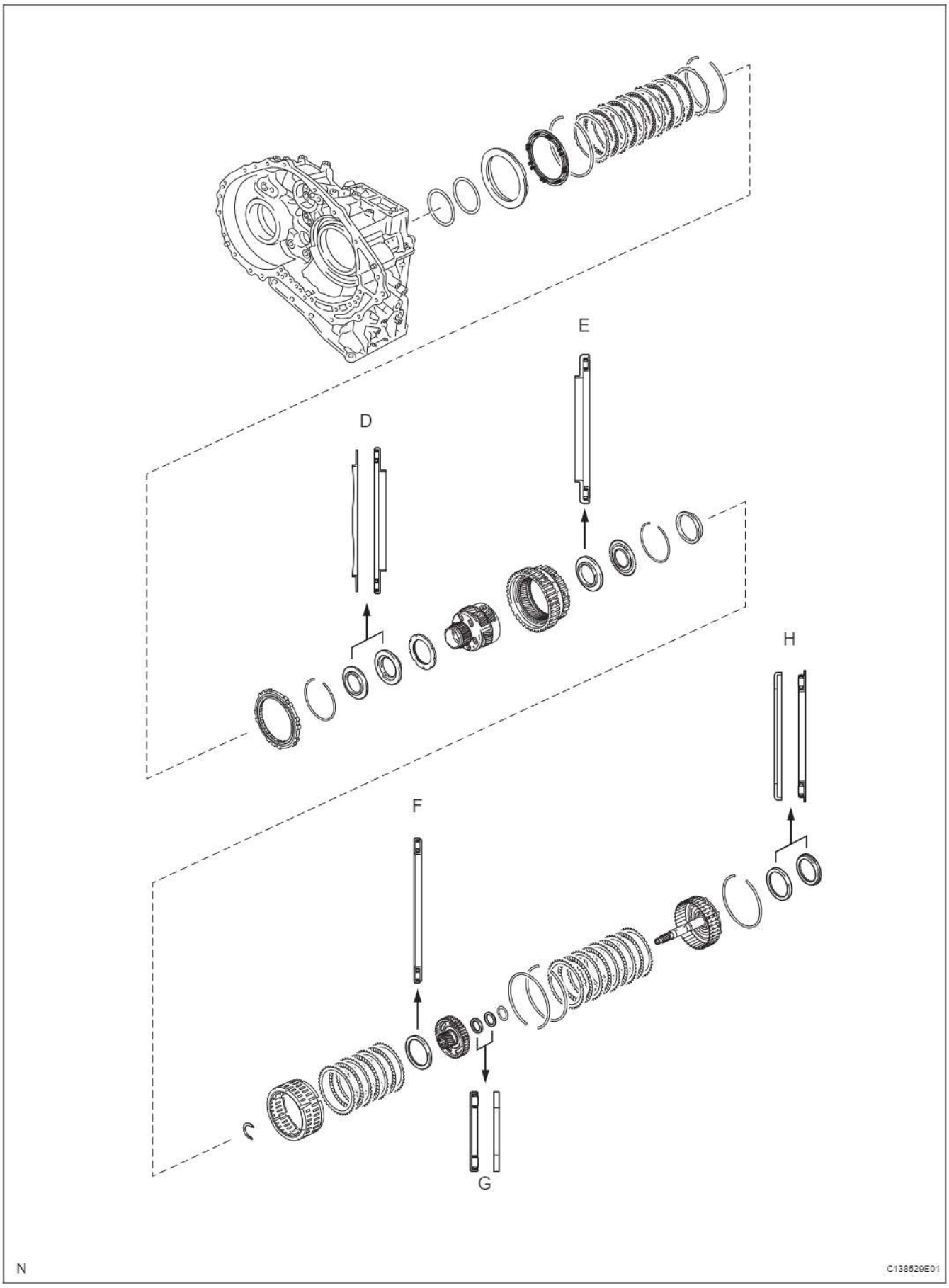
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REASSEMBLY

1. BEARING POSITION

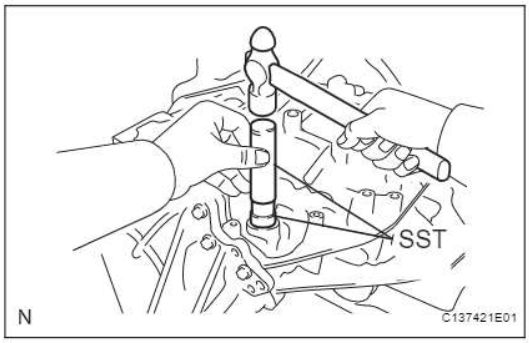


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Mark	Front Race Diameter Inside / Outside mm (in.)	Thrust Bearing Diameter Inside / Outside mm (in.)	Rear Race Diameter Inside / Outside mm (in.)
A	-	57.7 (2.271) / 75.2 (2.961)	-
B	-	29.1 (1.146) / 48.6 (1.913)	30.7 (1.209) / 48.3 (1.902)
C	65.9 (2.594) / 80.3 (3.161)	62.6 (2.465) / 82.4 (3.244)	-
D	59.4 (2.339) / 77 (3.032)	53.1 (2.091) / 79 (3.110)	-
E	-	56.1 (2.209) / 80.9 (3.185)	-
F	-	61.2 (2.409) / 79 (3.110)	-
G	-	28 (1.102) / 47.1 (1.854)	26.1 (1.028) / 44 (1.732)
H	52.2 (2.055) / 70.4 (2.772)	48.9 (1.925) / 72.0 (2.835)	-



2. INSTALL MANUAL VALVE LEVER SHAFT OIL SEAL

(a) Coat the lip of a new manual valve lever shaft oil seal with MP grease.

(b) Using SST and a hammer, install the manual valve lever shaft oil seal to the transaxle case.

SST 09950-60010 (09951-00230), 09950-70010 (09951-07100)

Oil seal installation depth:
-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

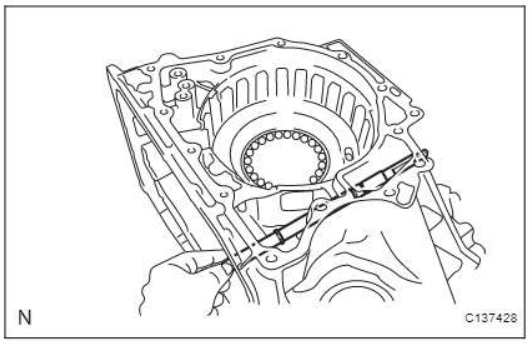
3. INSTALL MANUAL VALVE LEVER SHAFT

(a) Install a new spacer to the parking lock lever sub-assembly.

(b) Install the parking lock lever sub-assembly to the manual valve lever shaft.

(c) Install a new spacer to the manual valve lever sub-assembly.

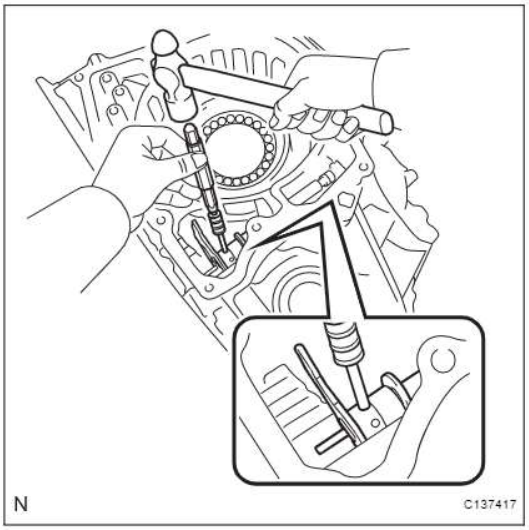
(d) Install the manual valve lever sub-assembly to the manual valve lever shaft.



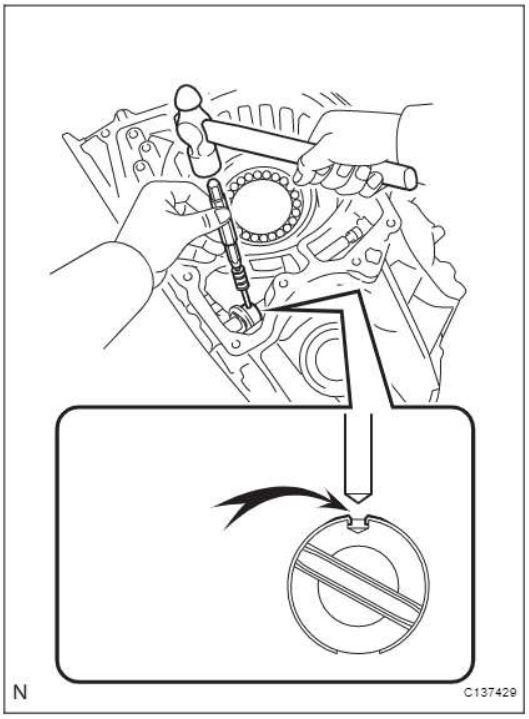
(e) Install the manual valve lever shaft to the transaxle case.

NOTICE:
Do not damage the manual valve lever shaft oil seal while installing the manual valve lever shaft to the transaxle case.

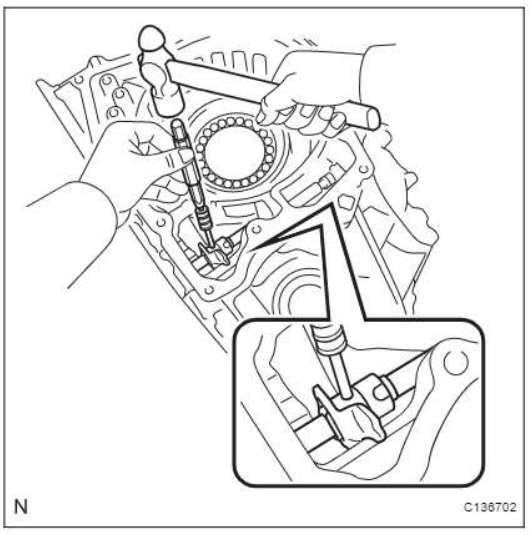
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(f) Using a pin punch (3 mm) and hammer, install a new slotted spring pin to the parking lock lever sub-assembly.

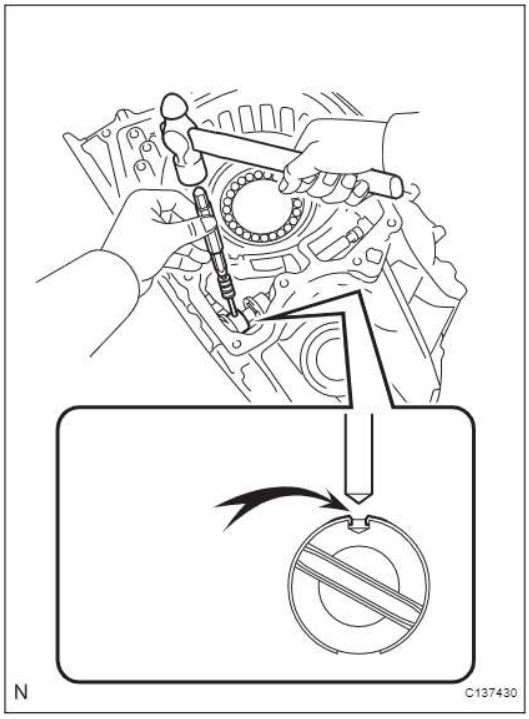


(g) Turn the spacer and the lever shaft to align the smaller hole of the spacer with the staking position mark on the lever shaft.
(h) Using a pin punch, stake the spacer through the small hole.
(i) Check that the spacer does not turn.

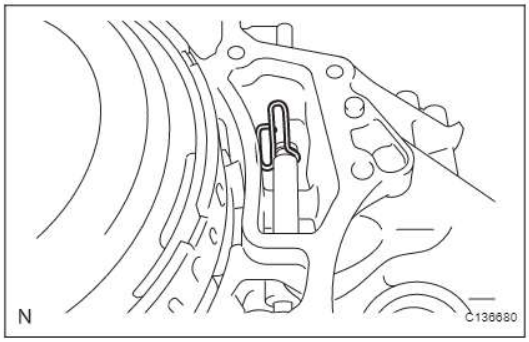


(j) Using a pin punch (3 mm) and hammer, install a new slotted spring pin to the manual valve lever sub-assembly.

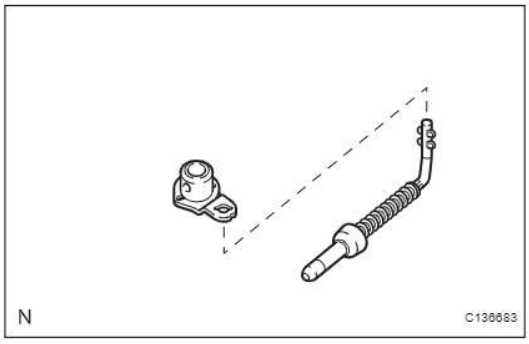
cardiagn.com



(k) Turn the spacer and the lever shaft to align the smaller hole of the spacer with the staking position mark on the lever shaft.
(l) Using a pin punch, stake the spacer through the small hole.
(m) Check that the spacer does not turn.

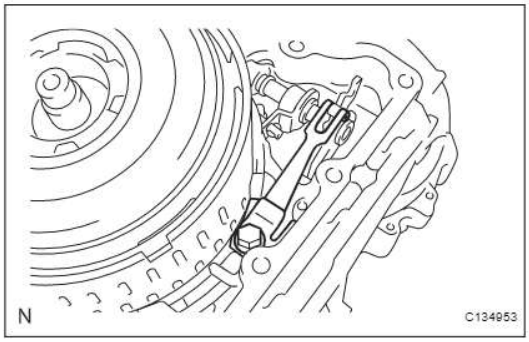


(n) Using needle-nose pliers, install the manual valve shaft retainer spring to the transaxle case.



4. INSTALL PARKING LOCK ROD SUB-ASSEMBLY

(a) Align the dial with the notches on the parking lock lever sub-assembly and install the parking lock rod sub-assembly.



5. INSTALL MANUAL DETENT SPRING SUB-ASSEMBLY

(a) Install the manual detent spring sub-assembly and cover to the transaxle case with the bolt.
Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)
NOTICE:
Make sure to install the manual detent spring first and then the cover.

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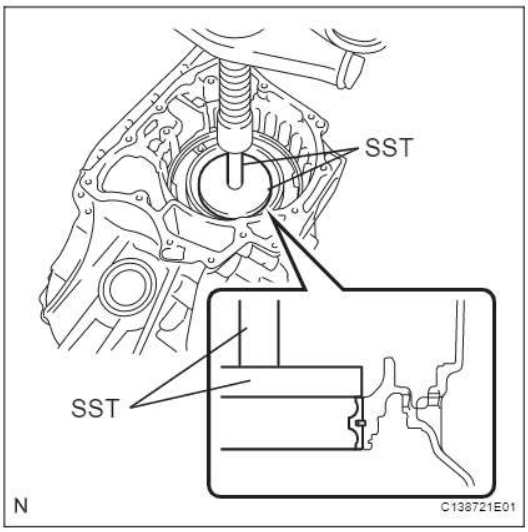
6. INSTALL COUNTER DRIVE GEAR BEARING

NOTICE:

Perform this procedure only when the counter drive gear bearing or transaxle case is replaced.

(a) Using SST and a press, install a new counter drive gear bearing and snap ring to the transaxle case.

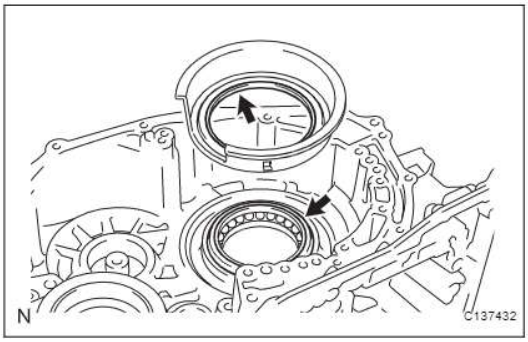
SST 09950-60020 (09951-01030), 09950-70010 (09951-07100)



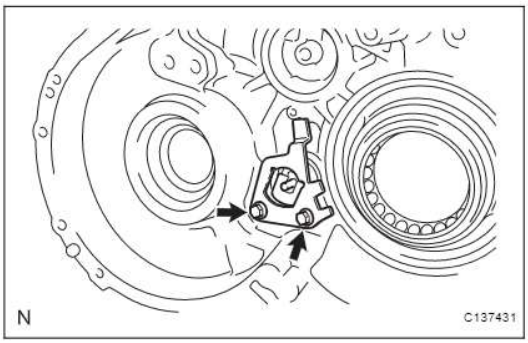
7. INSTALL NO. 3 BRAKE PISTON

(a) Coat the contact surface of the transaxle case with ATF.

(b) Coat the lip seal of the No. 3 brake piston with ATF.



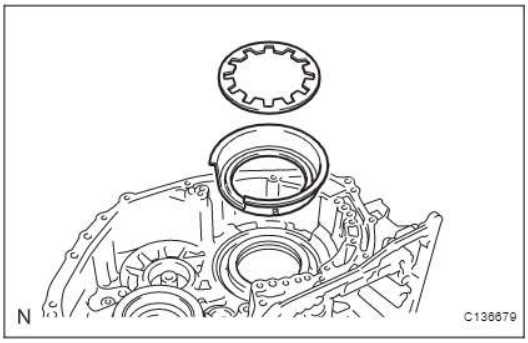
(c) Temporarily install the pawl stopper plate to the transaxle case with the 2 bolts.



(d) Press the return spring installation surface to install the No. 3 brake piston to the transaxle case.

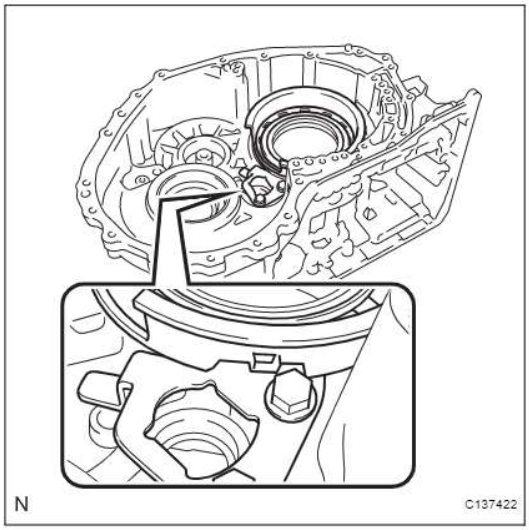
NOTICE:

- **Make sure that the lip of the No. 3 brake piston is not twisted and does not get caught in the transaxle case.**
- **After installing, make sure that the protrusions on the No. 3 brake piston and the grooves on the pawl stopper plate are aligned.**

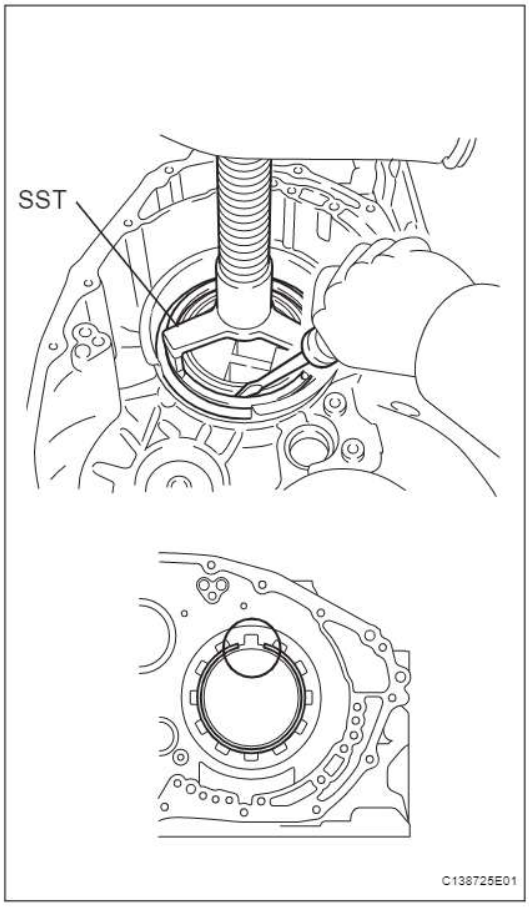


(e) Install the return spring to the transaxle case.

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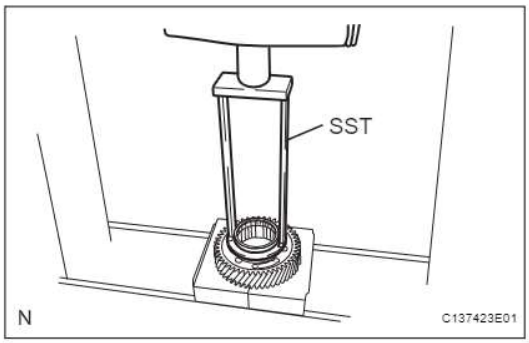


(f) Remove the 2 bolts and pawl stopper plate from the transaxle case.



(g) Place SST on the brake piston return spring and compress the brake piston return spring with a press.
SST 09387-00070
NOTICE:
Stop the press when the brake piston return spring is flush with the snap ring groove. This prevents the brake piston return spring from being deformed.

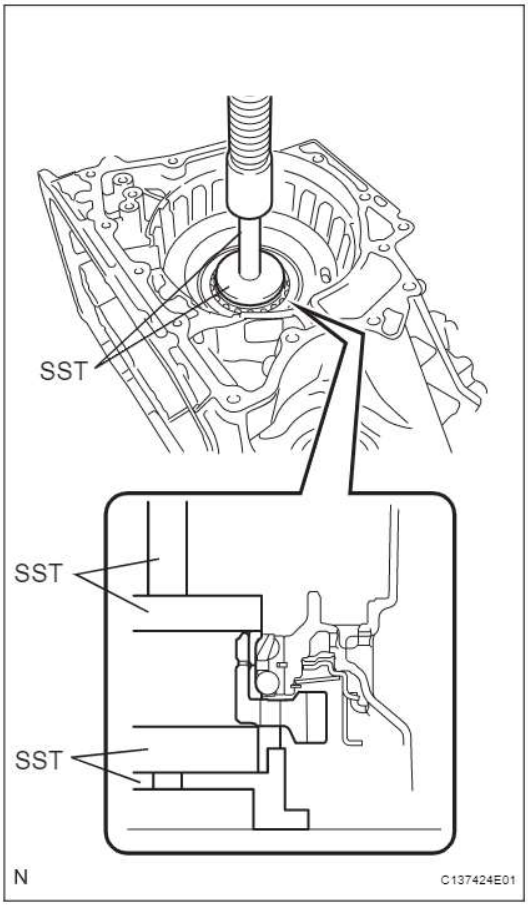
(h) Using a screwdriver, install the snap ring to the transaxle case as shown in the illustration.
NOTICE:
- **Confirm that the snap ring is secured in the groove of the transaxle case.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the brake piston return spring as shown in the illustration.**



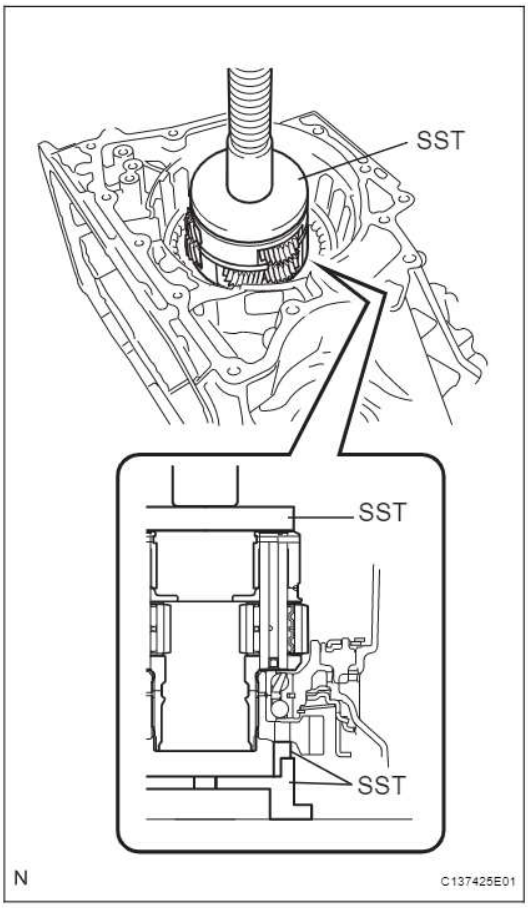
8. INSTALL COUNTER DRIVE GEAR

(a) Using SST and a press, install the bearing inner race (front side) to the counter drive gear.
SST 09387-00020

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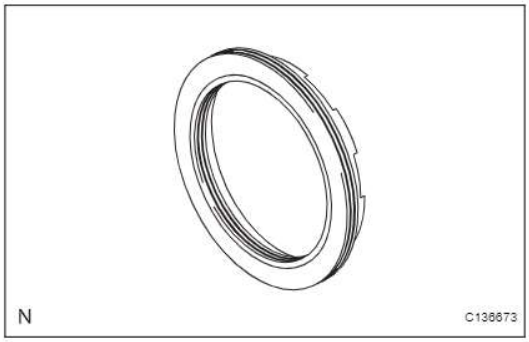
(b) Install the bearing inner race (rear side) and counter drive gear to the transaxle case.
SST 09223-15030, 09527-17011, 09950-60020 (09951-00810), 09950-70010 (09951-07100)
NOTICE:
There should not be any clearance between the bearing inner race (front side) and counter drive gear.



9. INSTALL FRONT PLANETARY GEAR ASSEMBLY

(a) Using SST and a press, press in the planetary gear assembly to the transaxle case.
SST 09223-15030, 09527-17011, 09951-01100

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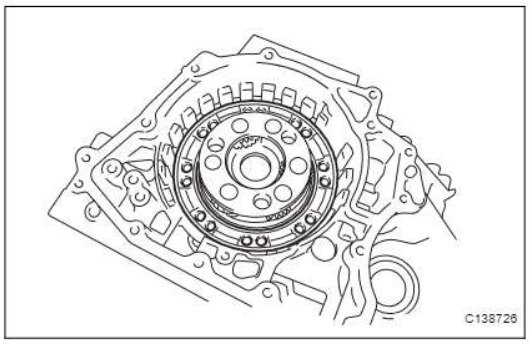


10. INSTALL NO. 2 BRAKE PISTON

(a) Coat 2 new O-rings with ATF and install them to the No. 2 brake piston.

NOTICE:

Ensure that the 2 O-rings are not twisted.



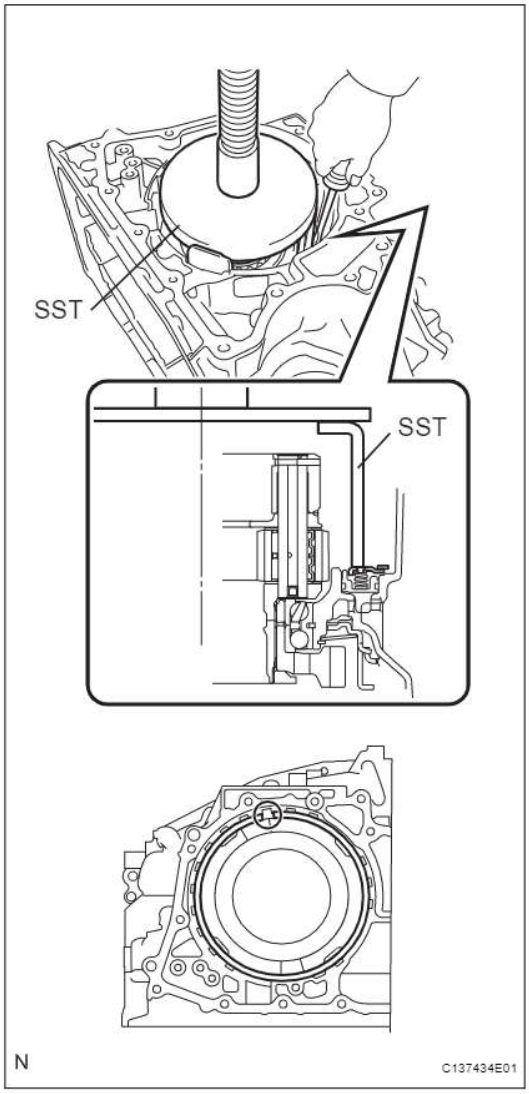
(b) Install the No. 2 brake piston to the transaxle case.

NOTICE:

Be careful not to damage the O-rings.

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

(a) Install the 1st and reverse brake return spring to the transaxle case.



(b) Place SST on the 1st and reverse brake return spring and compress the 1st and reverse brake return spring with a press.

SST 09387-00060

NOTICE:

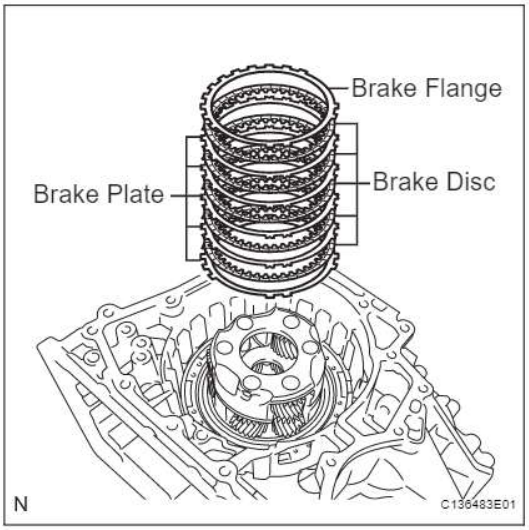
Stop the press when the 1st and reverse brake return spring is flush with the snap ring groove. This prevents the 1st and reverse brake return spring from being deformed.

(c) Using a screwdriver, install the snap ring to the transaxle case as shown in the illustration.

NOTICE:

- **Confirm that the snap ring is secured in the groove of the transaxle case.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the transaxle case as shown in the illustration.**

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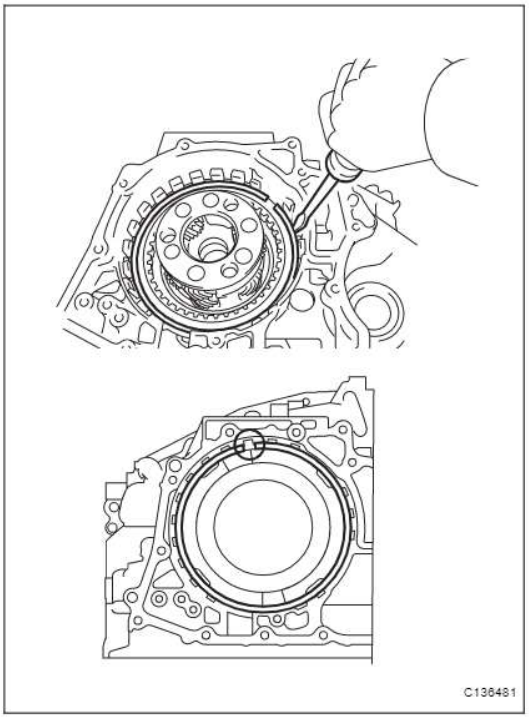


12. INSTALL NO. 2 BRAKE DISC

(a) Install the 5 brake discs, 5 brake plates, and brake flange to the transaxle case.

NOTICE:

Make sure that the discs, plates, and flange are installed in the correct order.

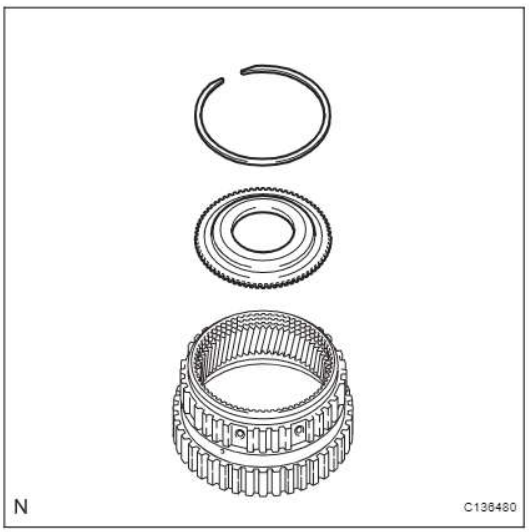


(b) Using a screwdriver, install the snap ring to the transaxle case.

NOTICE:

- **Confirm that the snap ring is secured in the groove of the transaxle case.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the transaxle case as shown in the illustration.**

13. INSPECT CLEARANCE OF NO. 2 BRAKE (See page AX-278)



14. INSTALL PLANETARY RING GEAR FLANGE

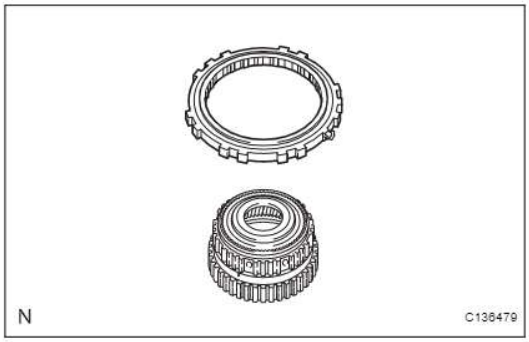
(a) Install the planetary ring gear flange to the planetary ring gear.

(b) Using a screwdriver, install the snap ring to the planetary ring gear.

NOTICE:

Confirm that the snap ring is secured in the groove of the planetary ring gear.

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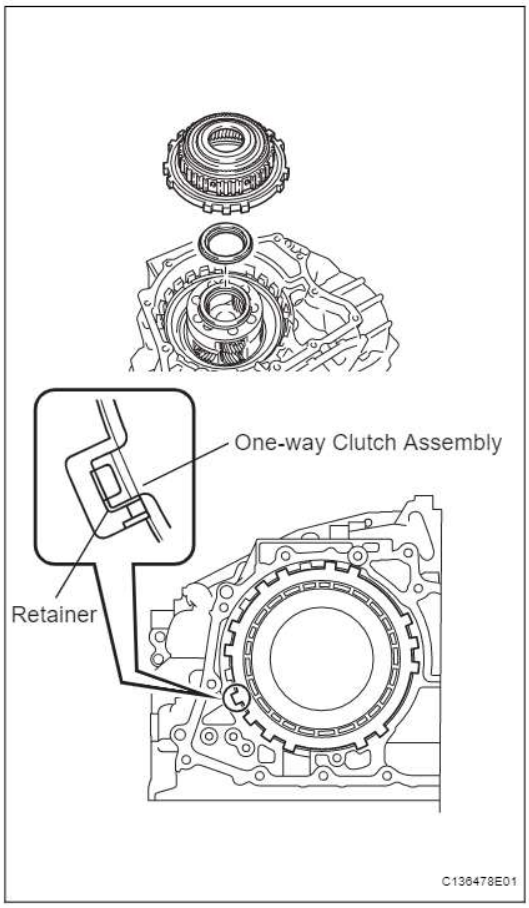


15. INSTALL PLANETARY RING GEAR

(a) Install the planetary ring gear to the one-way clutch assembly.

NOTICE:

Make sure that the one-way clutch assembly is positioned in the correct direction as shown in the illustration.



16. INSTALL ONE-WAY CLUTCH ASSEMBLY

(a) Coat the thrust needle roller bearing with ATF, and install it onto the planetary gear assembly.

Bearing diameter: mm (in.)

-	Inside	Outside
Bearing	56.1 (2.209)	80.9 (3.185)

NOTICE:

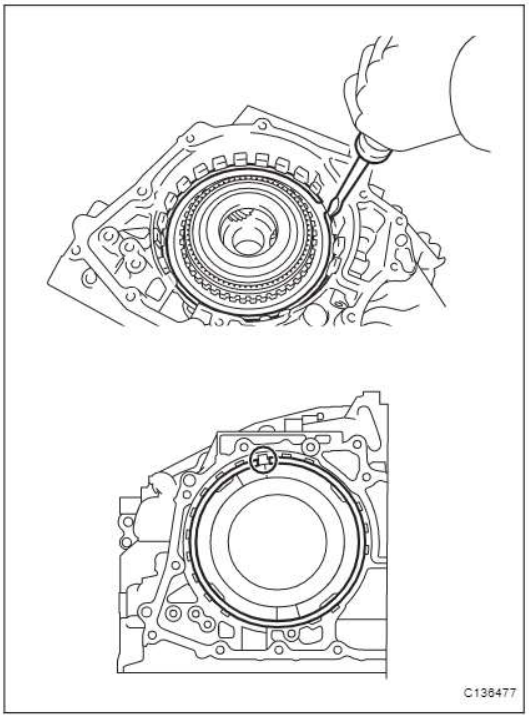
Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

(b) Install the one-way clutch assembly to the transaxle case.

NOTICE:

Make sure that there is no clearance between the retainer and the claw on the one-way clutch assembly. If there is any clearance, the spring of the retainer will be deformed.

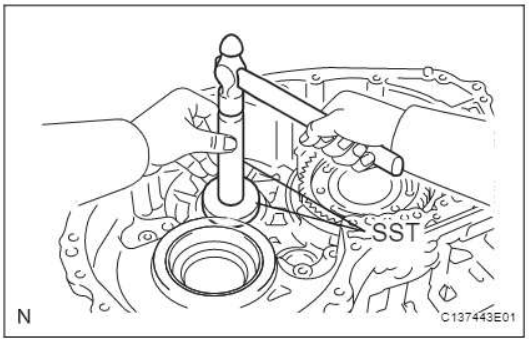
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(c) Using a screwdriver, install the snap ring to the transaxle case.

NOTICE:

- **Confirm that the snap ring is secured in the groove of the transaxle case.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the transaxle case.**



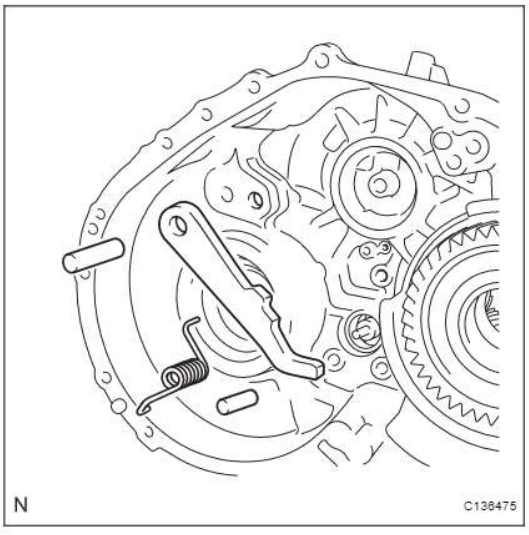
17. INSTALL COUNTER DRIVEN GEAR REAR TAPERED ROLLER BEARING OUTER RACE

(a) Using SST and a hammer, install the counter driven gear rear tapered roller bearing outer race to the transaxle case.

SST 09950-60010 (09951-00650), 09950-70010 (09951-07100)

NOTICE:

Be sure to install the counter driven gear rear tapered roller bearing outer race so that there is no clearance between the bearing outer race and the transaxle case. If there is any clearance, the turning torque of the counter drive gear cannot be measured correctly.

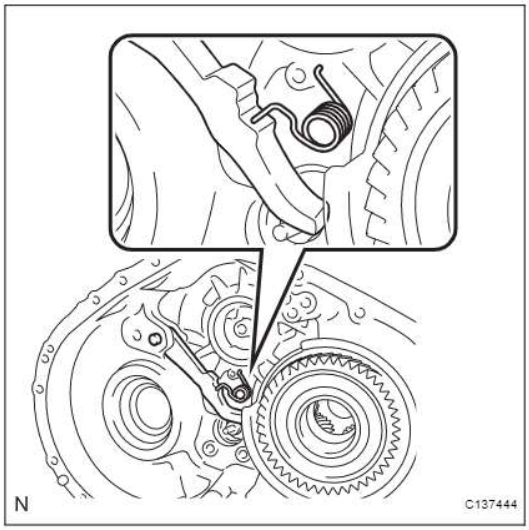


18. INSTALL PARKING LOCK PAWL

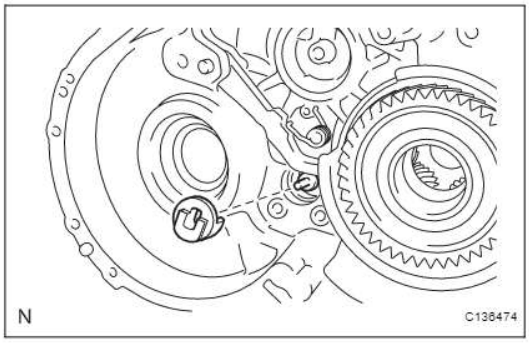
(a) Install the parking lock pawl to the transaxle case with the parking lock pawl shaft.

(b) Install the parking lock pawl pin to the transaxle case.

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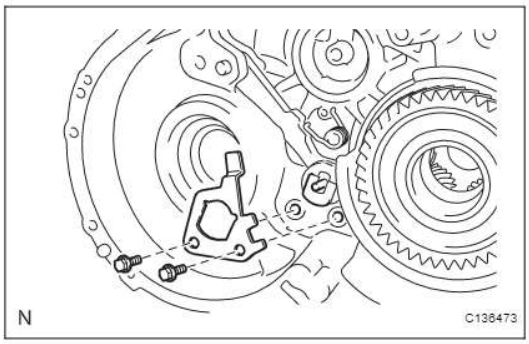


(c) Install the torsion spring to the parking lock pawl.
NOTICE:
Make sure that one end of the spring is fixed in the hole of the transaxle case and the other end is positioned on the parking lock pawl as shown in the illustration.



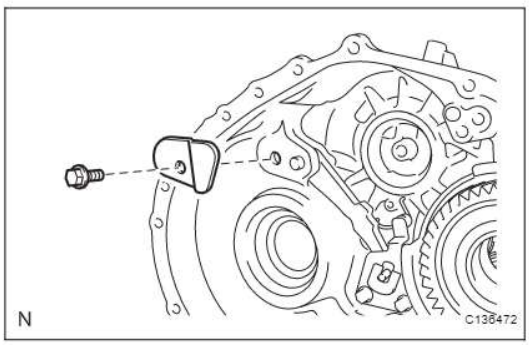
19. INSTALL PARKING LOCK SLEEVE

(a) Install the parking lock sleeve to the transaxle case.



20. INSTALL PAWL STOPPER PLATE

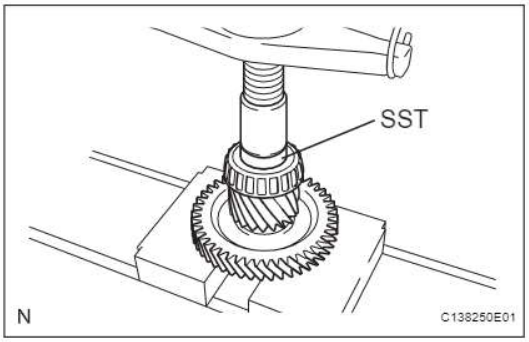
(a) Install the pawl stopper plate to the transaxle case with the 2 bolts.
Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)



21. INSTALL PAWL SHAFT CLAMP

(a) Install the pawl shaft clamp to the transaxle case with the bolt.
Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)

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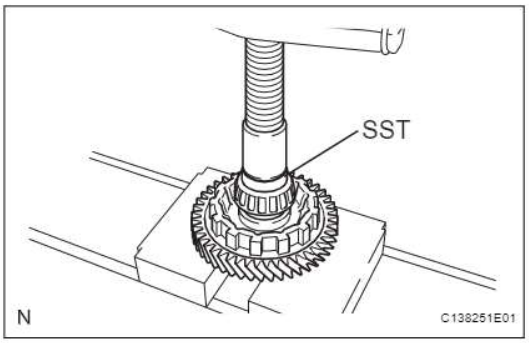
22. INSTALL COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, install a new the counter driven gear front tapered roller bearing to the counter driven gear sub-assembly.

SST 09950-60010 (09951-00530)

NOTICE:

Be sure to install the counter driven gear front tapered roller bearing so that there is no clearance between the bearing and the counter driven gear. If there is any clearance, the turning torque of the counter drive gear cannot be measured correctly.



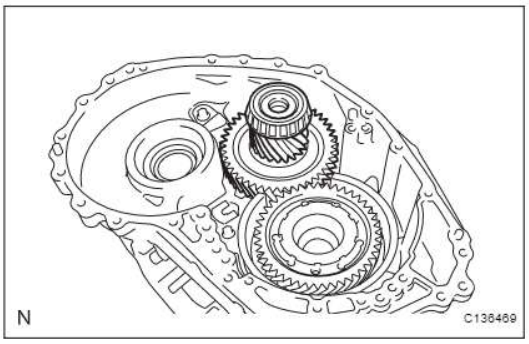
23. INSTALL COUNTER DRIVEN GEAR REAR TAPERED ROLLER BEARING

(a) Using SST and a press, install a new the counter driven gear rear tapered roller bearing to the counter driven gear sub-assembly.

SST 09950-60010 (09951-00420)

NOTICE:

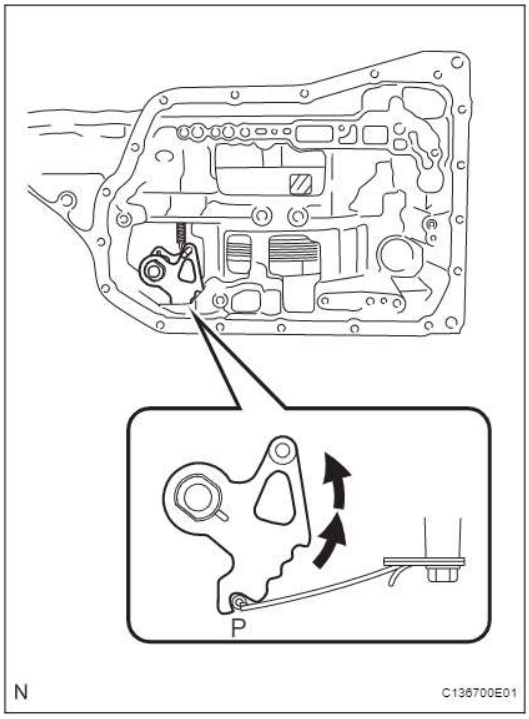
Be sure to install the counter driven gear rear tapered roller bearing and the differential drive pinion so that there is no clearance between each of them and the counter driven gear.



24. INSTALL COUNTER DRIVEN GEAR

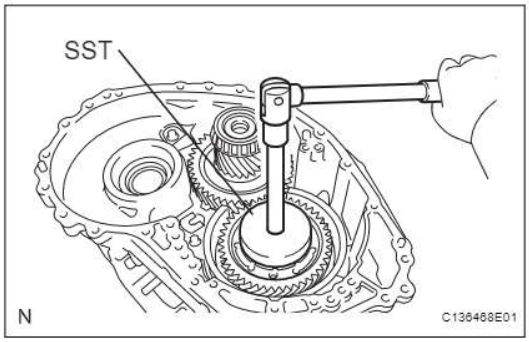
(a) Install the counter driven gear sub-assembly to the transaxle case.

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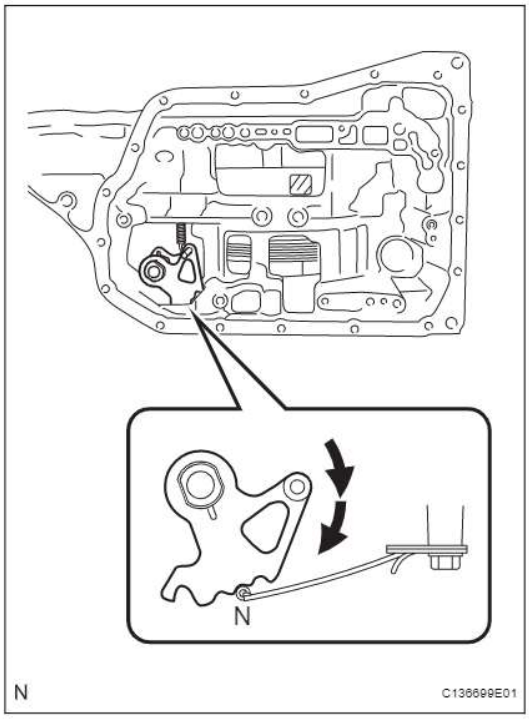


25. INSTALL COUNTER DRIVE GEAR NUT

(a) Turn the manual shaft lever 2 notches counterclockwise to set it in the P position as shown in the illustration.

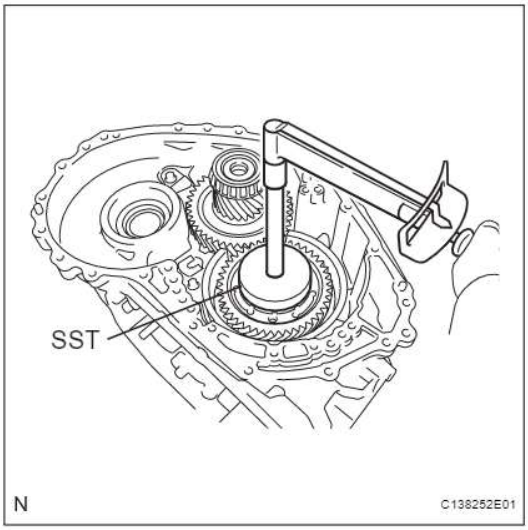


(b) Using SST, install a new nut.
SST 09387-00130
Torque: 120 N*m (1,223 kgf*cm, 88 ft.*lbf)

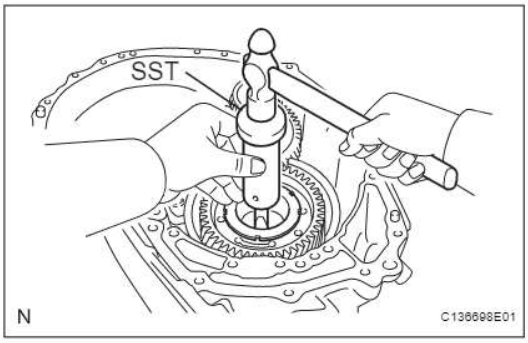


(c) Turn the manual shaft lever 2 notches clockwise to set it in the N position as shown in the illustration.

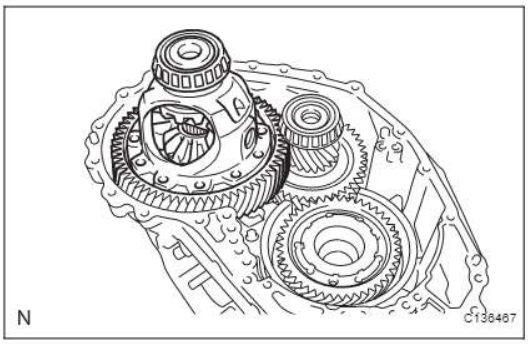
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(d) Using SST and a torque wrench, measure the turning torque of the bearing while rotating SST at 60 rpm.
SST 09387-00130
Turning torque:
0.10 to 0.22 N*m (1.02 to 2.24 kgf*cm, 0.89 to 1.94 in.*lbf)
When the measured value is not within the specified range, gradually tighten the nut until the turning toque falls within the specified range.
Maximum torque:
180 N*m (1,835 kgf*cm, 132 ft.*lbf)

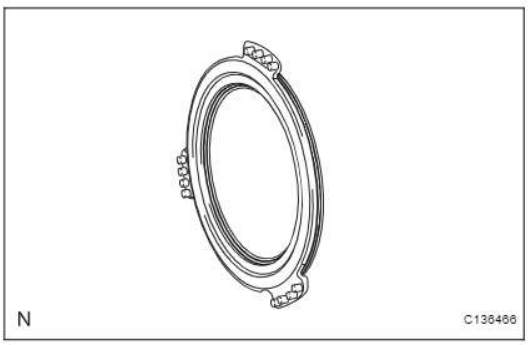


(e) Using SST and a hammer, stake the planetary gear assembly.
SST 09930-00010



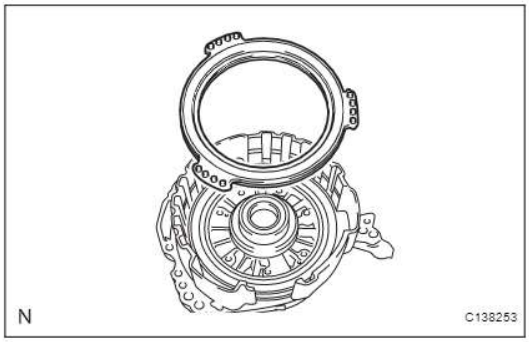
26. INSTALL FRONT DIFFERENTIAL CASE
(a) Install the differential case sub-assembly to the transaxle case.

27. INSPECT DIFFERENTIAL SIDE GEAR (See page AX-332)

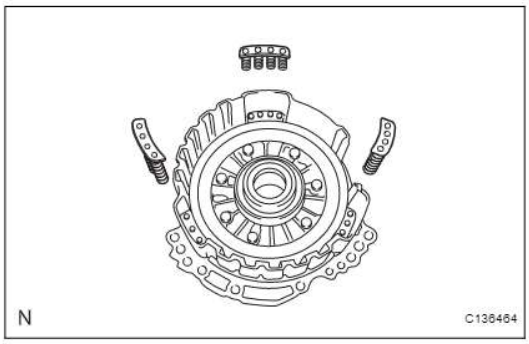


28. INSTALL NO. 1 BRAKE PISTON
(a) Coat 2 new O-rings with ATF and install them to the No. 1 brake piston.
NOTICE:
Ensure that the 2 O-rings are not twisted.

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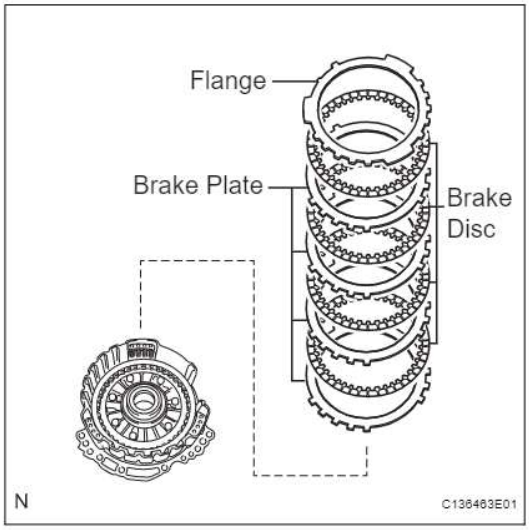


(b) Install the No. 1 brake piston to the oil pump assembly.
NOTICE:
Be careful not to damage the O-rings.



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

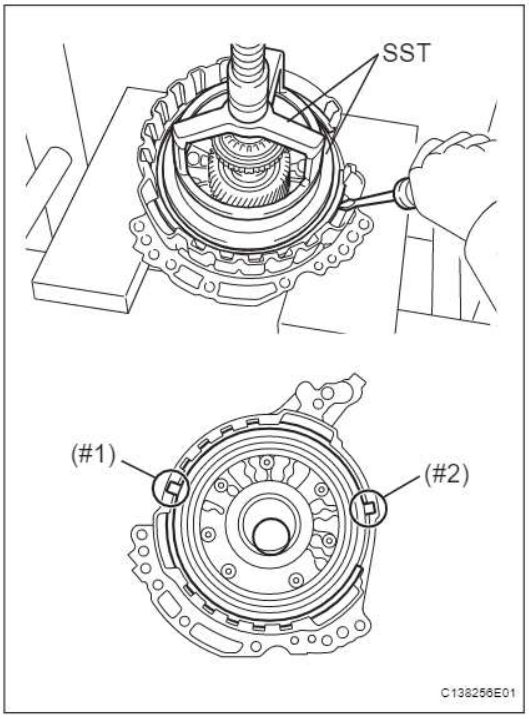
(a) Install the 3 2nd brake piston return springs to the oil pump assembly.
NOTICE:
Make sure that the 3 2nd brake piston return springs are installed straight through the protrusions on the oil pump assembly.



30. INSTALL NO. 1 BRAKE DISC

(a) Install the 4 brake discs, 4 brake plates, and brake flange to the oil pump assembly.
NOTICE:
- **Make sure that the discs, plates, and flange are installed in the correct order.**
- **Be sure to install the flange in the correct direction.**

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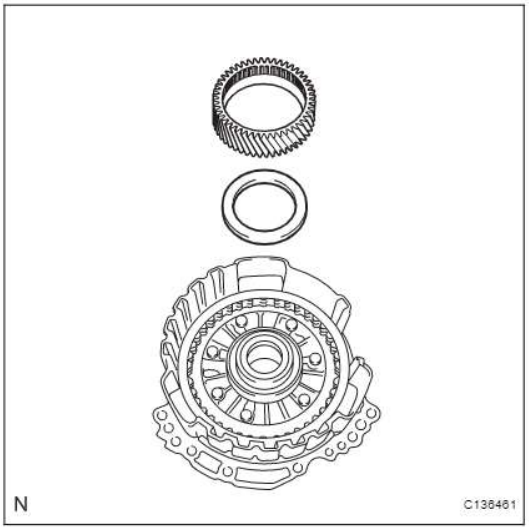


(b) Place SST on the flange and compress the flange with a press.
SST 09387-00070, 09495-65040
NOTICE:
Stop the press when the brake piston return spring is flush with the snap ring groove. This prevents the brake piston return spring from being deformed.

(c) Using a screwdriver, install the snap ring to the transaxle case as shown in the illustration (#1).
NOTICE:
- **Confirm the snap ring is fixed in the groove of the oil pump.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the brake piston return spring as shown in the illustration.**

(d) Using a screwdriver, install the snap ring to the oil pump assembly as shown in the illustration (#2).
NOTICE:
- **Confirm that the snap ring is secured in the groove of the oil pump.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the brake piston return spring as shown in the illustration.**

31. INSPECT CLEARANCE OF NO. 1 BRAKE (See page AX-278)



32. INSTALL UNDERDRIVE PLANETARY SUN GEAR

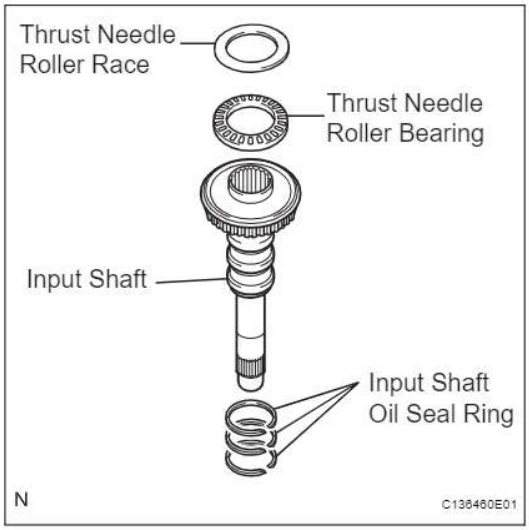
(a) Coat the thrust needle roller bearing with ATF, and install it to the oil pump assembly.
Bearing diameter: mm (in.)

-	Inside	Outside
Bearing	57.7 (2.272)	75.2 (2.961)

NOTICE:
Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

(b) Install the underdrive planetary sun gear to the oil pump assembly.

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33. INSTALL INPUT SHAFT SUB-ASSEMBLY

(a) Coat the 3 input shaft oil seal rings with ATF and install them to the input shaft.

NOTICE:
Do not expand the gap of the oil seal ring too much.

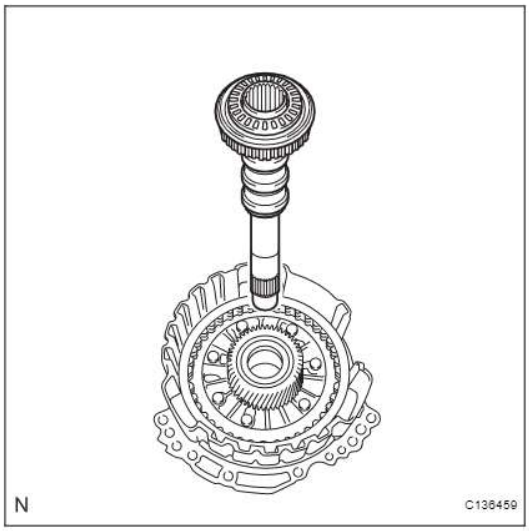
(b) Coat the thrust needle roller bearing and thrust needle roller race with ATF, and install them on the oil pump assembly.

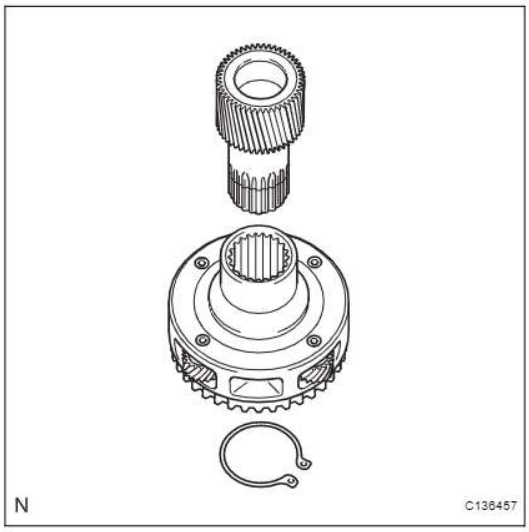
Bearing diameter: mm (in.)

-	Inside	Outside
Bearing	29.1 (1.146)	48.6 (1.913)
Race	30.7 (1.209)	48.3 (1.902)

NOTICE:
Be sure to install the thrust needle roller bearing in the correct direction.

(c) Install the input shaft to the oil pump assembly.



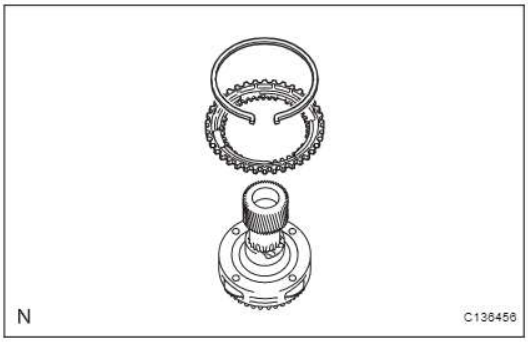


34. INSTALL PLANETARY SUN GEAR SUB-ASSEMBLY

(a) Using a snap ring expander, install the snap ring to the underdrive planetary gear assembly.

(b) Using a snap ring expander, install the front planetary sun gear sub-assembly to the underdrive planetary gear assembly with the snap ring expanded.

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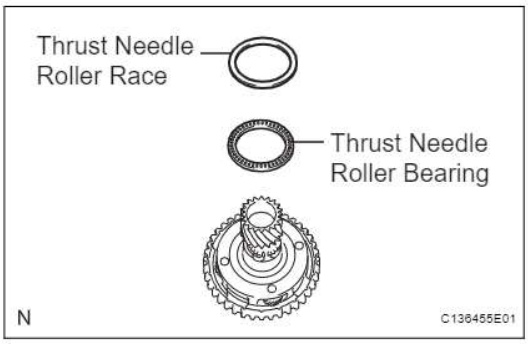


35. INSTALL UNDERDRIVE PLANETARY RING GEAR

(a) Install the underdrive planetary ring gear to the underdrive planetary gear assembly.

(b) Using needle-nose pliers, install the snap ring to the underdrive planetary ring gear.

NOTICE:
Confirm that the snap ring is secured in the groove of the underdrive planetary ring gear.



36. INSTALL NO. 3 BRAKE HUB

(a) Coat the thrust needle roller bearing with ATF and install it on the underdrive planetary gear assembly.

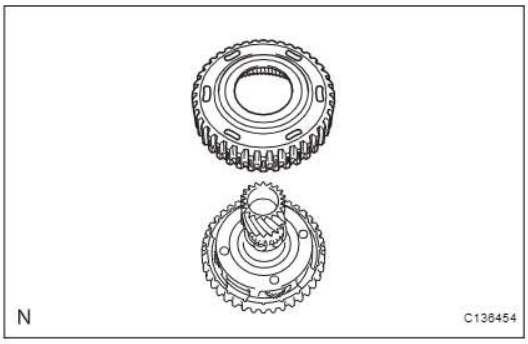
Bearing diameter: mm (in.)

-	Inside	Outside
Bearing	62.6 (2.464)	82.9 (3.263)
Race	65.9 (2.594)	80.3 (3.161)

NOTICE:
Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

(b) Coat the race with MP grease and install it to the No. 3 brake hub.

(c) Install the No. 3 brake hub to the underdrive planetary gear assembly.

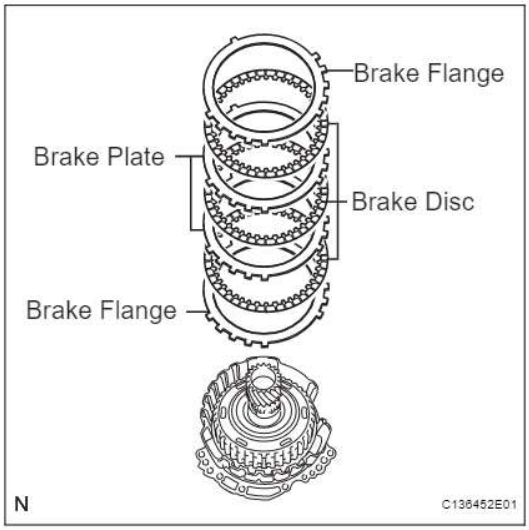




37. INSTALL UNDERDRIVE PLANETARY GEAR ASSEMBLY

(a) Install the underdrive planetary gear assembly to the oil pump assembly.

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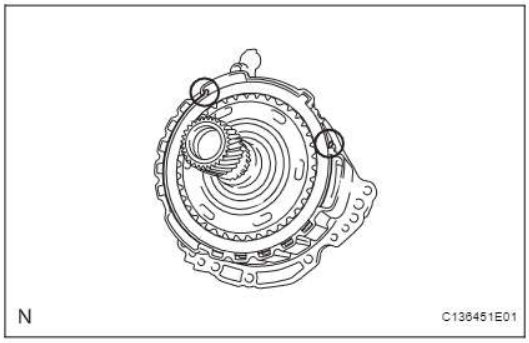


38. INSTALL NO. 3 BRAKE DISC

(a) Install the 2 brake flanges, 3 brake discs, and 2 brake plates to the oil pump assembly.

NOTICE:

Make sure that the discs, plates, and flange are installed in the correct order.

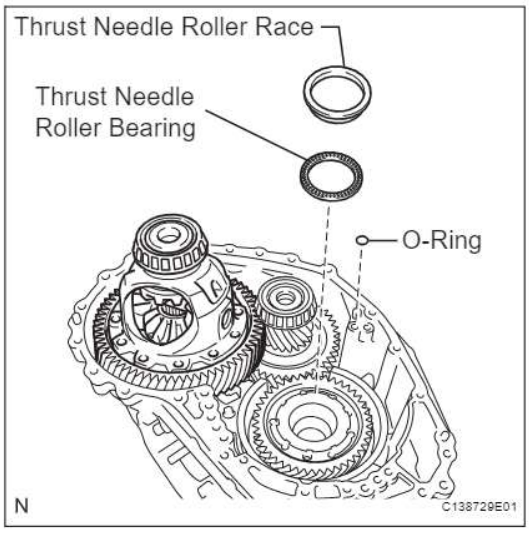


(b) Using a screwdriver, install the snap ring to the oil pump assembly.

NOTICE:

- **Confirm the snap ring is fixed in the groove of the oil pump.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the brake piston return spring as shown in the illustration.**

39. INSPECT CLEARANCE OF NO. 3 BRAKE



40. INSTALL FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Coat the O-ring with ATF and install it to the transaxle case.

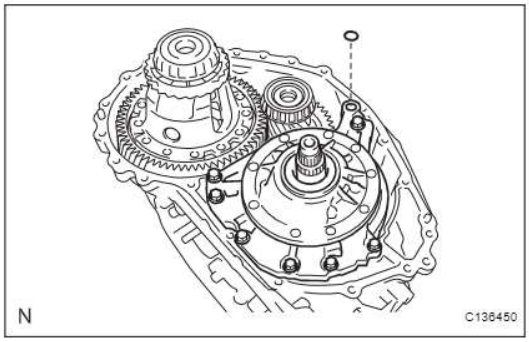
(b) Coat the thrust needle roller bearing and thrust needle roller race with ATF and install them on the underdrive planetary gear assembly.

Bearing and race diameter: mm (in.)

-	Inside	Outside
Bearing	53.1 (2.091)	79 (3.11)
Race	59.4 (2.339)	77 (3.03)

NOTICE:

Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

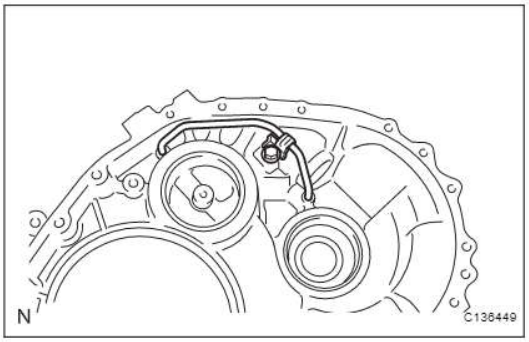


(c) Coat the O-ring with ATF and install it to the oil pump.

(d) Install the oil pump assembly to the transaxle case with the 7 bolts.

Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)

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41. INSTALL DIFFERENTIAL GEAR LUBE APPLY TUBE

(a) Install the differential gear lube apply tube to the transaxle housing.

NOTICE:

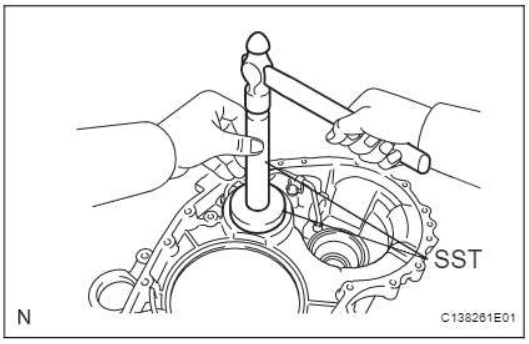
Insert the differential lube apply tube into the transaxle case until it makes contact with the stopper.

(b) Install the apply tube clamp to the differential gear lube apply tube with the bolt.

Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)

NOTICE:

There should be clearance between the differential lube apply tube and apply tube clamp.



42. INSTALL COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING OUTER RACE

(a) Install the shim to the transaxle housing.

(b) Using SST, install a new counter driven gear front tapered roller bearing outer race to the transaxle housing.

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

NOTICE:

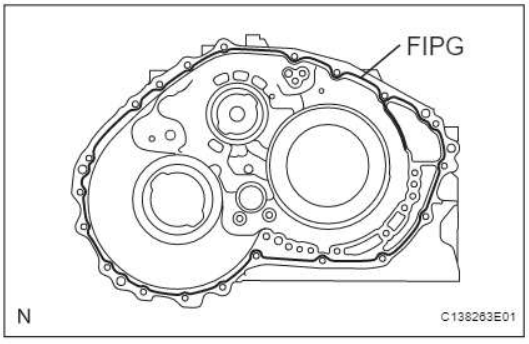
Be sure to install the counter driven gear front tapered roller bearing outer race so that there is no clearance between the shim and the transaxle housing.

43. INSTALL TRANSAXLE HOUSING

(a) Remove packing material from the contact surface between the transaxle housing and case.

NOTICE:

Make sure that there is no ATF on the contact surface.



(b) Apply FIPG to the transaxle case.

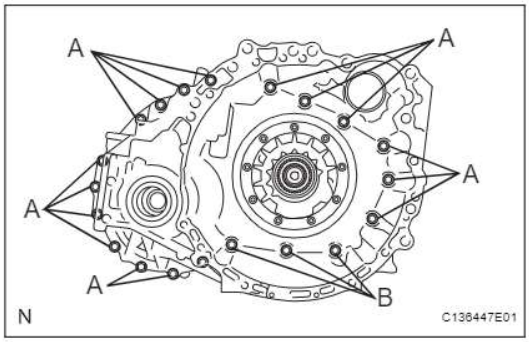
FIPG:

Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent.

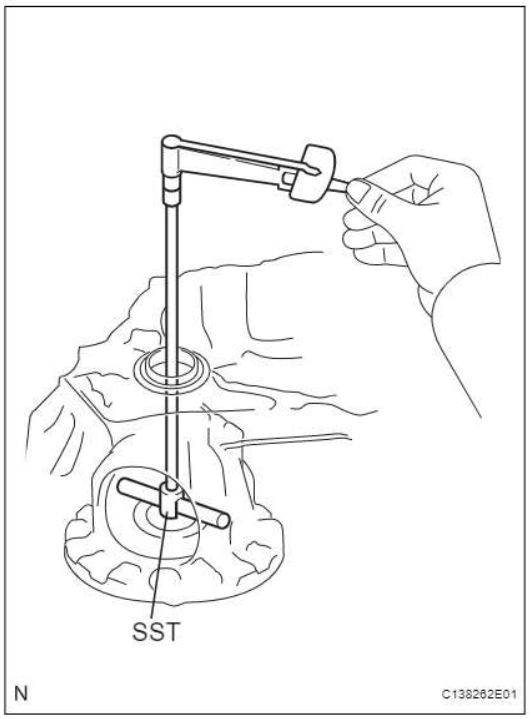
NOTICE:

Apply a bead of FIPG (width 1.2 mm (0.047 in.)) along the sealing surface.

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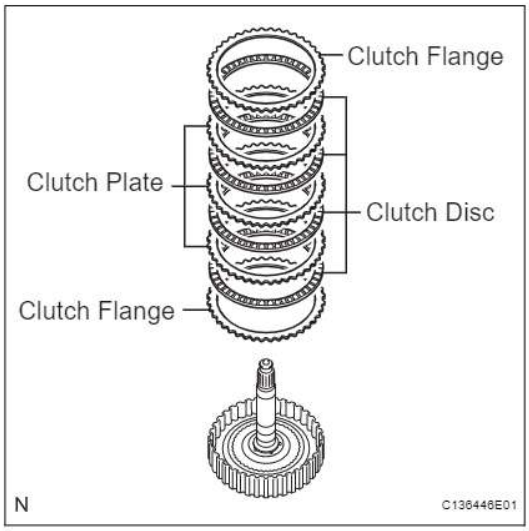
(c) Install the transaxle housing to the transaxle case with the 20 bolts.
Torque: Bolt A
31 N*m (316 kgf*cm, 23 ft.*lbf)
Bolt B
23 N*m (234 kgf*cm, 17 ft.*lbf)



44. ADJUST COUNTER DRIVEN GEAR PRELOAD

(a) Using SST and a torque wrench, measure the turning torque of the counter driven gear while rotating SST at 10 rpm.
SST 09564-33010
Turning torque:
Differential side bearing preload 3.29 to 6.07 N*m (33.53 to 61.86 kgf*cm, 2.42 to 4.46 ft.*lbf)
If the turning torque is not within the specified range, refer to the table below to select a shim of the counter driven gear front tapered roller bearing outer race so that the turning torque is within the specified range.

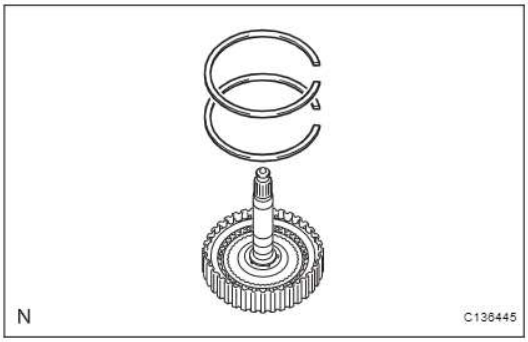
Thickness	Thickness	Thickness	Thickness
2.000 (0.0787)	2.275 (0.0896)	2.525 (0.0994)	2.775 (0.1093)
2.025 (0.0797)	2.300 (0.0906)	2.550 (0.1004)	2.800 (0.1102)
2.050 (0.0807)	2.325 (0.0915)	2.575 (0.1014)	2.825 (0.1112)
2.075 (0.0817)	2.350 (0.0925)	2.600 (0.1024)	2.850 (0.1122)
2.100 (0.0827)	2.375 (0.0935)	2.625 (0.1034)	2.875 (0.1132)
2.125 (0.0837)	2.400 (0.0945)	2.650 (0.1043)	2.900 (0.1142)
2.150 (0.0847)	2.425 (0.0955)	2.675 (0.1053)	2.925 (0.1152)
2.175 (0.0856)	2.450 (0.0965)	2.700 (0.1063)	2.950 (0.1161)
2.200 (0.0866)	2.475 (0.0974)	2.725 (0.1073)	2.975 (0.1171)
2.225 (0.0876)	2.500 (0.0984)	2.750 (0.1083)	3.000 (0.1181)
2.250 (0.0886)	-	-	-



45. INSTALL NO. 1 CLUTCH DISC

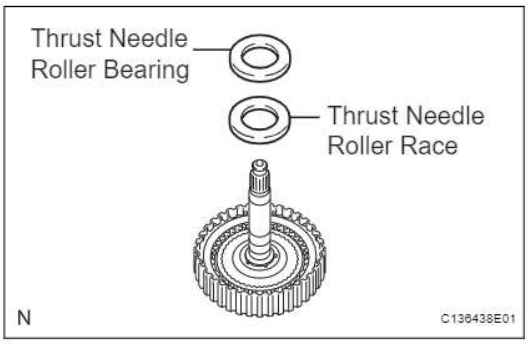
(a) Install the clutch flange, 4 clutch discs, and 4 clutch plates to the direct multiple disc clutch assembly.
NOTICE:
Make sure that the flange, discs, and plates are installed in the correct order.

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(b) Using a screwdriver, install the 2 snap rings to the direct multiple disc clutch assembly.
NOTICE:
Confirm that the snap ring is secured in the groove of the direct multiple disc clutch assembly.

46. INSPECT CLEARANCE OF NO. 1 CLUTCH DISC (See page AX-279)

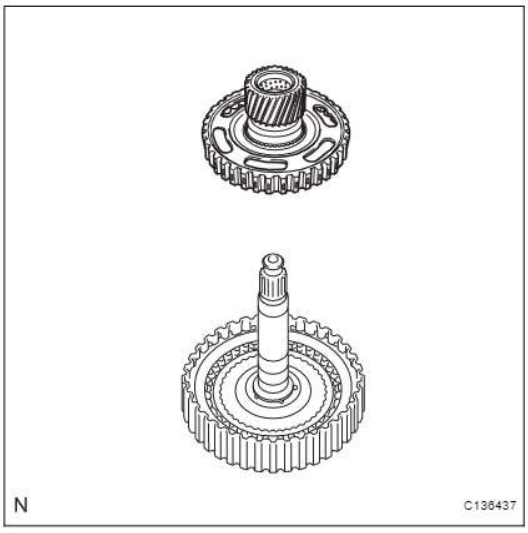


47. INSTALL REAR PLANETARY SUN GEAR ASSEMBLY

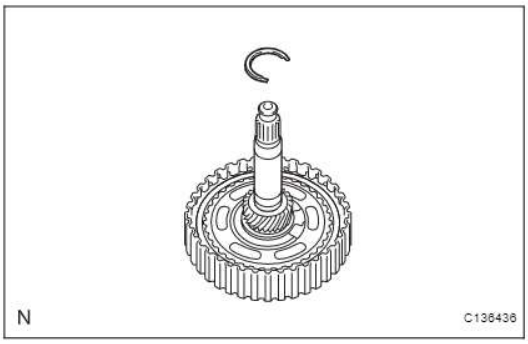
(a) Coat the thrust needle roller bearing and thrust needle roller race with ATF, and install them to the direct multiple disc clutch assembly.
Bearing and race diameter: mm (in.)

-	Inside	Outside
Bearing	28 (1.10)	47.1 (1.854)
Race	26.1 (1.028)	44 (1.73)

NOTICE:
Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

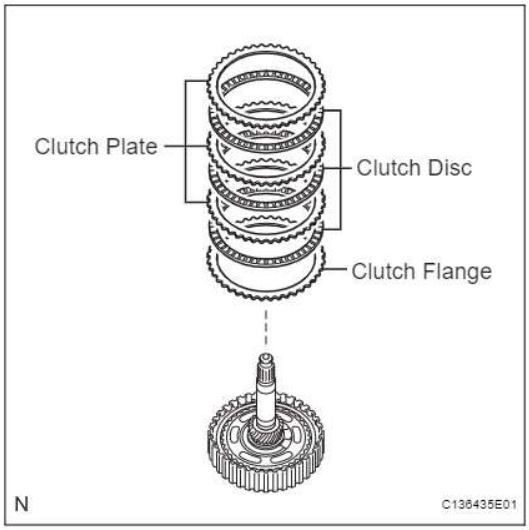


(b) Install the rear planetary sun gear to the direct multiple disc clutch assembly.



(c) Using a snap ring expander, install the snap ring to the direct multiple disc clutch assembly.

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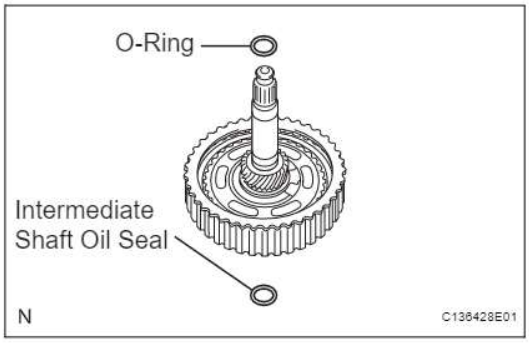


48. INSTALL NO. 2 CLUTCH DISC

(a) Install the clutch flange, 3 clutch discs, and 3 clutch plates to the direct multiple disc clutch assembly.

NOTICE:

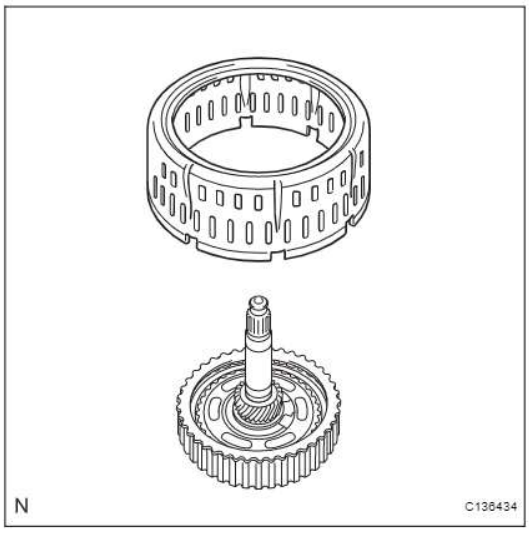
Make sure that the flange, discs, and plates are installed in the correct order.



49. INSTALL DIRECT MULTIPLE DISC CLUTCH SNAP RING

(a) Coat a new O-ring with ATF and install it to the direct multiple disc clutch assembly.

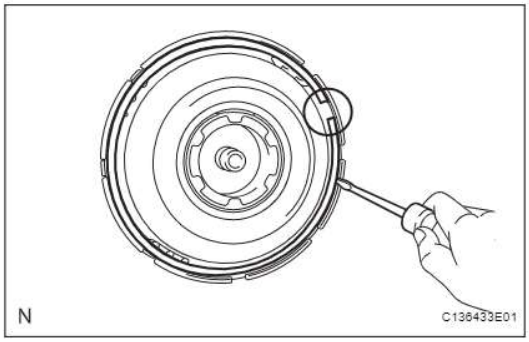
(b) Coat a new intermediate shaft oil seal ring with ATF and install it to the intermediate shaft.



(c) Install the No. 2 direct clutch piston to the direct multiple disc clutch assembly.

NOTICE:

Be sure to engage the claws on the direct multiple disc clutch assembly to the grooves on the No. 2 direct clutch piston.



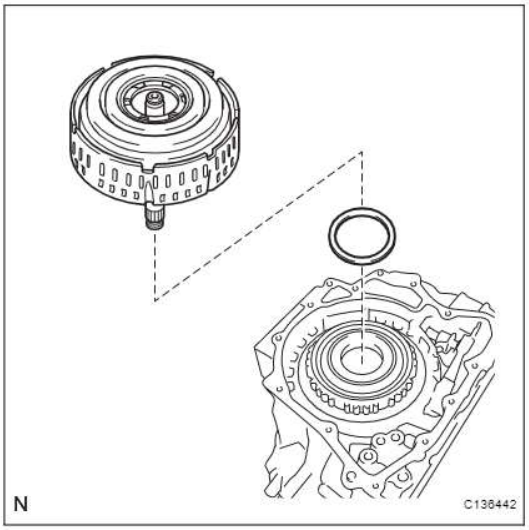
(d) Using a screwdriver, install the snap ring to the direct multiple disc clutch assembly.

NOTICE:

Position the opening of the snap ring as shown in the illustration.

50. INSPECT CLEARANCE OF NO. 2 CLUTCH DISC (See page AX-280)

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51. INSTALL REAR MULTIPLE DISC CLUTCH ASSEMBLY

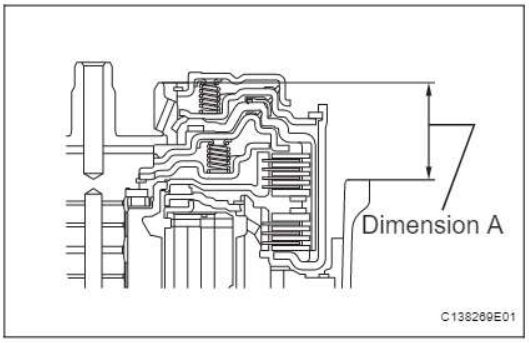
(a) Coat the thrust needle roller bearing with ATF and install it on the transaxle case.

Bearing diameter: mm (in.)

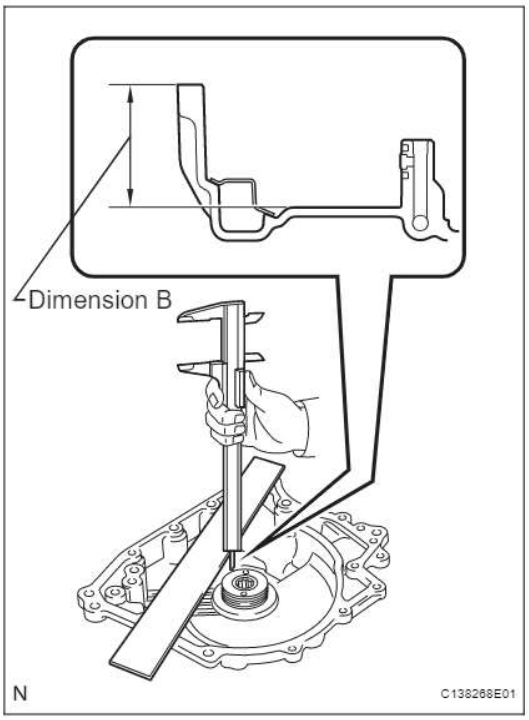
-	Inside	Outside
Bearing	61.2 (2.409)	79 (3.11)

(b) Install the direct multiple disc clutch assembly to the transaxle case.

(c) Clean the contact surface of the transaxle case and transaxle rear cover.



(d) As shown in the illustration, place a straight edge on the multiple direct clutch drum and measure the distance between the transaxle case and the straight edge using vernier calipers (Dimension A).



(e) Using vernier calipers and a straight edge, measure the distance shown in the illustration. (Dimension B)

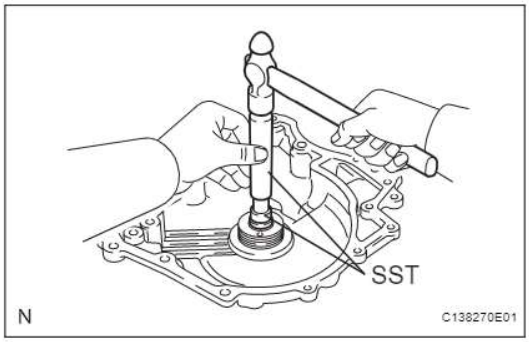
(f) Calculate the end play value using the following formula:

End play = Dimension B - Dimension A

End play:

0.007 to 1.113 mm (0.0003 to 0.0438 in.)

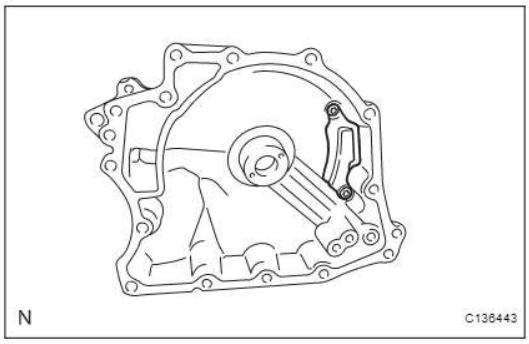
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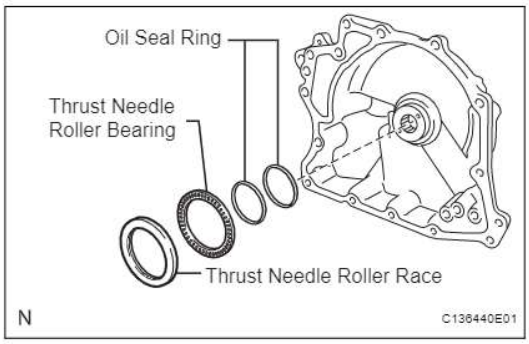
52. INSTALL TRANSAXLE REAR COVER SUB-ASSEMBLY

(a) Using SST and a hammer, install the needle roller bearing into the transaxle rear cover.
SST 09950-60010 (09951-00220), 09950-70010 (09951-07100)
Press installation depth:
21.5 to 21.9 mm (0.8464 to 08622 in.)

(b) Apply sealant to the 2 "TORX" screws.
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent



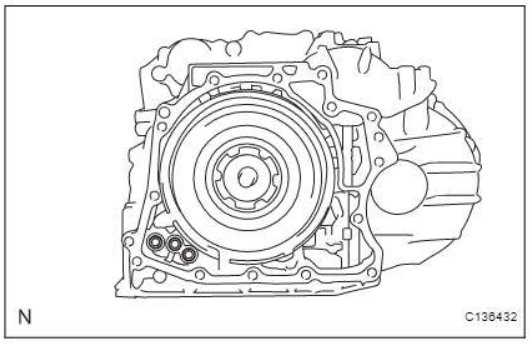
(c) Using a "TORX" wrench (T30), install the transaxle rear cover plate to the transaxle rear cover with the 2 "TORX" screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)



(d) Coat the thrust needle roller bearing and thrust needle roller race with ATF and install it on the transaxle case.
Bearing diameter: mm (in.)

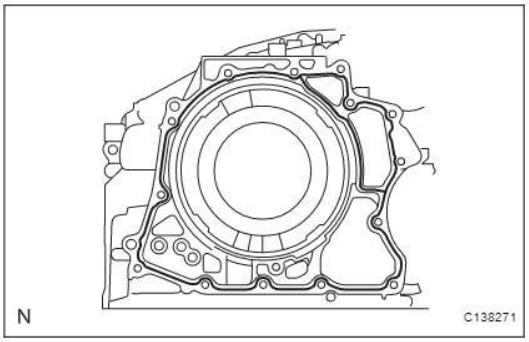
-	Inside	Outside
Bearing	48.9 (1.925)	72.0 (2.835)
Race	52.2 (2.055)	70.4 (2.772)

(e) Coat the 2 new oil seals with ATF and install them to the transaxle rear cover.

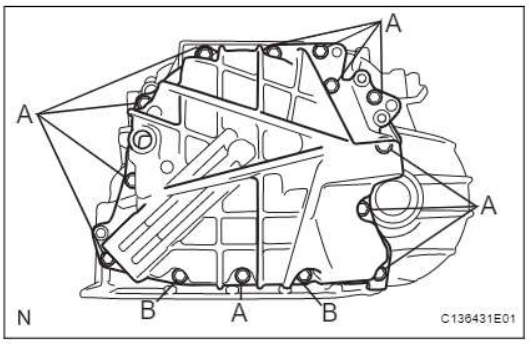


(f) Coat the 3 O-rings with ATF and install them to the transaxle case.
NOTICE:
Ensure that the 3 O-rings are not twisted.

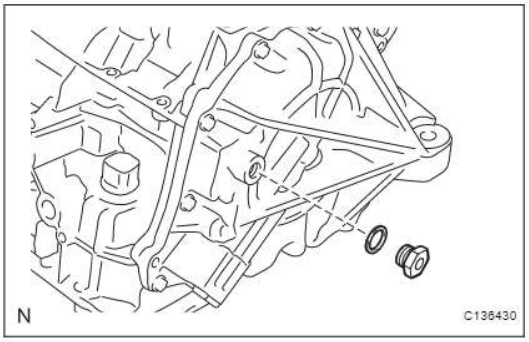
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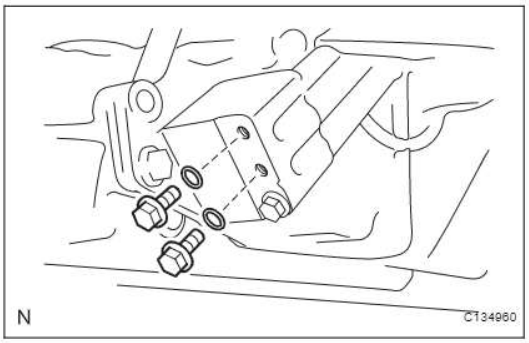
(g) Remove packing material from the contact surfaces between the transaxle rear cover and transaxle case.
NOTICE:
Make sure that there is no ATF on the contact surface.
FIPG:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent.



(h) Install the transaxle rear cover to the transaxle case with the 14 bolts.
Torque: Bolt A
23 N*m (234 kgf*cm, 17 ft.*lbf)
Bolt B
17 N*m (173 kgf*cm, 12 ft.*lbf)

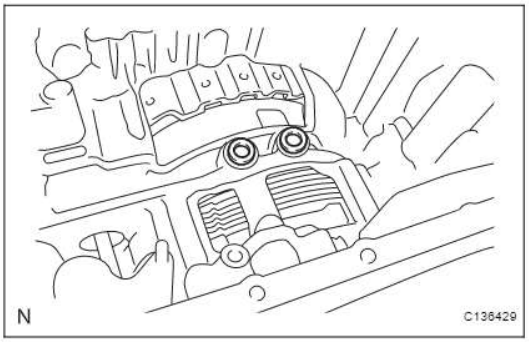


(i) Install a new gasket to the refill plug.
(j) Install the refill plug to the transaxle rear cover.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



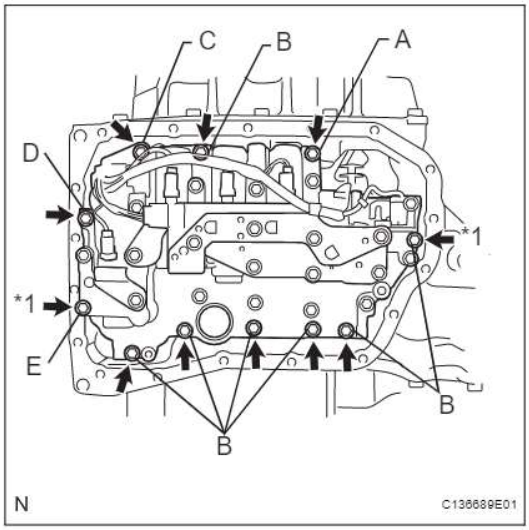
(k) Coat 2 new O-rings with ATF and install them to the 2 No. 1 automatic transaxle case plugs.
(l) Install the 2 No. 1 automatic transaxle case plugs to the transaxle rear cover.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)

53. INSPECT INPUT SHAFT END PLAY (See page AX-274)



54. INSTALL TRANSAXLE CASE GASKET
(a) Coat the 2 gaskets with ATF and install them to the transaxle case.

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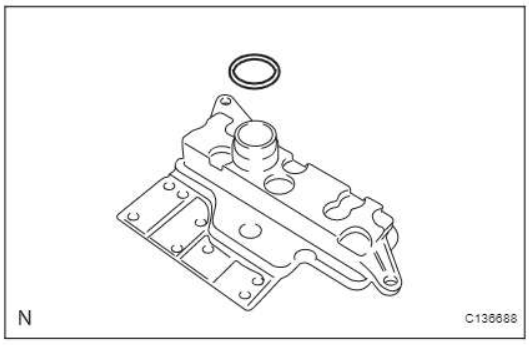


55. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Install the valve body assembly to the transaxle case with the 11 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

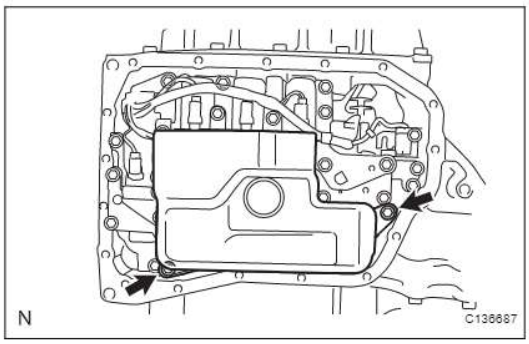
-	Bolt length
Bolt A	25 mm (0.98 in.)
Bolt B	30 mm (1.18 in.)
Bolt C	35 mm (1.38 in.)
Bolt D	45 mm (1.77 in.)
Bolt E	55 mm (2.17 in.)

NOTICE:
- **When installing the transmission valve body assembly, be careful not to allow the transmission revolution sensor and transaxle case to interfere each other.**
- **Be sure to insert the pin of the manual valve lever into the groove on the end of the manual valve.**
- **First, temporarily tighten the bolts marked by (*1) in the illustration because they are positioning bolts.**



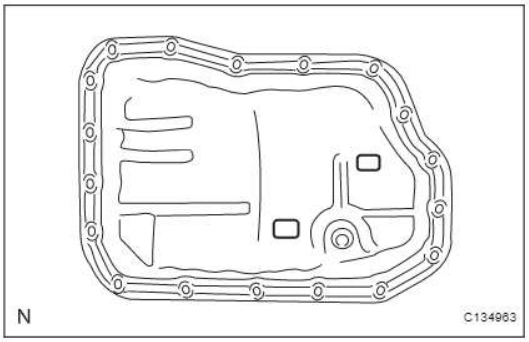
56. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

(a) Coat a new O-ring with ATF and install it to the oil strainer assembly.
NOTICE:
Ensure that the O-ring is not twisted or pinched.



(b) Install the oil strainer assembly to the valve body assembly with the 2 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

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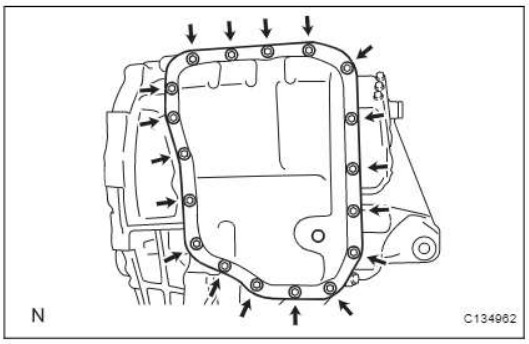
57. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the automatic transaxle oil pan sub-assembly.

(b) Apply sealant to the 18 bolts.

Sealant:

Toyota Genuine Seal Packing 1344, Three Bond 1344 or equivalent.

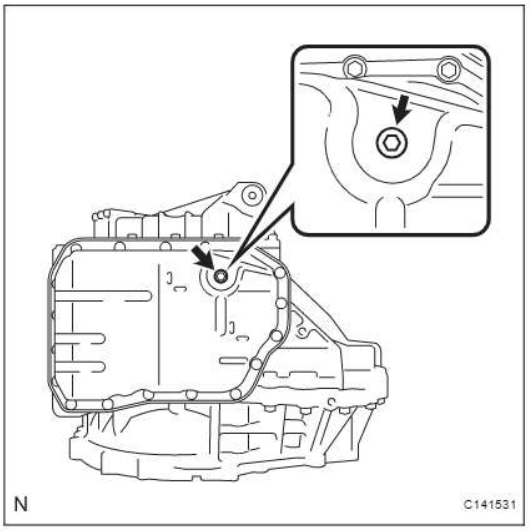


(c) Install the automatic transaxle oil pan sub-assembly and a new gasket to the transaxle case with the 18 bolts.

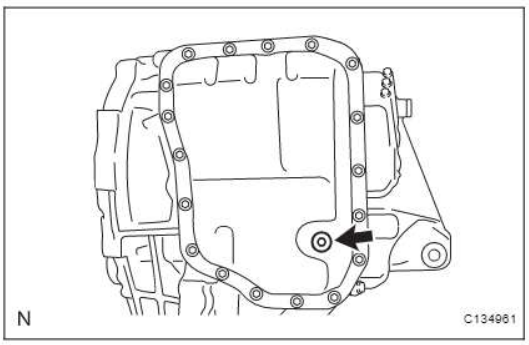
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

NOTICE:

- **In order to ensure proper sealing of the transmission pan bolts, apply sealant to the bolts and install them within 10 minutes of sealant application.**
- **Completely remove any oil or grease from the contact surface of the transaxle case and oil pan sub-assembly with the gasket before installation.**



(d) Install the No. 1 oil filler tube from the automatic transaxle assembly.



(e) Install the overflow plug and a new gasket to the oil pun sub-assembly.

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

58. INSTALL NO. 1 TRANSAXLE CASE PLUG

(a) Install the 3 gaskets to the 3 hexagon bolts.

(b) Apply sealant to the 3 hexagon bolts.

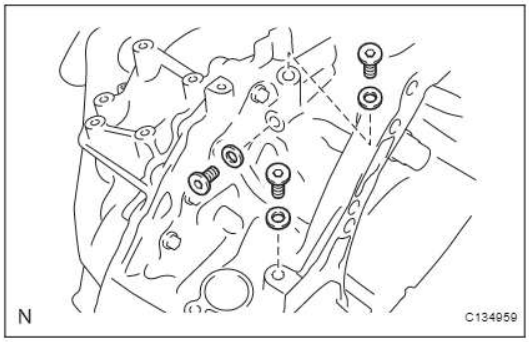
Sealant:

Toyota Genuine Seal Packing 1344, Three Bond 1344 or equivalent.

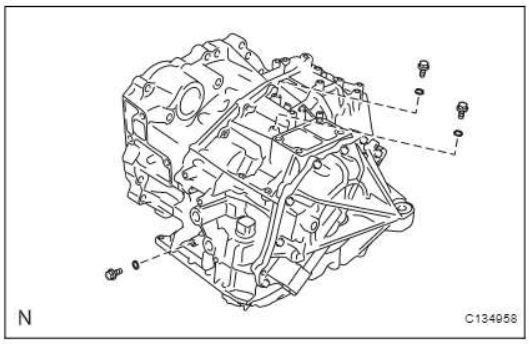
NOTICE:

In order to ensure proper sealing of the hexagon bolts, apply sealant to the bolts and install them within 10 minutes of sealant application.

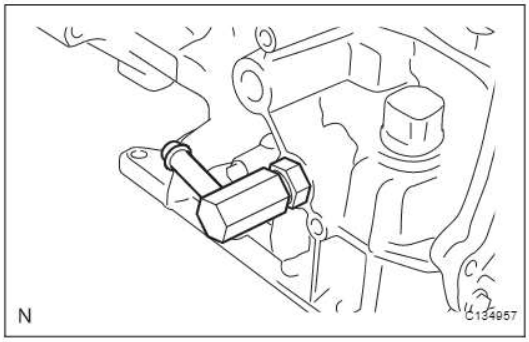
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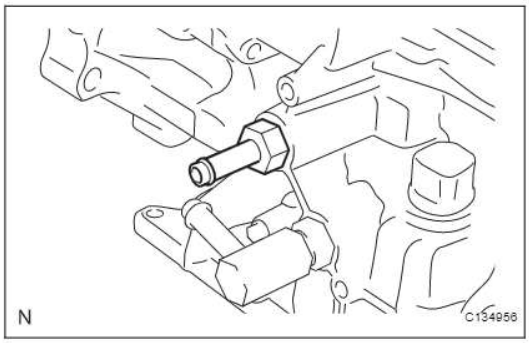
(c) Install the 3 hexagon bolts to the transaxle housing with the gaskets.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)



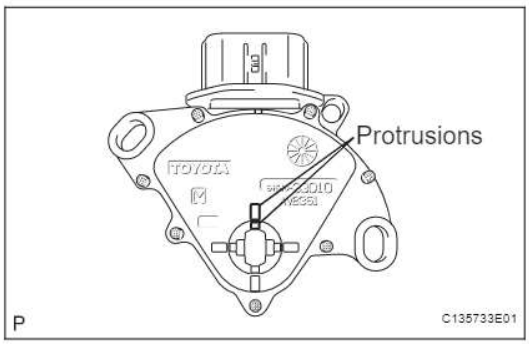
(d) Coat 3 new O-rings with the ATF and install them to the 3 No. 1 transaxle case plugs.
(e) Install the 3 No. 1 transaxle case plugs to the transaxle case.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



59. INSTALL OIL COOLER TUBE UNION (OUTLET OIL COOLER UNION)
(a) Coat a new O-ring with ATF and install it to the oil cooler tube union (outlet oil cooler union).
(b) Install the oil cooler tube union (outlet oil cooler union) to the transaxle case as shown in the illustration.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

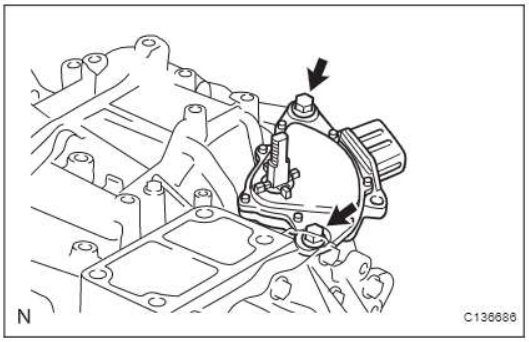


60. INSTALL OIL COOLER TUBE UNION (INLET OIL COOLER UNION)
(a) Coat a new O-ring with ATF and install it to the oil cooler tube union (inlet oil cooler union).
(b) Install the oil cooler tube union (inlet oil cooler union) to the transaxle case.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

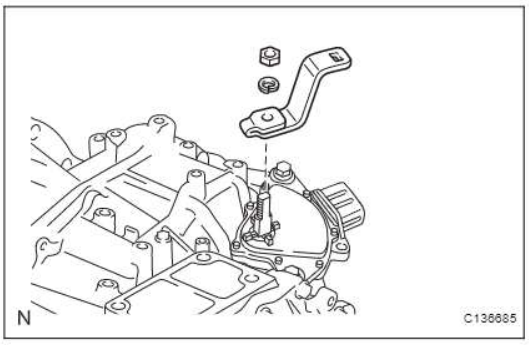


61. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY
(a) Align the protrusions of the park/neutral position switch.

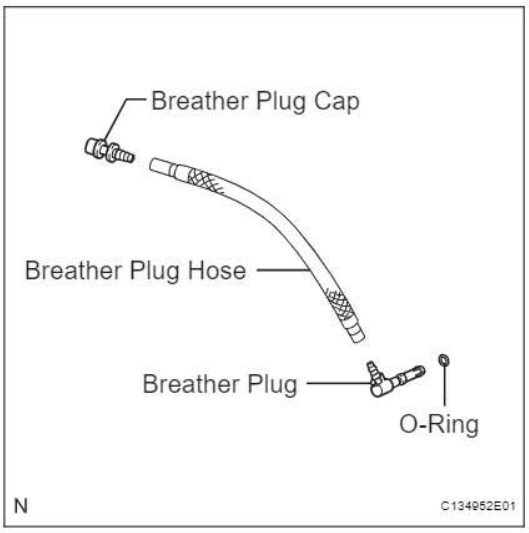
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(b) Install the park/neutral position switch to the control shaft with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
NOTICE:
- **Before installing the park/neutral position switch, remove any dirt or rust on the installation portion of the control shaft. Be sure to install the switch straight along the shaft while being careful not to deform the plate spring that supports the shaft. If the plate spring is deformed, the park/neutral switch cannot be reinstalled correctly.**
- **After installing the park/neutral position switch, confirm that the 2 protrusions on the switch are aligned.**

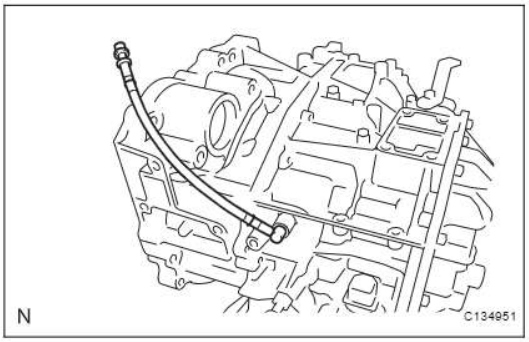


(c) Install the control shaft lever to the control shaft with the washer and nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



62. INSTALL BREATHER PLUG HOSE

(a) Install a new O-ring to the breather plug.
(b) Install the breather plug to the breather plug hose.
(c) Install the breather plug cap to the breather plug hose.

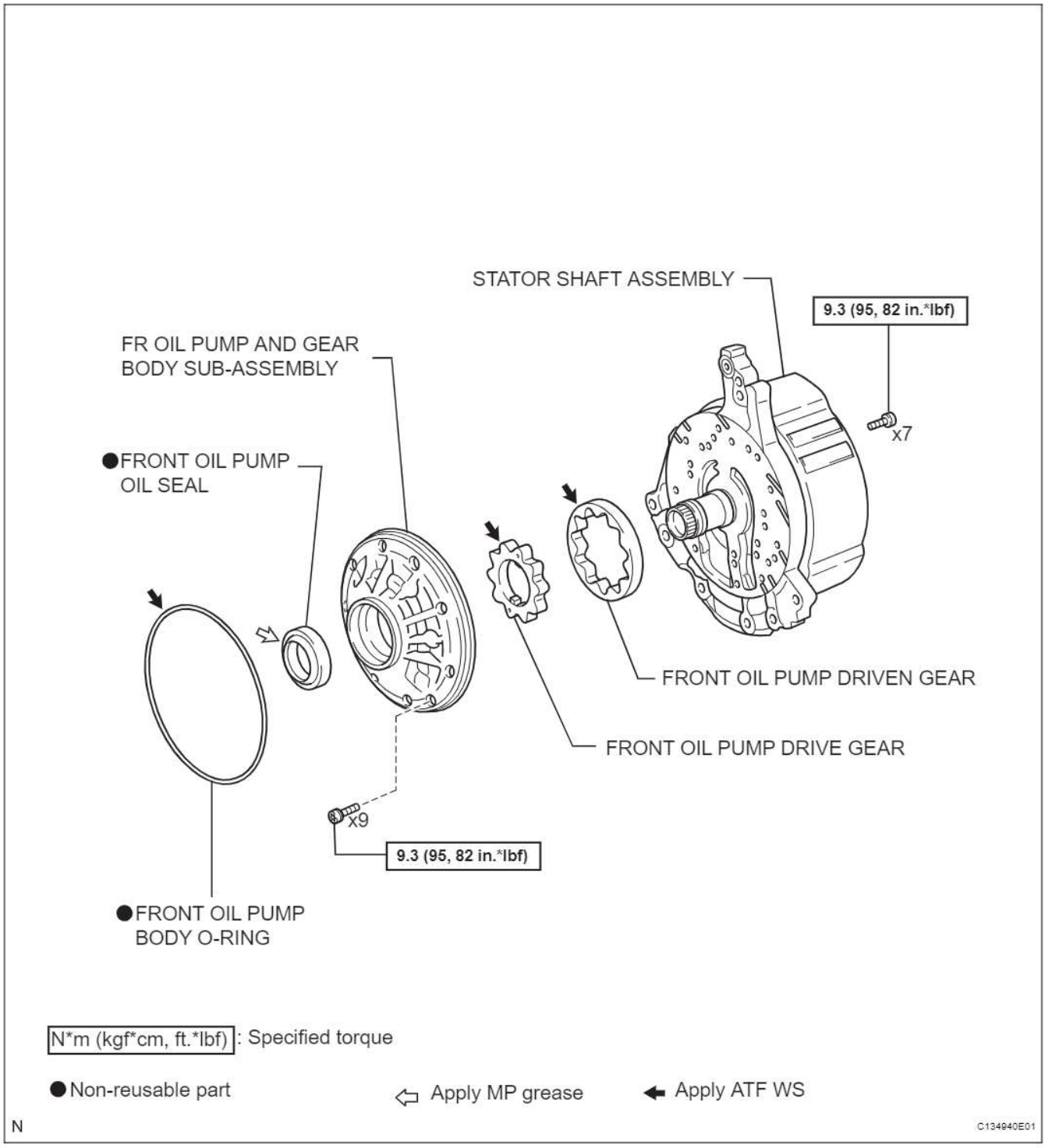


(d) Install the breather plug hose to the transaxle case.

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OIL PUMP

COMPONENTS



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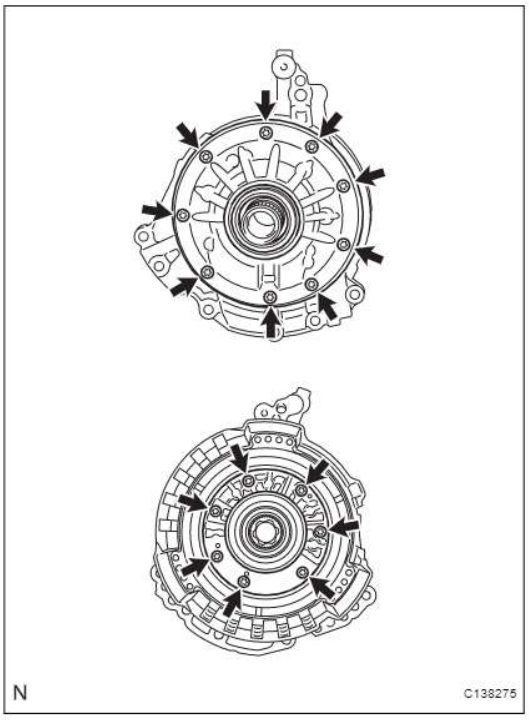
AX

DISASSEMBLY

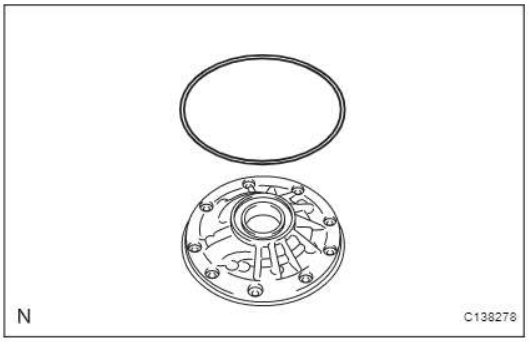
1. **INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY (See page AX-315)**

2. **REMOVE STATOR SHAFT ASSEMBLY**
   (a) Using a "TORX" wrench (T30), remove the 16 bolts and stator shaft assembly from the oil pump body.
   NOTICE:
   Keep the gears in the order of installation.

3. **INSPECT CLEARANCE OF FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY (See page AX-315)**



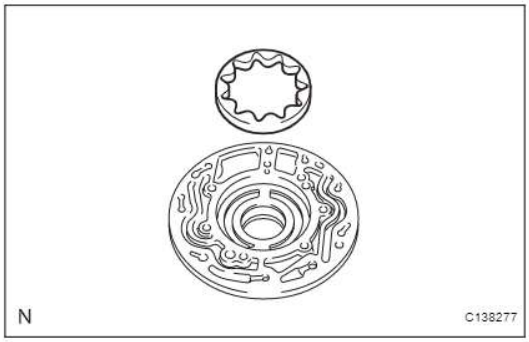
4. **REMOVE FRONT OIL PUMP BODY O-RING**
   (a) Remove the O-ring from the oil pump body.



5. **REMOVE FRONT OIL PUMP DRIVE GEAR**
   (a) Remove the front oil pump drive gear from the oil pump body.

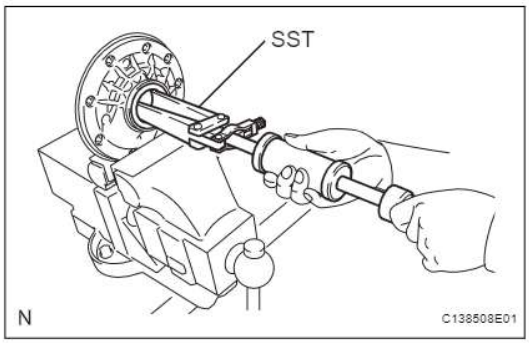


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6. REMOVE FRONT OIL PUMP DRIVEN GEAR

(a) Remove the front oil pump driven gear from the oil pump body.



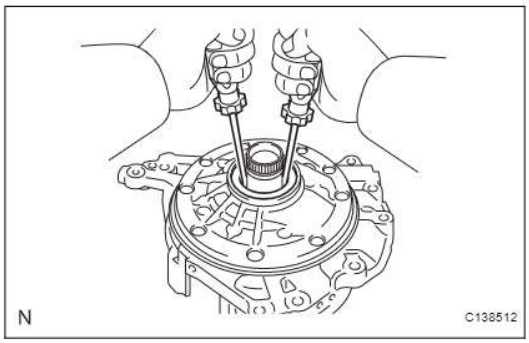
7. REMOVE FRONT OIL PUMP OIL SEAL

(a) Mount the oil pump in a soft jaw vise.

(b) Using SST, remove the oil seal from the oil pump body.

SST 09308-00010

INSPECTION

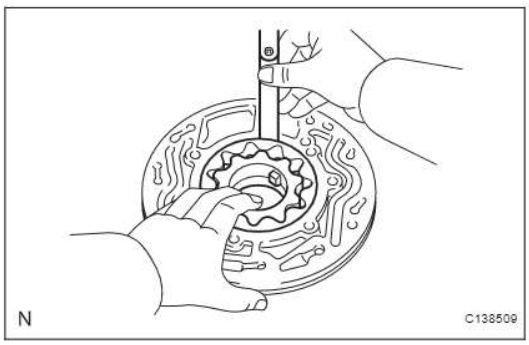


1. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Turn the drive gear with 2 screwdrivers and make sure that it rotates smoothly.

NOTICE:

Be careful not to damage the oil seal lip.



2. INSPECT CLEARANCE OF FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Push the driven gear to one side of the body.

(b) Using a feeler gauge, measure the clearance.

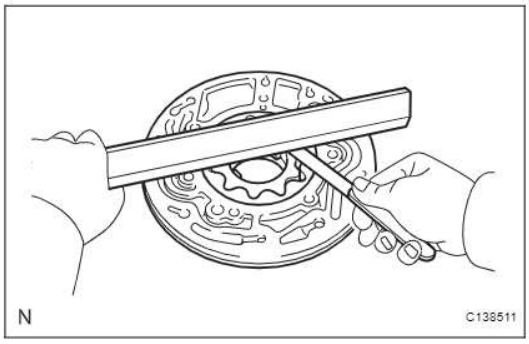
Standard clearance:

0.08 to 0.15 mm (0.0031 to 0.0059 in.)

Maximum clearance:

0.15 mm (0.0059 in.)

If the clearance is greater than the maximum, replace the oil pump body sub-assembly.



(c) Using a straight edge and feeler gauge, measure the side clearance of both gears.

Standard side clearance:

0.025 to 0.04 mm (0.0010 to 0.0016 in.)

Maximum side clearance:

0.04 mm (0.0016 in.)

Drive gear thickness:

Mark	Thickness
-	11.547 to 11.555 mm (0.4546 to 0.4549 in.)
-	11.555 to 11.563 mm (0.4549 to 0.4552 in.)
-	11.564 to 11.571 mm (0.4553 to 0.4556 in.)

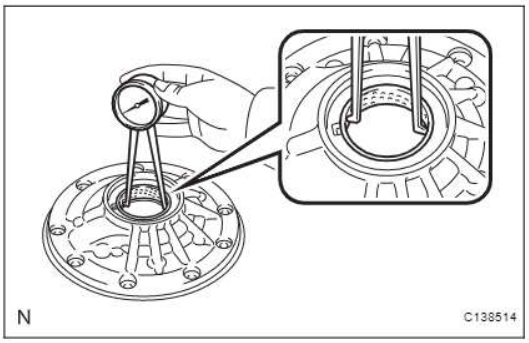
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AX

Mark	Thickness
-	11.572 to 11.579 mm (0.4556 to 0.4559 in.)
-	11.580 to 11.587 mm (0.4559 to 0.4562 in.)

Driven gear thickness:

Mark	Thickness
-	11.547 to 11.555 mm (0.4546 to 0.4549 in.)
-	11.555 to 11.563 mm (0.4549 to 0.4552 in.)
-	11.564 to 11.571 mm (0.4553 to 0.4556 in.)
-	11.572 to 11.579 mm (0.4556 to 0.4559 in.)
-	11.580 to 11.587 mm (0.4559 to 0.4562 in.)

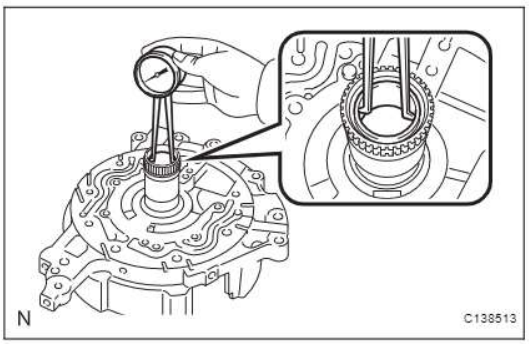


3. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the oil pump body bushing.

Standard inside diameter:
43.113 to 43.138 mm (1.6974 to 1.6983 in.)
Maximum inside diameter:
43.188 mm (1.7003 in.)

If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.



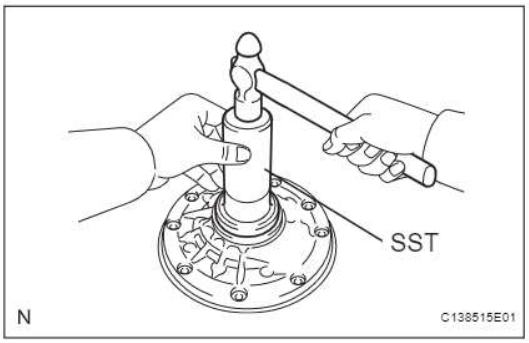
4. INSPECT STATOR SHAFT ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the oil pump body bushing.

Standard inside diameter:
22.500 to 22.526 mm (0.8858 to 0.8868 in.)
Maximum inside diameter:
22.570 mm (0.8886 in.)

If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.

REASSEMBLY

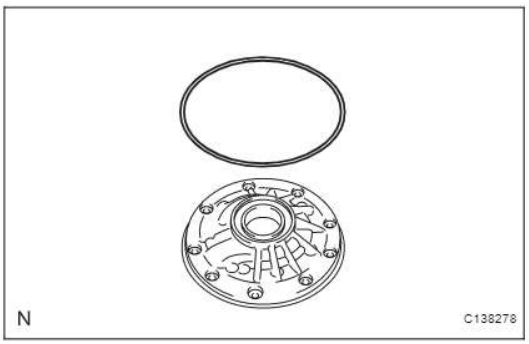


1. INSTALL FRONT OIL PUMP OIL SEAL

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

SST 09350-32014 (09351-32140)
NOTICE:
The seal end should be level with the outer edge of the oil pump.

(b) Coat the lip of the oil seal with MP grease.

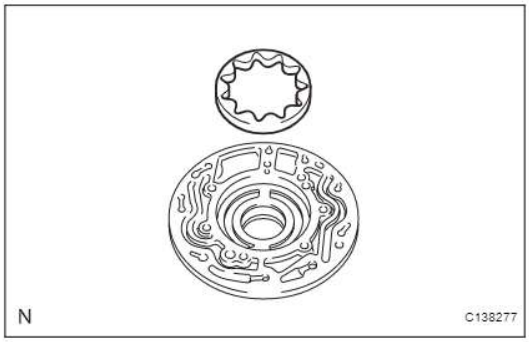


2. INSTALL FRONT OIL PUMP BODY O-RING

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

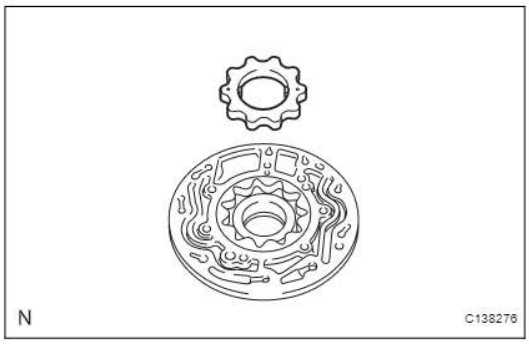
NOTICE:
Ensure that the O-ring is not twisted.

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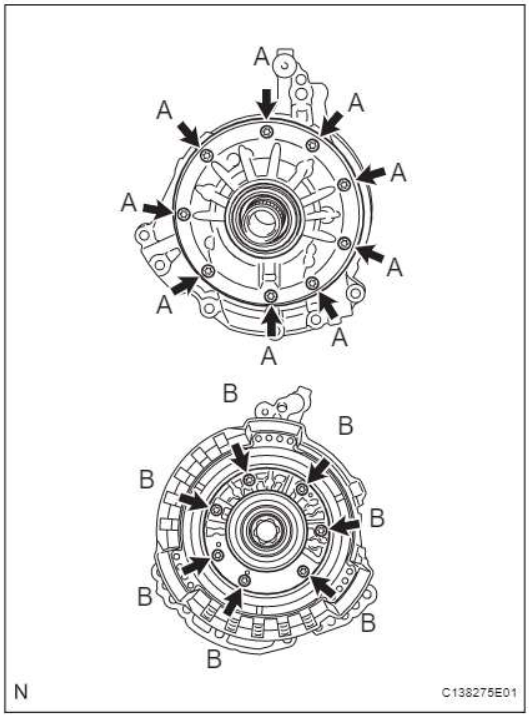
3. INSTALL FRONT OIL PUMP DRIVEN GEAR

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



4. INSTALL FRONT OIL PUMP DRIVE GEAR

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



5. INSTALL STATOR SHAFT ASSEMBLY

(a) Align each knock pin of the stator shaft with the holes in the oil pump body and install the stator shaft to the oil pump body with the 16 bolts.

(b) Using a "TORX" socket (T30), install the 11 bolts.
Torque: 9.3 N*m (95 kgf*cm, 82 in.*lbf)

-	Bolt length:
Bolt A	14 mm (0.55 in)
Bolt B	26 mm (1.02 in)

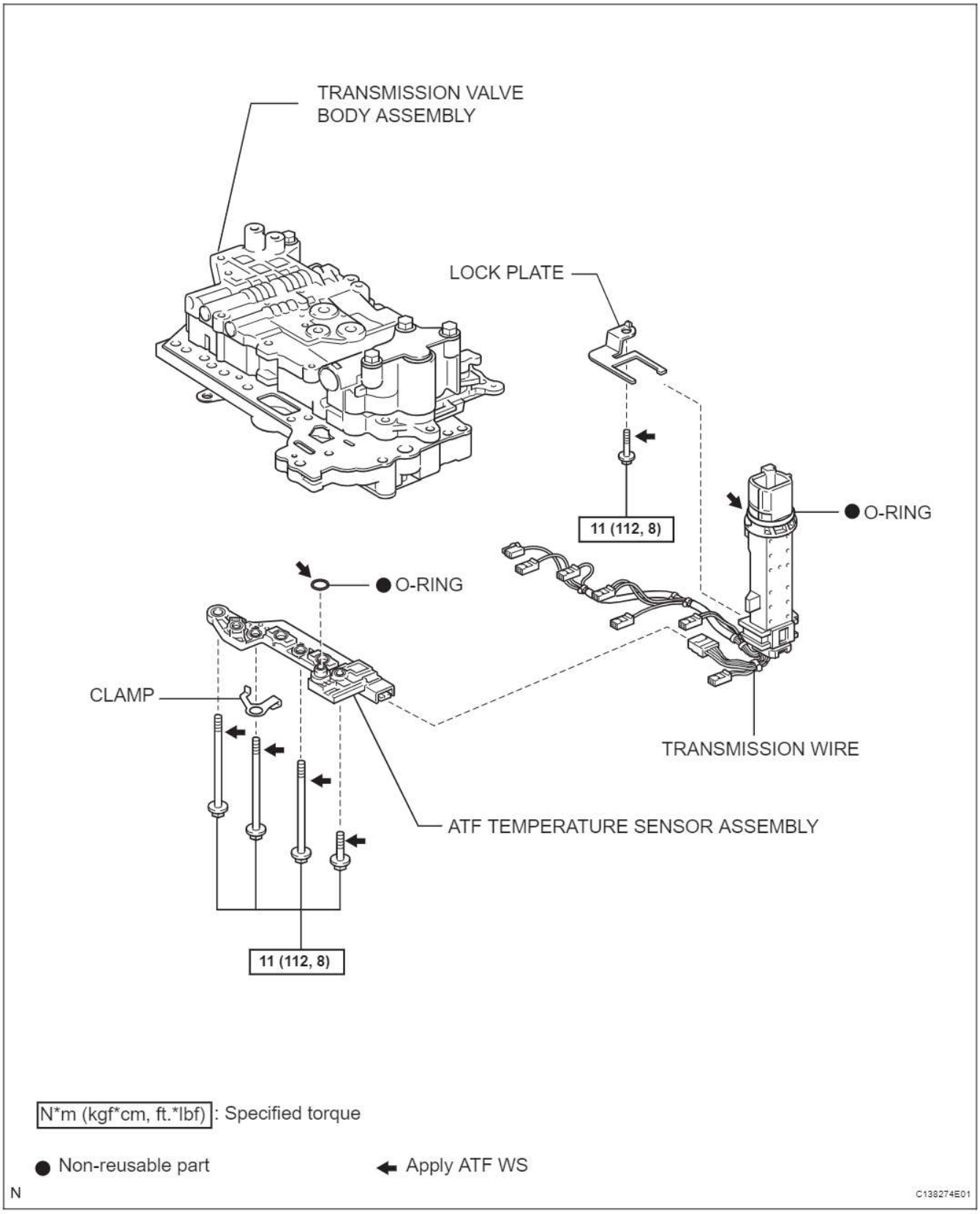
6. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY (See page AX-315)

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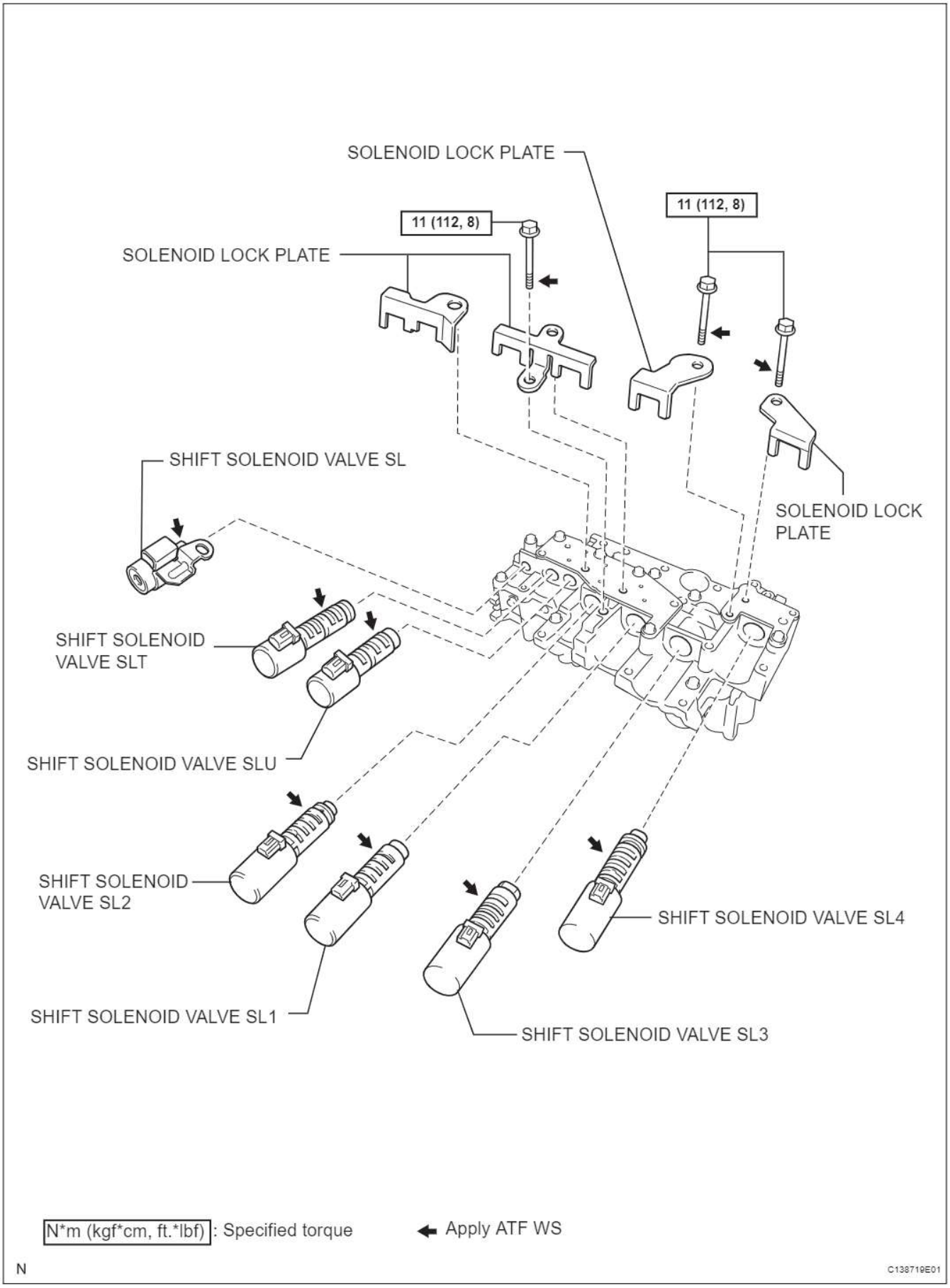
SHIFT SOLENOID VALVE

COMPONENTS

AX



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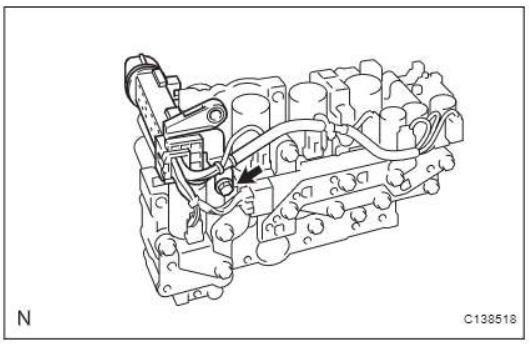
AX

REMOVAL

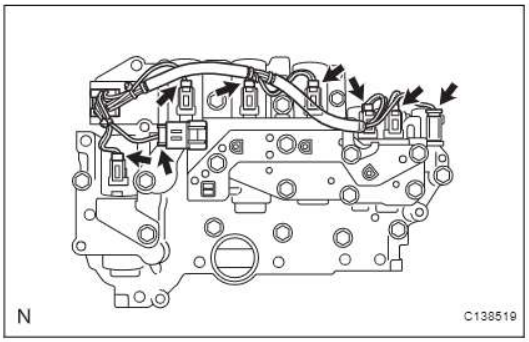
1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY** (See page AX-207)
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-182)**
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-182)**
4. **REMOVE TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**

DISASSEMBLY

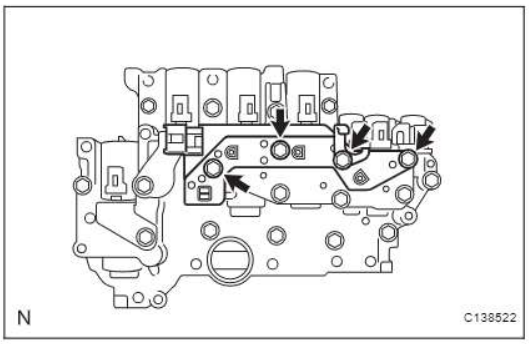
1. **REMOVE TRANSMISSION WIRE**
   (a) Disconnect the connector from the transmission wire.
   (b) Remove the bolt and lock plate from the valve body assembly.



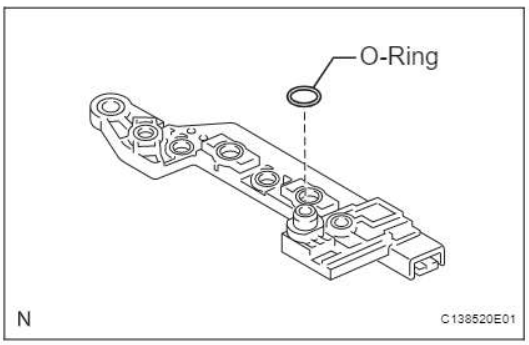
   (c) Disconnect the 8 connectors and remove the transmission wire from the valve body assembly.



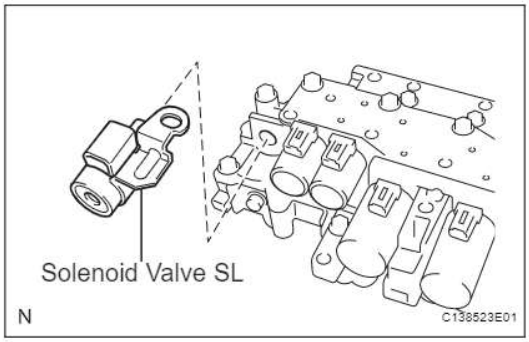
2. **REMOVE ATF TEMPERATURE SENSOR ASSEMBLY**
   (a) Remove the 4 bolts, ATF temperature sensor assembly and clamp from the valve body assembly.



   (b) Remove the O-ring from the ATF temperature sensor assembly. O-ring

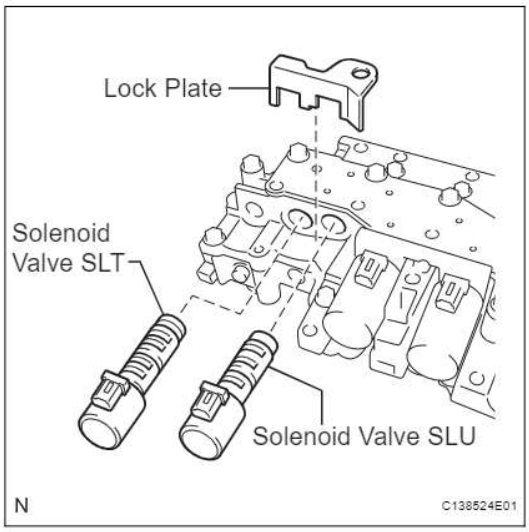


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3. REMOVE SHIFT SOLENOID VALVE SL

(a) Remove the shift solenoid valve SL from the valve body assembly.

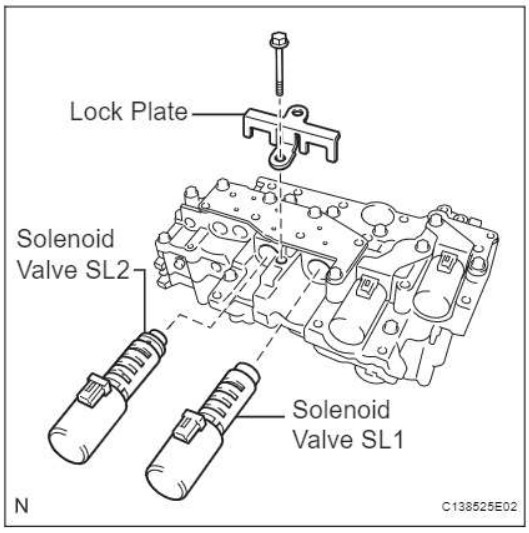


4. REMOVE SHIFT SOLENOID VALVE SLT

(a) Remove the lock plate and shift solenoid valve SLT from the valve body assembly

5. REMOVE SHIFT SOLENOID VALVE SLU

(a) Remove the shift solenoid valve SLU from the valve body assembly.



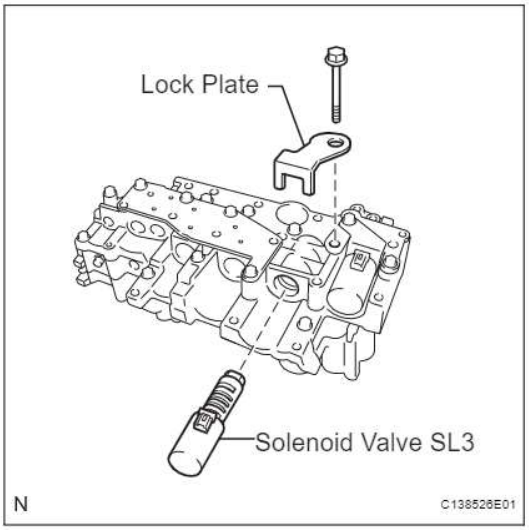
6. REMOVE SHIFT SOLENOID VALVE SL2

(a) Remove the bolt, lock plate and shift solenoid valve SL2 from the valve body assembly.

7. REMOVE SHIFT SOLENOID VALVE SL1

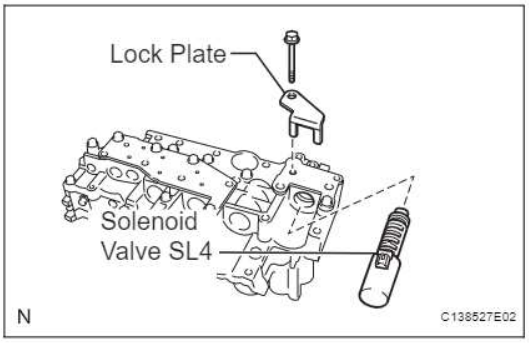
(a) Remove the shift solenoid valve SL1 from the valve body assembly.

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8. REMOVE SHIFT SOLENOID VALVE SL3

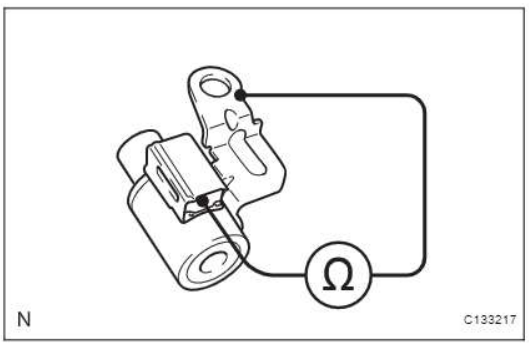
(a) Remove the bolt, lock plate and shift solenoid valve SL3 from the valve body assembly.



9. REMOVE SHIFT SOLENOID VALVE SL4

(a) Remove the bolt, lock plate and shift solenoid valve SL4 from the valve body assembly.

INSPECTION



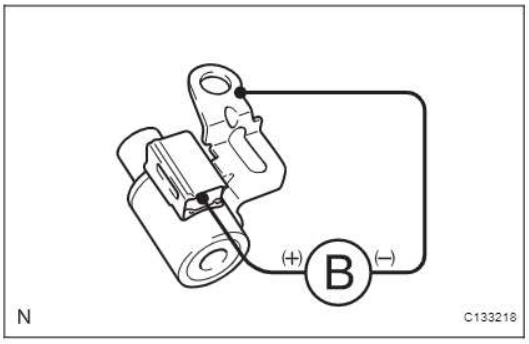
1. INSPECT SHIFT SOLENOID VALVE SL

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

Standard resistance

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

If the value is not as specified, replace the shift solenoid valve.



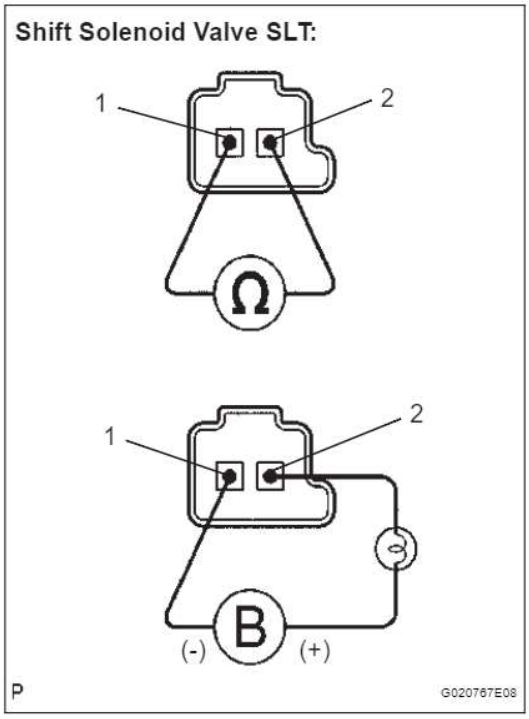
(b) Connect the positive (+) lead to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.

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2. INSPECT SHIFT SOLENOID VALVE SLT

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

Standard resistance

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

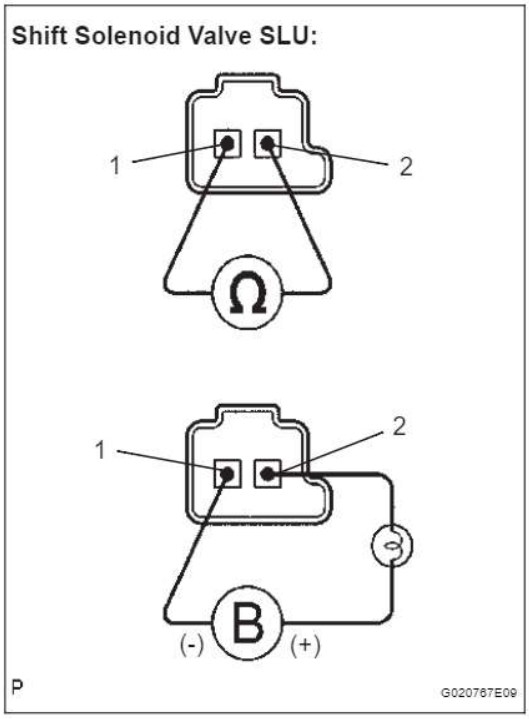
If the value is not as specified, replace the shift solenoid valve.

(b) 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 shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



3. INSPECT SHIFT SOLENOID VALVE SLU

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

Standard resistance

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

If the value is not as specified, replace the shift solenoid valve.

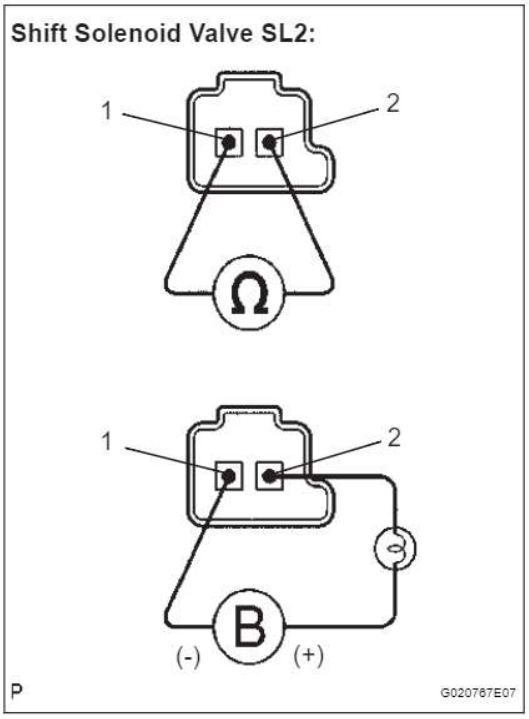
(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.

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4. INSPECT SHIFT SOLENOID VALVE SL2

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

Standard resistance

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

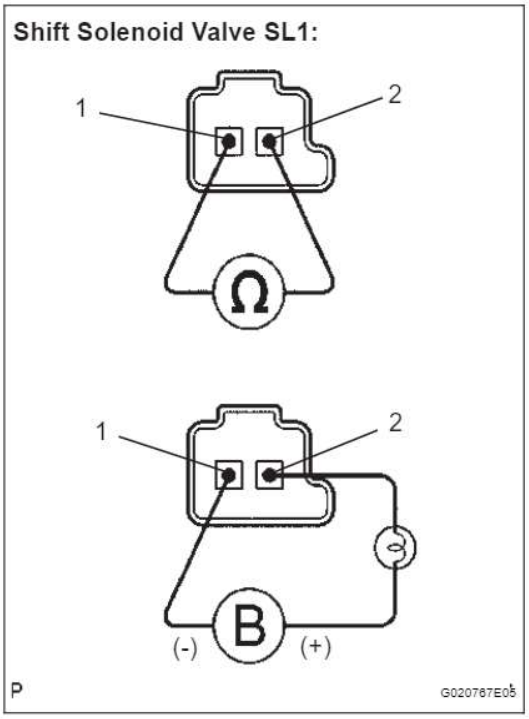
If the value is not as specified, replace the shift solenoid valve.

(b) 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 shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



5. INSPECT SHIFT SOLENOID VALVE SL1

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

Standard resistance

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

If the value is not as specified, replace the shift solenoid valve.

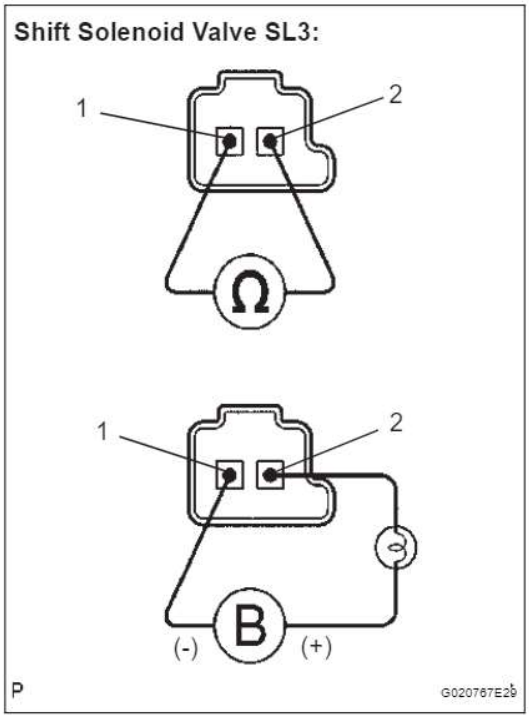
(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.

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6. INSPECT SHIFT SOLENOID VALVE SL3

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

Standard resistance

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

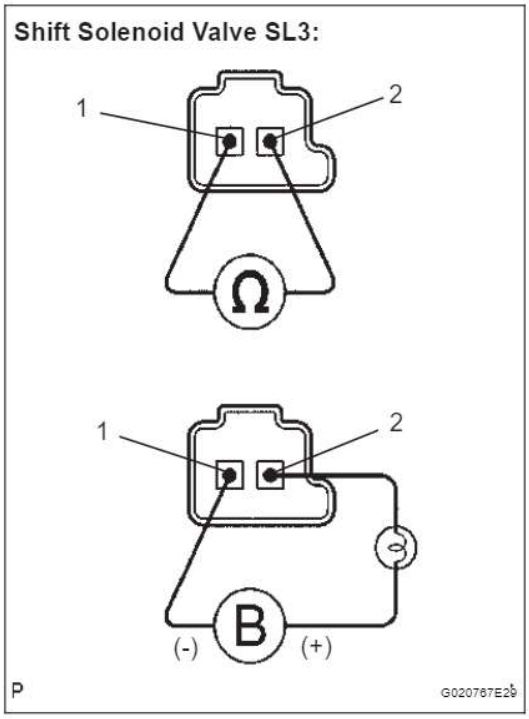
If the value is not as specified, replace the shift solenoid valve.

(b) 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 shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



7. INSPECT SHIFT SOLENOID VALVE SL4

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

Standard resistance

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

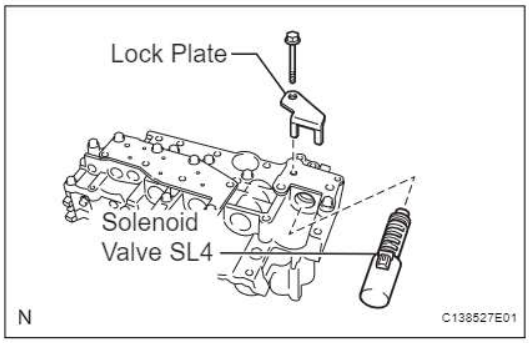
If the value is not as specified, replace the shift solenoid valve.

(b) 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 shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



REASSEMBLY

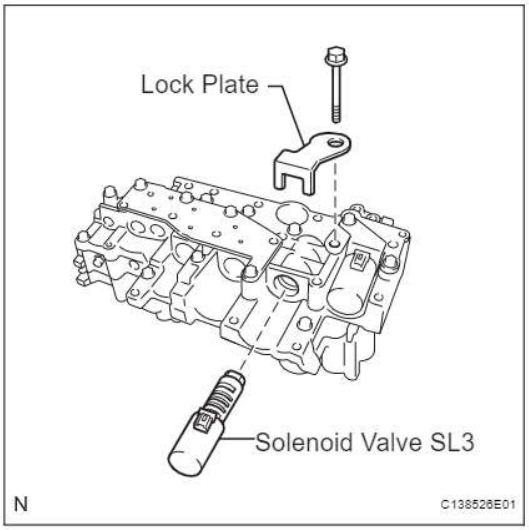
1. INSTALL SHIFT SOLENOID VALVE SL4

(a) Coat the shift solenoid valve SL4 and bolt with ATF.

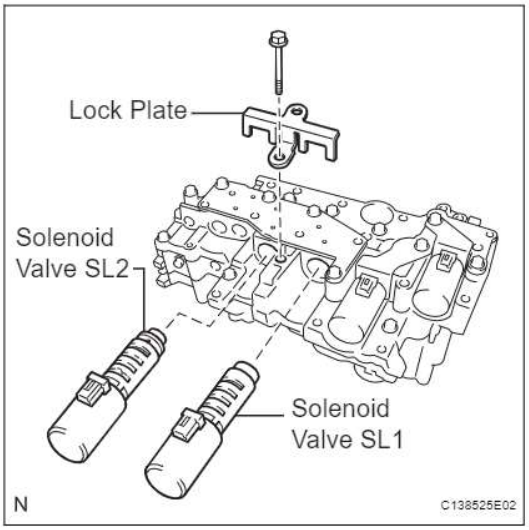
(b) Install the shift solenoid valve SL4 and lock plate to the valve body assembly with the bolt.

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

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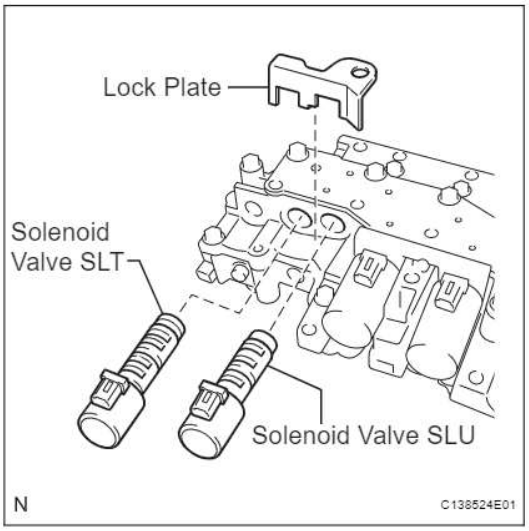


2. **INSTALL SHIFT SOLENOID VALVE SL3**
   (a) Coat the shift solenoid valve SL3 and bolt with ATF.
   (b) Install the shift solenoid valve SL3 and lock plate to the valve body assembly with the bolt.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



3. **INSTALL SHIFT SOLENOID VALVE SL1**
   (a) Coat the shift solenoid valve SL1 with ATF.
   (b) Install the shift solenoid valve SL1 to the valve body assembly.

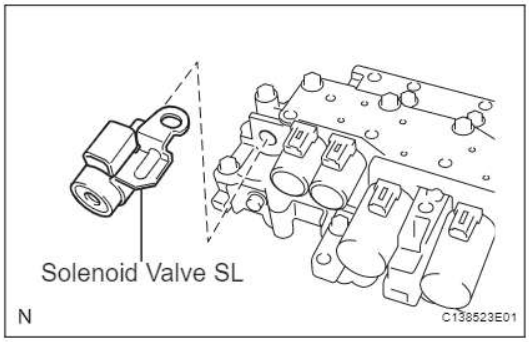
4. **INSTALL SHIFT SOLENOID VALVE SL2**
   (a) Coat the shift solenoid valve SL2 and bolt with ATF.
   (b) Install the shift solenoid valve SL2 and lock plate to the valve body assembly with the bolt.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



5. **INSTALL SHIFT SOLENOID VALVE SLU**
   (a) Coat the shift solenoid valve SLU with ATF.
   (b) Install the shift solenoid valve SLU to the valve body assembly.

6. **INSTALL SHIFT SOLENOID VALVE SLT**
   (a) Coat the shift solenoid valve SLT with ATF.
   (b) Install the shift solenoid valve SLT and lock plate to the valve body assembly.

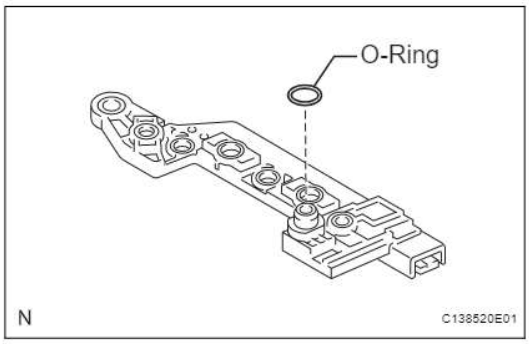
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7. INSTALL SHIFT SOLENOID VALVE SL

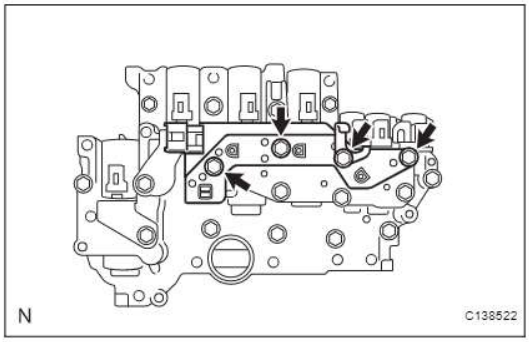
(a) Coat the shift solenoid valve SL with ATF.

(b) Install the shift solenoid valve SL to the valve body assembly.



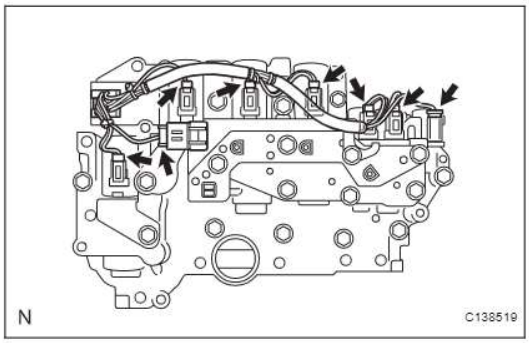
8. INSTALL ATF TEMPERATURE SENSOR ASSEMBLY

(a) Coat a new O-ring with ATF and install it to the ATF temperature sensor assembly.



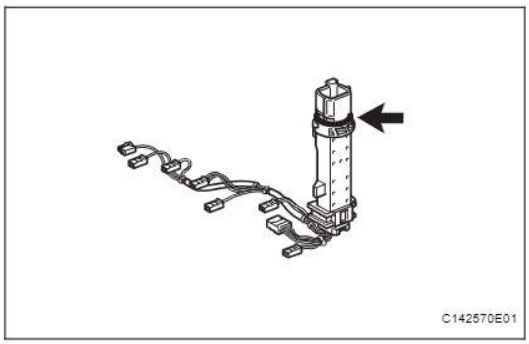
(b) Coat the 4 bolts with ATF.

(c) Install the ATF temperature sensor assembly and clamp to the valve body assembly with the 4 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



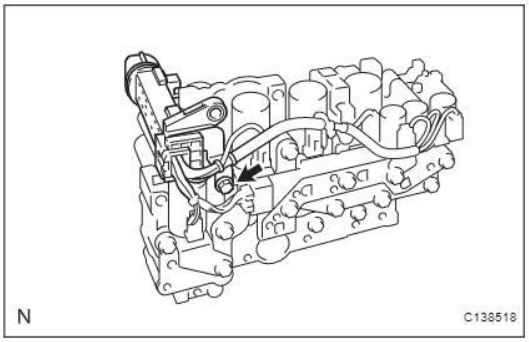
9. INSTALL TRANSMISSION WIRE

(a) Connect the 8 connectors to the valve body assembly.



(b) Coat the O-ring with ATF.

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(c) Coat the bolt with ATF.
(d) Install the transmission wire and lock plate to the valve body assembly with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

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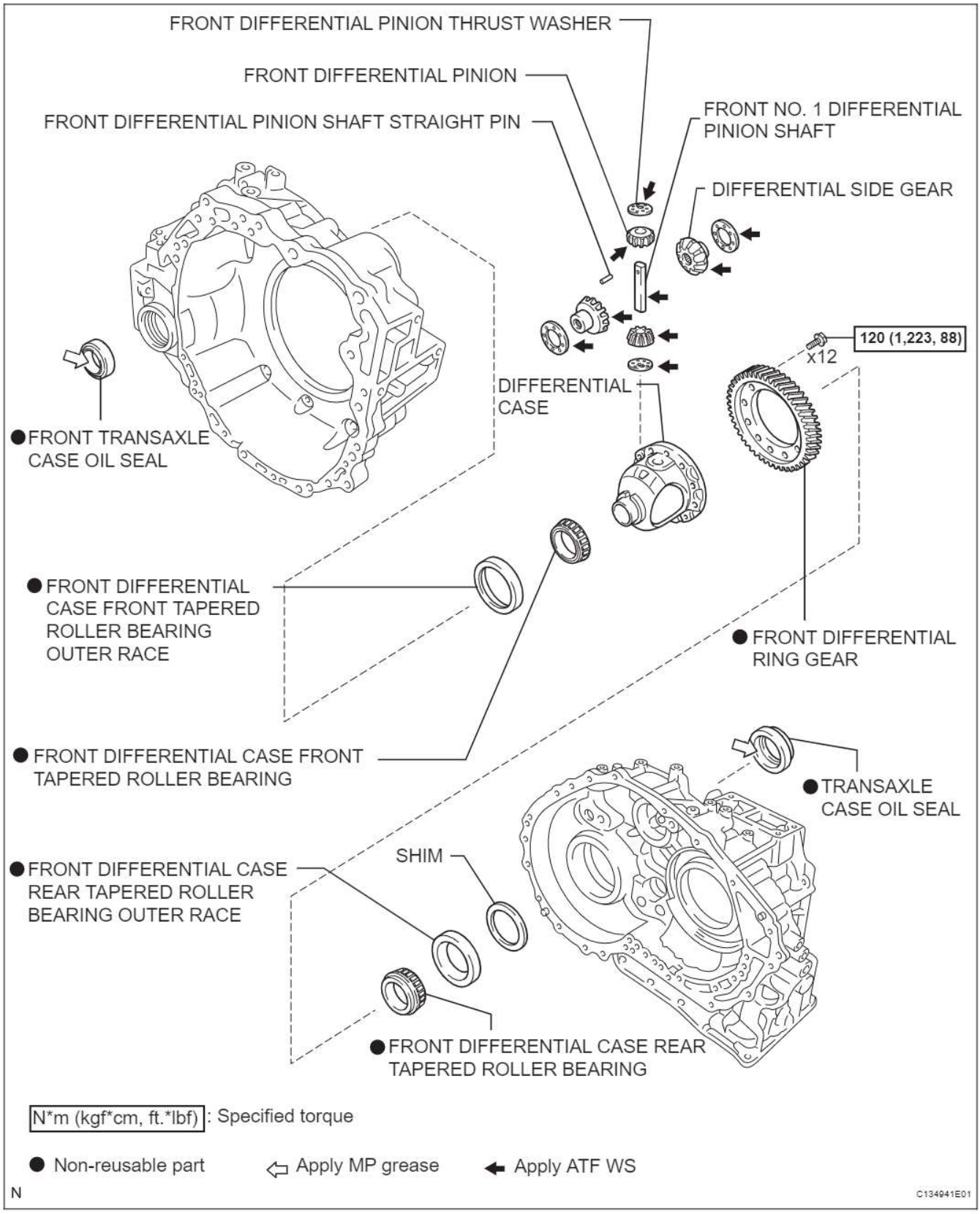
INSTALLATION

1. INSTALL TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)
2. INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-184)
3. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-185)
4. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (See page AX-214)

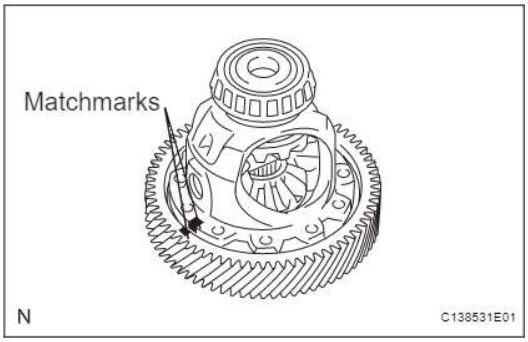
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DIFFERENTIAL CASE

COMPONENTS



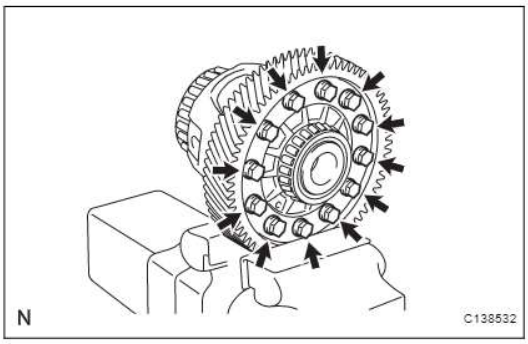
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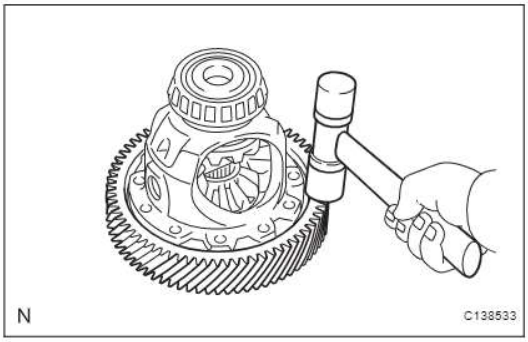
DISASSEMBLY

1. REMOVE FRONT DIFFERENTIAL RING GEAR

(a) Put matchmarks on the front differential ring gear and differential case.



(b) Remove the 12 bolts.

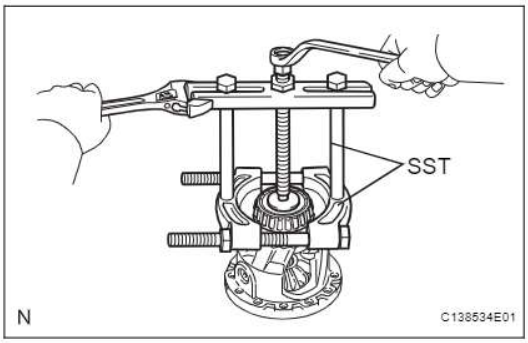


(c) Using a plastic hammer, tap on the front differential ring gear to remove it from the case.

2. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

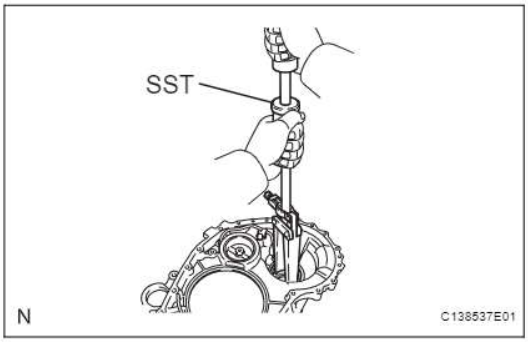
(a) Using SST, remove the front differential case front tapered roller bearing from the differential case.

SST 09950-00020, 09950-00030, 09950-60010 (09951-00480)

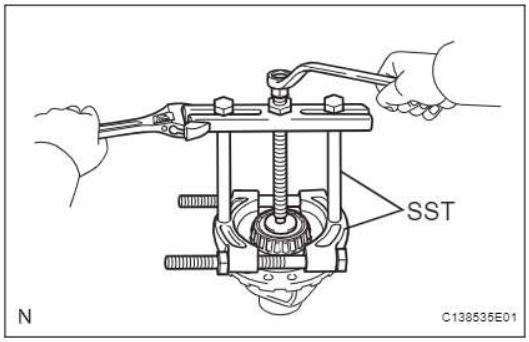


(b) Using SST, remove the front differential case front tapered roller bearing outer race and shim from the transaxle housing.

SST 09308-00010

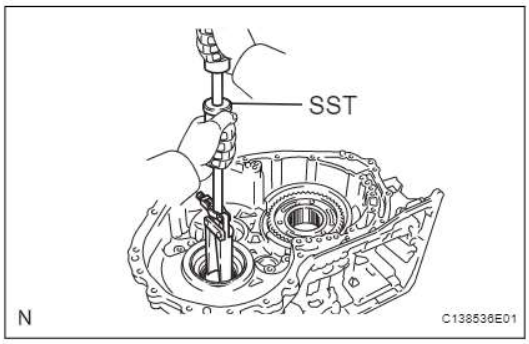


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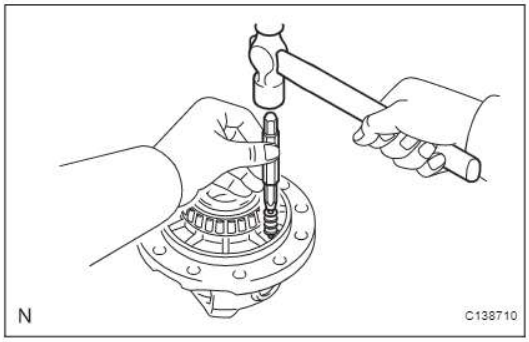


3. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST, remove the front differential case rear tapered roller bearing from the differential case.
SST 09950-00020, 09950-00030, 09950-60010 (09951-00480)

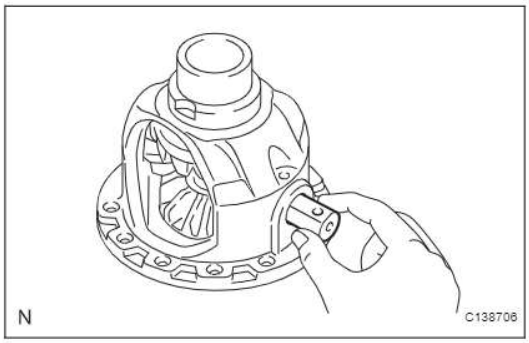


(b) Using SST, remove the front differential case rear tapered roller bearing outer race from the transaxle case.
SST 09308-00010



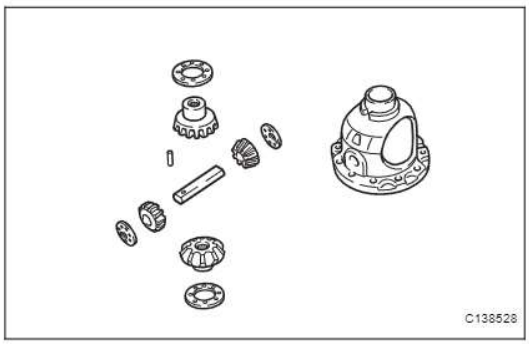
4. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a pin punch (3 mm) and hammer, remove the straight pin.
NOTICE:
Before removing the straight pin, unstake it with a pin punch.



5. REMOVE FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Remove the front No. 1 differential pinion shaft from the differential case.

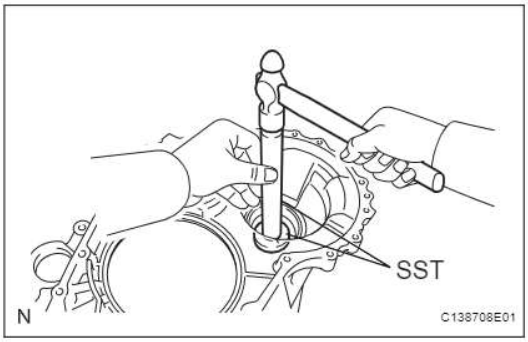


6. REMOVE DIFFERENTIAL SIDE GEAR

(a) Remove the 2 front differential pinions, 2 pinion thrust washers, 2 front differential side gears, and 2 side gear thrust washers from the differential case.

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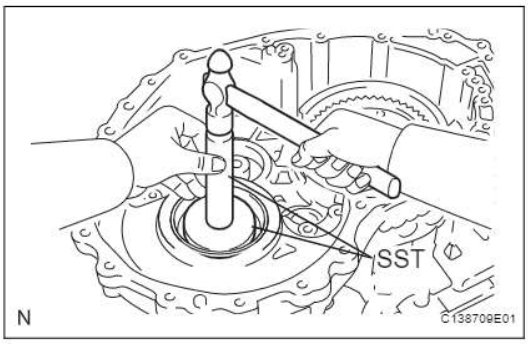
AX



7. REMOVE FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, remove the front transaxle case oil seal from the transaxle housing.

SST 09950-60010 (09951-00540), 09950-70010 (09951-07200)

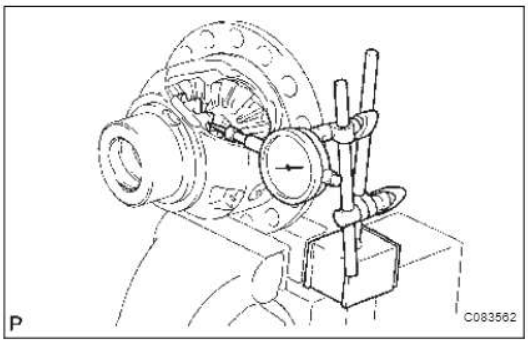


8. REMOVE TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, remove the transaxle case oil seal from transaxle case.

SST 09950-60010 (09951-00650), 09950-70010 (09951-07100)

INSPECTION



1. INSPECT DIFFERENTIAL SIDE GEAR BACKLASH

(a) Hold the differential case in a vise between aluminum plates.

NOTICE:

Do not overtighten the vise.

(b) Place a dial indicator on the tip of the side gear tooth at a right angle.

(c) Hold the pinion gear in the differential case and measure the backlash of the side gear.

Standard backlash:

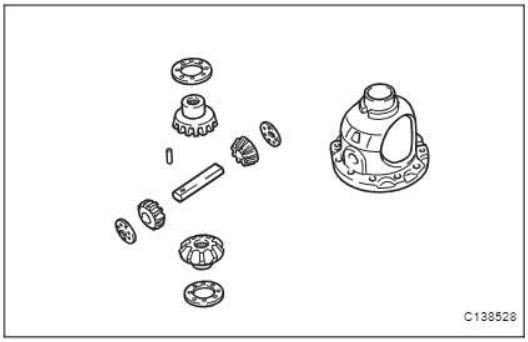
0 to 0.15 mm (0 to 0.0059 in.)

Thrust washer thickness

Thickness	Thickness
1.50 mm (0.0591 in.)	1.75 mm (0.0689 in.)
1.55 mm (0.0610 in.)	1.80 mm (0.0709 in.)
1.60 mm (0.0630 in.)	1.85 mm (0.07283 in.)
1.65 mm (0.0650 in.)	1.90 mm (0.07480 in.)
1.70 mm (0.0669 in.)	-

If the backlash is greater than the standard range, select another side gear thrust washer.

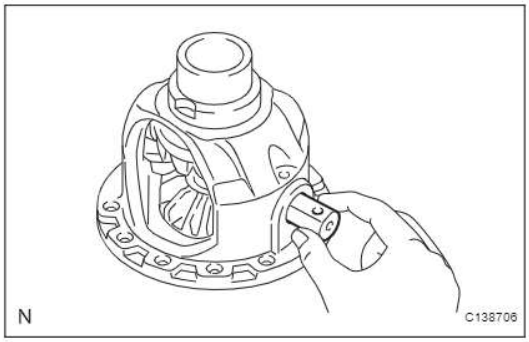
REASSEMBLY



1. INSTALL DIFFERENTIAL SIDE GEAR

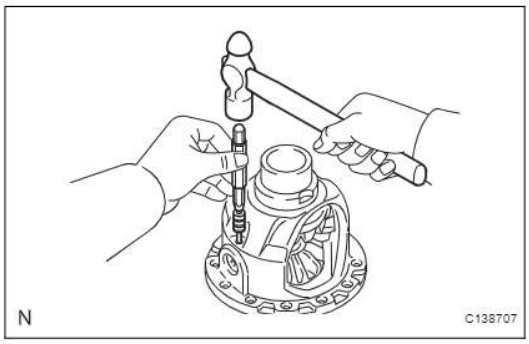
(a) Coat the 2 front differential side gears, 2 side gear thrust washers, 2 front differential pinions and 2 pinion thrust washers with ATF and install them to the differential case.

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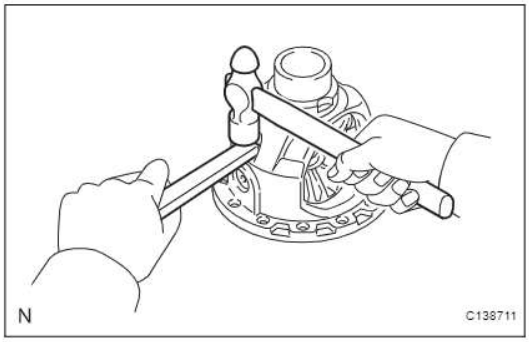


2. **INSTALL FRONT NO. 1 DIFFERENTIAL PINION SHAFT**
   (a) Coat the front No. 1 differential pinion shaft with ATF, and install it to the differential case.

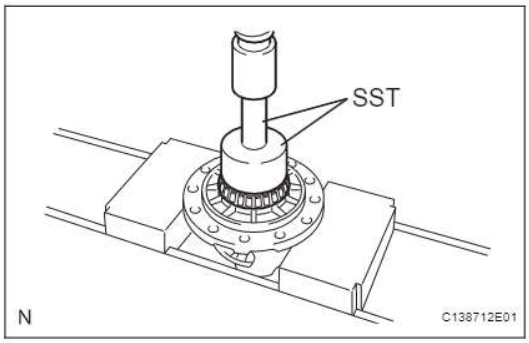
3. **INSPECT DIFFERENTIAL SIDE GEAR BACKLASH (See page AX-332)**



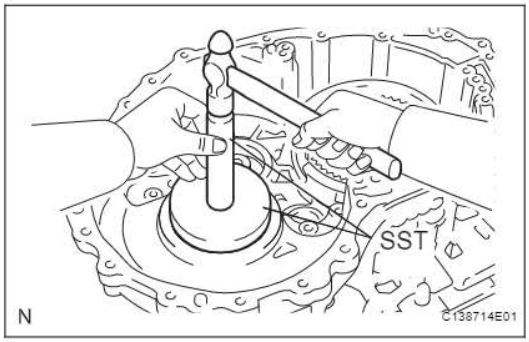
4. **INSTALL FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN**
   (a) Using a pin punch (3 mm) and hammer, install the pinion shaft straight pin.
   NOTICE:
   Align the holes, and install the pinion shaft straight pin.



   (b) Using a chisel and hammer, stake the differential case.
   NOTICE:
   Stake the differential case after adjusting the backlash.

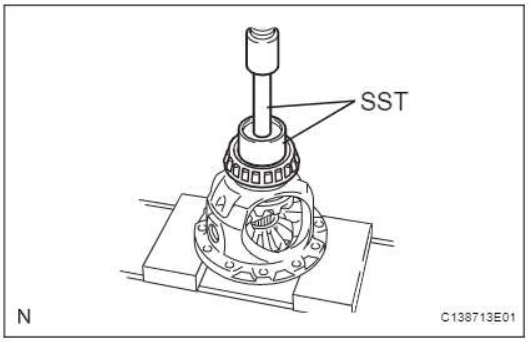


5. **INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING**
   (a) Using SST and a press, install the front differential case rear tapered roller bearing to the differential case.
   SST 09710-04081, 09950-60010 (09951-00480), 09950-70010 (09951-07100)
   NOTICE:
   Do not damage the bearing cage during bearing inner race installation.



   (b) Using SST and a hammer, install the front differential case rear tapered roller bearing outer race to the transaxle case.
   SST 09950-70010 (09951-07150), 09950-60020 (09951-00790)
   NOTICE:
   Ensure that there is no clearance between the bearing and transaxle case.

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6. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

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

SST 09710-04081, 09950-60010 (09951-00480), 09950-70010 (09951-07100)

NOTICE:

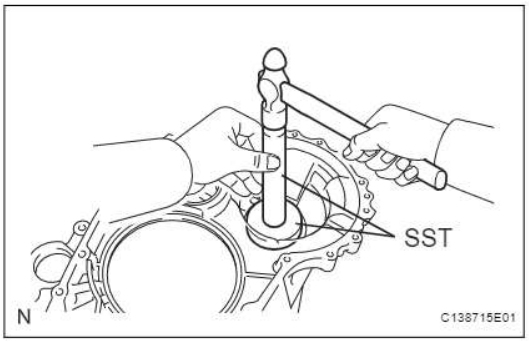
Do not damage the bearing cage during bearing inner race installation.

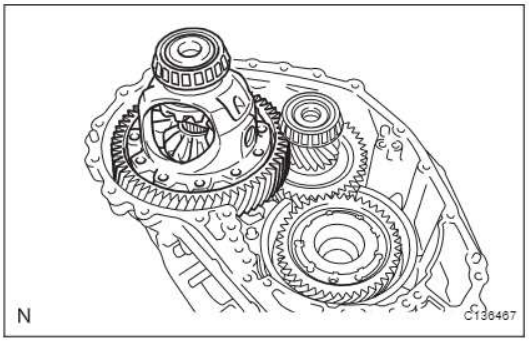
(b) Install the shim to the transaxle housing.

(c) Using SST and a hammer, install the front differential case front tapered roller bearing outer race to the transaxle housing.

NOTICE:

Ensure that there is no clearance between the bearing and transaxle housing.

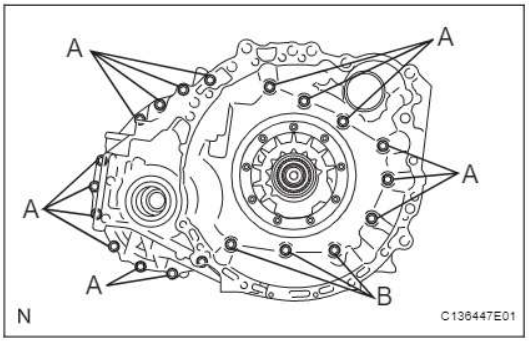




7. ADJUST DIFFERENTIAL SIDE BEARING PRELOAD

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

(b) Clean the contact surfaces of the transaxle case and transaxle housing.



(c) Install the transaxle housing to the transaxle case with the 20 bolts.

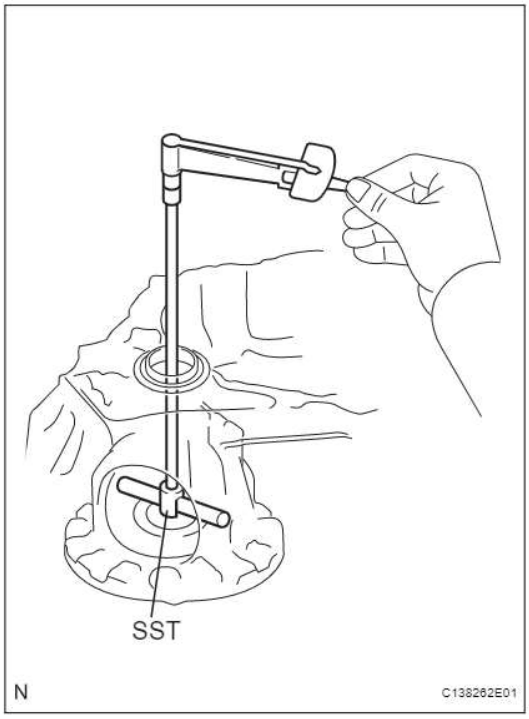
Torque: Bolt A

31 N*m (316 kgf*cm, 23 ft.*lbf)

Bolt B

23 N*m (234 kgf*cm, 17 ft.*lbf)

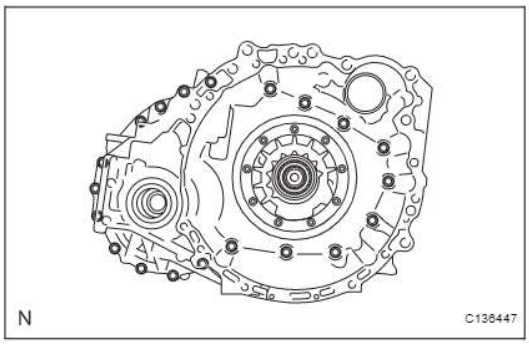
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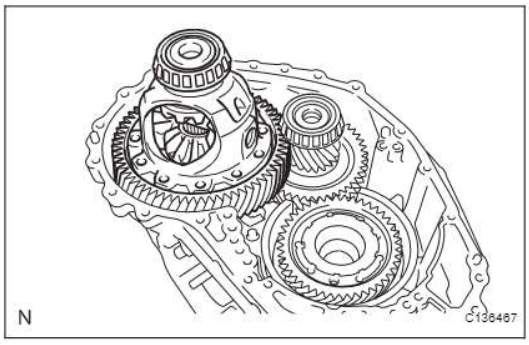
(d) Using SST, turn the differential assembly right and left 2 or 3 times to settle the bearing.
SST 09564-33010

(e) Using SST and a torque wrench, measure the turning torque of the differential side bearing while rotating SST at 10 rpm.
SST 09564-33010
Turning torque:
1.05 to 1.93 N*m (10.70 to 19.67 kgf*cm, 9.29 to 17.08 in.*lbf)
If the turning torque is not within the specified range, refer to the table below to select a shim so that the turning torque is within the specified range.
Shim thickness: mm (in.)

Thickness	Thickness	Thickness	Thickness
2.000 (0.0787)	2.225 (0.0876)	2.450 (0.0965)	2.675 (0.1054)
2.025 (0.0797)	2.250 (0.0886)	2.475 (0.0974)	2.700 (0.1063)
2.050 (0.0807)	2.275 (0.0896)	2.500 (0.0984)	2.725 (0.1073)
2.075 (0.0817)	2.300 (0.0906)	2.525 (0.0994)	2.750 (0.1083)
2.100 (0.0827)	2.325 (0.0915)	2.550 (0.1004)	2.775 (0.1093)
2.125 (0.0837)	2.350 (0.0925)	2.575 (0.1014)	2.800 (0.1102)
2.150 (0.0847)	2.375 (0.0935)	2.600 (0.1024)	2.825 (0.1112)
2.175 (0.0856)	2.400 (0.0945)	2.625 (0.1034)	2.850 (0.1122)
2.200 (0.0866)	2.425 (0.0955)	2.650 (0.1043)	2.875 (0.1132)

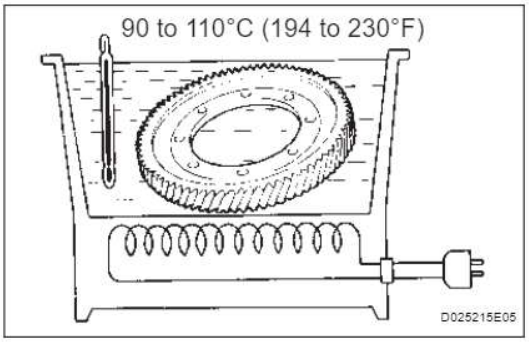


(f) Remove the 20 bolts and the transaxle housing from the transaxle case.



(g) Remove the differential assembly from the transaxle case.

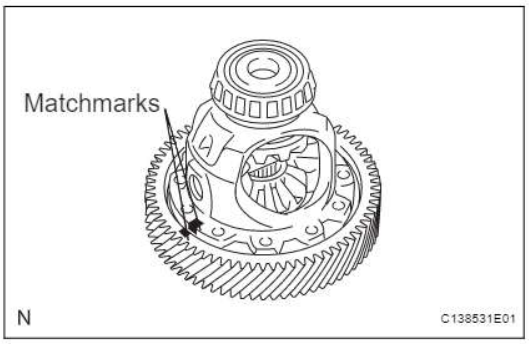
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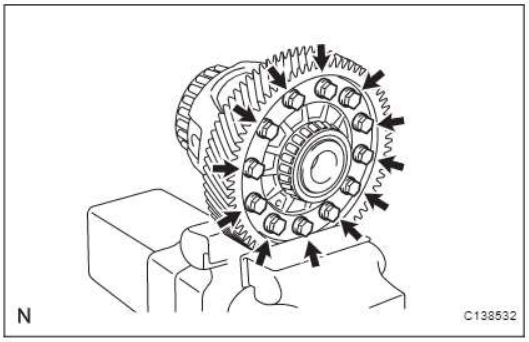
8. INSTALL FRONT DIFFERENTIAL RING GEAR

(a) Using ATF and a heater, heat the front differential ring gear to 90 to 110°C (194.0 to 230.0°F).
NOTICE:
Do not heat the ring gear to more than 110°C (230.0°F).

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



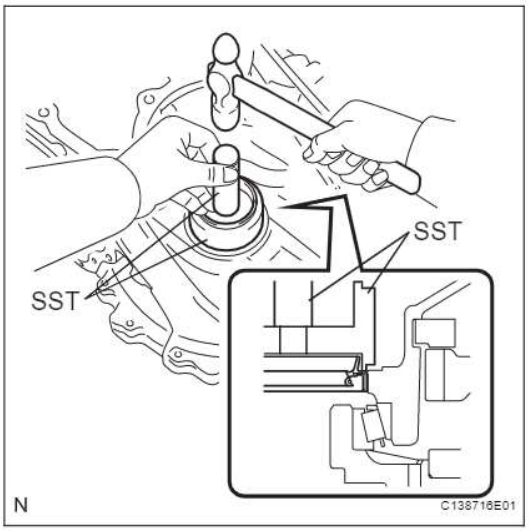
(c) Align the matchmarks, and install the front differential ring gear case quickly.
NOTICE:
Do not install the bolts while the ring gear is hot.



(d) Tighten the 12 bolts.
Torque: 120 N*m (1,223 kgf*cm, 88 ft.*lbf)
NOTICE:
Tighten the bolts a little at a time in diagonal order.

9. INSTALL TRANSAXLE CASE OIL SEAL

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

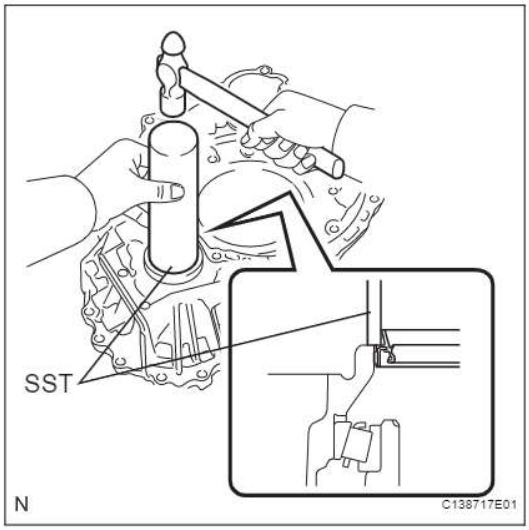


(b) Using SST and a hammer, install the oil seal.
SST 09316-10010, 09950-70010 (09951-07100)
Oil seal drive in depth:
-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

10. INSTALL FRONT TRANSAXLE CASE OIL SEAL

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

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(b) Using SST and a hammer, install the oil seal.
SST 09308-14010
Oil seal drive in depth:
-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

AX

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