DEFINITION OF TERMS

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

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PART AND SYSTEM NAME LIST

This reference list indicates the part and system names used in this manual along with their definitions.

Part and System Name	Definition
Accel position sensor	Accelerator pedal position sensor
AFS	Air fuel ratio sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor "A"	Transmission fluid temperature sensor
Camshaft timing oil control valve, Oil control valve OCV, VVT, VSV	Camshaft timing oil control valve
Charcoal canister	Evaporative emissions canister
Crankshaft position sensor "A"	Crankshaft position sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic transmission
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Engine immobiliser system, Immobiliser system	Vehicle anti-theft system
Engine speed sensor	Crankshaft position sensor
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
Input speed sensor, Input turbine speed sensor "A", Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intermediate shaft speed sensor "A"	Counter gear speed sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
O2 sensor	Heater oxygen sensor
ORVR system	On-board refueling vapor recovery system
Output speed sensor	Output shaft speed sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
PNP switch, NSW	Park/Neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
PS pressure switch	Power steering pressure switch
Shift solenoid	Transmission shift solenoid valve
Speed sensor, Vehicle speed sensor "A", Speed sensor for skid control ECU	Vehicle speed sensor
THA	Intake air temperature
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Toyota HCAC system, Hydrocarbon adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Transmission control switch, Shift lock control unit	Shift lock control module
Turbo pressure sensor	Turbocharger pressure sensor
Vacuum sensor	Manifold air pressure sensor
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Variable timing and lift, VVTL	Camshaft timing and lift control
Variable valve timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system

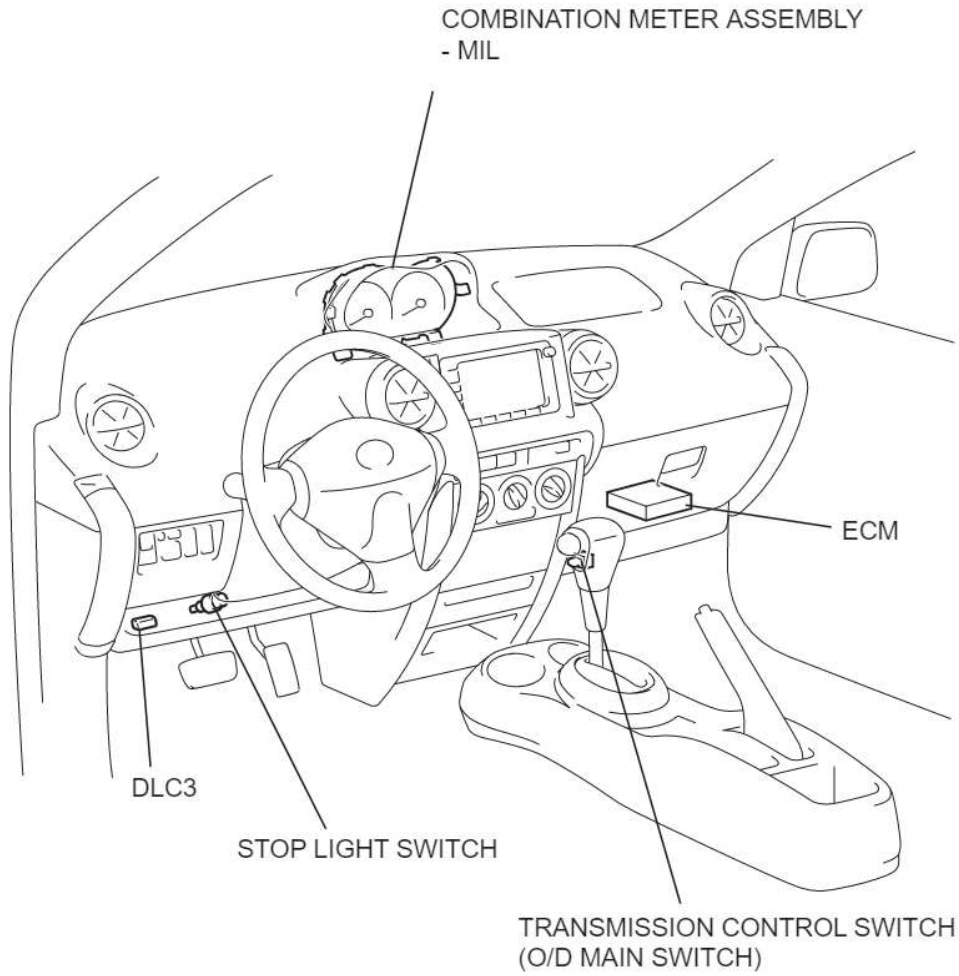
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Part and System Name	Definition
VSV for ACM	Active control engine mount
VSV for CCV, VSV for canister close valve	Evaporative emissions canister vent valve
VSV for EVAP, No. 1 vacuum switching valve assembly, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for intake control	Intake manifold tuning solenoid valve
VSV for pressure switching valve, By-pass VSV	Evaporative emission pressure switching valve
VSV for turbo	Turbocharger pressure control solenoid valve

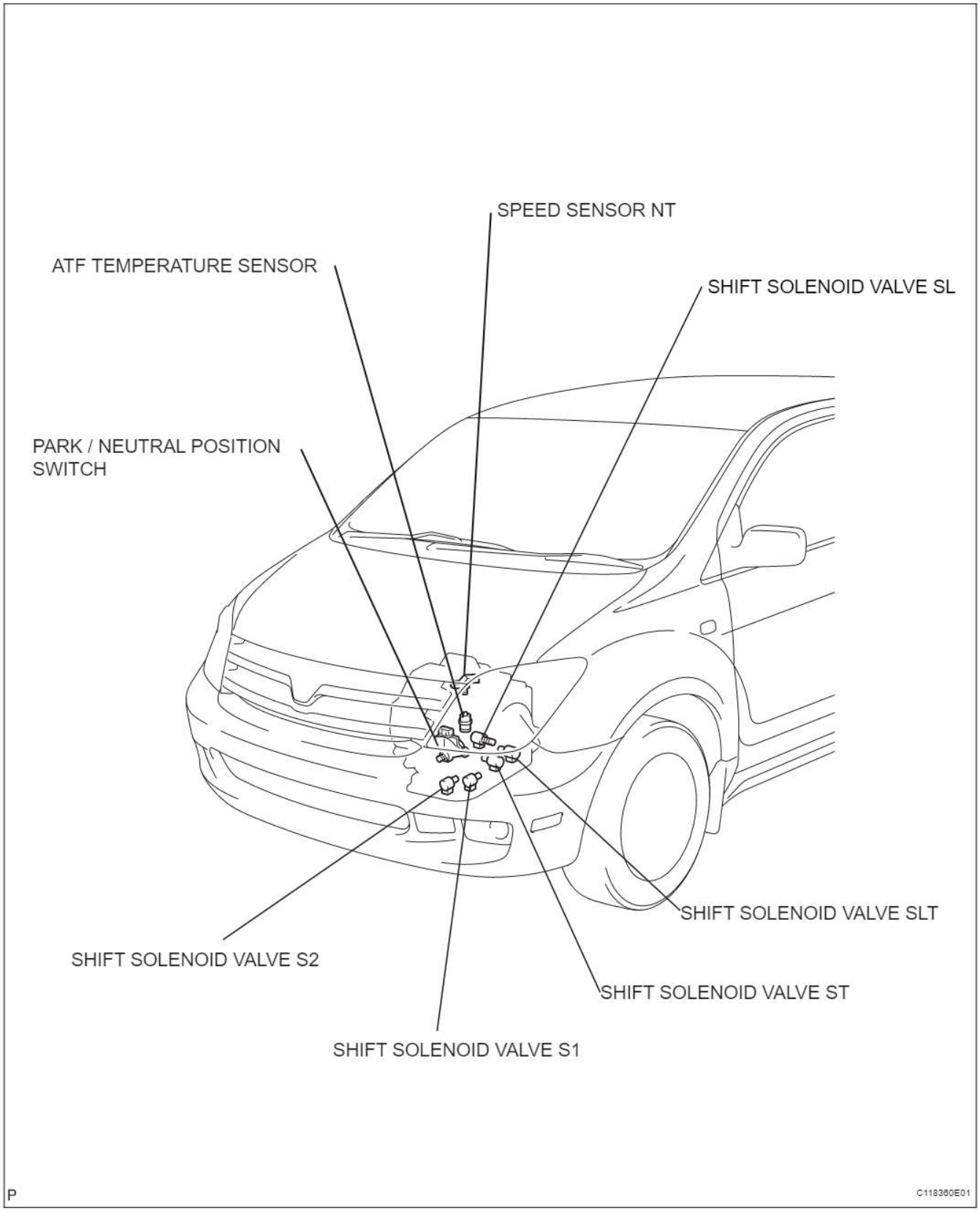
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PARTS LOCATION



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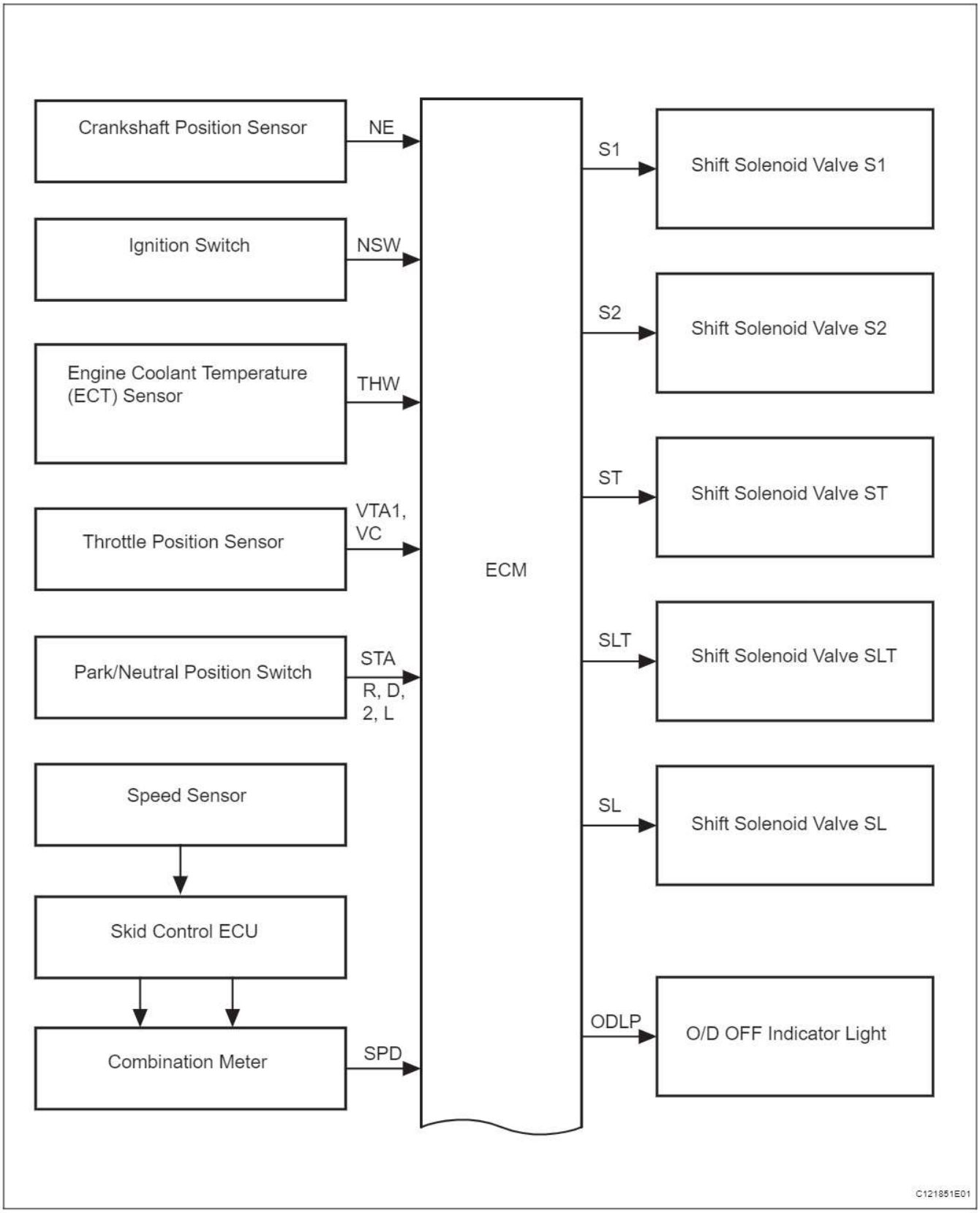
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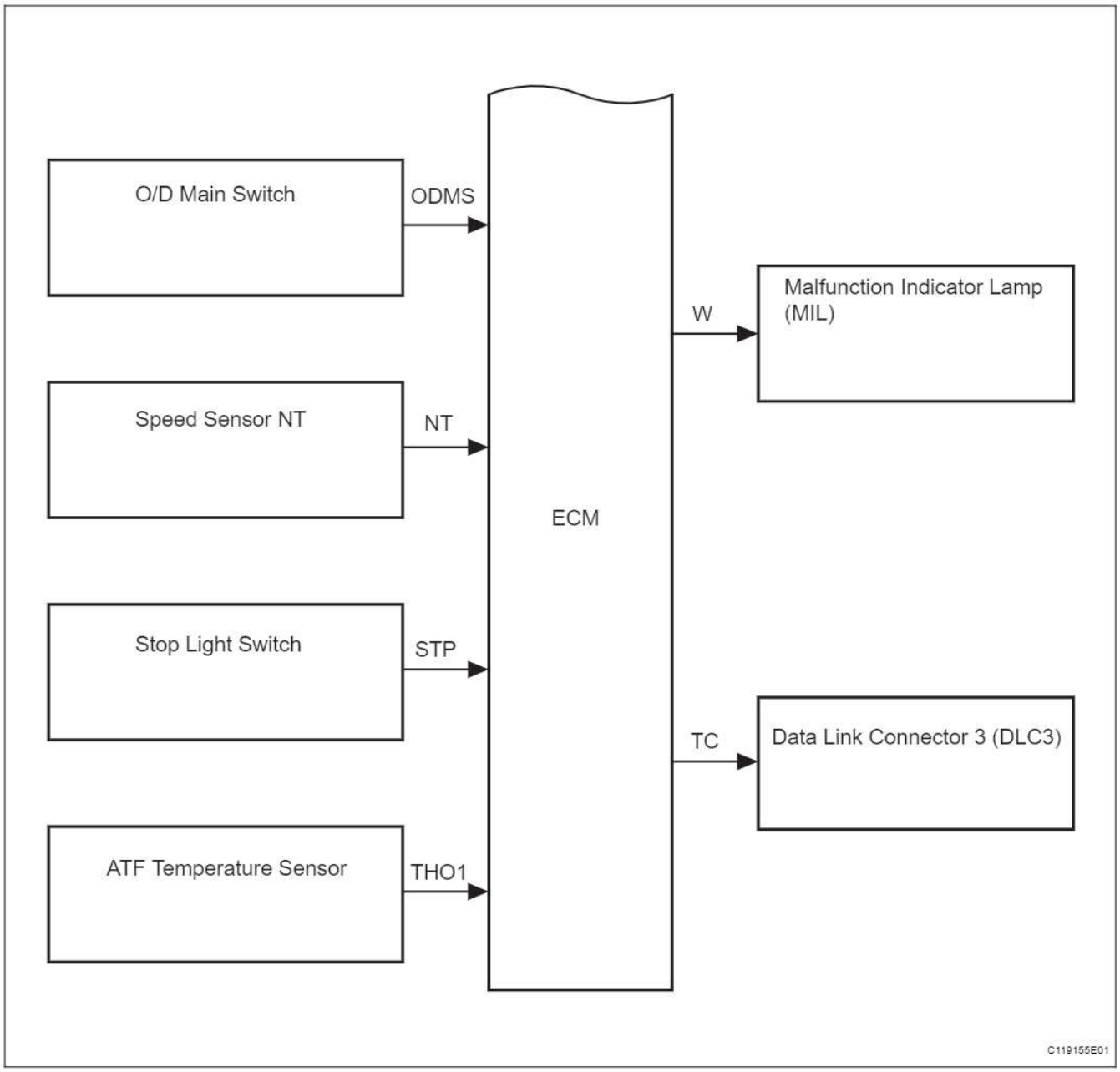
SYSTEM DIAGRAM

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

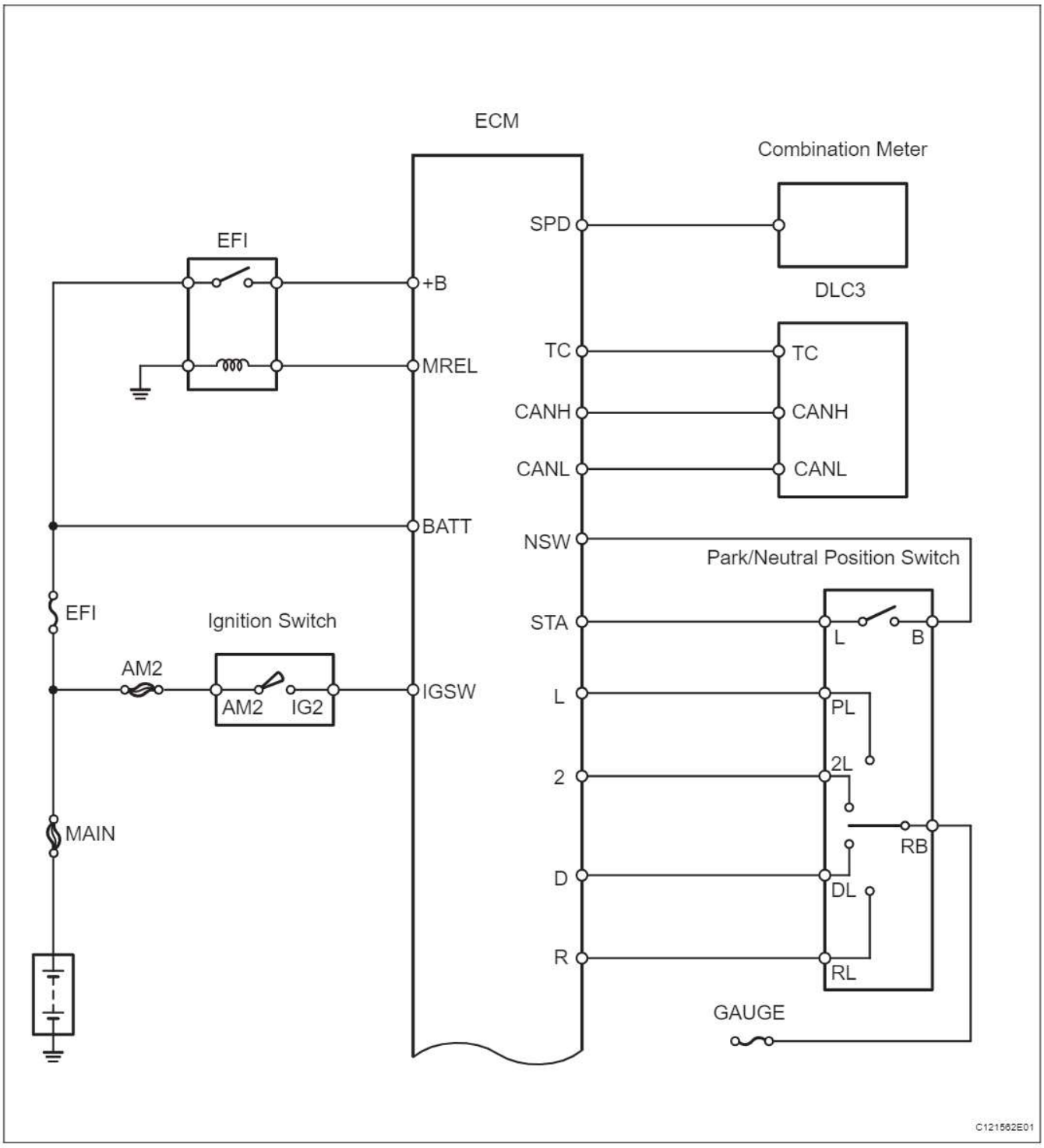


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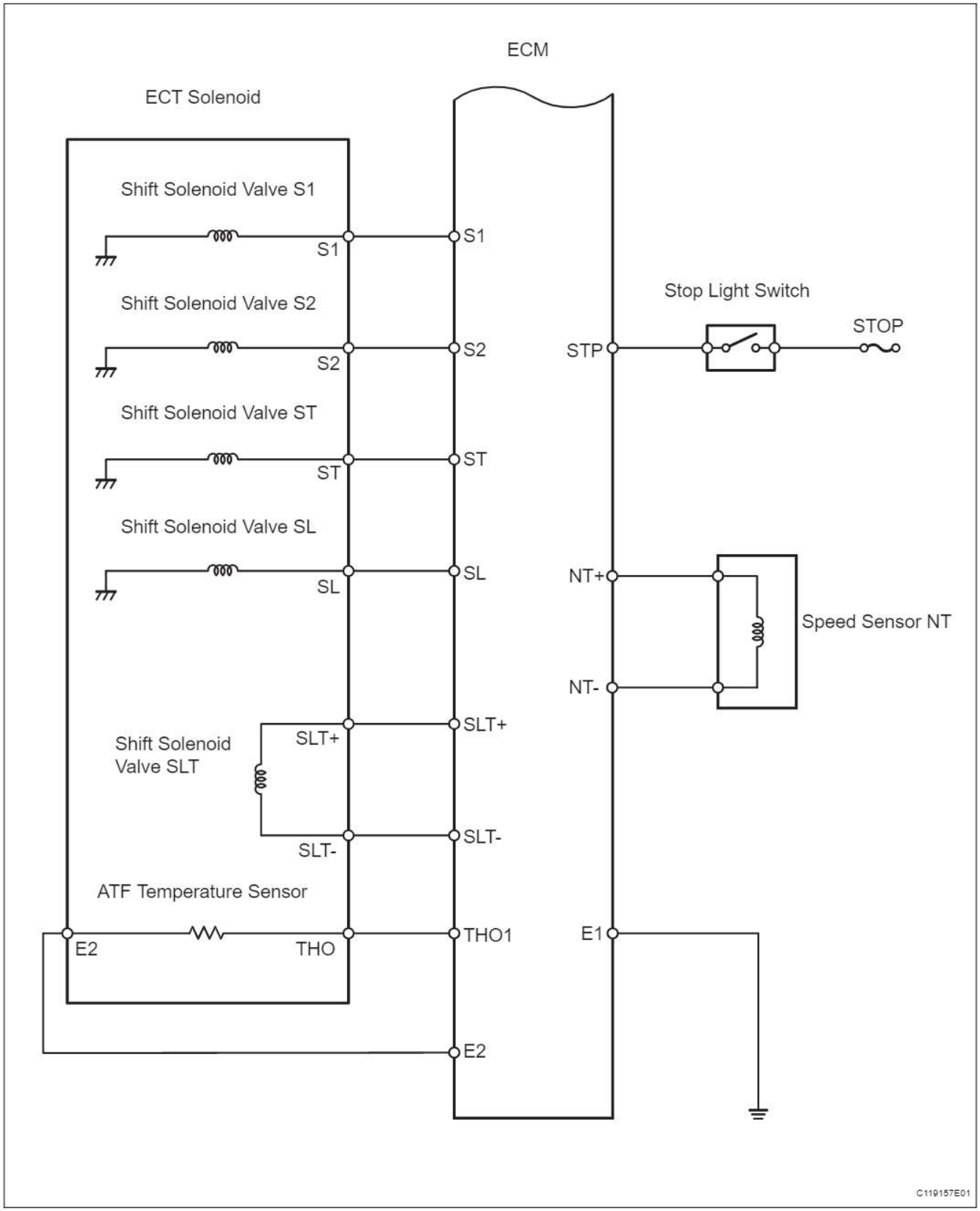
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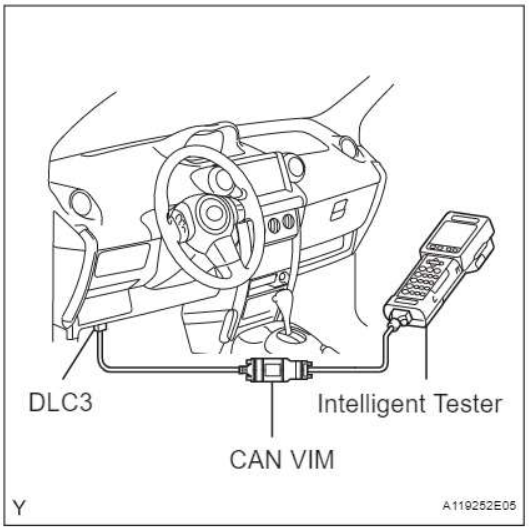


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6. **CHECK MIL**
   (a) Check that the MIL illuminates when turning the ignition switch ON.
   If the MIL does not illuminate, there is a problem in the MIL circuit (see page ES-321).
   (b) When the engine is started, the MIL should turn off.
7. **ALL READINESS**
   (a) For this vehicle, using the intelligent tester allows readiness codes corresponding to all DTCs to be read. When the diagnosis (normal or malfunctioning) has been completed, readiness codes are set. Enter the following menus: ENHANCED OBD II / MONITOR STATUS on the intelligent tester.



DTC CHECK / CLEAR

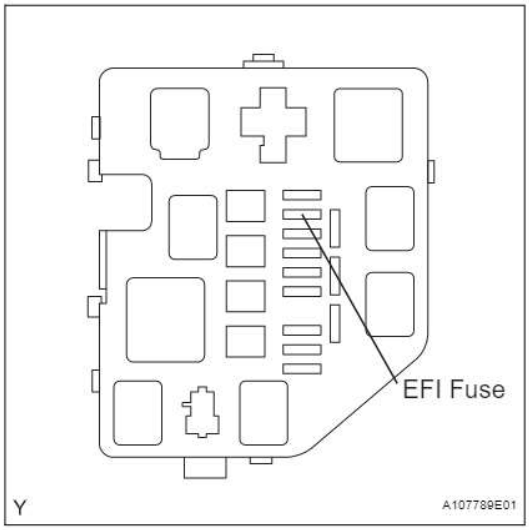
1. **CHECK DTC**
   (a) DTCs which are stored in the ECM can be displayed on the intelligent tester.
   The intelligent tester can display pending DTCs and current DTCs. Some DTCs are not stored unless a malfunction is detected in consecutive driving cycles. When a malfunction is detected in only one driving cycle, it is stored as a pending DTC.
   (1) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
   (2) Turn the ignition switch ON.
   (3) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES (or PENDING CODE).
   (4) Confirm the DTCs and freeze frame data and then write them down.
   (5) Confirm the details of the DTCs (see page AX-36).
   NOTICE:
   When simulating a symptom with the scan tool to check for DTCs, use normal mode. For codes on the DIAGNOSTIC TROUBLE CODE CHART subject to "2 trip detection logic", perform the following actions. Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the symptom has been simulated twice, the MIL illuminates and the DTCs are recorded in the ECM.
2. **CLEAR DTC**
   (a) When using the intelligent tester:
   (1) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
   (2) Turn the ignition switch ON.

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(3) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES. Then press YES.
HINT:
When operating the intelligent tester to erase the codes, the DTCs and freeze frame data will be erased.

(b) When not using the intelligent tester:
(1) Disconnect the battery terminal or remove the EFI fuse from the engine room junction block for 60 seconds or more. If you disconnect the battery terminal, perform the "INITIALIZATION" procedure (see page AX-19).



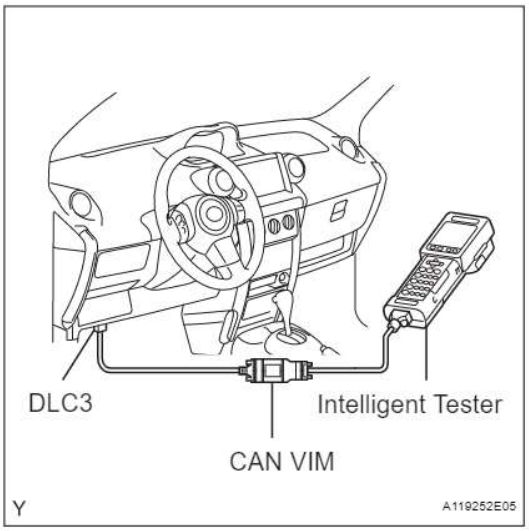
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CHECK MODE PROCEDURE

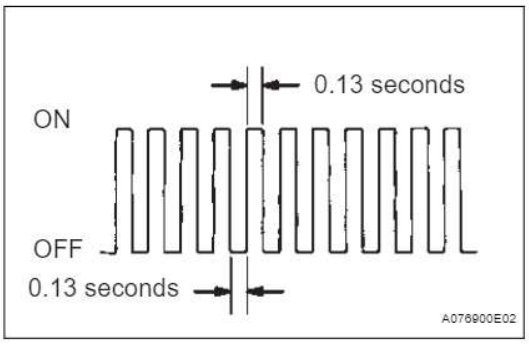
1. DESCRIPTION

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



(f) Change the ECM to check mode. Make sure the MIL flashes as shown in the illustration.
NOTICE:
All DTCs and freeze frame data recorded will be erased if: 1) the intelligent tester is used to change the ECM from normal mode to check mode or vice versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.
Before changing to check mode, make notes of the DTCs and freeze frame data.
(g) Start the engine. The MIL should turn off after the engine starts.
(h) Perform "MONITOR DRIVE PATTERN" for the ECT test (see page AX-21).
(Or, simulate the conditions of the malfunction described by the customer.)
(i) After simulating the malfunction conditions, use the intelligent tester to check the DTC and freeze frame data.

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FAIL-SAFE CHART

1. FAIL-SAFE CHART

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

(a) Vehicle speed signal (SPD):
When there are problems with vehicle speed signals, O/D up-shift is prohibited.

(b) Speed sensor (NT):
When the input turbine speed sensor has a malfunction, O/D up-shift is prohibited.

(c) Automatic Transmission Fluid (ATF) temperature sensor:
When the ATF temperature sensor has a malfunction, O/D up-shift is prohibited.

(d) Shift solenoid valve SL:
If the ECM detects a malfunction in the solenoid valve SL, it turns the valve OFF.

(e) Shift solenoid valve SLT:
When the solenoid valve SLT has a malfunction, O/D up-shift is prohibited.

(f) Engine Coolant Temperature (ECT) sensor:
When the ECT sensor has a malfunction, O/D up-shift is prohibited.

(g) Knock sensor:
When the knock sensor has a malfunction, O/D up-shift is prohibited.

(h) Throttle position sensor:
When the throttle position sensor has a malfunction, O/D up-shift is prohibited.

(i) Shift solenoid valve S1 and S2:
Fail-safe function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid "ON" and "OFF" in order to shift into the gear positions shown in the table below.
The ECM also turns the shift solenoid valve ST OFF at the same time. If both solenoids malfunction, hydraulic control cannot be performed electronically and must be done manually.
Manual shifting as shown in the following table must be done. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid. Even if starting the engine in the fail-safe mode, the gear position remains in the same position.

Position	Normal			Shift Solenoid Valve S1 Malfunctioning			Shift Solenoid Valve S2 Malfunctioning			Both Solenoid Valves Malfunctioning
	Solenoid Valve		Gear	Solenoid Valve		Gear	Solenoid Valve		Gear	Gear when shift selector is manually operated
	S1	S2		S1	S2		S1	S2		
D	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd
	OFF	OFF	3rd	X	OFF	3rd	OFF	X	3rd	3rd
	OFF	ON	O/D	X	ON	O/D	OFF	X	3rd	3rd

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Position	Normal			Shift Solenoid Valve S1 Malfunctioning			Shift Solenoid Valve S2 Malfunctioning			Both Solenoid Valves Malfunctioning
	Solenoid Valve		Gear	Solenoid Valve		Gear	Solenoid Valve		Gear	Gear when shift selector is manually operated
	S1	S2		S1	S2		S1	S2		
2	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd
	OFF	OFF	3rd	X	OFF	3rd	OFF	X	3rd	3rd
L	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd

HINT:

- X: OFF (the ECM stops sending current to a malfunctioning solenoid valve)
- ↓: Condition in the electrical operation is shown above the "↓".
- ↓: Condition in the fail-safe mode is shown below the "↓".

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AUTOMATIC TRANSAXLE SYSTEM

PRECAUTION

NOTICE:

- **When disconnecting the cable from the negative (-) battery terminal, initialize the following system(s) after the cable is reconnected.**

System Name	See procedure
Sliding Roof System	RF-4

- **Perform the RESET MEMORY procedure (A/T initialization) when replacing the automatic transaxle assembly, engine assembly or ECM (see page AX-19).**

HINT:

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

CAUTION:

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

NOTICE:

- **The automatic transaxle is composed of precision-made parts, necessitating careful inspection before reassembly because even a small nick could cause fluid leakage or affect performance.**
- **The procedures are organized so that you work on only one component group at a time. This will help avoid confusion with similar-looking parts of different sub-assemblies being on your workbench at the same time.**
- **The component groups are inspected and repaired from the converter housing side.**
- **Whenever possible, complete the inspection, repair and reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups.**
- **Use of Toyota Genuine ATF T-IV is recommended.**
- **All disassembled parts should be washed clean, and compressed air should be blown through any fluid passages and holes.**
- **Dry all parts with compressed air. Never use cloth.**
- **The recommended ATF or kerosene should be used for cleaning.**
- **After cleaning, the parts should be arranged in the order they were removed for efficient inspection, repairs, and reassembly.**

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- When disassembling a valve body, be sue to match each valve with its corresponding spring.
- New discs for the brakes and clutches that will be used for replacement must be soaked in ATF for at least 15 minutes before reassembly.
- All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.
- All old gaskets and rubber O-rings must be replaced.
- Do not apply adhesive cement to gaskets and similar parts.
- Make sure that the ends of the snap rings are not aligned with any cutouts. Also make sure that snap rings are correctly installed into the grooves.
- If a worn bushing is to be replaced, the sub-assembly containing the bushing must also be replaced.
- Check the thrust bearings and races for wear or damage. Replace if necessary.
- Use petroleum jelly to keep parts in place.
- When working with FIPG material, perform the following:
  Using a razor blade and gasket scraper, remove all old FIPG material from the gasket surface.
  Clean all components thoroughly to remove all foreign matter.
  Clean both sealing surfaces with a non-residue solvent.
  Apply FIPG material in a continuous line approximately 1 mm (0.04 in.) in diameter on the sealing surface.
  Reassemble parts within 10 minutes of applying FIPG material. Failing to do so will require the FIPG material to be removed and reapplied.

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DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

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

NOTICE:

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

(a) Warm up the engine.

(b) Turn the ignition switch OFF.

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

(d) Turn the ignition switch ON.

(e) Turn the intelligent tester ON.

(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.

(g) Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light switch status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF	-
PNP SW (NSW)	PNP switch status/ ON or OFF	Shift lever is: On P or N: ON Not on P or N: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38
REVERSE	PNP switch status/ ON or OFF	Shift lever is: On R: ON Not on R: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38
DRIVE	PNP switch status/ ON or OFF	Shift lever is: On D: ON Not on D: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38

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Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
2ND	PNP switch status/ ON or OFF	Shift lever is: On 2: ON Not on 2: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38
LOW	PNP switch status/ ON or OFF	Shift lever is: On L: ON Not on L: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38
SHIFT	ECM gear shift command/ 1st, 2nd, 3rd or 4th (O/D)	Shift lever position is: • On L: 1st • On 2: 1st or 2nd • On 3 (O/D OFF): 1st, 2nd or 3rd • On D (O/D ON): 1st, 2nd, 3rd or 4th (O/D)	-
LOCK UP SOL	Lock-up solenoid status/ ON or OFF	• Lock-up: ON • Not on lock-up: OFF	-
SOLENOID (SLT)	Shift solenoid SLT status/ ON or OFF	• Accelerator pedal is depressed: OFF • Accelerator pedal is released: ON	-
OVERDRV CUT SW2	O/D switch status/ ON or OFF	• Ignition switch ON: ON ↓ • O/D switch pushed: OFF ↓ • O/D switch pushed: ON	-
AT FLUID TEMP	ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature during cold soak	If value is -40°C (-40°F) or 215°C (419°F), ATF temperature sensor circuit is opened or short circuited

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2. PERFORM ACTIVE TEST

HINT:

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

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
(d) Turn the ignition switch ON.
(e) Turn the tester ON.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.

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(g) Perform the ACTIVE TEST.

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate shift solenoid valve and set each shift lever position by yourself [Vehicle Condition] 50 km/h (31 mph) or less [Other information] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of shift solenoid valves
LOCK UP	[Test Details] Control shift solenoid SL to set automatic transaxle to the lock-up condition [Vehicle Condition] Vehicle speed: 58 km/h (36 mph) or more	Possible to check shift solenoid SL operation
TIMING SOL	[Test Details] Operate shift solenoid ST [Vehicle Condition] • Vehicle stopped • IDL: ON	Possible to check shift solenoid ST operation
LINE PRESS UP*	[Test Details] Operate shift solenoid SLT and raise line pressure [Vehicle Condition] • Vehicle stopped • IDL: ON HINT: OFF: Line pressure up ON: No action (normal operation)	-

HINT:
*: LINE PRESS UP in the ACTIVE TEST is performed to check the line pressure changes by connecting SST to the automatic transaxle, which is used in the HYDRAULIC TEST (see page AX-18) as well. Please note that the pressure values in the ACTIVE TEST and HYDRAULIC TEST are different.

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DIAGNOSTIC TROUBLE CODE CHART

DTC No.	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	- Short in park/neutral position switch circuit - Park/Neutral position switch - ECM	Comes on	DTC stored	AX-38
P0710	Transmission Fluid Temperature Sensor "A" Circuit	- Open or short in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-42
P0711	Transmission Fluid Temperature Sensor "A" Performance	- Transaxle fluid level - ATF temperature sensor - ECM	Comes on	DTC stored	AX-45
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	- Short in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-42
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	- Open in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-42
P0717	Input Speed Sensor Circuit No Signal	- Open or short in speed sensor NT circuit - Speed sensor NT - ECM - Automatic transaxle (clutch, brake, gear, etc.)	Comes on	DTC stored	AX-48
P0724	Brake Switch "B" Circuit High	- Short in stop light switch circuit - Stop light switch - ECM	Comes on	DTC stored	AX-51
P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)	- Shift solenoid valve SL remains open or closed - Valve body is blocked - Shift solenoid valve SL - Torque converter clutch - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-54
P0751	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	- Shift solenoid valve S1 remains open or closed - Valve body is blocked - Shift solenoid valve S1 - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-57

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DTC No.	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0756	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	- Shift solenoid valve S2 remains open or closed - Valve body is blocked - Shift solenoid valve S2 - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-60
P0787	Shift / Timing Solenoid Low (Shift Solenoid Valve ST)	- Short in shift solenoid valve ST circuit - Shift solenoid valve ST - ECM	Comes on	DTC stored	AX-63
P0788	Shift / Timing Solenoid High (Shift Solenoid Valve ST)	- Open in shift solenoid valve ST circuit - Shift solenoid valve ST - ECM	Comes on	DTC stored	AX-63
P0973	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	- Short in shift solenoid valve S1 circuit - Shift solenoid valve S1 - ECM	Comes on	DTC stored	AX-66
P0974	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)	- Open in shift solenoid valve S1 circuit - Shift solenoid valve S1 - ECM	Comes on	DTC stored	AX-66
P0976	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	- Short in shift solenoid valve S2 circuit - Shift solenoid valve S2 - ECM	Comes on	DTC stored	AX-70
P0977	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)	- Open in shift solenoid valve S2 circuit - Shift solenoid valve S2 - ECM	Comes on	DTC stored	AX-70
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	- Open or short in shift solenoid valve SLT circuit - Shift solenoid valve SLT - ECM	Comes on	DTC stored	AX-73
P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	- Short in shift solenoid valve SL circuit - Shift solenoid valve SL - ECM	Comes on	DTC stored	AX-77
P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	- Open in shift solenoid valve SL circuit - Shift solenoid valve SL - ECM	Comes on	DTC stored	AX-77

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DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P0705	2 or more switches are ON simultaneously for P (NSW), R, N (NSW), D, 2 and L positions (2 trip detection logic)	• Short in park/neutral position switch circuit • park/neutral position switch • ECM

MONITOR DESCRIPTION

These DTCs indicate a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.
The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that the engine can be started only when the shift lever is on P or N.
The park/neutral position switch sends a signal to the ECM according to the shift lever position (R, D, 2 or L).
The ECM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The ECM will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705: Park/Neutral position switch/Verify switch input
Required sensors/Components	Park/Neutral position switch
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	2 driving cycles
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

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

TYPICAL MALFUNCTION THRESHOLDS

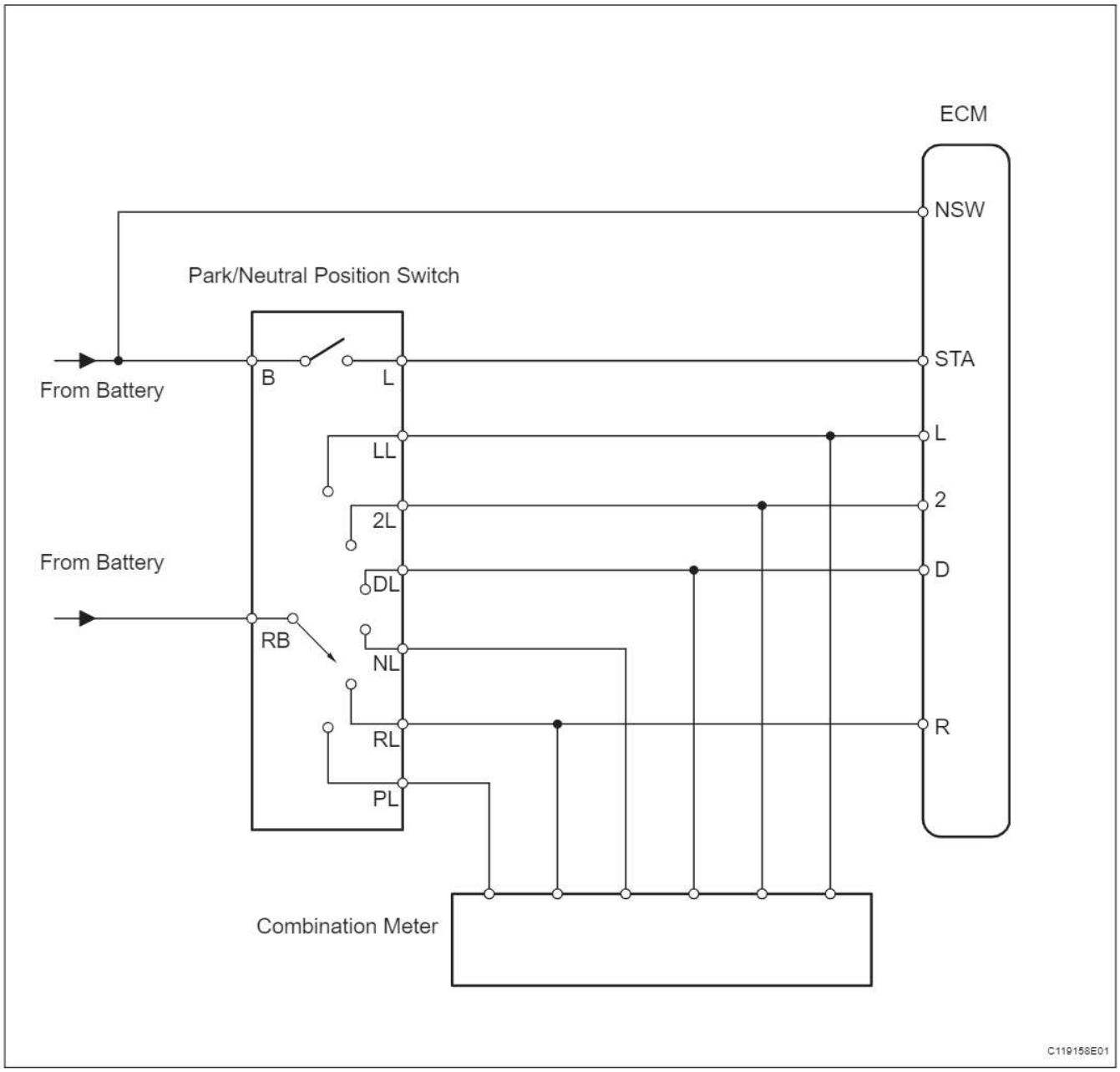
When either condition below is met:	A or B
A. Number of the following signal inputs at the same time	2 or more
Park/Neutral position switch	ON
R switch	ON
D switch	ON
2 switch	ON
L switch	ON
B. All of the following conditions are met:	-
Park/Neutral position switch	OFF
R switch	OFF
D switch	OFF
2 switch	OFF
L switch	OFF

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COMPONENT OPERATING RANGE

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

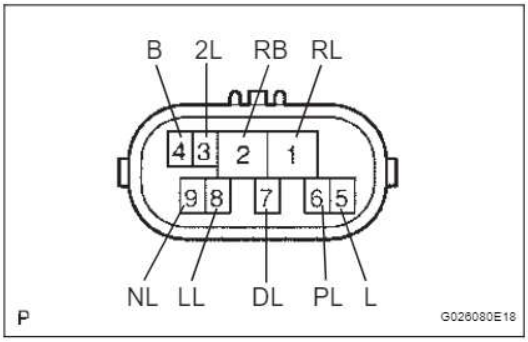
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT PARK/NEUTRAL POSITION SWITCH



(a) Disconnect the P1 park/neutral position switch connector.
(b) Measure the resistance of the park/neutral position switch when the shift lever is moved to each position.

Standard resistance

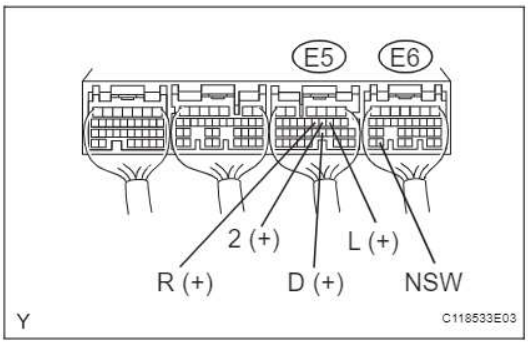
Tester Connection	Shift Lever Position	Specified Condition
2 (RB) - 6 (PL) and 4 (B) - 5 (L)	P	Below 1 Ω
2 (RB) - 6 (PL) and 4 (B) - 5 (L)	Not on P	10 kΩ or higher
1 (RL) - 2 (RB)	R	Below 1 Ω
1 (RL) - 2 (RB)	Not on R	10 kΩ or higher
2 (RB) - 9 (NL) and 4 (B) - 5 (L)	N	Below 1 Ω
2 (RB) - 9 (NL) and 4 (B) - 5 (L)	Not on N	10 kΩ or higher
2 (RB) - 7 (DL)	D	Below 1 Ω
2 (RB) - 7 (DL)	Not on D	10 kΩ or higher
2 (RB) - 3 (2L)	2	Below 1 Ω
2 (RB) - 3 (2L)	Not on 2	10 kΩ or higher
2 (RB) - 8 (LL)	L	Below 1 Ω
2 (RB) - 8 (LL)	Not on L	10 kΩ or higher

NG → REPLACE PARK/NEUTRAL POSITION SWITCH

AX

OK

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



(a) Turn the ignition switch ON.
(b) Measure the voltage of the wire harness side connectors.

Standard voltage

Tester Connection	Shift Lever Position	Specified Condition
E6-30 (NSW) - Body ground	P or N	Below 1 V
E6-30 (NSW) - Body ground	Not on P or N	10 to 14 V
E5-11 (R) - Body ground	R	10 to 14 V*
E5-11 (R) - Body ground	Not on R	Below 1 V
E5-21 (D) - Body ground	D or 3	10 to 14 V
E5-21 (D) - Body ground	Not on D or 3	Below 1 V
E5-10 (2) - Body ground	2	10 to 14 V
E5-10 (2) - Body ground	Not on 2	Below 1 V
E5-9 (L) - Body ground	L	10 to 14 V
E5-9 (L) - Body ground	Not on L	Below 1 V

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

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM

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

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

AX

MONITOR DESCRIPTION

ATF temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will illuminate the MIL and store the DTC.
HINT:
- *1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.
- *2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.
- The ATF temperature can be checked on the intelligent tester display.

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Chattering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

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TYPICAL ENABLING CONDITIONS

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

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

P0713: Range check (High resistance)

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

TYPICAL MALFUNCTION THRESHOLDS

P0710: Range check (Chattering)

ATF temperature sensor resistance	Less than 79 Ω or more than 156 kΩ

P0712: Range check (Low resistance)

ATF temperature sensor resistance	Less than 79 Ω

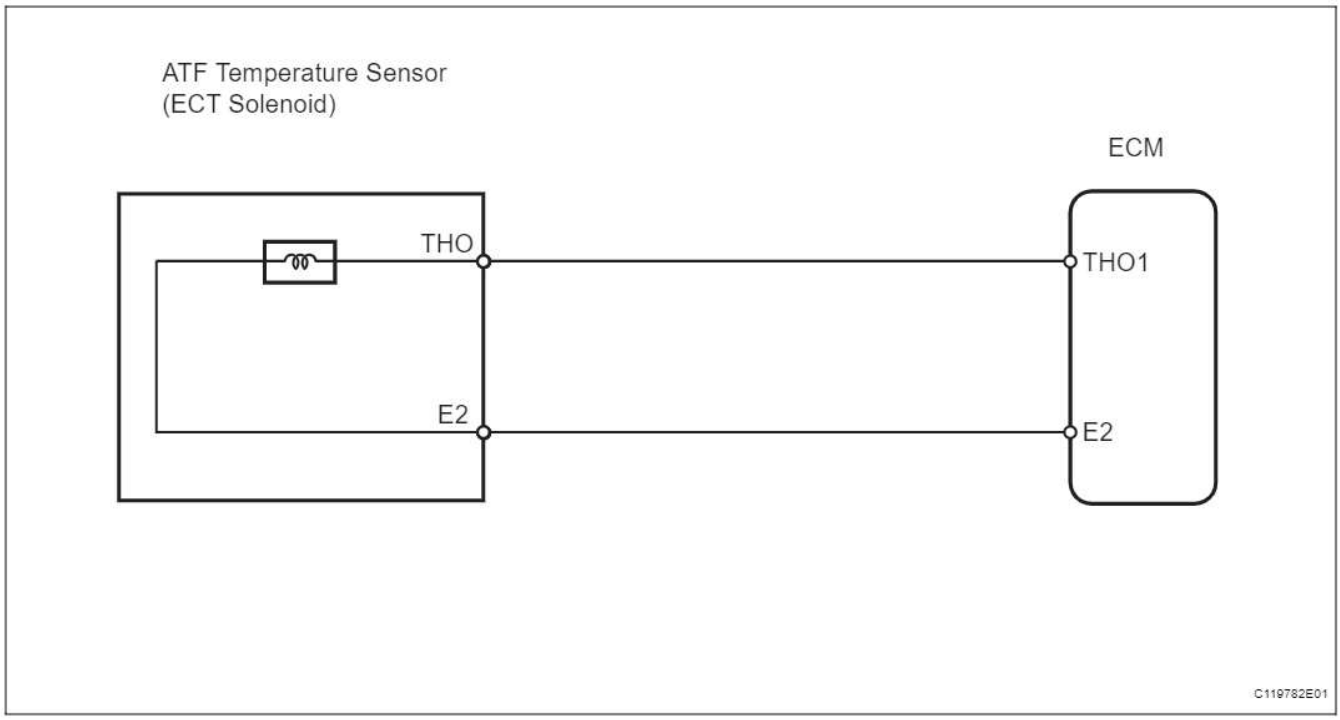
P0713: Range check (High resistance)

ATF temperature sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

ATF temperature sensor	Resistance: 79 Ω to 156 kΩ

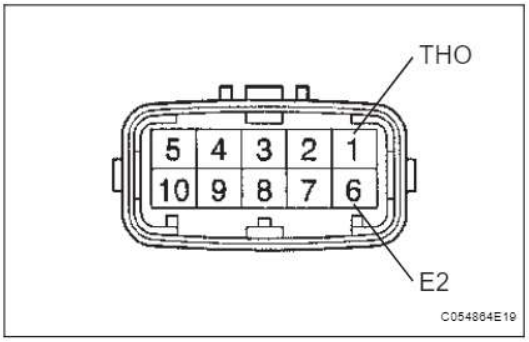
WIRING DIAGRAM



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INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

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

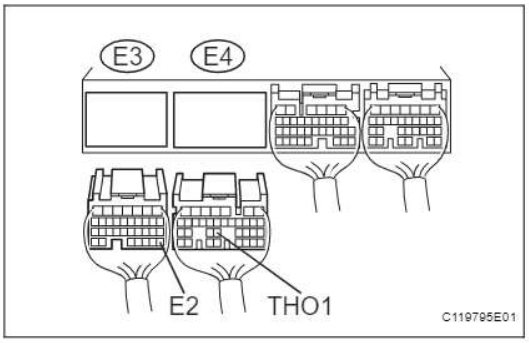
HINT:
If the resistance is out of the specified range of either of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.
Standard resistance

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

NG → **REPAIR OR REPLACE TRANSMISSION WIRE**

OK

2 CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E3 and E4 ECM connectors.
(b) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
E4-24 (THO1) - E3-28 (E2)	79 Ω to 156 kΩ
E4-24 (THO1) - Body ground	10 kΩ or higher
E3-28 (E2) - Body ground	10 kΩ or higher

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

OK

REPLACE ECM

AX

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DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance

DESCRIPTION

Refer to DTC P0710 (see page AX-42).

DTC No.	DTC Detection Condition	Trouble Area
P0711	Both (a) and (b) are detected (2 trip detection logic): (a) 12 sec. after engine start, temperature of atmosphere and that of engine coolant temperature are more than -10°C (14°F) (b) After normal driving for over 17 min. and 9 km (5.6 miles), ATF temperature is less than 10°C (50°F)	• Transaxle fluid level • ATF temperature sensor • ECM

MONITOR DESCRIPTION

This DTC indicates that there is a problem with output from the ATF temperature sensor and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects open and short circuits of the ATF temperature circuit or faults in the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 10°C (50°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and illuminates the MIL.

MONITOR STRATEGY

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

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Time after engine start	16 min. and 40 sec. or more
ECT	-15°C (5°F) or more
ATF temperature circuit	Not circuit malfunction
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction
Throttle sensor circuit	Not circuit malfunction
IAT (Intake air temperature) sensor circuit	Not circuit malfunction
Driving distance after engine start	9 km (5.6 miles) or more
IAT (12 sec. after engine start)	-10°C (14°F) or more
ECT (12 sec. after engine start)	-10°C (14°F) or more

TYPICAL MALFUNCTION THRESHOLDS

ATF temperature	Less than 10°C (50°F)

COMPONENT OPERATING RANGE

ATF temperature	Resistance: 79 Ω to 156 kΩ

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WIRING DIAGRAM

Refer to DTC P0710 (see page AX-43).

INSPECTION PROCEDURE

HINT:

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

NOTICE:

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

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

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
AT FLUID TEMP	ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature during cold soak	If value is -40°C (-40°F) or 215°C (419°F), ATF temperature sensor circuit is opened or short circuited

HINT:

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

AX

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

HINT:

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

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

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

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

(b) Turn the ignition switch ON and push the intelligent tester main switch ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / 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

A

2	CHECK TRANSAXLE FLUID LEVEL

OK:
Automatic transaxle fluid level is correct.

NG → ADD FLUID

OK

REPLACE TRANSMISSION WIRE

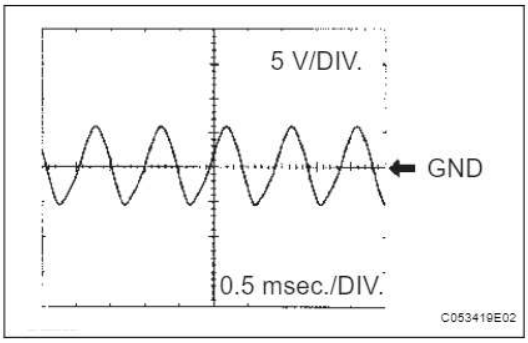
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DTC	P0717	Input Speed Sensor Circuit No Signal

DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P0717	ECM detects conditions (a), (b) and (c) continuously for 5 sec. or more (1 trip detection logic): (a) Vehicle speed: 50 km/h (31 mph) or more (b) Solenoid valves and park/neutral position switch are normal (c) Speed sensor NT: Less than 300 rpm	• Open or short in speed sensor NT circuit • Speed sensor NT • ECM • Automatic transaxle (clutch, brake, gear, etc.)



1. **Reference: Inspect using an oscilloscope.**
   Check the waveform of the ECM connector.
   OK:
   Refer to illustration

Item	Content
Tester Connection	E4-35 (NT+) - E4-27 (NT-)
Tool Setting	5 V/DIV., 0.5 msec./DIV.
Condition	Vehicle speed 20 km/h (12 mph)

MONITOR DESCRIPTION

The input speed sensor detects the transmission input shaft speed. The ECM determines the gear shift timing based on a comparison of the input speed sensor (input shaft speed) with the output speed sensor (output shaft speed).

AX

When the output shaft speed is higher than the expected value and the input shaft speed is 300 rpm or less while running with the shift lever on D, the ECM will conclude that there is malfunction of the input turbine speed sensor (NT). The ECM will illuminate the MIL.

MONITOR STRATEGY

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

TYPICAL ENABLING CONDITIONS

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

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Engine	Running
Transmission range switch	Not detected

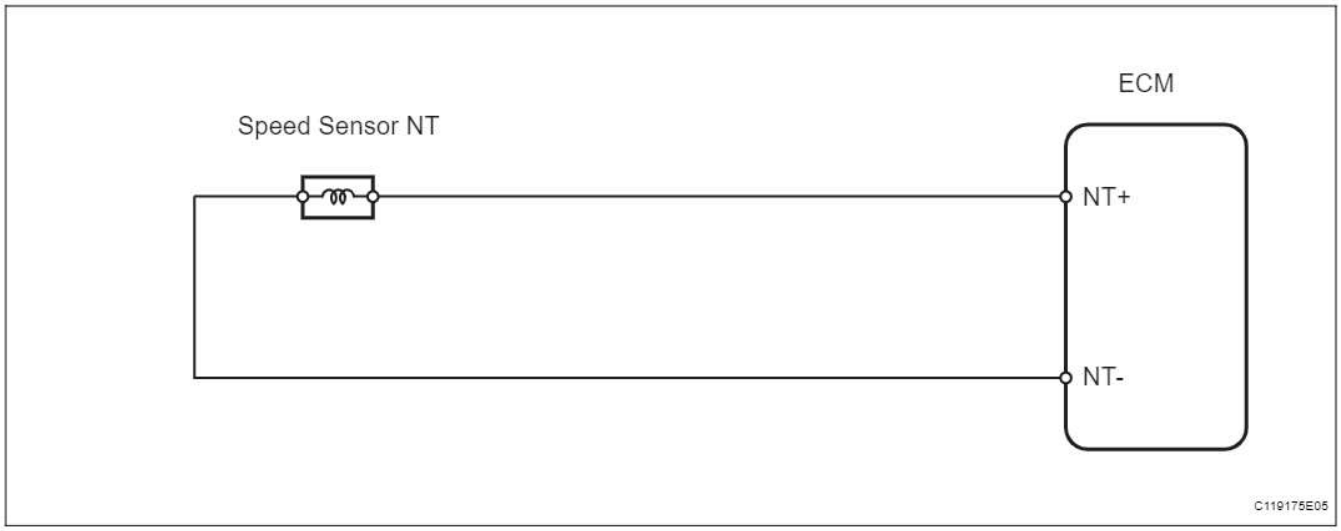
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

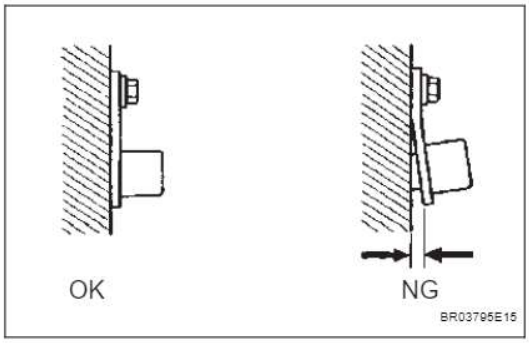
Speed sensor (NT)	Resistance: 560 Ω to 680 kΩ

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT SPEED SENSOR NT (INSTALLATION)



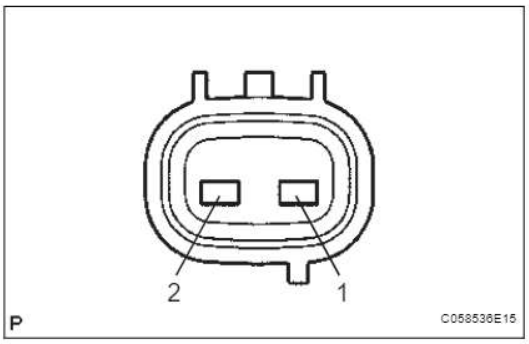
(a) Check the speed sensor NT installation.
OK:
Installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **SECURELY INSTALL SPEED SENSOR OR REPLACE SPEED SENSOR**

OK

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2 INSPECT SPEED SENSOR NT



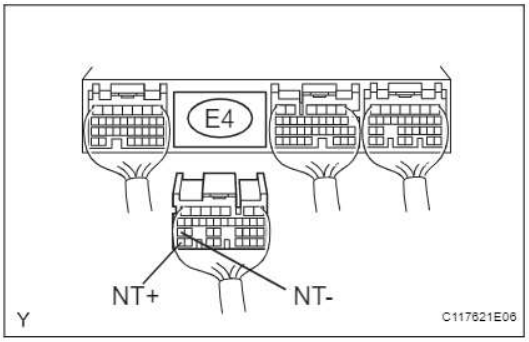
(a) Disconnect the T2 sensor connector.
(b) Measure the resistance of the sensor.
Standard resistance

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

NG → **REPLACE SPEED SENSOR NT**

OK

3 CHECK WIRE HARNESS (SPEED SENSOR NT - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
E4-35 (NT+) - E4-27 (NT-)	560 to 680 Ω
E4-35 (NT+) - Body ground	10 kΩ or higher
E4-27 (NT-) - Body ground	10 kΩ or higher

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

AX

OK

REPLACE ECM

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

DTC No.	DTC Detection Condition	Trouble Area
P0724	Stop light switch remains ON even when vehicle is driven in GO (30 km/h (18.65 mph) or more) and STOP (less than 3 km/h (1.86 mph)) pattern 5 times (2 trip detection logic)	• Short in stop light switch circuit • Stop light switch • ECM

MONITOR DESCRIPTION

The circuit prevents the engine from stopping when the vehicle is stopped by sudden braking when the torque converter clutch is in the "lock-up" mode. The ECM receives the signal from the stop light switch when the brake pedal is depressed. Then, the ECM sends a signal to the lock-up solenoid valve to turn lock-up off.
This DTC indicates that the stop light switch remains ON. When the stop light switch remains ON during GO and STOP driving, the ECM interprets this as a fault in the stop light switch. Then the MIL illuminates and the ECM stores the DTC. The vehicle must GO (30 km/h (18.65 mph) or more) and STOP (less than 3 km/h (1.86 mph)) 5 times for 2 driving cycles in order for the DTC to be output.

MONITOR STRATEGY

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

TYPICAL ENABLING CONDITIONS

The stop light switch remains on while GO and STOP is repeated 5 times.
GO and STOP are defined as follows:

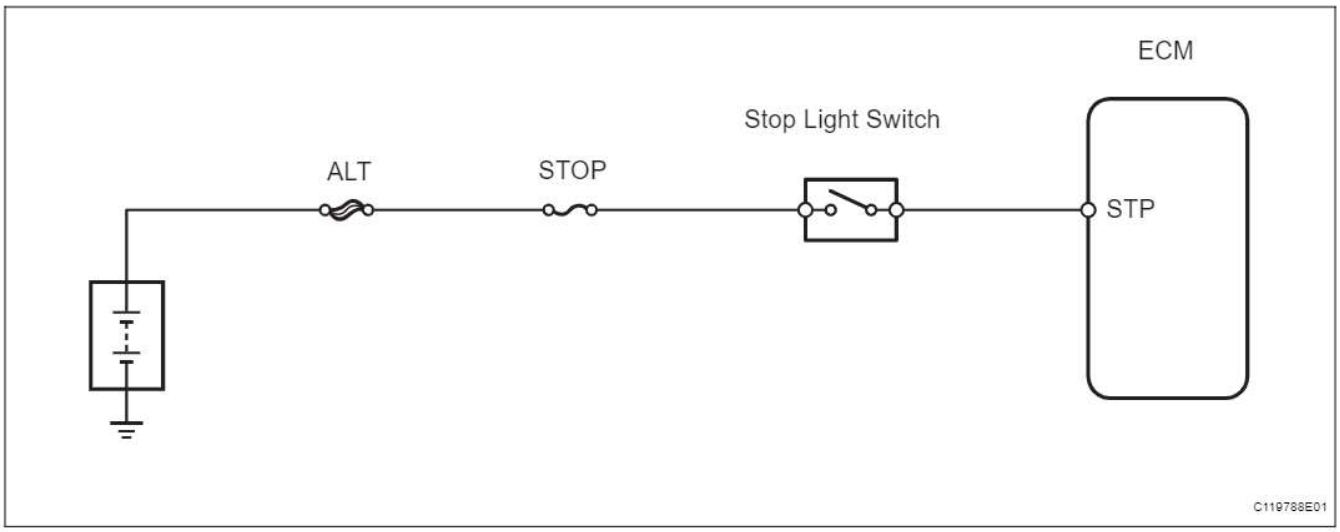
The monitor will run whenever the following DTCs are not present	None
GO: Vehicle speed	30 km/h (18.65 mph) or more
STOP: Vehicle speed	Less than 3 km/h (1.86 mph)

TYPICAL MALFUNCTION THRESHOLDS

Brake switch status	Stuck ON

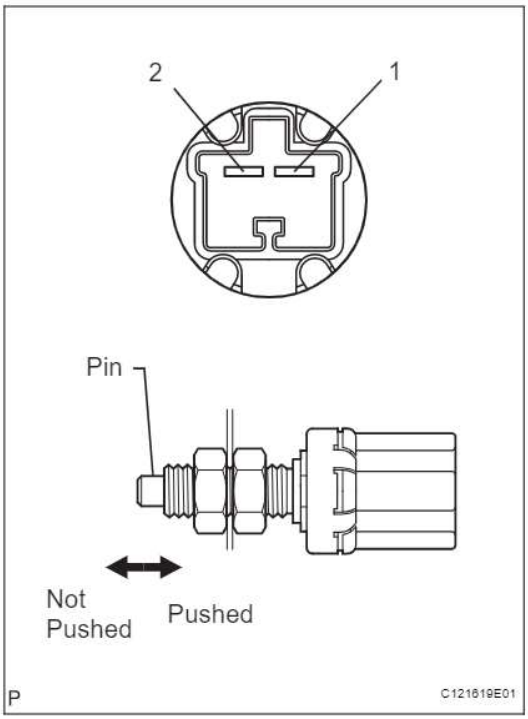
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WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT STOP LIGHT SWITCH



(a) Remove the S6 stop light switch.
(b) Measure the resistance of the switch.
Standard resistance

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

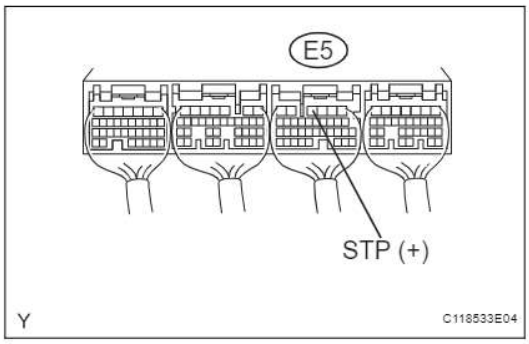
NG → **REPLACE STOP LIGHT SWITCH**

OK

AX

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2 CHECK WIRE HARNESS (STOP LIGHT SWITCH - ECM)



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

Tester Connection	Condition	Specified Condition
E5-4 (STP) - Body ground	Brake pedal is depressed	7.5 to 14 V
E5-4 (STP) - Body ground	Brake pedal is released	Below 1.5 V

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

OK

REPLACE ECM

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

DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P0741	• Lock-up does not occur when driving in lock-up range (normal driving at 80 km/h [50 mph]), or lock-up remains ON in lock-up OFF range (2 trip detection logic) • When lock-up is ON, clutch or brake slips or gear is broken (2 trip detection logic)	• Shift solenoid valve SL remains open or closed • Valve body is blocked • Shift solenoid valve SL • Torque converter clutch • Automatic transaxle (clutch, brake, gear, etc.) • ECM

MONITOR DESCRIPTION

Based on the signals from the throttle position sensor, air flow meter and crankshaft position sensor, the ECM sends a signal to the shift solenoid valve SL to regulate the hydraulic pressure and provide smoother gear shifts. The shift solenoid valve SL responds to commands from the ECM. The valve controls the lock-up relay valve to perform torque-converter lock-up and flexible lock-up functions.
The ECM compares the engine rpm (NE) signal and the input turbine speed signal to detect torque converter lock-up. The ECM then compares the lock-up status against the lock-up schedule in the ECM memory. If the ECM does not detect lock-up at the appropriate time, it will conclude that there is a malfunction in shift solenoid valve SL. The ECM will illuminate the MIL.

AX

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve SL/OFF malfunction Shift solenoid valve SL/ON malfunction
Required sensors/Components	Shift solenoid valve SL
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec. ON malfunction 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below:

The monitor will run whenever the following DTCs are not present	None
ECT (Engine coolant temperature)	60°C (140°F) or higher
Vehicle speed	25 km/h (15.5 mph) or more
Transmission range	"D"
ECM selected gear	3rd or 4th
Shift solenoid S1 circuit	Not circuit malfunction
Shift solenoid S2 circuit	Not circuit malfunction

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Shift solenoid SL circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Input (turbine) speed sensor circuit	Not circuit malfunction
Internal counter shaft speed sensor circuit	Not circuit malfunction
Throttle position sensor circuit	Not circuit malfunction

OFF malfunction

ECM lock-up command	ON

ON malfunction

ECM lock-up command	OFF
Throttle valve opening angle	8% or more
Vehicle speed	Less than 60 km/h (37.3 mph)

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction

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

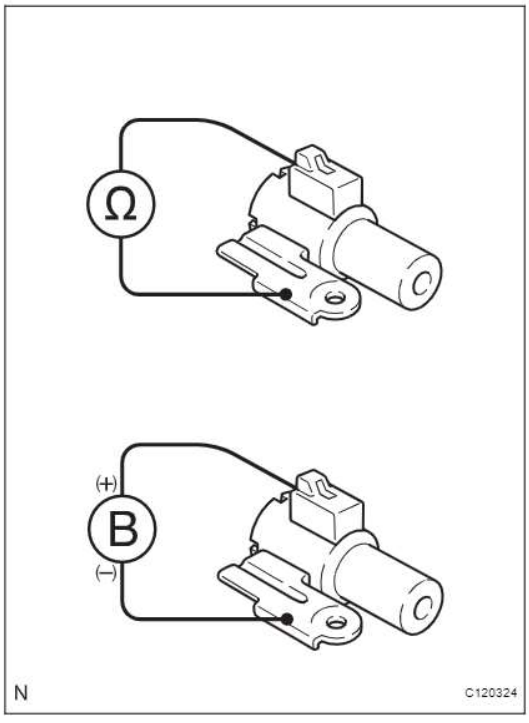
ON malfunction

2 detections are necessary per driving cycle:
1st detection; temporary flag ON
2nd detection; pending fault code ON
Vehicle speed must be under 10 km/h (6.2 mph) once before 2nd detection

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

INSPECTION PROCEDURE

1	INSPECT SHIFT SOLENOID VALVE SL



(a) Remove the shift solenoid valve SL.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG	REPLACE SHIFT SOLENOID VALVE SL

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OK

2	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

(a) Check the transmission valve body assembly.

OK:

There are no foreign objects on each valve.

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

OK

3	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Check the torque converter clutch assembly (see page AX-146).

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR AUTOMATIC TRANSAXLE ASSEMBLY

AX

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SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

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

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

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HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The ECM of this system is connected to the CAN and multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN and multiplex communication 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-30).

NEXT

6	VISUAL INSPECTION

NEXT

7	SETTING CHECK MODE DIAGNOSIS*

(a) Refer to the CHECK MODE PROCEDURE (see page AX-31).

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NEXT

8	PROBLEM SYMPTOM CONFIRMATION

(a) Refer to the ROAD TEST (see page AX-14).
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-33).

NEXT

10	DTC CHECK*

(a) Refer to the DTC CHECK / CLEAR (see page AX-30).
Result

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

AX

B → GO TO STEP 18

A

11	BASIC INSPECTION

(a) Refer to the AUTOMATIC TRANSAXLE FLUID (see page AX-82).
(b) Refer to the PARK/NEUTRAL POSITION SWITCH (see page AX-87).
(c) Refer to the FLOOR SHIFT ASSEMBLY (see page AX-116).

NG → GO TO STEP 21

OK

12	MECHANICAL SYSTEM TEST

(a) Refer to the MECHANICAL SYSTEM TESTS (see page AX-16).

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NG → GO TO STEP 17

OK

13	HYDRAULIC TEST

(a) Refer to the HYDRAULIC TEST (see page AX-18).

NG → GO TO STEP 17

OK

14	MANUAL SHIFTING TEST

(a) Refer to the MANUAL SHIFTING TEST (see page AX-19).

NG → GO TO STEP 16

OK

15	PROBLEM SYMPTOMS TABLE CHAPTER 1

(a) Refer to the PROBLEM SYMPTOMS TABLE (see page AX-23).

NG → GO TO STEP 19

OK

16	PROBLEM SYMPTOMS TABLE CHAPTER 2

(a) Refer to the PROBLEM SYMPTOMS TABLE (see page AX-23).

NEXT

17	PART INSPECTION

NG → GO TO STEP 20

OK

18	DTC CHART

(a) Refer to the DIAGNOSTIC TROUBLE CODE CHART (see page AX-36).

NEXT

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19	CIRCUIT INSPECTION

NEXT

20	IDENTIFICATION OF PROBLEM

NEXT

21	REPAIR OR REPLACE

NEXT

22	CONFIRMATION TEST

NEXT

END

AX

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

DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
P0751	The gear required by the ECM does not match the actual gear when driving (2 trip detection logic)	• Shift solenoid valve S1 remains open or closed • Valve body is blocked • Shift solenoid valve S1 • Automatic transaxle (clutch, brake, gear, etc.) • ECM

MONITOR DESCRIPTION

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

MONITOR STRATEGY

Related DTCs	P0751: Shift solenoid valve S1/OFF malfunction Shift solenoid valve S1/ON malfunction
Required sensor/Components	Shift solenoid valve S1
Frequency of operation	Continuous
Duration	OFF malfunction (A): 0.85 sec. OFF malfunction (B): 0.8 sec. ON malfunction (A) (B): 0.8 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 the following DTCs are not present	None
ECT (Engine coolant temperature)	60°C (140°F) or more
Transmission range	"D"
Shift solenoid S1 circuit	Not circuit malfunction
Shift solenoid S2 circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Input (turbine) speed sensor circuit	Not circuit malfunction
Internal counter shaft speed sensor circuit	Not circuit malfunction
Throttle position sensor circuit	Not circuit malfunction

OFF malfunction (A)

ECM selected gear	1st
Vehicle speed	9 to 40 km/h (5.6 to 24.9 mph)

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Throttle valve opening angle	25% or more 7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

OFF malfunction (B)

Current ECM selected gear	4th
Last ECM selected gear	3rd

ON malfunction (A)

Current ECM selected gear	4th
Last ECM selected gear	3rd

ON malfunction (B)

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

TYPICAL MALFUNCTION THRESHOLDS

[OFF malfunction]
Following conditions met: OFF malfunction (A) and (B).
2 detections are necessary per driving cycle:
1st detection; temporary flag ON
2nd detection; pending fault code ON

AX

OFF malfunction (A)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.64 to 0.78

OFF malfunction (B)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	Changes as follows 0.95 to 1.09 (Last) to 0.64 to 0.78 (Current)

[ON malfunction]
Following conditions met: ON malfunction (A) and (B).

ON malfunction (A)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	Does not change as follows 0.95 to 1.09 (Last) to 0.64 to 0.78 (Current)

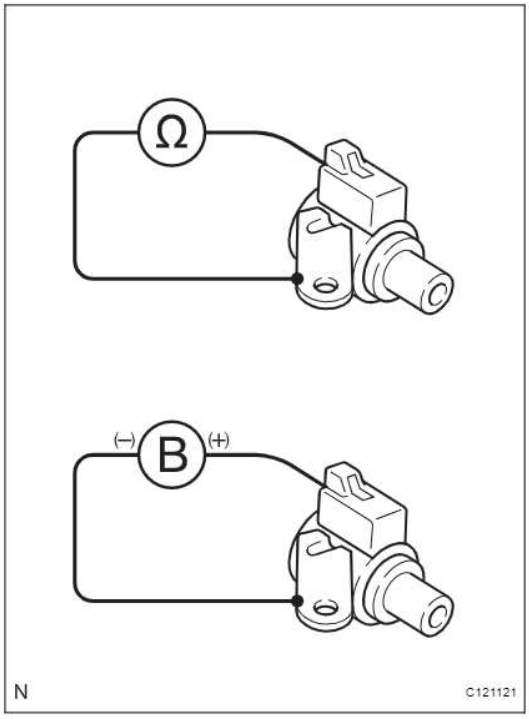
ON malfunction (B)

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

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INSPECTION PROCEDURE

1	INSPECT SHIFT SOLENOID VALVE S1



(a) Remove the shift solenoid valve S1.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE S1**

OK

2	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

(a) Check the transmission valve body assembly.
OK:
There are no foreign objects on each valve.

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

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

AX

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

DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
P0756	The gear required by the ECM does not match the actual gear when driving (2 trip detection logic)	• Shift solenoid valve S2 remains open or closed • Valve body is blocked • Shift solenoid valve S2 • Automatic transaxle (clutch, brake, gear, etc.) • ECM

MONITOR DESCRIPTION

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

MONITOR STRATEGY

Related DTCs	P0756: Shift solenoid valve S2/OFF malfunction Shift solenoid valve S2/ON malfunction
Required sensor/Components	Shift solenoid valve S2
Frequency of operation	Continuous
Duration	0.85 sec.
MIL operation	2 driving cycles
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below.

The monitor will run whenever the following DTCs are not present	None
ECT (Engine coolant temperature)	60°C (140°F) or more
Transmission range	"D"
Shift solenoid S1 circuit	Not circuit malfunction
Shift solenoid S2 circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Input (turbine) speed sensor circuit	Not circuit malfunction
Internal counter shaft speed sensor circuit	Not circuit malfunction
Throttle position sensor circuit	Not circuit malfunction

OFF malfunction (A)

ECM selected gear	1st
Vehicle speed	9 to 40 km/h (5.6 to 24.9 mph)
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

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OFF malfunction (B)

ECM selected gear	3rd
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

OFF malfunction (C)

ECM selected gear	4th
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

ON malfunction (A)

ECM selected gear	2nd
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

ON malfunction (B)

ECM selected gear	3rd
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

ON malfunction (C)

ECM selected gear	4th
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

[OFF malfunction]
Following conditions met: OFF malfunction (A), (B) and (C).
2 detections are necessary per driving cycle:
1st detection; temporary flag ON
2nd detection; pending fault code ON

OFF malfunction (A)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	1.50 to 1.80

OFF malfunction (B)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.95 to 1.09

OFF malfunction (C)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.95 to 1.09

[ON malfunction]
Following conditions met: ON malfunction (A), (B) and (C).

ON malfunction (A)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	2.75 to 3.35

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ON malfunction (B)

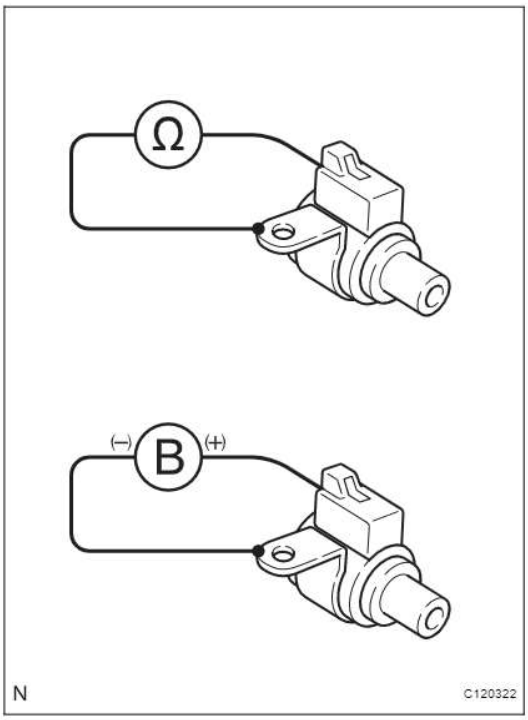
Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.64 to 0.78

ON malfunction (C)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.64 to 0.78

INSPECTION PROCEDURE

1 INSPECT SHIFT SOLENOID VALVE S2



(a) Remove the shift solenoid valve S2.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE S2**

OK

2 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

(a) Check the transmission valve body assembly.
OK:
There are no foreign objects on each valve.

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

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

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AUTOMATIC TRANSAXLE FLUID

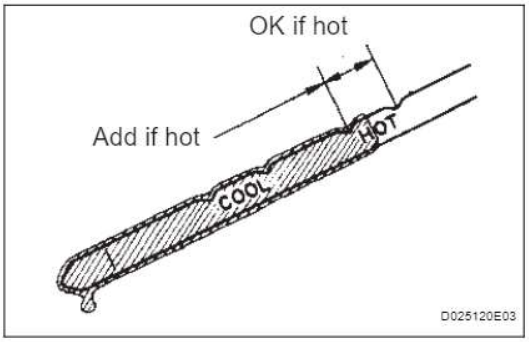
ADJUSTMENT

1. CHECK TRANSAXLE FLUID LEVEL

HINT:

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

Fluid temperature:
70 to 80°C (158 to 176°F)



(a) Park the vehicle on a level surface and set the parking brake.
(b) With the engine idling and the brake pedal depressed, adjust the shift lever to each position from P to L position, and return it to the P position.
(c) Take out the ATF dipstick and wipe it clean.
(d) Fully insert it back into the pipe.
(e) Take it out and check that the fluid level is at the HOT position.
If there are leaks, it is necessary to repair or replace O-rings, FIPGs, oil seals, plugs and/or other parts.

AX

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

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

DESCRIPTION

Shift solenoid valve ST is switched ON/OFF by a signal from the ECM so that letting in or out timing of 2nd brake is adjusted by operating the orifice control valve. Therefore, shift solenoid valve ST operates when letting in or out the reverse clutch.
If the shift solenoid ST is broken, the shift shock increases.

DTC No.	DTC Detection Condition	Trouble Area
P0787	ECM detects short in solenoid valve ST circuit 2 times when solenoid valve ST is operated (1 trip detection logic)	• Short in shift solenoid valve ST circuit • Shift solenoid valve ST • ECM
P0788	ECM detects open in solenoid valve ST circuit 2 times when solenoid valve ST is not operated (1 trip detection logic)	• Open in shift solenoid valve ST circuit • Shift solenoid valve ST • ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve ST circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the circuit (see page AX-32).

MONITOR STRATEGY

Related DTCs	P0787: Shift timing solenoid valve ST/Range check (Low resistance) P0788: Shift timing solenoid valve ST/Range check (High resistance)
Required sensor/Components	Shift solenoid valve ST
Frequency of operation	Continuous
Duration	2 times
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0787: 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.

P0788: Range check (High resistance)

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

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TYPICAL MALFUNCTION THRESHOLDS

P0787: Range check (Low resistance)

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

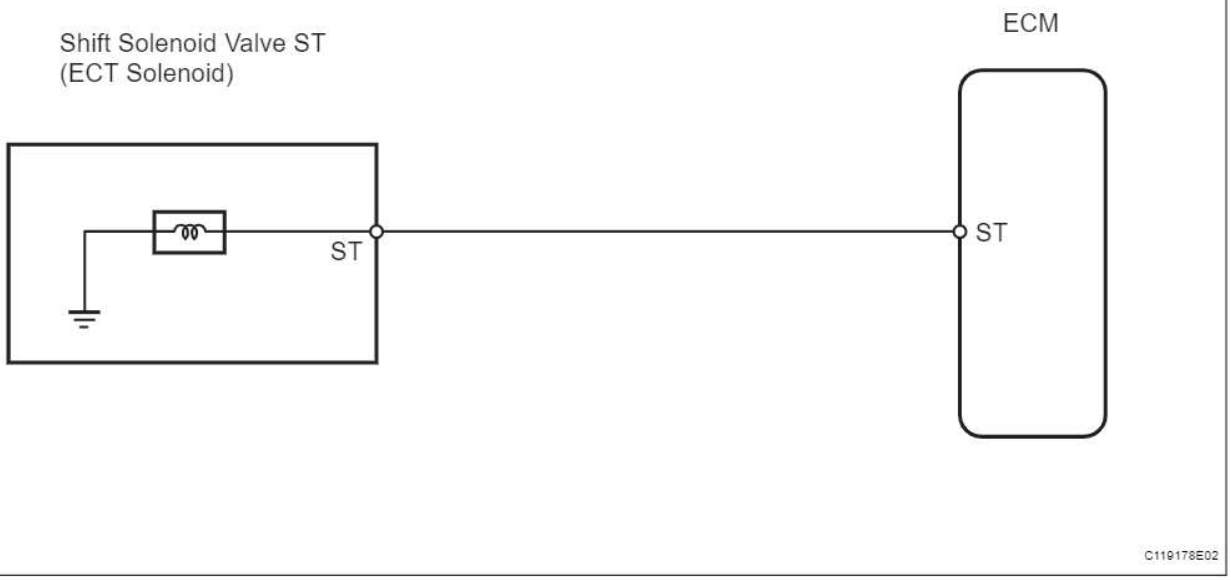
P0788: Range check (High resistance)

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 ST	Resistance: 11 to 15 Ω at 20°C (68°F)

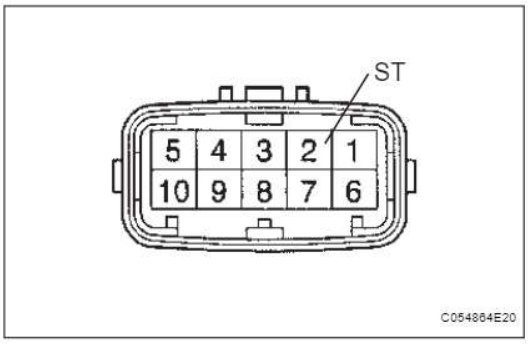
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE ST)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

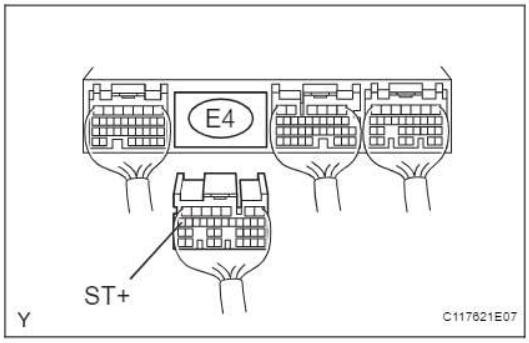
Tester Connection	Condition	Specified Condition
2 (ST) - Body ground	20°C (68°F)	11 to 15 Ω

NG → Go to step 3

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OK

2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

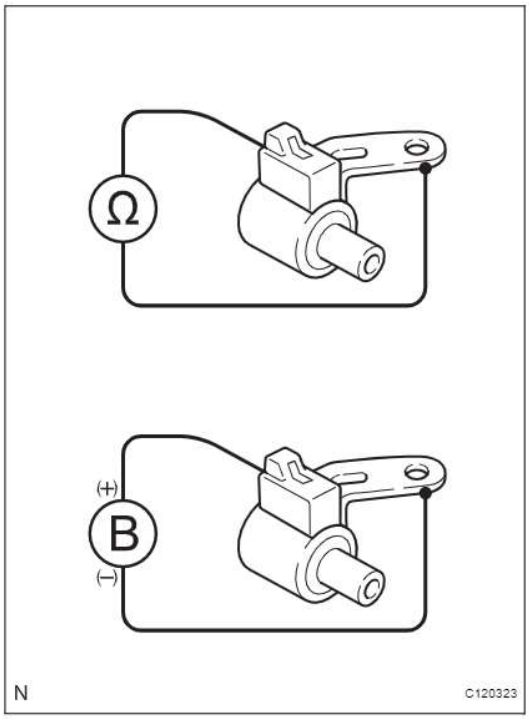
Tester Connection	Condition	Specified Condition
E4-19 (ST) - Body ground	20°C (68°F)	11 to 15 Ω

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

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE ST



(a) Remove the shift solenoid valve ST.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ω at 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE ST**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

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AX

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

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

DESCRIPTION

Shifting from 1st to O/D is performed in combination with the ON and OFF operation of the shift solenoid valve S1 and S2 controlled by the ECM. If an open or short circuit occurs in either of the solenoid valves, the ECM controls the remaining normal solenoid valve to allow the vehicle to be operated safely (see page AX-32).

Fail-safe function:

If either of the solenoid valve circuits develops an open or short, the ECM turns the other solenoid valve ON and OFF to shift to the gear positions shown in the table below. The ECM also turns the shift solenoid valve ST OFF at the same time. If both solenoids are malfunctioning, hydraulic control cannot be performed electronically and must be done manually.

Manual shifting as shown in the table below must be done. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid.

Position	Normal			Shift Solenoid Valve S1 Malfunctioning			Shift Solenoid Valve S2 Malfunctioning			Both Solenoid Valves Malfunctioning
	Solenoid Valve		Gear	Solenoid Valve		Gear	Solenoid Valve		Gear	Gear when shift selector is manually operated
	S1	S2		S1	S2		S1	S2		
D	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd
	OFF	OFF	3rd	X	OFF	3rd	OFF	X	3rd	3rd
	OFF	ON	O/D	X	ON	O/D	OFF	X	3rd	3rd
2	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd
	OFF	OFF	3rd	X	OFF	3rd	OFF	X	3rd	3rd
L	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd

HINT:

- X: OFF (the ECM stops sending current to a malfunctioning solenoid valve)
- ↓: Condition in the electrical operation is shown above the "↓".
- ↓: Condition in the fail-safe mode is shown below the "↓".

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve S1 circuit 2 times when solenoid valve S1 is operated (1 trip detection logic)	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	ECM detects open in solenoid valve S1 circuit 2 times when solenoid valve S1 is not operated (1 trip detection logic)	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

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MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid.

MONITOR STRATEGY

Related DTCs	P0973: Shift solenoid valve S1/Range check (Low resistance) P0974: Shift solenoid valve S1/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S1
Frequency of operation	Continuous
Duration	2 times or more
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0973: 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.

P0974: Range check (High resistance)

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

TYPICAL MALFUNCTION THRESHOLDS

P0973: Range check (Low resistance)

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

P0974: Range check (High resistance)

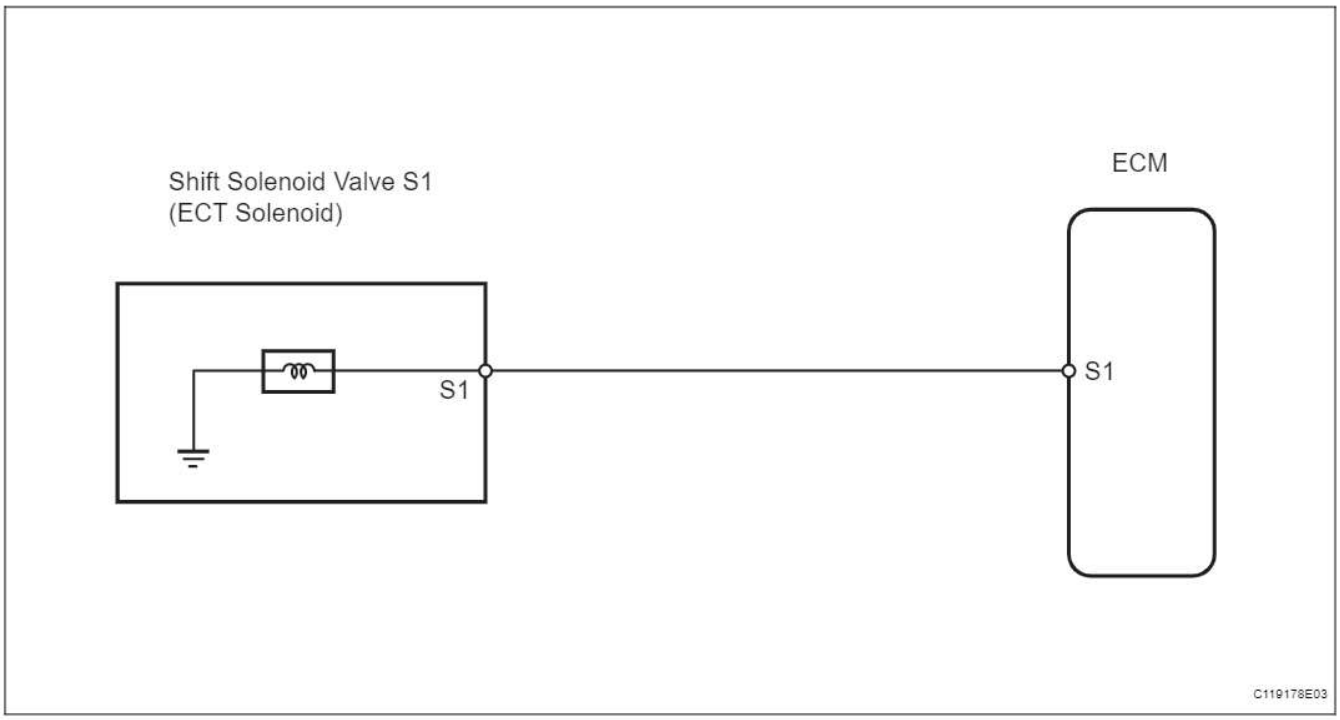
Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

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

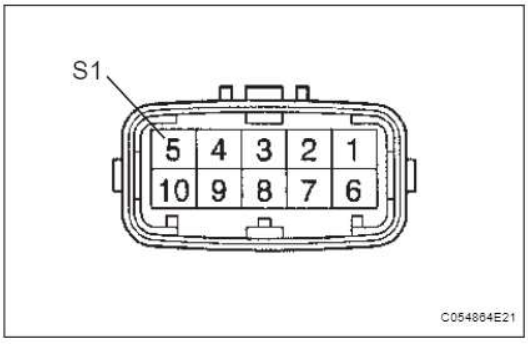
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WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

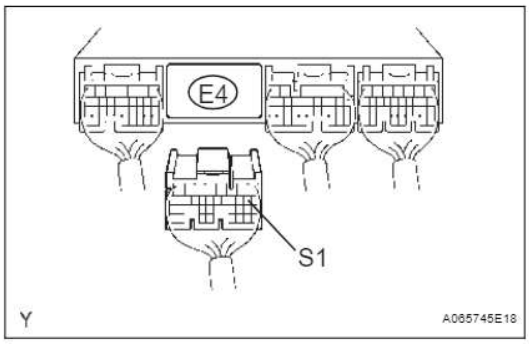
Tester Connection	Condition	Specified Condition
5 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

OK → Go to step 3

OK

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2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

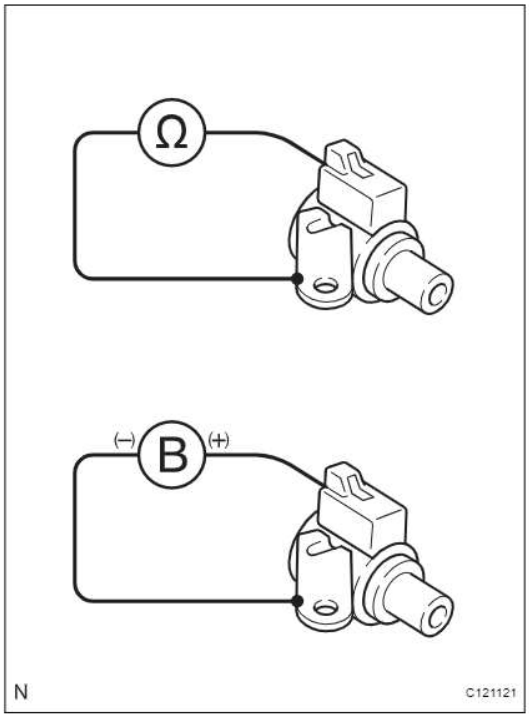
Tester Connection	Condition	Specified Condition
E4-9 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

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

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE S1



(a) Remove the shift solenoid valve S1.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE S1**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

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AX

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

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

DESCRIPTION

Refer to DTC P0973 (see page AX-66).

DTC No.	DTC Detection Condition	Trouble Area
P0976	ECM detects short in solenoid valve S2 circuit 2 times when solenoid valve S2 is operated (1 trip detection logic)	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	ECM detects open in solenoid valve S2 circuit 2 times when solenoid valve S2 is not operated (1 trip detection logic)	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid.

MONITOR STRATEGY

Related DTCs	P0976: Shift solenoid valve S2/Range check (Low resistance) P0977: Shift solenoid valve S2/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S2
Frequency of operation	Continuous
Duration	2 times or more
MIL operation	1 driving cycle
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

P0976: 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.

P0977: Range check (High resistance)

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

TYPICAL MALFUNCTION THRESHOLDS

P0976: Range check (Low resistance)

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

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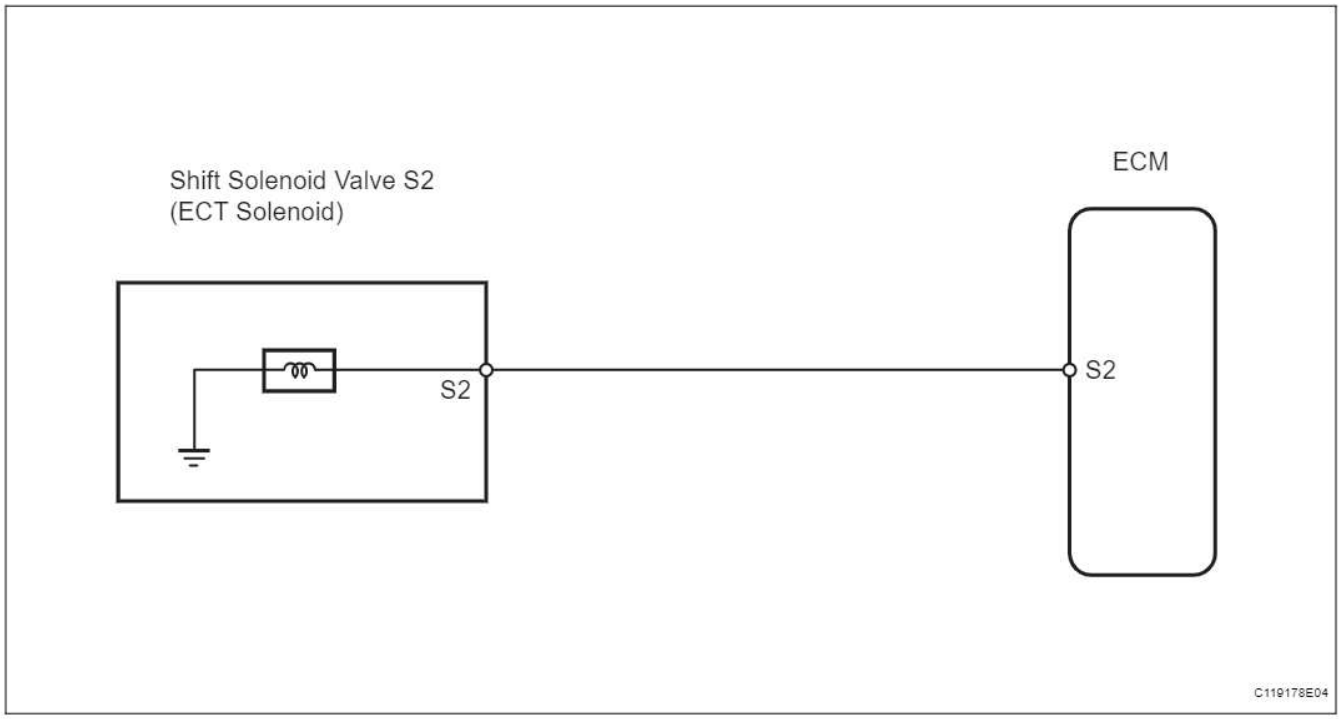
P0977: Range check (High resistance)

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

COMPONENT OPERATING RANGE

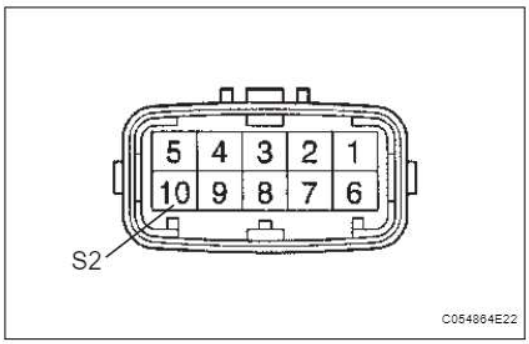
Shift solenoid valve S2	Resistance: 11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.

Standard resistance

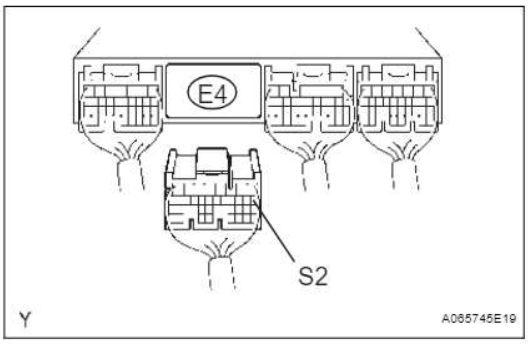
Tester Connection	Condition	Specified Condition
10 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

NG → Go to step 3

OK

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2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

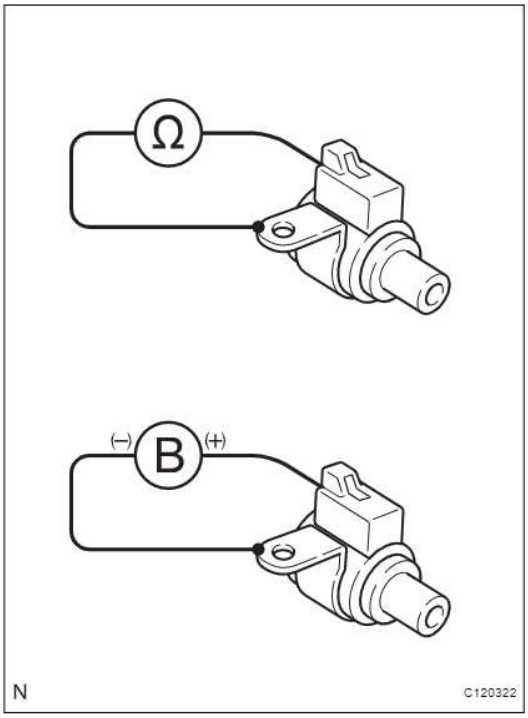
Tester Connection	Condition	Specified Condition
E4-8 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

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

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE S2



(a) Remove the shift solenoid valve S2.
(b) Measure the resistance between the solenoid valve terminal and solenoid valve body.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE S2**

OK

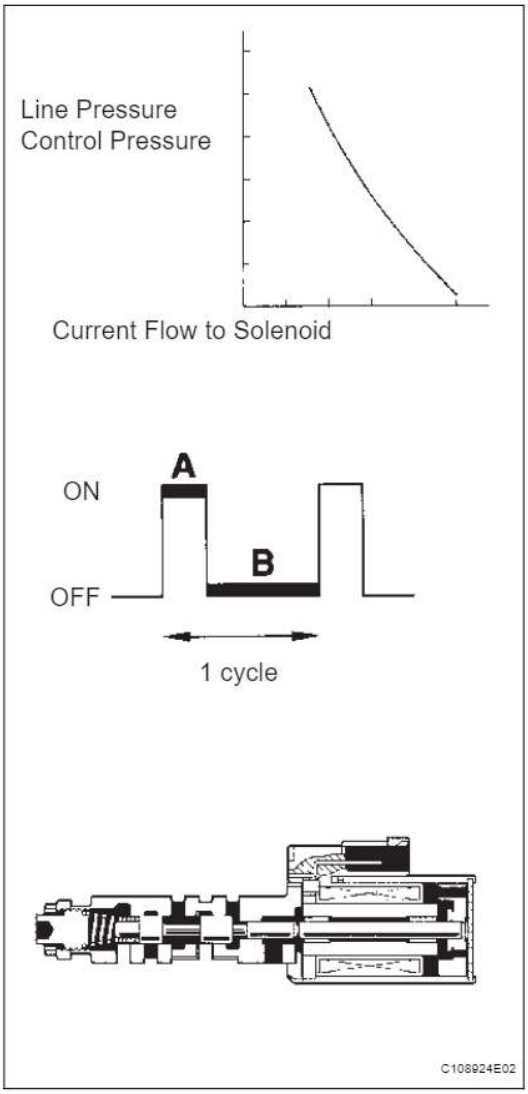
REPAIR OR REPLACE TRANSMISSION WIRE

AX

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

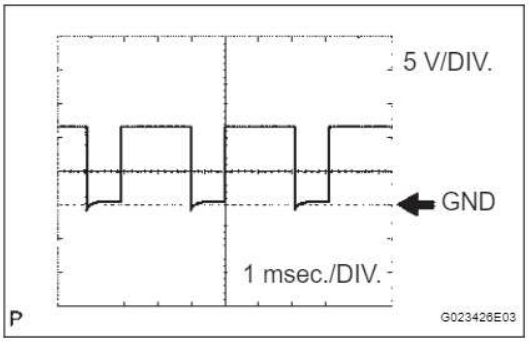
DESCRIPTION



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

DTC No.	DTC Detection Condition	Trouble Area
P2716	Condition (a) or (b) below is detected for 1 sec. or more (1 trip detection logic): (a) SLT - terminal: 0 V (b) SLT - terminal: 12 V	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM

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1. **Reference: Inspect using an oscilloscope.**
Check the waveform of the ECM connector.
OK:
Refer to illustration.

Item	Content
Tester Connection	E4-12 (SLT+) - E4-13 (SLT-)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Engine idle speed

MONITOR DESCRIPTION

The shift 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 ECM adjusts the duty cycle of the solenoid valve SLT to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs. When an open or short in the shift solenoid valve SLT circuit is detected, the ECM interprets this as a fault. The ECM will illuminate the MIL.

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

AX

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present.	None
Solenoid current cut status	Not cut
Battery voltage	11 V or more

TYPICAL MALFUNCTION THRESHOLDS

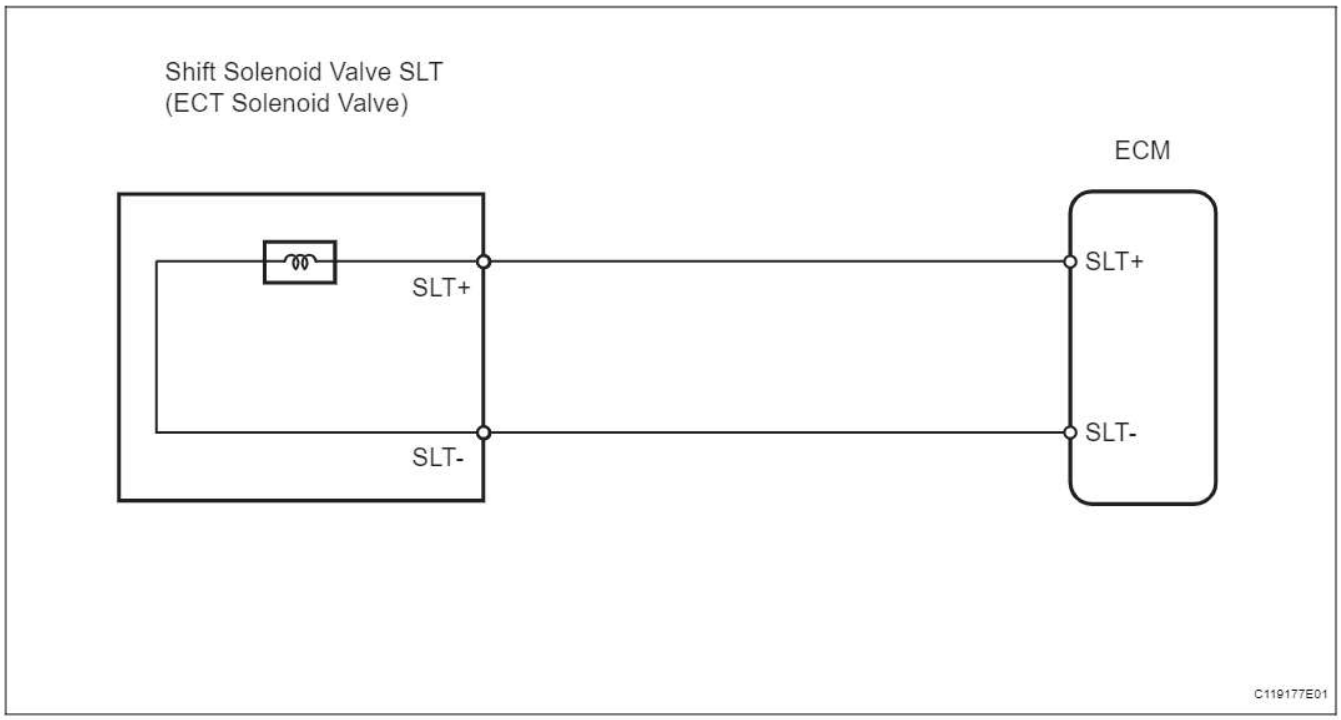
Solenoid status (SLT) from MIC	Fail (open or short) (Output signal duty equal to 100%)

COMPONENT OPERATING RANGE

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

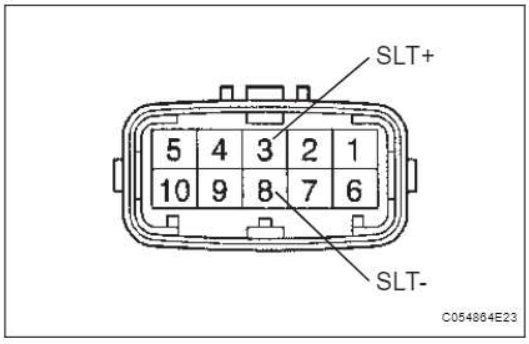
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WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLT)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

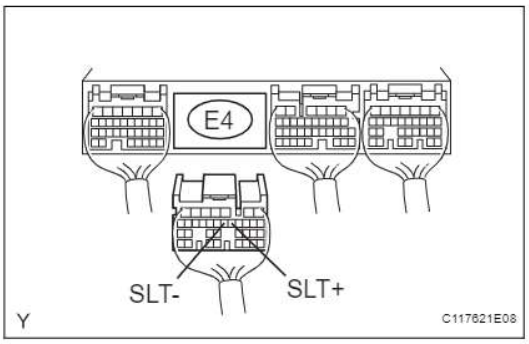
Tester Connection	Condition	Specified Condition
3 (SLT+) - 8 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
3 (SLT+) - Body ground	20°C (68°F)	10 kΩ or higher
8 (SLT-) - Body ground	20°C (68°F)	10 kΩ or higher

NG → Go to step 3

OK

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2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

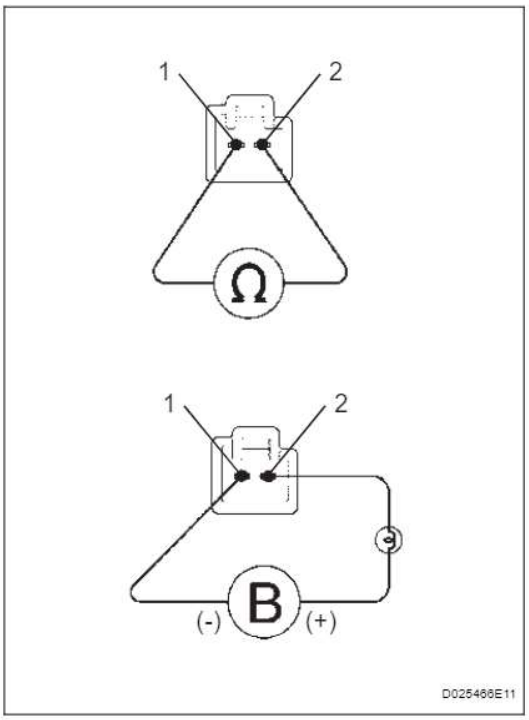
Tester Connection	Condition	Specified Condition
E4-12 (SLT+) - E4-13 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
E4-12 (SLT+) - Body ground	20°C (68°F)	10 kΩ or higher
E4-13 (SLT-) - Body ground	20°C (68°F)	10 kΩ or higher

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

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE SLT



(a) Remove the shift solenoid valve SLT.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
5.0 to 5.6 Ωat 20°C (68°F)
(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
(d) Check the operating noise of terminal 1 of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SLT**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

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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)

DESCRIPTION

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

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

Fail-safe function:
If the ECM 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 ECM sends a signal to the solenoid valve SL to regulate the hydraulic pressure and provide smoother gear shifts. The shift solenoid valve SL responds to commands from the ECM. The valve controls the lock-up relay valve to perform the torque-converter lock-up function. If the ECM 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	OFF
Time after solenoid ON to OFF	More than 0.008 sec.

AX
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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

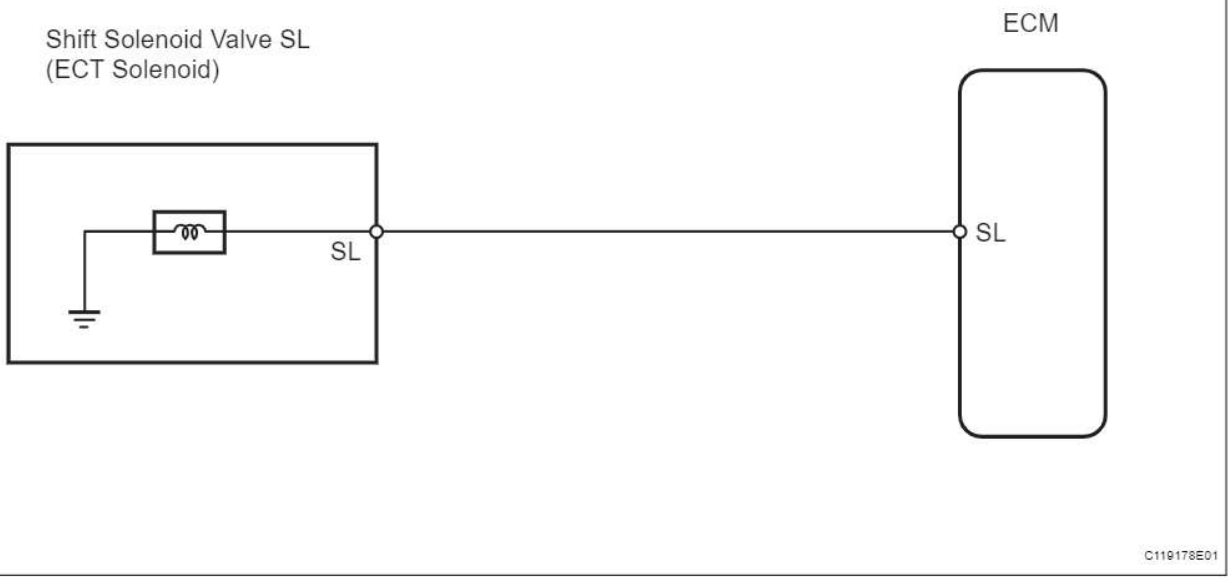
P2770: Range check (High resistance)

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)

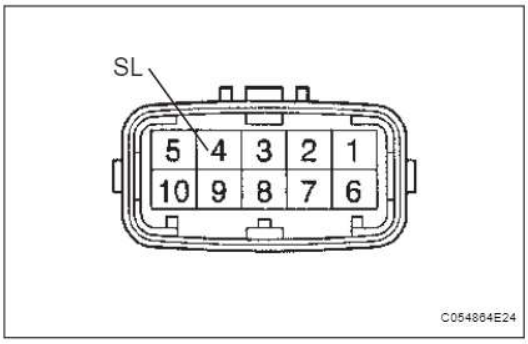
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

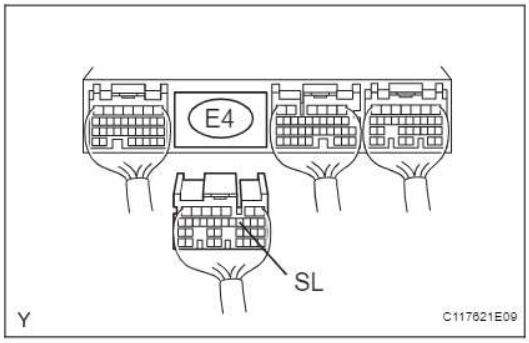
Tester Connection	Condition	Specified Condition
4 (SL) - Body ground	20°C (68°F)	11 to 15 Ω

NG → **Go to step 3**

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OK

2 CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

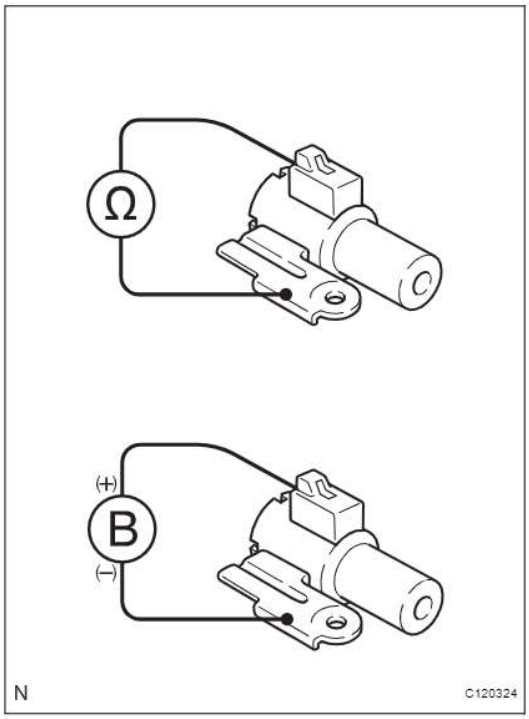
Tester Connection	Condition	Specified Condition
E4-11 (SL) - Body ground	20°C (68°F)	11 to 15 Ω

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

OK

REPLACE ECM

3 INSPECT SHIFT SOLENOID VALVE SL



(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)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SL**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

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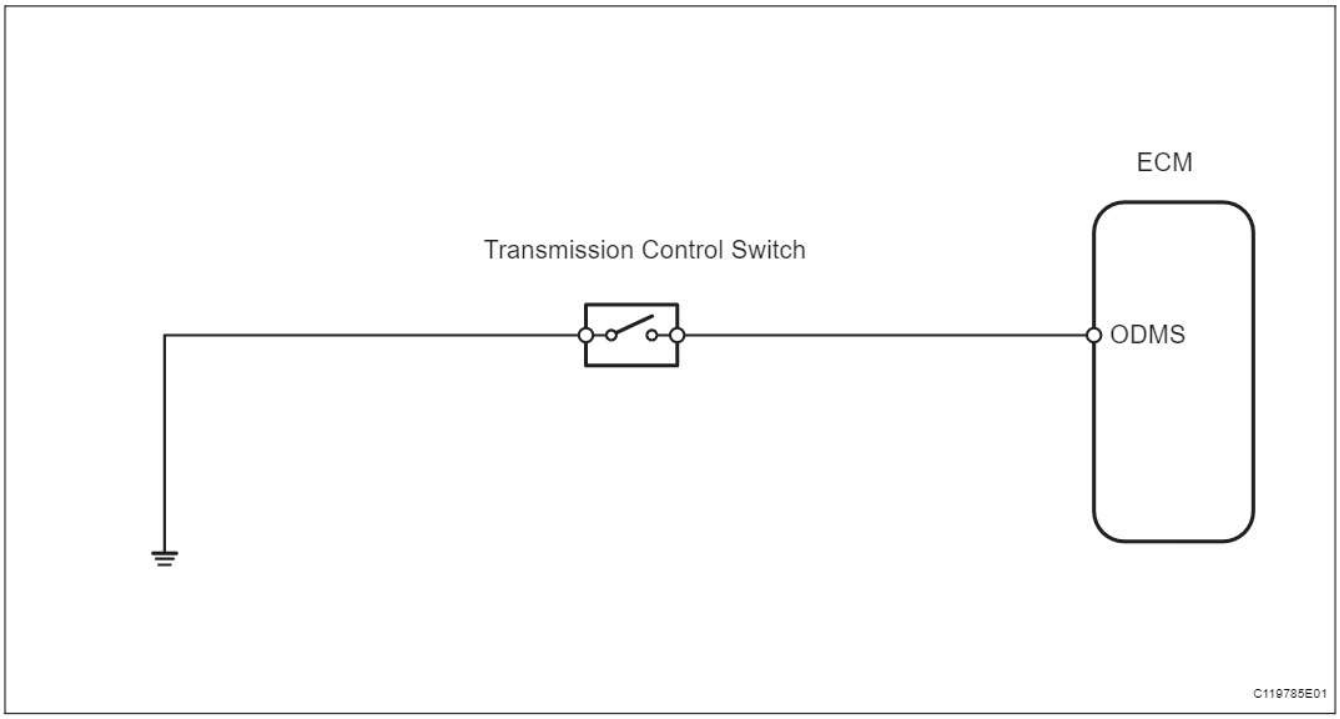
AX

O/D Main Switch Circuit

DESCRIPTION

The O/D main switch (transmission control switch) is a momentary type switch. When pressing the O/D main switch, the O/D OFF indicator light illuminates and the ECM prohibits shifting into O/D. When it is pressed again, the O/D OFF indicator light goes off and the ECM allows shifting into O/D. Turning the ignition switch OFF will reset the O/D OFF indicator light.

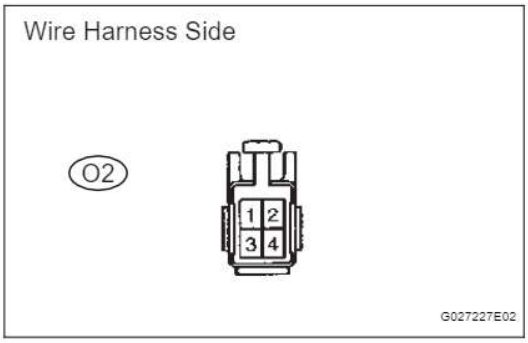
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (TRANSMISSION CONTROL SWITCH - BODY GROUND)



(a) Disconnect the O2 switch connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

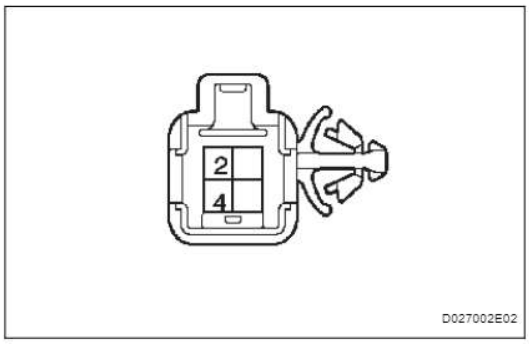
Tester Connection	Specified Condition
4 - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

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2 INSPECT TRANSMISSION CONTROL SWITCH (O/D MAIN SWITCH)



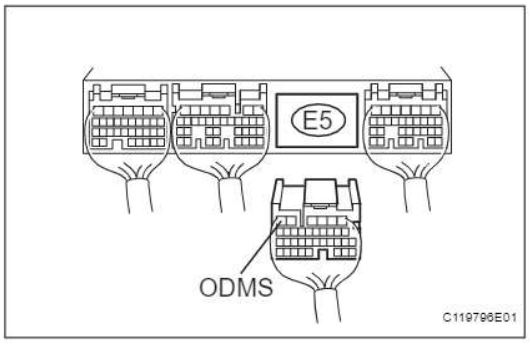
(a) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
2 - 4	Continuously press transmission control switch	Below 1 Ω
2 - 4	Release transmission control switch	10 kΩ or higher

NG → **REPLACE TRANSMISSION CONTROL SWITCH**

OK

3 CHECK WIRE HARNESS (TRANSMISSION CONTROL SWITCH - ECM)



(a) Disconnect the E5 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
E5-6 (ODMS) - Body ground	Continuously press transmission control switch	Below 1 Ω
E5-6 (ODMS) - Body ground	Release transmission control switch	10 kΩ or higher

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

OK

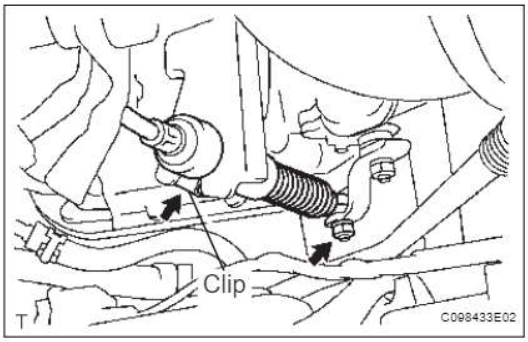
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

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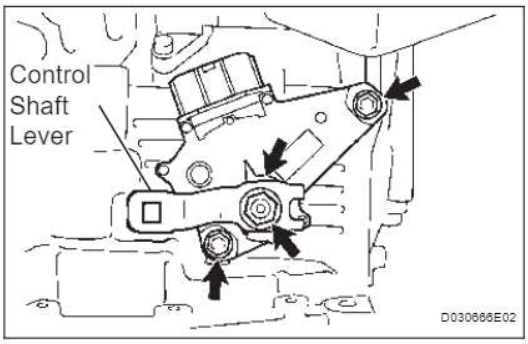
REMOVAL

1. **REMOVE BATTERY**

2. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the nut and disconnect the control cable from the control shaft lever.
   (b) Remove the clip and disconnect the control cable from the control cable bracket.

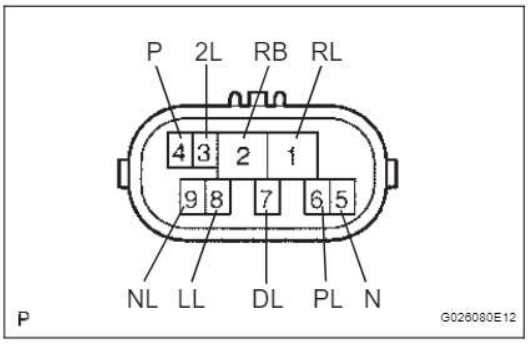


3. **REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY**
   (a) Disconnect the connector from the park/neutral position switch.
   (b) Remove the nut, washer and control shaft lever.
   (c) Pry out the lock washer and remove the manual valve shaft nut.
   (d) Remove the 2 bolts and pull out the park/neutral position switch.



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

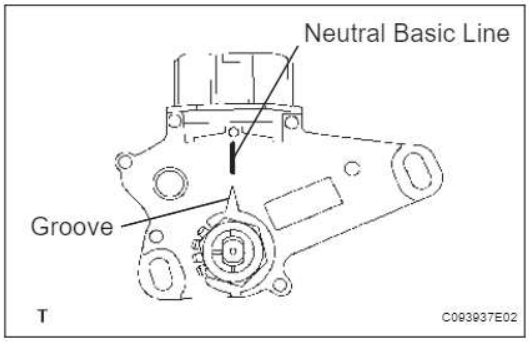


Tester Connection	Shift Lever Position	Specified Condition
2 (RB) - 6 (PL)	P	Below 1 Ω
4 (P) - 5 (N)	P	Below 1 Ω
2 (RB) - 6 (PL)	Not on P	10 kΩ or higher
4 (P) - 5 (N)	Not on P	10 kΩ or higher
1 (RL) - 2 (RB)	R	Below 1 Ω
1 (RL) - 2 (RB)	Not on R	10 kΩ or higher
2 (RB) - 9 (NL)	N	Below 1 Ω
4 (P) - 5 (N)	N	Below 1 Ω
2 (RB) - 9 (NL)	Not on N	10 kΩ or higher
4 (P) - 5 (N)	Not on N	10 kΩ or higher
2 (RB) - 7 (DL)	D	Below 1 Ω
2 (RB) - 7 (DL)	Not on D	10 kΩ or higher
2 (RB) - 3 (2L)	2	Below 1 Ω
2 (RB) - 3 (2L)	Not on 2	10 kΩ or higher
2 (RB) - 8 (LL)	L	Below 1 Ω
2 (RB) - 8 (LL)	Not on L	10 kΩ or higher

If the result is not as specified, replace the switch assembly.

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ADJUSTMENT

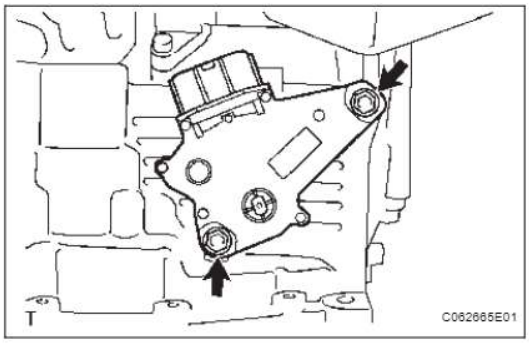
1. ADJUST PARK/NEUTRAL POSITION SWITCH ASSEMBLY

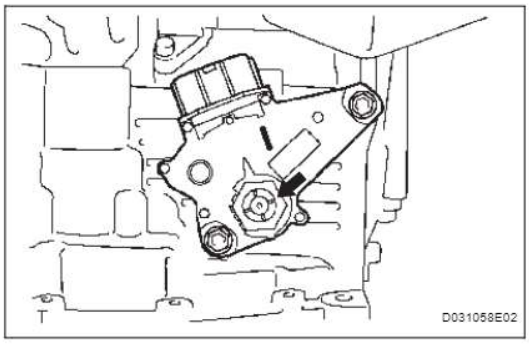
(a) Loosen the 2 bolts of the park/neutral position switch and set the shift lever to the N position.
(b) Align the groove and neutral basic line.
(c) Hold the switch in this position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
(d) After adjustment, perform the inspection (see page AX-87).

INSTALLATION

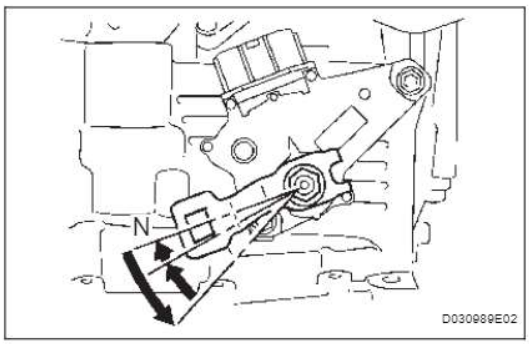
1. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Install the park/neutral position switch to the manual valve shaft.
(b) Temporarily install the 2 bolts.

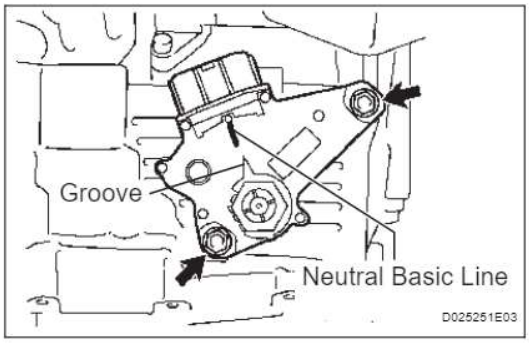




(c) Install a new lock washer and tighten the manual valve shaft nut.
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)
(d) Temporarily install the control shaft lever.



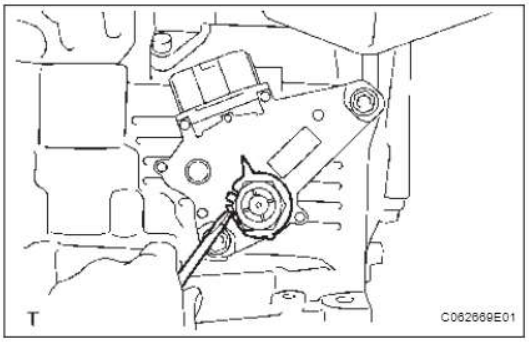
(e) Turn the lever counterclockwise until it stops, and then turn it clockwise 2 notches.
(f) Remove the control shaft lever.



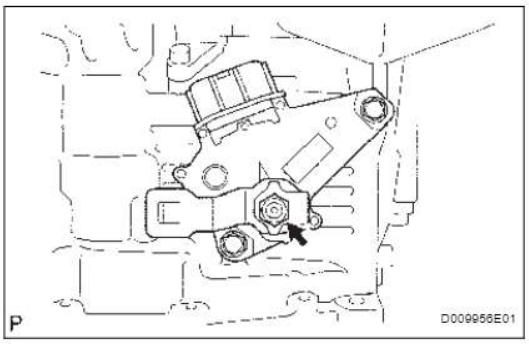
(g) Align the groove with neutral basic line.
(h) Hold the switch in this position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

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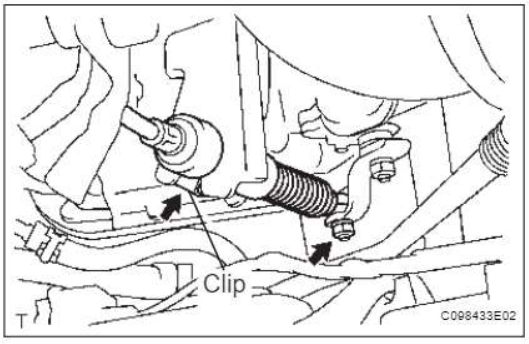
AX



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



(j) Install the control shaft lever with the washer and nut.
Torque: 12.7 N*m (130 kgf*cm, 9 ft.*lbf)
(k) Connect the connector to the park/neutral position switch.



2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY
(a) Temporarily install the control cable to the control shaft lever with the nut.
(b) Install the control cable to the bracket with a new clip.

3. INSTALL BATTERY

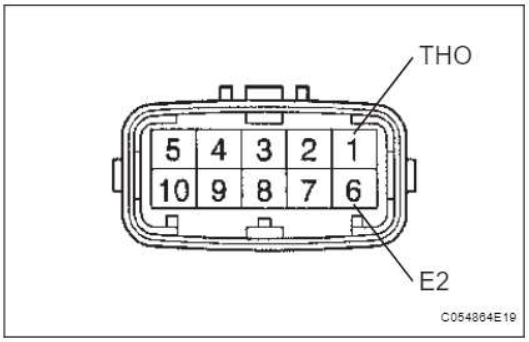
4. ADJUST SHIFT LEVER POSITION
(a) Adjust the shift lever position (see page AX-121).

5. INSPECT SHIFT LEVER POSITION
(a) Inspect the shift lever position (see page AX-121).

6. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY
(a) Inspect the switch (see page AX-87).

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INSPECTION

1. INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)

(a) Disconnect the E1 wire connector.

(b) Measure the resistance of the transmission wire.

Standard resistance

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

HINT:

If the resistance is not as specified for either of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

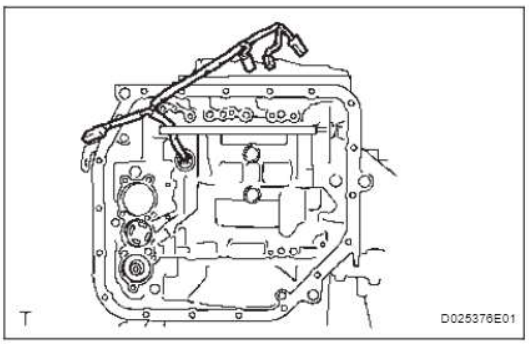
ATF Temperature	Specified Condition
10°C (68°F)	6.4 kΩ
110°C (230°F)	0.2 kΩ

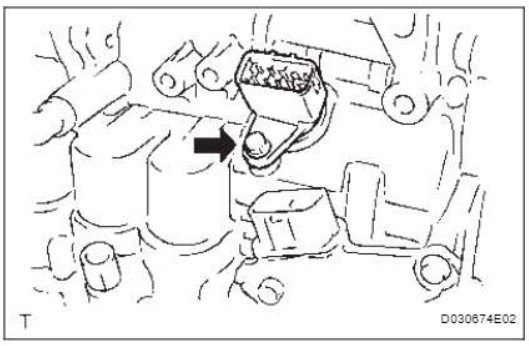
INSTALLATION

1. INSTALL TRANSMISSION WIRE

(a) Coat an O-ring with ATF.

(b) Install the transmission wire.





(c) Install the bolt.

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

2. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

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

(b) Temporarily install the valve body with the 13 bolts.

HINT:

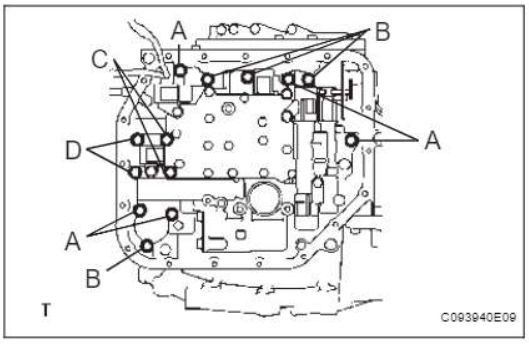
Bolt length:

32 mm (1.26 in.) for bolt A

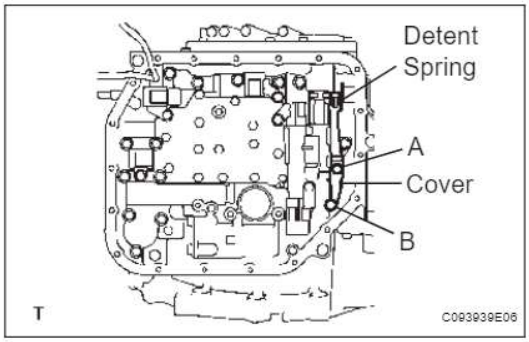
22 mm (0.87 in.) for bolt B

55 mm (2.17 in.) for bolt C

45 mm (1.77 in.) for bolt D



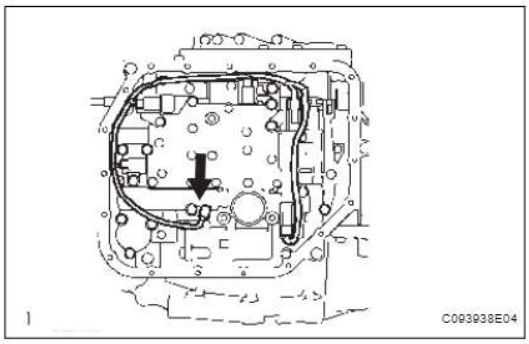
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(c) Temporarily install the detent spring and cover with the 2 bolts.
HINT:
Bolt length:
14 mm (0.55 in.) for bolt A
45 mm (1.77 in.) for bolt B

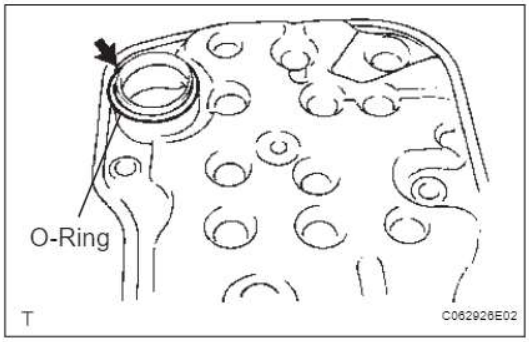
(d) Check that the manual valve lever contacts the center of the roller at the tip of the detent spring.

(e) Tighten the 15 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



(f) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

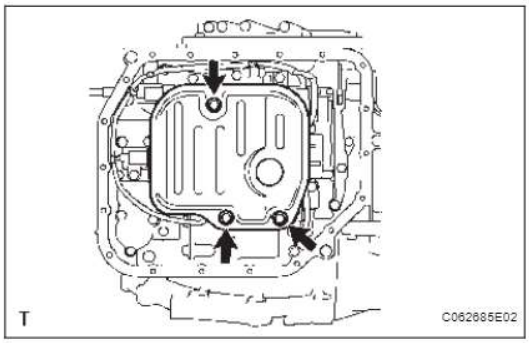
(g) Connect the 5 shift solenoid valve connectors.



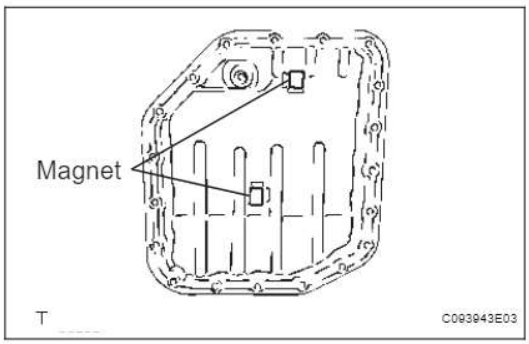
3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

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

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



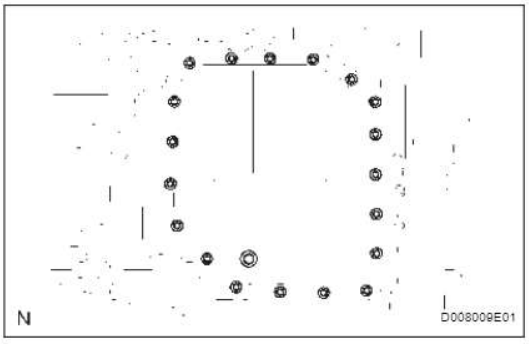
(c) Install the oil strainer with the 3 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



4. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the oil pan, as shown in the illustration.

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(b) Install a new gasket and the oil pan with the 19 bolts.
Torque: 7.8 N*m (8 kgf*cm, 69 in.*lbf)

5. **INSTALL ENGINE UNDER COVER LH**

6. **ADD AUTOMATIC TRANSAXLE FLUID**
Fluid type:
Toyota Genuine ATF TYPE T-IV
Standard capacity:
2.9 liters (3.1 US qts, 2.6 Imp. qts)

7. **INSPECT AUTOMATIC TRANSAXLE FLUID**
(a) Inspect the automatic transaxle fluid (see page AX-82).

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

2. ROAD TEST

NOTICE:

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

(a) D position test

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

(1) Check up-shift operation.

Check that the 1 → 2, 2 → 3 and 3 → O/D up-shifts take place at the shift point shown in the automatic shift schedule (see page SS-19).

HINT:

O/D Gear Up-shift Prohibition Control

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

O/D and 3rd Gear Lock-up Prohibition Control

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

3rd Gear Lock-up Prohibition Control

- O/D main switch OFF (O/D ON).

(2) Check for shift shock and slip.

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

(3) Check for abnormal noise and vibration.

While driving the vehicle in the lock-up or O/D gear with the shift lever on D, check for abnormal noises and vibration.

HINT:

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

(4) Check kick-down operation.

While driving the vehicle in all gears with the shift lever on D, check that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick-downs conform to those indicated on the automatic shift schedule (see page SS-19).

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

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(6) Check the lock-up mechanism.
- Drive the vehicle in the O/D gear with the shift lever on D. Maintain a steady speed (lock-up ON) of about 60 km/h (37 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:
If there is a sudden increase in engine speed, there is no lock-up.

(b) 2 position test
Move the shift lever to 2 and fully depress the accelerator pedal. Check the following:
(1) Check up-shift operation.
Check that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (see page SS-19).
HINT:
There is no O/D up-shift and lock-up when the shift lever on 2.
(2) Check engine braking.
While driving the vehicle in the 2nd gear with the shift lever on 2, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

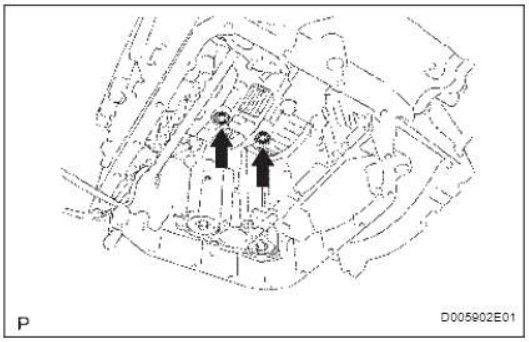
(c) L position test
Move the shift lever to L and fully depress the accelerator pedal. Check the following:
(1) Check that there is no up-shift.
While driving the vehicle with the shift lever on L, check that there is no up-shift to 2nd gear.
(2) Check engine braking.
While driving the vehicle with the shift lever on L, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration.

(d) R position test
Move the shift lever to R and lightly depress the accelerator pedal. Check that the vehicle moves backward without any abnormal noise or vibration.
CAUTION:
Before conducting this test, ensure that no people or obstacles are in the test area.

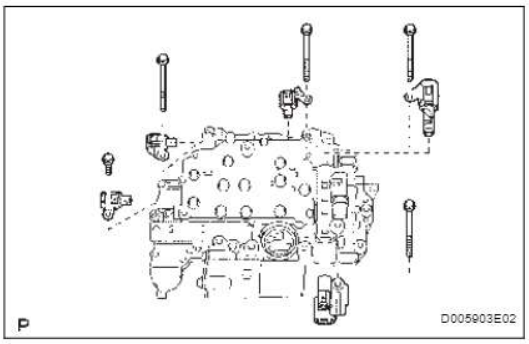
(e) P position test
Stop the vehicle on an incline (more than 5°). Then move the shift lever to P and release the parking brake. Check that the parking lock pawl holds the vehicle in place.

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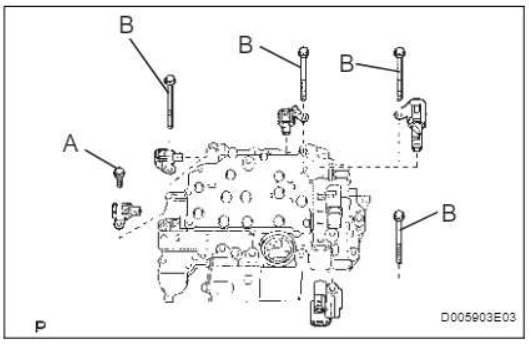
(f) Remove the 2 apply gaskets.



(g) Remove the 5 bolts and 5 shift solenoid valves.

INSTALLATION

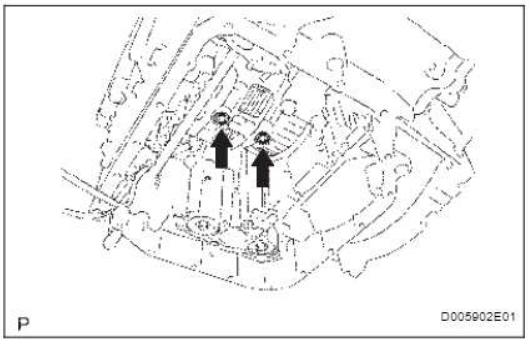
1. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

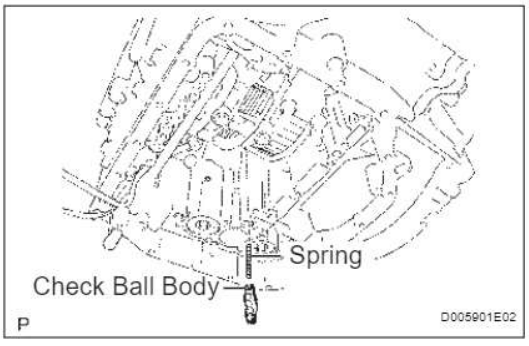


(a) Install the 5 shift solenoid valves with the 5 bolts.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)
HINT:
Bolt length:
14 mm (0.55 in.) for bolt A
55 mm (2.17 in.) for bolt B

(b) Coat 2 new apply gaskets with ATF.

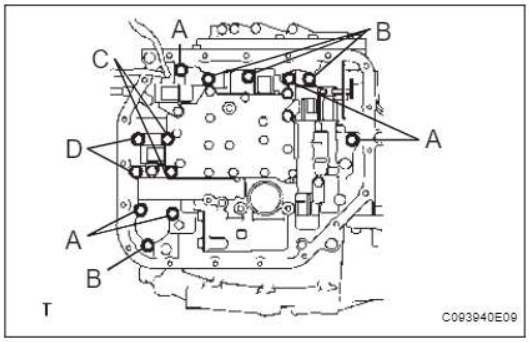
(c) Install the gaskets on the transaxle case.



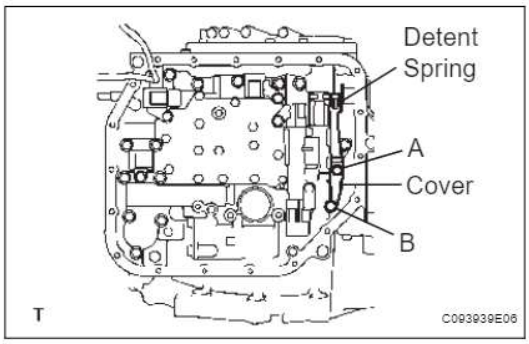


(d) Install the spring and check ball body.

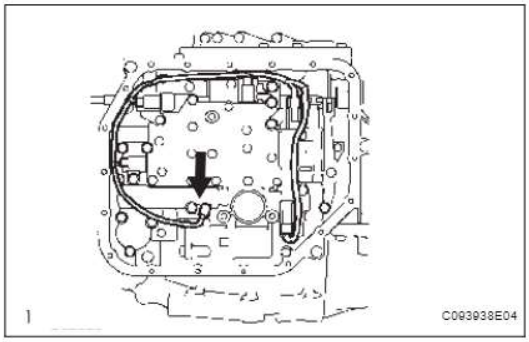
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(e) Align the groove of the manual valve with the pin of the manual valve lever.
(f) Temporarily install the valve body with the 13 bolts.
HINT:
Bolt length:
32 mm (1.26 in.) for bolt A
22 mm (0.87 in.) for bolt B
55 mm (2.17 in.) for bolt C
45 mm (1.77 in.) for bolt D

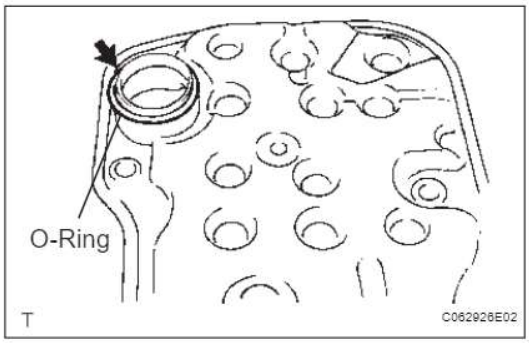


(g) Temporarily install the detent spring and cover with the 2 bolts.
HINT:
Bolt length:
14 mm (0.55 in.) for bolt A
45 mm (1.77 in.) for bolt B
(h) Check that the manual valve lever contacts the center of the roller at the tip of the detent spring.
(i) Tighten the 15 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

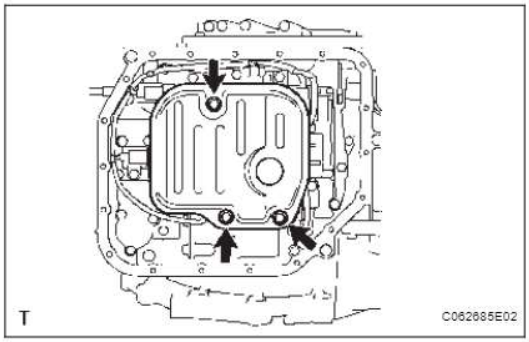


(j) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)
(k) Connect the 5 shift solenoid valve connectors.

2. INSTALL VALVE BODY OIL STRAINER ASSEMBLY



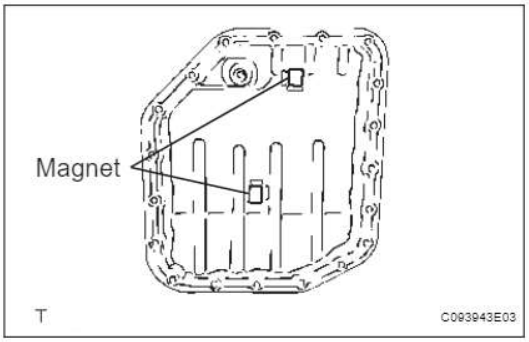
(a) Coat a new O-ring with ATF.
(b) Install the O-ring on the oil strainer.

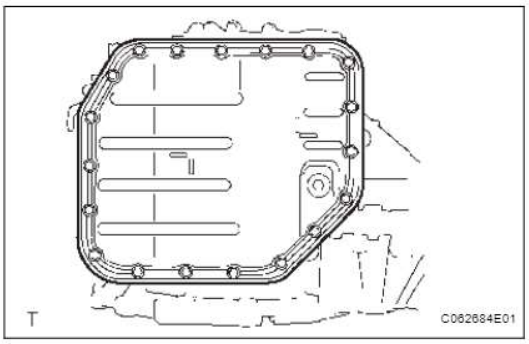


(c) Install the oil strainer with the 3 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

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3. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**
   (a) Install the 2 magnets in the oil pan, as shown in the illustration.
   (b) Install a new gasket and the oil pan with the 19 bolts.
   Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)
4. **INSTALL ENGINE UNDER COVER LH**
5. **ADD AUTOMATIC TRANSAXLE FLUID**
   Fluid type:
   Toyota Genuine ATF TYPE T-IV
6. **INSPECT AUTOMATIC TRANSAXLE FLUID**
   (a) Inspect the automatic transaxle fluid (see page AX-82).

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ON-VEHICLE INSPECTION

1. CHECK SHIFT LOCK OPERATION

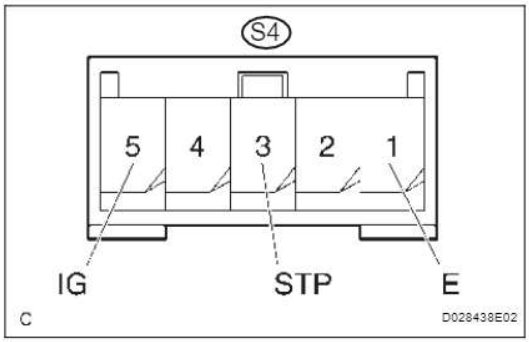
(a) Adjust the shift lever to the P position.
(b) Turn the ignition switch to the LOCK position.
(c) Check that the shift lever cannot be adjusted to any position other than P.
(d) Turn the ignition switch to the ON position, depress the brake pedal and check that the shift lever can be adjusted to all positions.
If the operation cannot be done as specified, inspect the shift lock control switch.

2. CHECK SHIFT LOCK RELEASE BUTTON OPERATION

(a) When operating the shift lever with the shift lock release button pressed and the ignition switch in the ACC or ON position, check that the lever can be adjusted to all positions.
If the operation cannot be done as specified, check the shift lever assembly installation condition.

3. CHECK KEY INTERLOCK OPERATION

(a) Turn the ignition switch to the ON position.
(b) Depress the brake pedal and adjust the shift lever to any position other than P.
(c) Check that the ignition switch cannot be turned to the LOCK position.
(d) Adjust the shift lever to the P position, turn the ignition switch to the LOCK position and check that the ignition key can be removed.
If the operation cannot be done as specified, inspect the shift lock control switch.



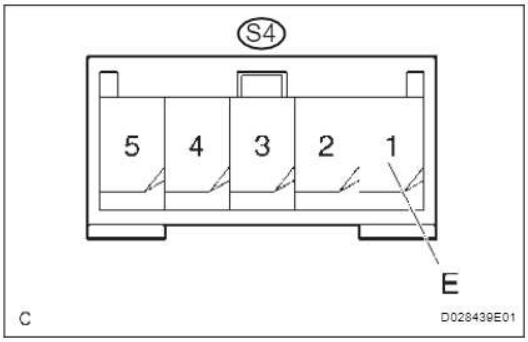
4. INSPECT SHIFT LOCK CONTROL SWITCH

(a) Measure the voltage according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control switch connector.

Standard voltage

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

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

Standard resistance

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

If the result is not as specified, replace the shift lock control switch.

INSPECTION

1. INSPECT SHIFT LOCK CONTROL SWITCH

(a) Disconnect the connector A and connector B of the shift lock control switch.

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

HINT:

"Switch ON" means push the button on top of the switch.

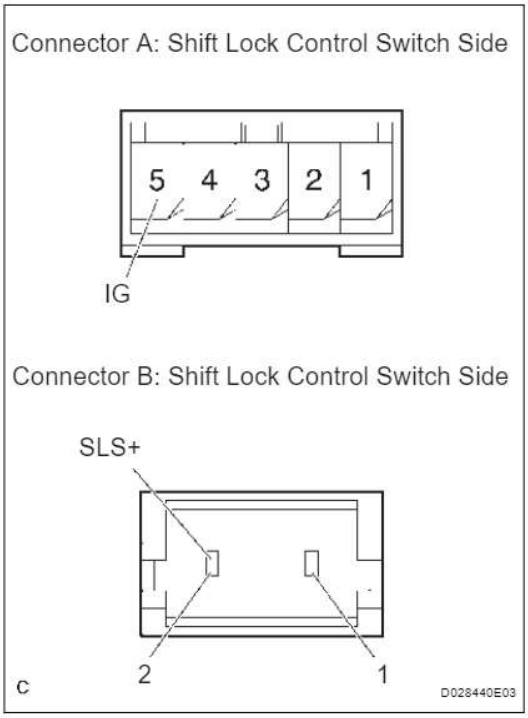
NOTICE:

Match the tester probe with current direction as the shift lock control switch circuit has a diode.

Standard resistance

Tester Condition	Condition	Specified Condition
A5 (IG) - B2 (SLS+)	Switch ON	Below 1 Ω
A5 (IG) - B2 (SLS+)	Switch OFF	10 kΩ or higher

If the result is not as specified, replace the shift lock control switch.



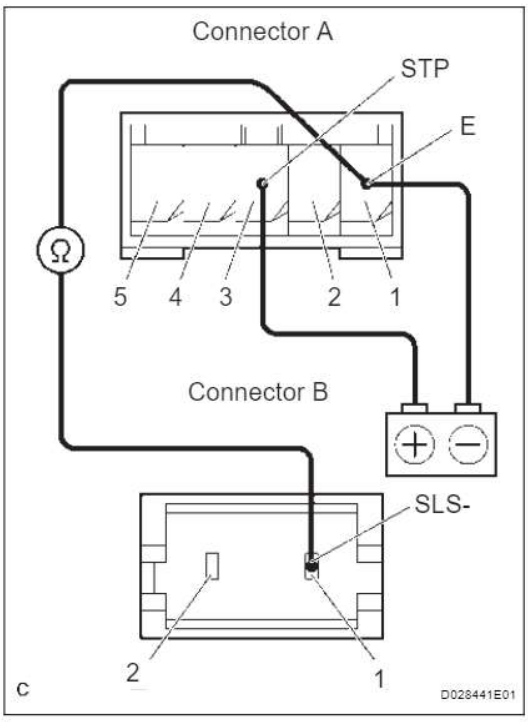
(c) Connect the battery's positive (+) lead to terminal 3 (STP) and the negative (-) lead to terminal 1 (E).

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

Standard resistance

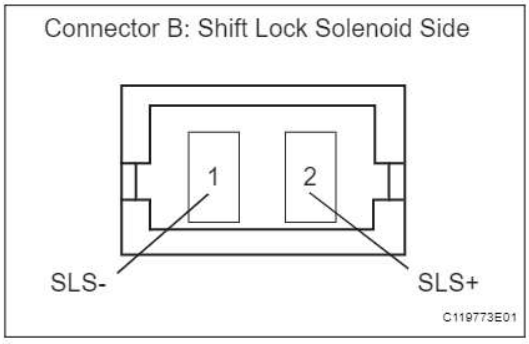
Tester Condition	Condition	Specified Condition
A1 (E) - B1 (SLS-)	Connect battery	Below 1 Ω
A1 (E) - B1 (SLS-)	Disconnect battery	10 kΩ or higher

If the result is not as specified, replace the shift lock control switch.



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2. INSPECT SHIFT LOCK SOLENOID

(a) Disconnect the solenoid connector.

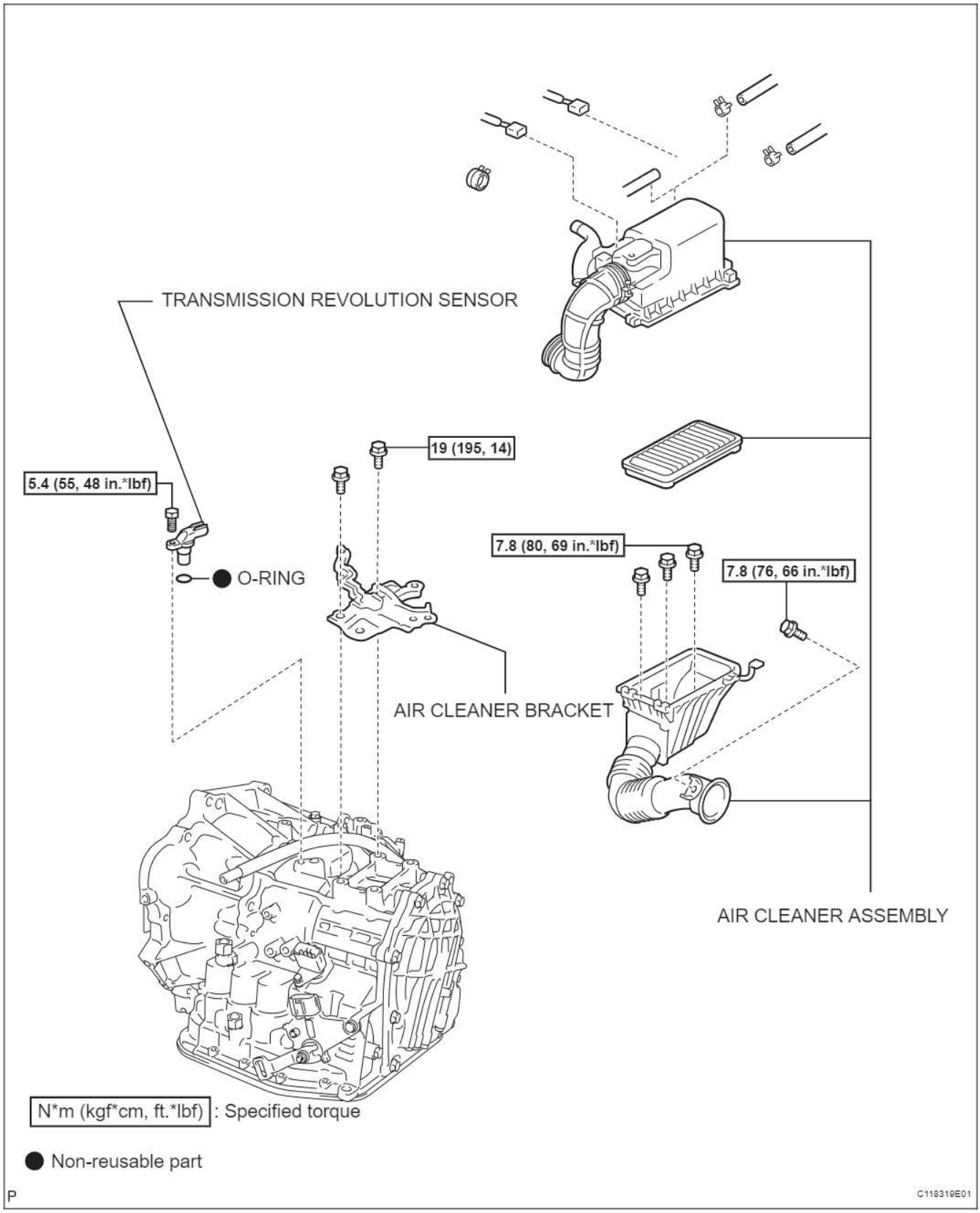
(b) Connect the battery's positive (+) lead to terminal 2 (SLS+) and the negative (-) lead to terminal 1 (SLS-).

(c) Check that the operating noise of the solenoid can be heard.
If the solenoid does not operate, replace the solenoid.

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TRANSMISSION REVOLUTION SENSOR

COMPONENTS

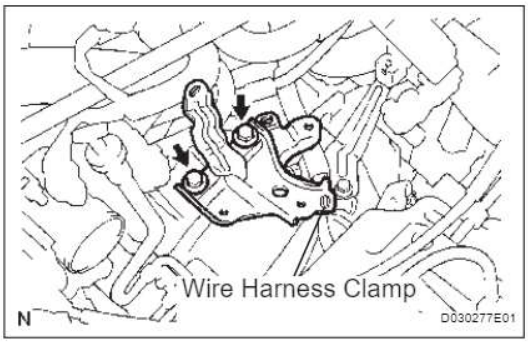


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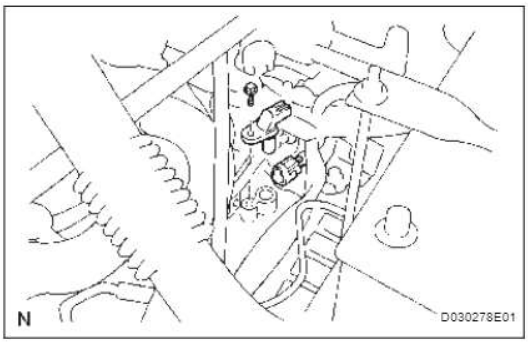
REMOVAL

1. **REMOVE AIR CLEANER ASSEMBLY**
   (a) Remove the air cleaner (see page ES-346).

2. **REMOVE AIR CLEANER BRACKET**
   (a) Disconnect the wire harness clamp.
   (b) Remove the 2 bolts and air cleaner bracket.



3. **REMOVE TRANSMISSION REVOLUTION SENSOR**
   (a) Disconnect the connector.
   (b) Remove the bolt and transmission revolution sensor.
   (c) Remove the O-ring from the sensor.

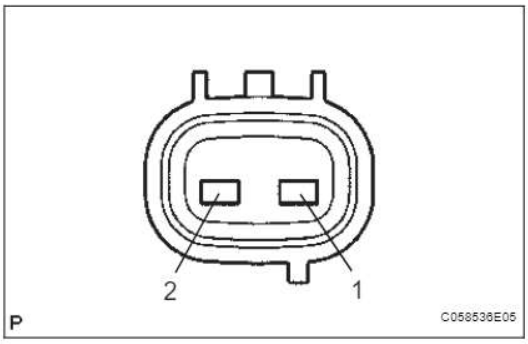


INSPECTION

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

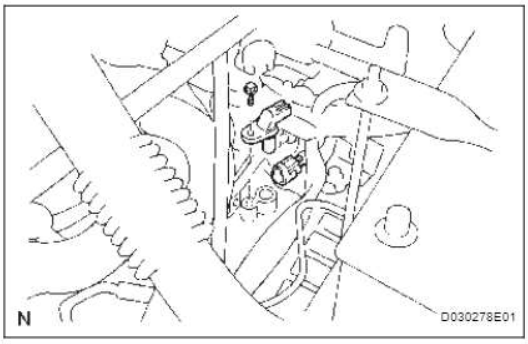
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

If the result is not as specified, replace the sensor.



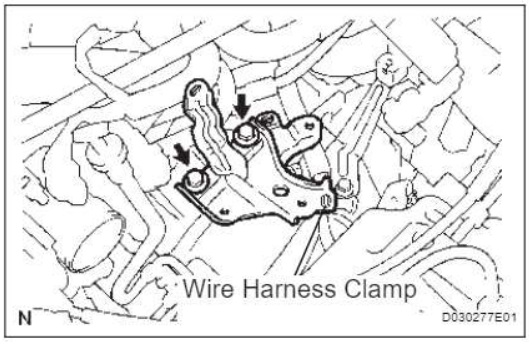
INSTALLATION

1. **INSTALL TRANSMISSION REVOLUTION SENSOR**
   (a) Coat a new O-ring with ATF.
   (b) Install the O-ring to the transmission revolution sensor.
   (c) Install the sensor with the bolt.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
   (d) Connect the connector.



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2. **INSTALL AIR CLEANER BRACKET**
   (a) Install the air cleaner bracket with the 2 bolts.
   Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
   (b) Connect the wire harness clamp to the air cleaner bracket.

3. **INSTALL AIR CLEANER ASSEMBLY**
   (a) Install the air cleaner (see page ES-348).

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MECHANICAL SYSTEM TESTS

1. STALL SPEED TEST

HINT:

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

NOTICE:

- **Do not perform the stall speed test longer than 5 seconds.**
- **To ensure safety, perform this test in an open and level area that provides good traction.**
- **The stall speed test should always be performed with at least 2 people. One person should observe the condition of the wheels and wheel chocks while the other is performing the test.**

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

(b) Run the vehicle until the ATF temperature has reached 50 to 80°C (122 to 176°F).

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

(d) Chock all 4 wheels.

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

(f) Move the shift lever to the drive position.

(g) Depress the accelerator pedal as much as possible with your right foot.

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

Standard value:

2,050 to 2,550 rpm

Evaluation:

Test Result	Possible Cause
Stall speed is lower than standard value	• Stator one-way clutch is not operating properly • Torque converter is faulty (stall speed is less than standard value by 600 rpm or more) • Engine power may be insufficient
Stall speed is higher than standard value	• Line pressure is low • Forward clutch slipping • No. 2 one-way clutch is not operating properly

2. SHIFT TIME LAG TEST

HINT:

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

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

(b) Run the vehicle until the ATF temperature has reached 50 to 80°C (122 to 176°F).

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

(d) Set the parking brake and keep the brake pedal depressed firmly.

(e) Check the D range time lag.

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

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(2) Move the shift lever to D and measure the time until the shock is felt.
(3) Repeat the 2 procedures above 3 times, and calculate the average time of the 3 tests.

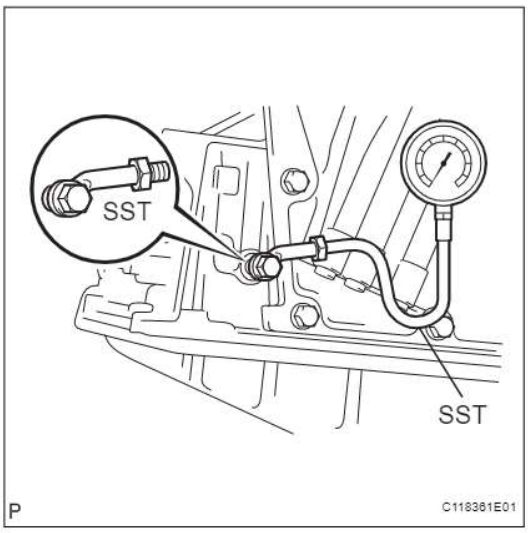
(f) Check the R range time lag.
(1) Move the shift lever to N and wait for 1 minute.
(2) Move the shift lever to R and measure the time until the shock is felt.
(3) Repeat the 2 procedures above 3 times, and calculate the average time of the 3 tests.

Standard value:

D range time lag is less than 1.2 seconds
R range time lag is less than 1.5 seconds

Evaluation:

Test Result	Possible Cause
D range time lag exceeds standard value	• Line pressure is low • Forward clutch is worn • No. 2 one-way clutch is not operating properly
R range time lag exceeds standard value	• Line pressure is low • Direct clutch worn • 1st and reverse brake worn



HYDRAULIC TEST

1. MEASURE LINE PRESSURE

NOTICE:

- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **The line pressure test should always be performed with at least 2 people. One person should observe the condition of the wheels or wheel chocks while the other is performing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**
- **This test must be performed after checking and adjusting the engine.**
- **Perform the test with the A/C OFF.**
- **When conducting the stall test, do not continue for more than 10 seconds.**

(a) Warm up the ATF.
(b) Remove the test plug on the transaxle case center right side and connect SST.

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

(c) Fully apply the parking brake and chock the 4 wheels.
(d) Start the engine and check idling speed.
(e) Keep your left foot firmly on the brake pedal and move the shift lever to D.
(f) Measure the line pressure when the engine is idling.
(g) Depress the accelerator pedal as much as possible with your right foot. Quickly read the highest line pressure reading when the engine speed reaches stall speed.

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(h) Perform the measure line pressure test again with the shift lever on R.

Specified line pressure:

Condition	Shift Lever on D	Shift Lever on R
Idling	372 to 407 kPa (3.8 to 4.2 kgf/cm^2, 54 to 60 psi)	541 to 636 kPa (5.5 to 6.5 kgf/cm^2, 78 to 92 psi)
Stall	1,107 to 1,225 kPa (11.3 to 12.5 kgf/cm^2, 161 to 178 psi)	1,695 to 1,813 kPa (17.3 to 18.5 kgf/cm^2, 246 to 263 psi)

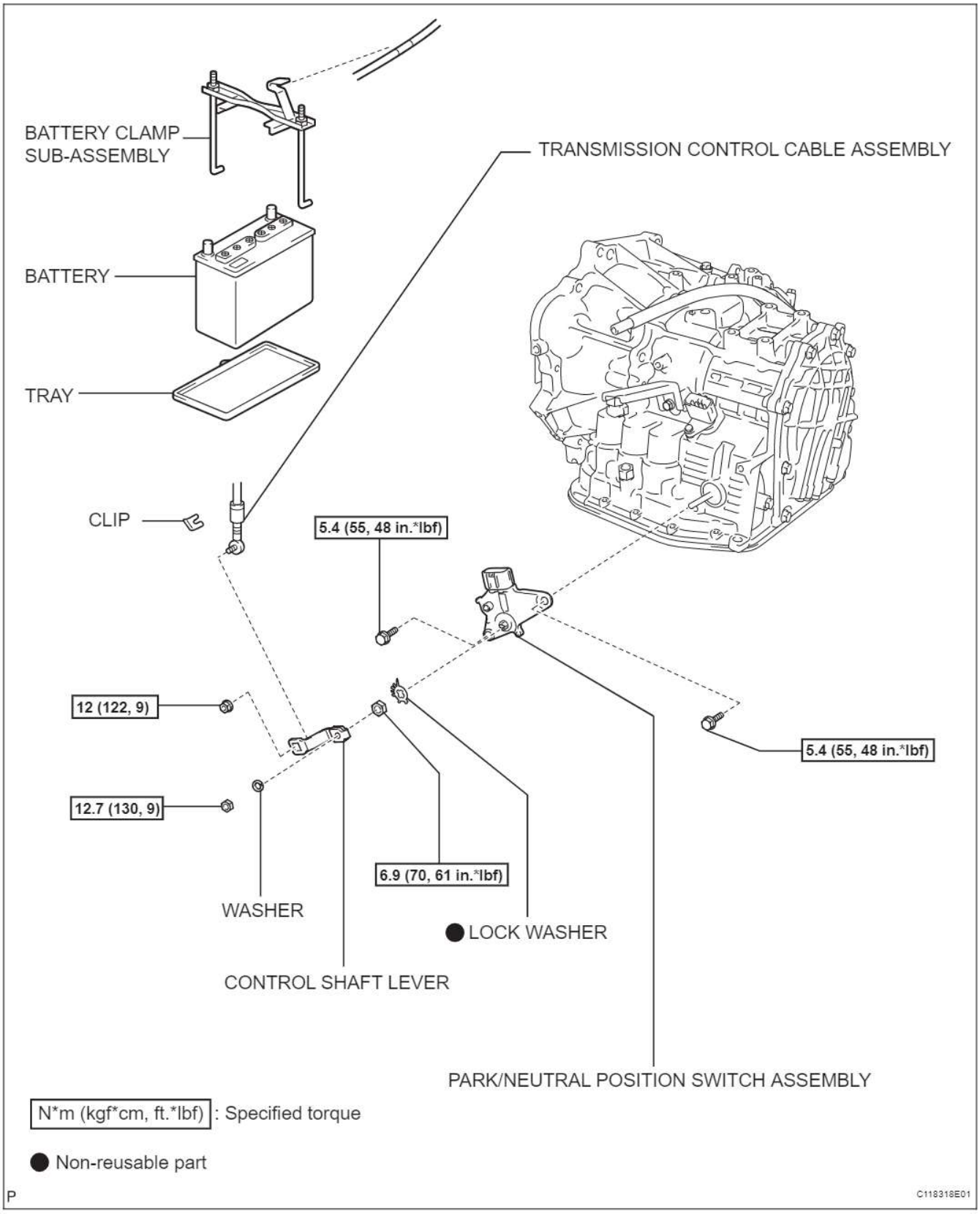
Evaluation:

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

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PARK / NEUTRAL POSITION SWITCH

COMPONENTS



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ON-VEHICLE INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

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

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

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

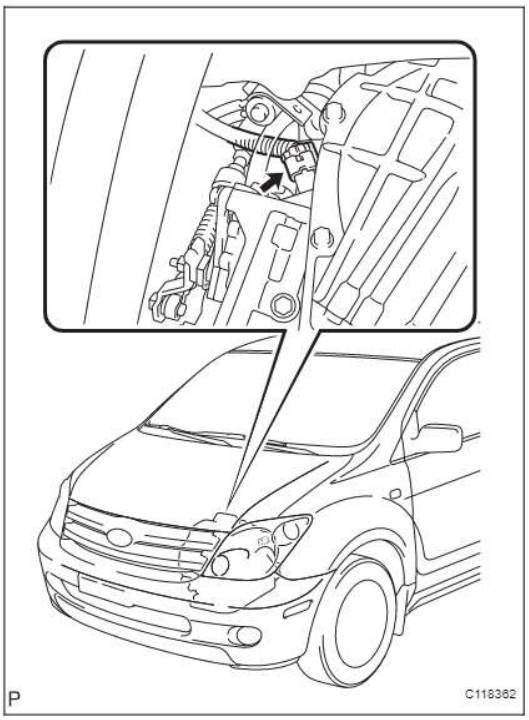
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MANUAL SHIFTING TEST

1. MANUAL SHIFTING TEST

HINT:

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



(a) Disconnect the connector of the transmission wire.
HINT:
It is possible to deactivate the electrical shift control by disconnecting the transmission wire. The gear positions can then be changed mechanically with the shift lever.

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

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

HINT:
If the gear positions L, 2 and D are difficult to distinguish, do the following ROAD TEST.
If any abnormality is found in the above test, the problem is in the transaxle itself.

(c) Connect the connector of the transmission wire.

(d) Clear the DTC (see page AX-30).

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INITIALIZATION

1. **RESET MEMORY**

NOTICE:

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

HINT:

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

The reset procedures are as follows.

(a) Turn the ignition switch OFF.

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

(c) Turn the ignition switch ON and push the tester main switch ON.

(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II.

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

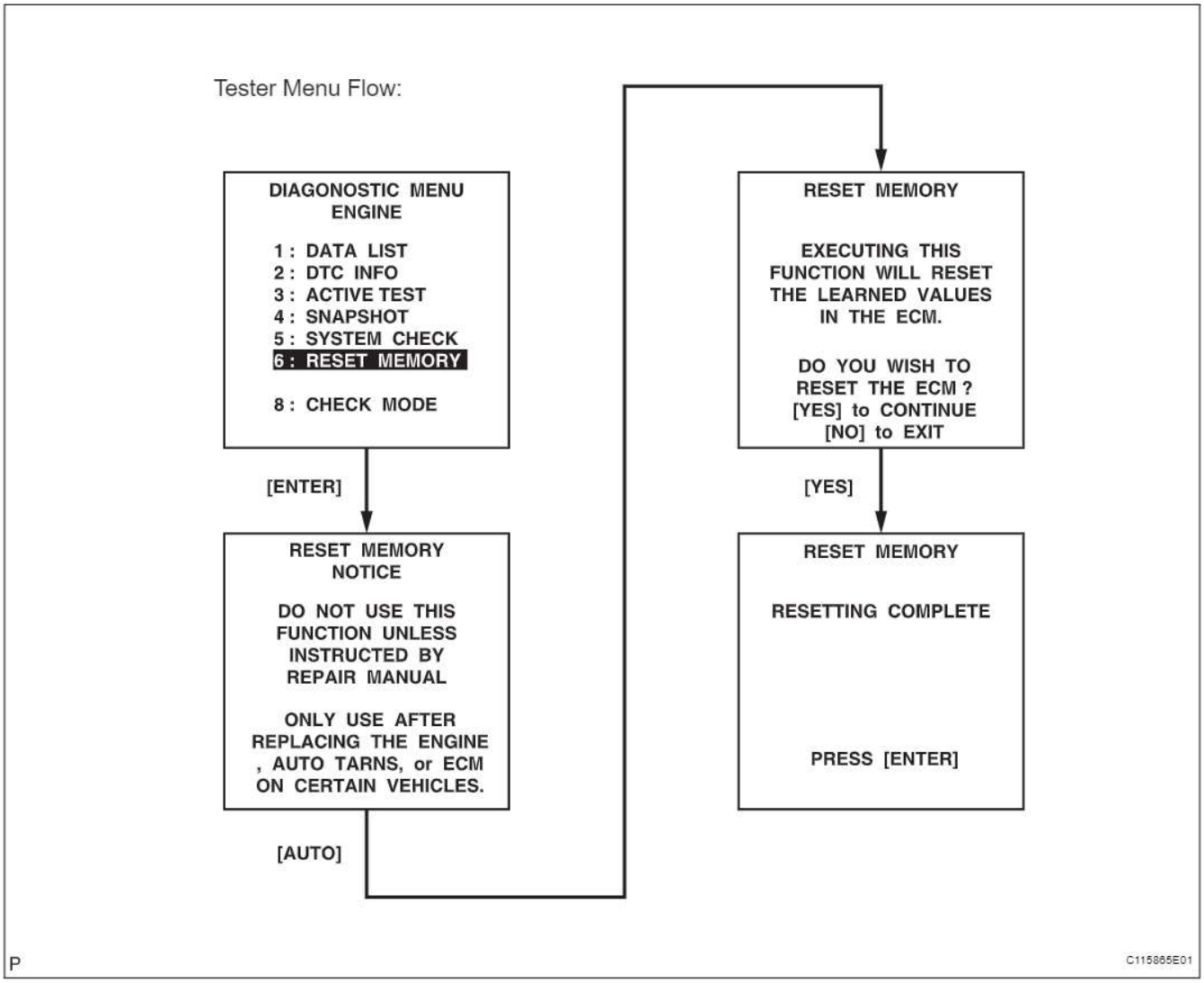
CAUTION:

After performing the RESET MEMORY procedures, be sure to perform the ROAD TEST (see page AX-14) as described earlier.

HINT:

The ECM learns through the ROAD TEST.

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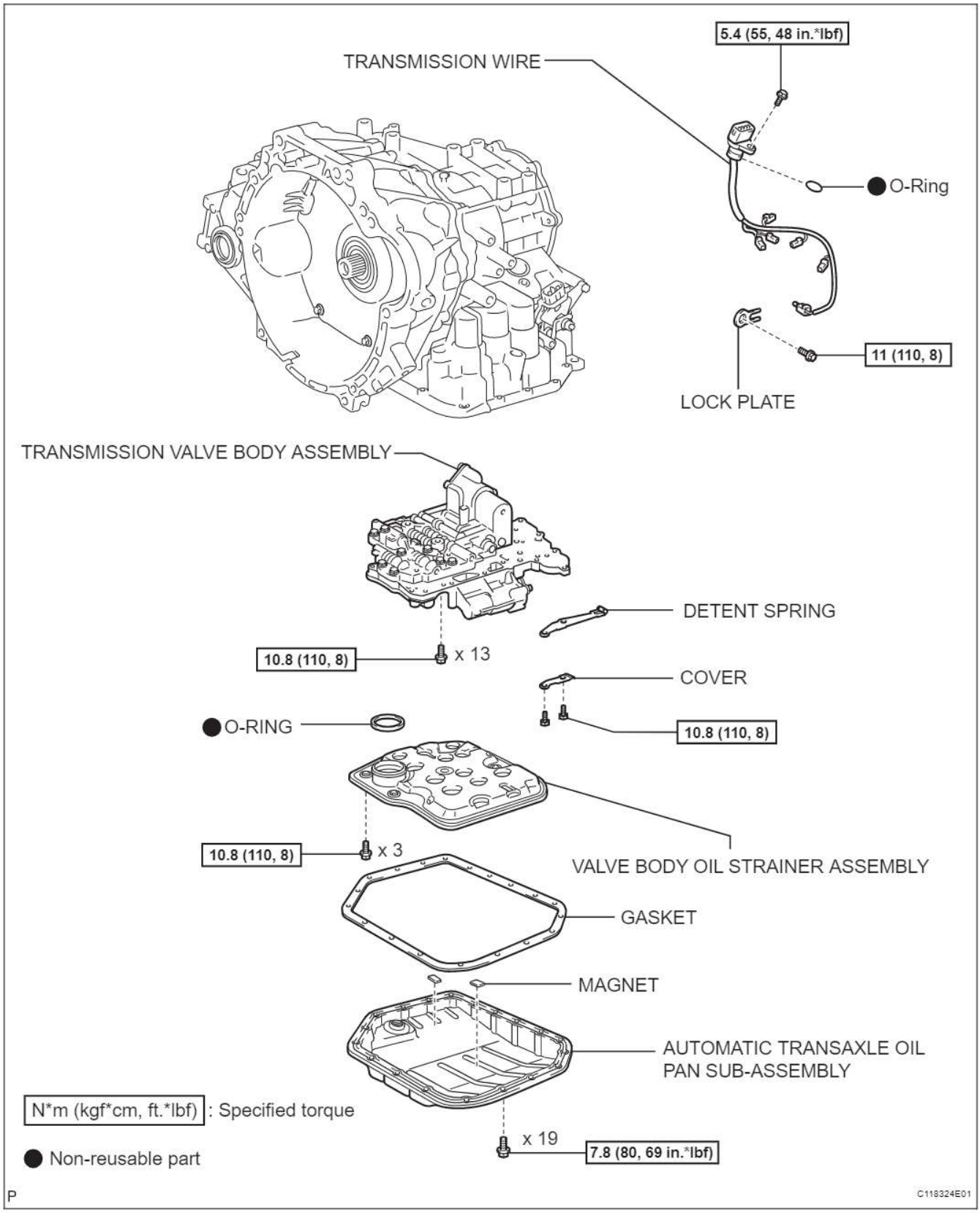


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TRANSMISSION WIRE

COMPONENTS



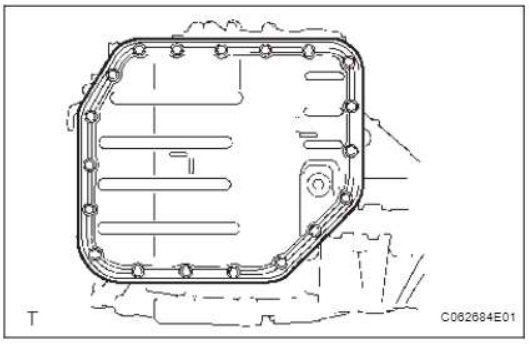
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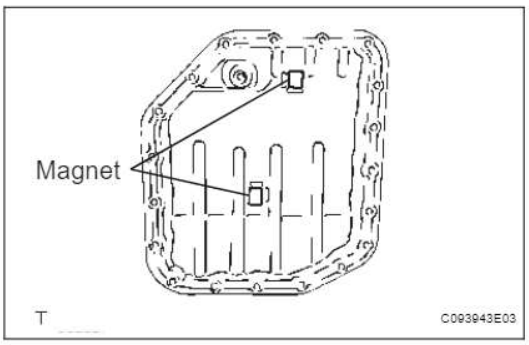
REMOVAL

1. **REMOVE ENGINE UNDER COVER LH**

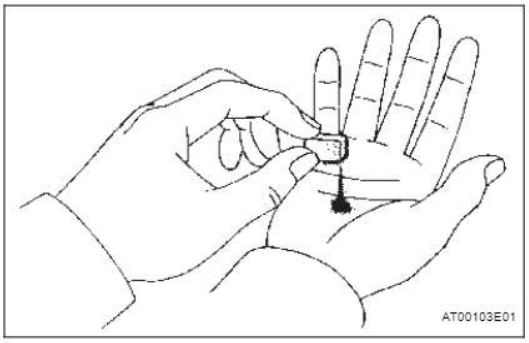
2. **DRAIN AUTOMATIC TRANSAXLE FLUID**
   (a) Remove the drain plug and gasket, and drain ATF.
   (b) Install a new gasket and the drain plug.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

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



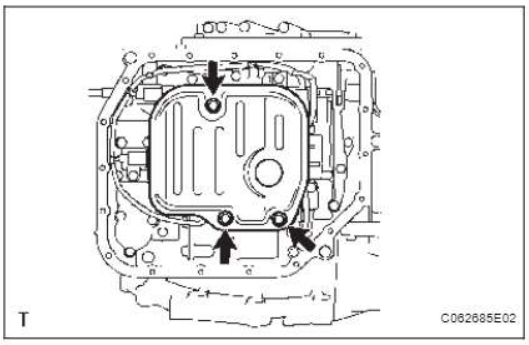


   (b) Remove the 2 magnets from the oil pan.



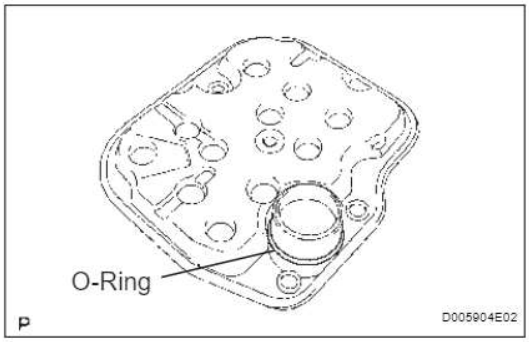
   (c) Examine particles in the pan.
      (1) Use the removed magnets to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transaxle.
      Steel (magnetic): bearing, gear and plate wear
      Brass (non-magnetic): bushing wear

4. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY**
   (a) Remove the 3 bolts and oil strainer.
   NOTICE:
   Be careful as some fluid will come out with the oil strainer.

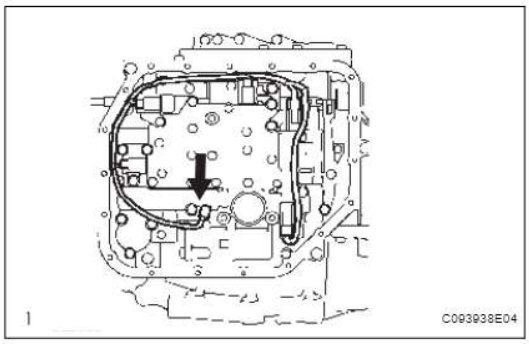


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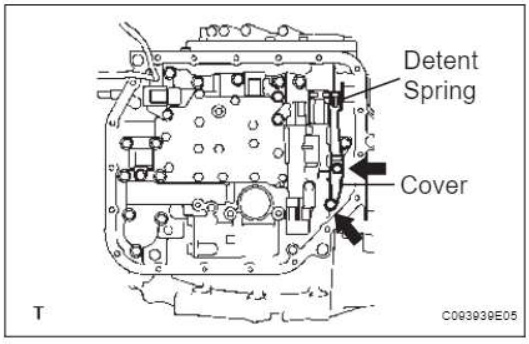
(b) Remove the O-ring from the oil strainer.



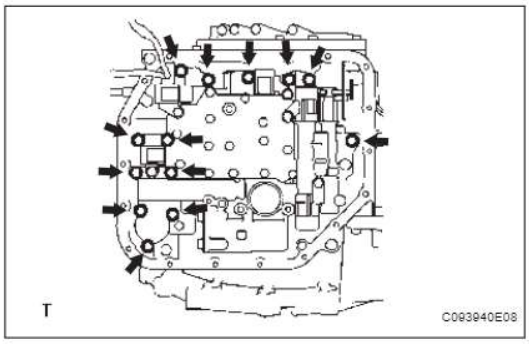
5. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Disconnect the 5 connectors.

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



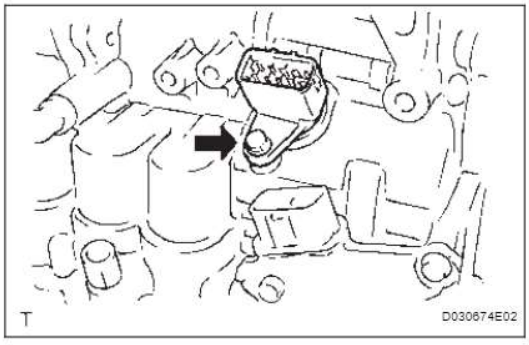
(c) Remove the 2 bolts, cover and detent spring.



(d) Remove the 13 bolts and valve body.

NOTICE:

Be careful not to drop the check valve body, spring and accumulator piston.



6. REMOVE TRANSMISSION WIRE

(a) Remove the bolt and transmission wire.

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MONITOR DRIVE PATTERN

1. **TEST MONITOR DRIVE PATTERN FOR ECT**

CAUTION:

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

HINT:

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

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

(a) Preparation for driving

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

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

(b) Drive pattern

CAUTION:

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

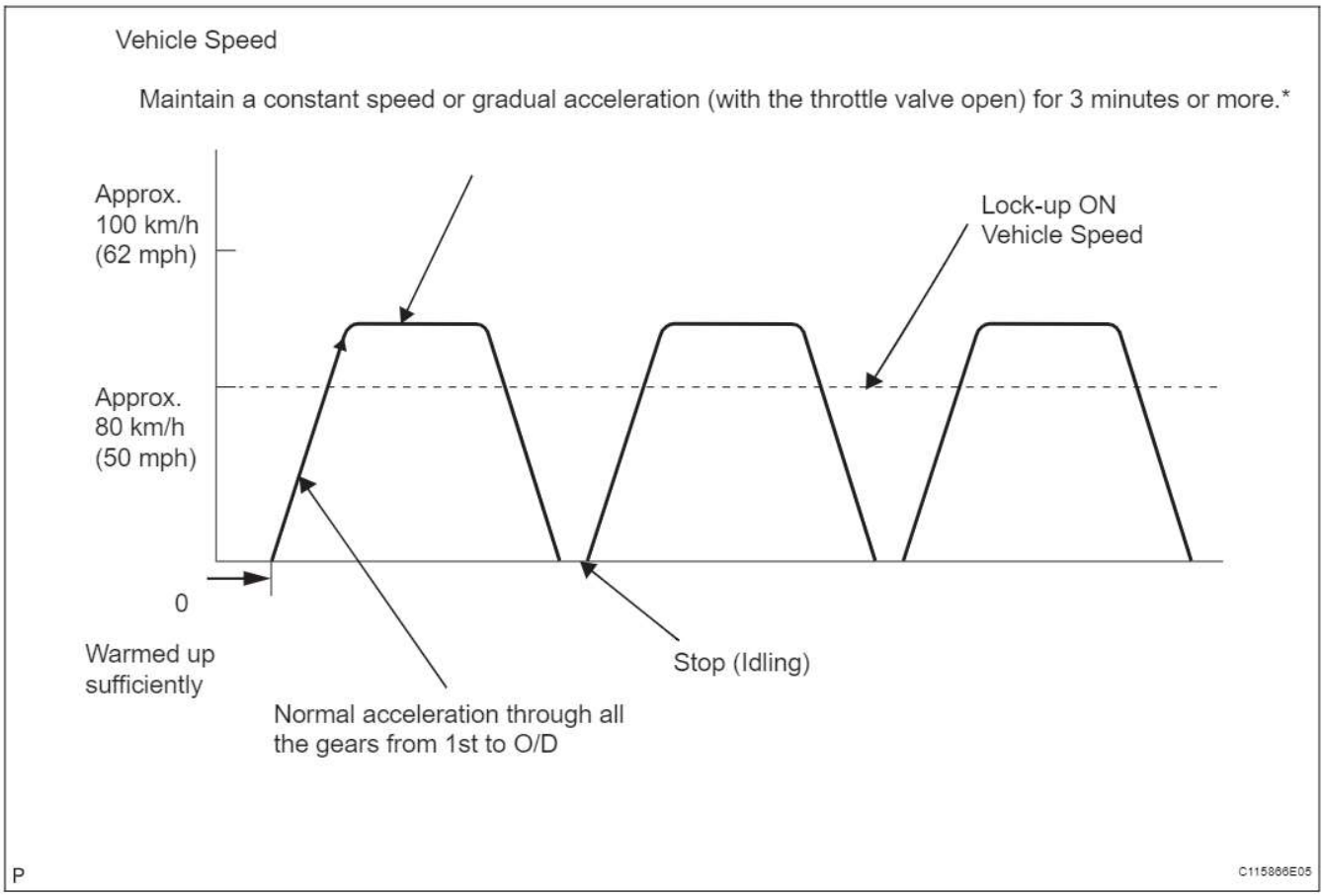
(1) Drive the vehicle through all the gears.
Stop → 1st → 2nd → 3rd → O/D → O/D (lock-up ON).

(2) Repeat the above drive pattern 3 times or more.

NOTICE:

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

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

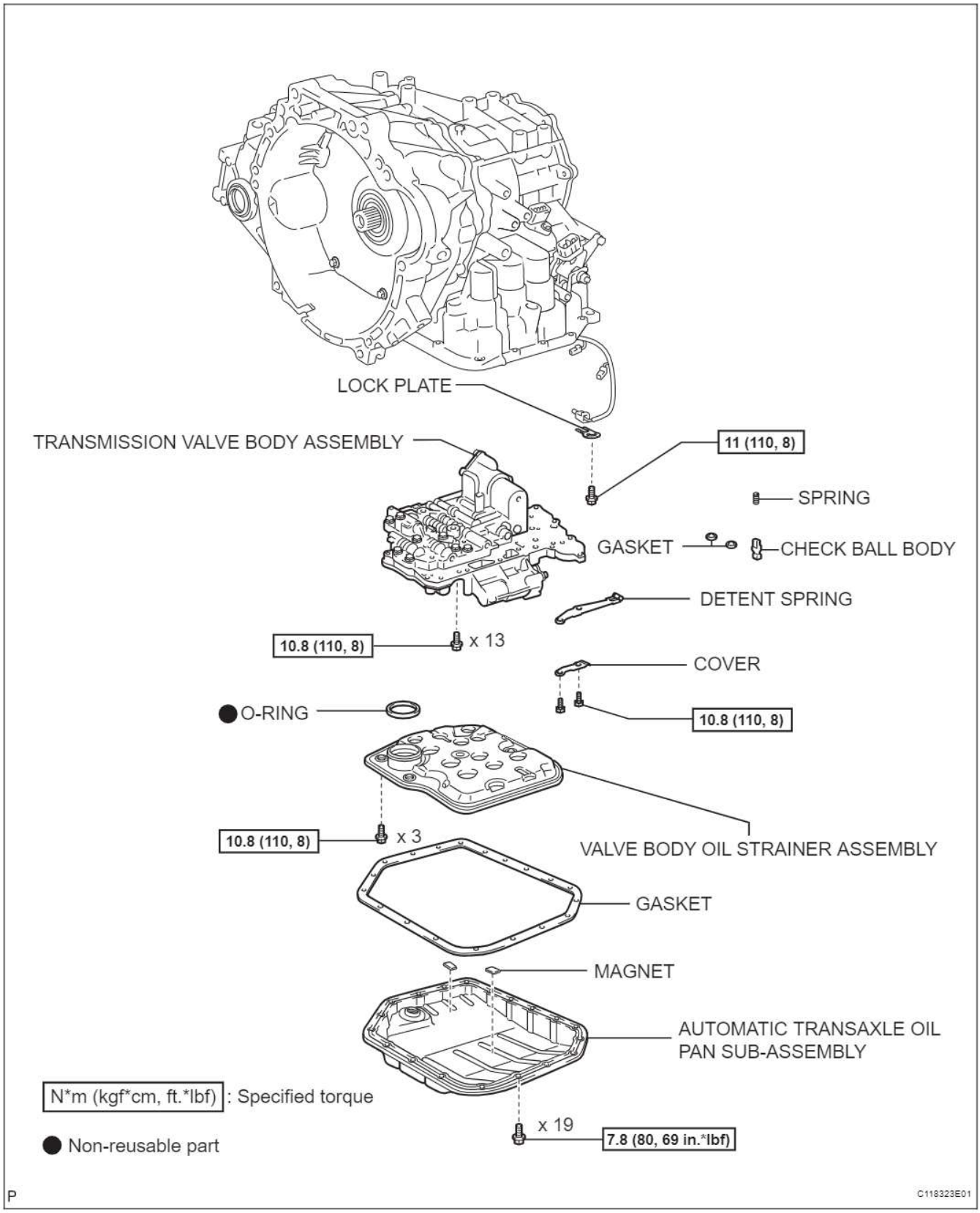
NOTICE:
It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

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VALVE BODY ASSEMBLY

COMPONENTS

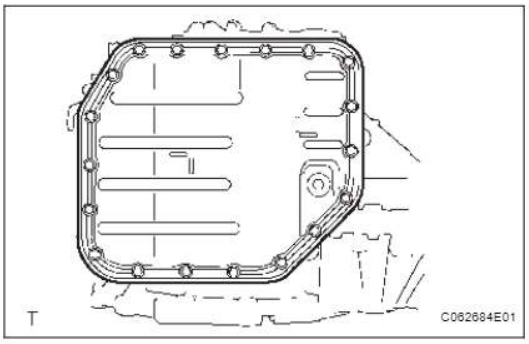


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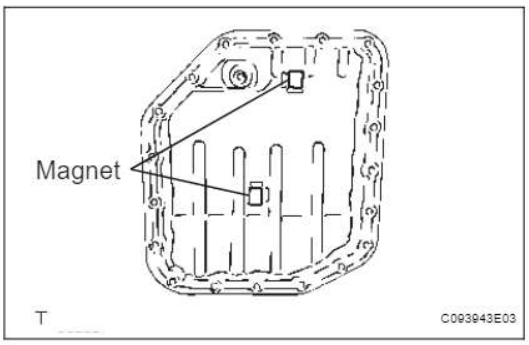
REMOVAL

1. **REMOVE ENGINE UNDER COVER LH**

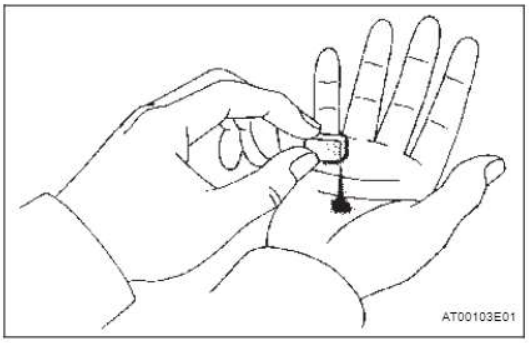
2. **DRAIN AUTOMATIC TRANSAXLE FLUID**
   (a) Remove the drain plug and gasket, and drain ATF.
   (b) Install a new gasket and the drain plug.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



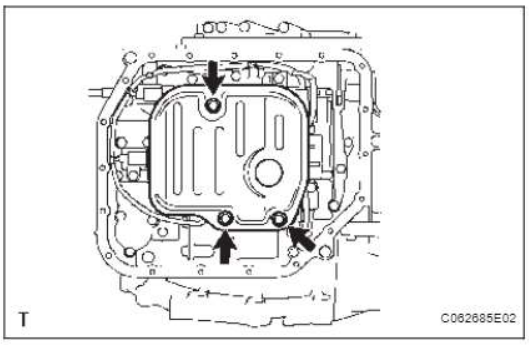
3. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**
   (a) Remove the 19 bolts, oil pan and gasket.
   NOTICE:
   Some fluid will remain in the oil pan. Remove all the oil pan bolts, and carefully remove the oil pan sub-assembly.



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

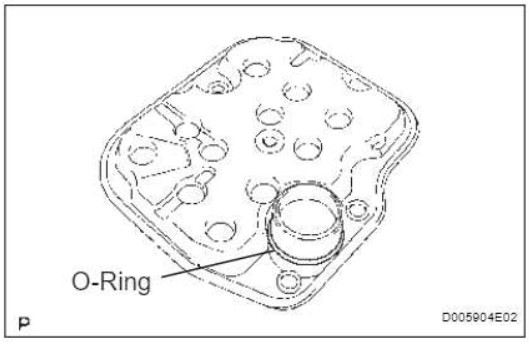


   (c) Examine particles in the pan.
      (1) Use the removed magnets to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transaxle.
      Steel (magnetic): bearing, gear and plate wear
      Brass (non-magnetic): bushing wear

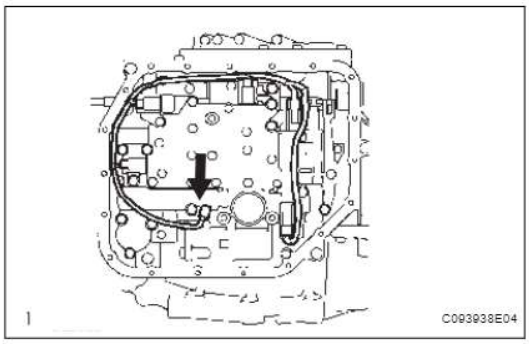


4. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY**
   (a) Remove the 3 bolts and oil strainer.
   NOTICE:
   Be careful as some fluid will come out with the oil strainer.

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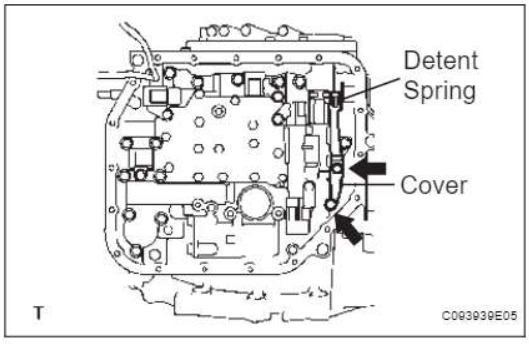
(b) Remove the O-ring from the oil strainer.



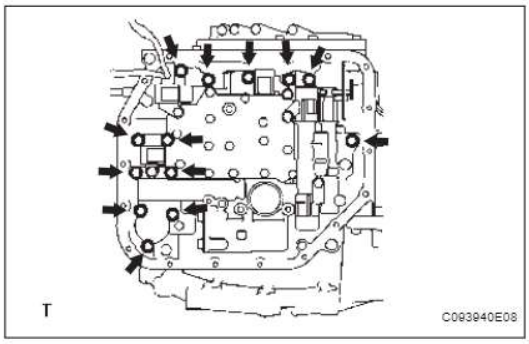
5. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Disconnect the 5 connectors.

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



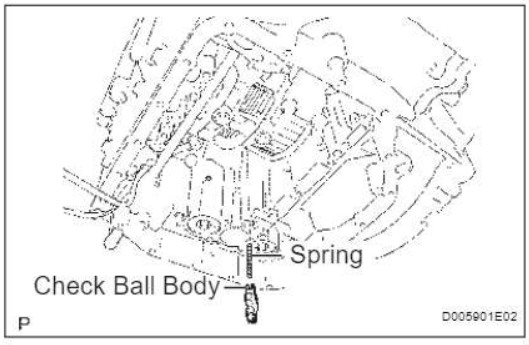
(c) Remove the 2 bolts, cover and detent spring.



(d) Remove the 13 bolts and valve body.

NOTICE:

Be careful not to drop the check valve body, spring and accumulator piston.



(e) Remove the check ball body and spring.

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PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- The Matrix Chart is divided into 3 chapters. When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 2 to proceed to 3, proceed as instructed.
- If the instruction "Proceed to next circuit inspection shown in problem symptoms table" is given in the flowchart for each circuit, proceed to the next suspected area in the table.
- If the problem still occurs even though there are no malfunctions in any of the circuits, check the ECM and replace it if necessary.

CHAPTER 1: ELECTRICAL CIRCUIT MATRIX CHART

Symptom	Suspected area	See page
No up-shift (a particular gear, from 1st to 3rd gear, is not up-shifted)	ECM	IN-33
No up-shift (3rd -> O/D)	1. O/D main switch circuit	AX-80
	2. ECM	IN-33
No down-shift (O/D -> 3rd)	1. O/D main switch circuit	AX-80
	2. ECM	IN-33
No down-shift (a particular gear, from 3rd to 1st gear, is not down-shifted)	ECM	IN-33
No lock-up or no lock-up off	1. Stop light switch circuit	AX-51
	2. Engine coolant temperature sensor circuit	ES-47
	3. Throttle position sensor circuit	ES-47
	4. ECM	IN-33
Shift point too high or too low	ECM	IN-33
Up-shift to 2nd while shift lever on L	ECM	IN-33
Up-shift to 3rd while shift lever on 2	ECM	IN-33
Up-shift to O/D from 3rd while O/D main switch is OFF	1. O/D main switch circuit	AX-80
	2. ECM	IN-33
Up-shift to O/D from 3rd while engine is cold	ECM	IN-33
Harsh engagement (N -> D)	ECM	IN-33
Harsh engagement (lock-up)	ECM	IN-33
Harsh engagement (any driving position)	ECM	IN-33
Poor acceleration	ECM	IN-33
Engine stalls when starting off or stopping	ECM	IN-33
No kick-down	ECM	IN-33
Malfunction in shifting	1. Park/Neutral position switch circuit	AX-38
	2. ECM	IN-33

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

Symptom	Suspected area	See page
Vehicle does not move in any forward position and reverse position	1. Manual valve	AX-148
	2. Valve body assembly (primary regulator valve)	AX-98
	3. Valve body assembly (secondary regulator valve)	AX-98
	4. Off-vehicle repair matrix chart	-
Vehicle does not move with shift lever on R	1. Manual valve	AX-148
	2. Off-vehicle repair matrix chart	-
No up-shift (1st -> 2nd)	1. Valve body assembly (1-2 shift valve)	AX-98
	2. Off-vehicle repair matrix chart	-
No up-shift (2nd -> 3rd)	1. Valve body assembly (2-3 shift valve)	AX-98
	2. Off-vehicle repair matrix chart	-
No up-shift (3rd -> O/D)	1. Valve body assembly (3-4 shift valve)	AX-98
	2. Off-vehicle repair matrix chart	-
No down-shift (O/D -> 3rd)	Valve body assembly (3-4 shift valve)	AX-98
No down-shift (3rd -> 2nd)	Valve body assembly (2-3 shift valve)	AX-98
No down-shift (2nd -> 1st)	Valve body assembly (1-2 shift valve)	AX-98
No lock-up or no lock-up off	1. Valve body assembly (lock-up relay valve)	AX-98
	2. Valve body assembly (lock-up control valve)	AX-98
	3. Valve body assembly (solenoid relay valve)	AX-98
	4. Valve body assembly (solenoid modulator valve)	AX-98
	5. Off-vehicle repair matrix chart	-
Harsh engagement (N -> D)	1. Valve body assembly (C1 accumulator)	AX-98
	2. Valve body assembly (accumulator control valve)	AX-98
	3. Off-vehicle repair matrix chart	-
Harsh engagement (N -> R)	1. C3 accumulator	AX-148
	2. Valve body assembly (accumulator control valve)	AX-98
	3. Valve body assembly (reverse control valve)	AX-98
	4. Off-vehicle repair matrix chart	-
Harsh engagement (lock-up)	1. Valve body assembly (lock-up relay valve)	AX-98
	2. Valve body assembly (accumulator control valve)	AX-98
	3. Valve body assembly (lock-up control valve)	AX-98
	4. Off-vehicle repair matrix chart	-
Harsh engagement (1st -> 2nd)	1. B2 accumulator	AX-148
	2. Valve body assembly (accumulator control valve)	AX-98
Harsh engagement (2nd -> 3rd)	1. C2 accumulator	AX-148
	2. Valve body assembly (accumulator control valve)	AX-98
Harsh engagement (3rd -> O/D)	1. Valve body assembly (B1 accumulator)	AX-98
	2. Valve body assembly (accumulator control valve)	AX-98
	3. Valve body assembly (3-4 shift timing valve)	AX-98
Harsh engagement (O/D -> 3)	1. Valve body assembly (3-4 shift timing valve)	AX-98
	2. Valve body assembly (4-3 shift timing valve)	AX-98
Harsh engagement (shift lever on D, 2, L)	Valve body assembly (coast relay valve)	AX-98
Slip or shudder (forward and reverse)	1. Valve body assembly (oil strainer)	AX-98
	2. Off-vehicle repair matrix chart	-
No engine braking (1st/shift lever on L)	1. Valve body assembly (reverse control valve)	AX-98
	2. Off-vehicle repair matrix chart	-
No engine braking (2nd/shift lever on 2)	Valve body assembly (3-4 shift valve)	AX-98
No kick-down	1. Valve body assembly (1-2 shift valve)	AX-98
	2. Valve body assembly (2-3 shift valve)	AX-98
	3. Valve body assembly (3-4 shift valve)	AX-98

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Symptom	Suspected area	See page
Poor acceleration	Valve body assembly (SLT damper)	AX-98

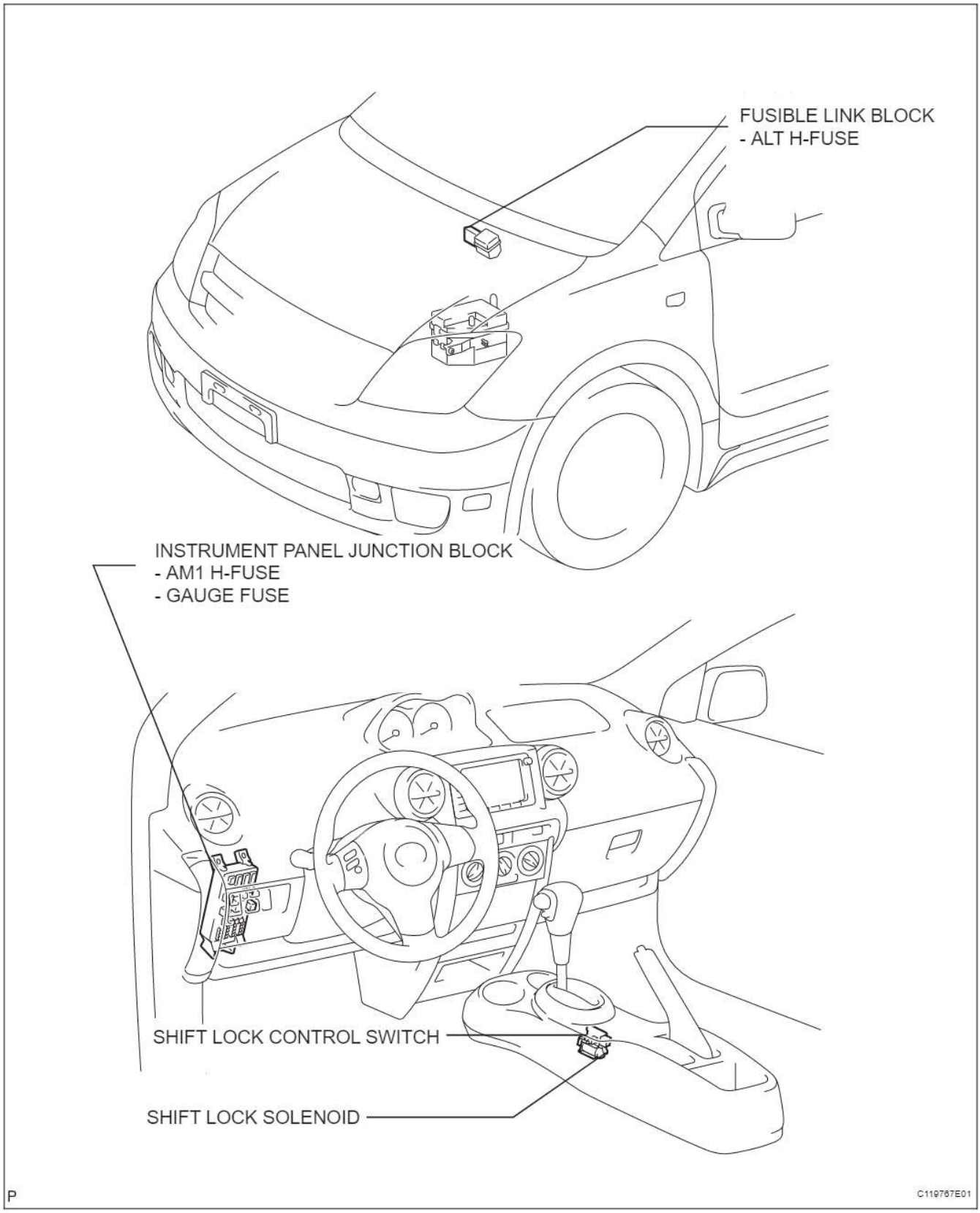
CHAPTER 3: OFF-VEHICLE REPAIR

Symptom	Suspected area	See page
Vehicle does not move in any forward position and reverse position	1. Planetary gear unit	AX-148
	2. Forward clutch	AX-148
	3. No. 2 one-way clutch	AX-148
	4. Reverse clutch	AX-148
	5. 1st and reverse brake	AX-148
Vehicle does not move with shift lever on R	1. Planetary gear unit	AX-148
	2. Reverse clutch	AX-148
	3. 1st and reverse brake	AX-148
No up-shift (1st -> 2nd)	1. 2nd brake	AX-148
	2. No. 1 one-way clutch	AX-148
No up-shift (2nd -> 3rd)	Direct clutch	AX-148
No up-shift (3rd -> O/D)	O/D and 2nd brake	AX-148
No lock-up or no lock-up off	Torque converter clutch	AX-146
Harsh engagement (N -> D)	1. Forward clutch	AX-148
	2. No. 2 one-way clutch	AX-148
Harsh engagement (N -> R)	1. Reverse clutch	AX-148
	2. 1st and reverse brake	AX-148
Harsh engagement (lock-up)	Torque converter clutch	AX-146
Harsh engagement (1st -> 2nd)	1. 2nd brake	AX-148
	2. No. 1 one-way clutch	AX-148
Harsh engagement (2nd -> 3rd)	Direct clutch	AX-148
Harsh engagement (3rd -> O/D)	O/D and 2nd brake	AX-148
Slip or shudder (forward position)	1. Torque converter clutch	AX-146
	2. Forward clutch	AX-148
	3. Direct clutch	AX-148
	4. O/D and 2nd brake	AX-148
	5. 2nd brake	AX-148
	6. No. 1 one-way clutch	AX-148
	7. No. 2 one-way clutch	AX-148
Slip or shudder (reverse position)	1. Reverse clutch	AX-148
	2. 1st and reverse brake	AX-148
Slip or shudder (1st)	No. 2 one-way clutch	AX-148
Slip or shudder (2nd)	1. 2nd brake	AX-148
	2. No. 1 one-way clutch	AX-148
Slip or shudder (3rd)	Direct clutch	AX-148
Slip or shudder (O/D)	O/D and 2nd brake	AX-148
No engine braking (1st/shift lever on L)	1st and reverse brake	AX-148
No engine braking (2nd/shift lever on 2)	O/D and 2nd brake	AX-148
Poor acceleration (all positions)	Torque converter clutch	AX-146
Large shift shock or engine stalls when starting off or stopping	Torque converter clutch	AX-146

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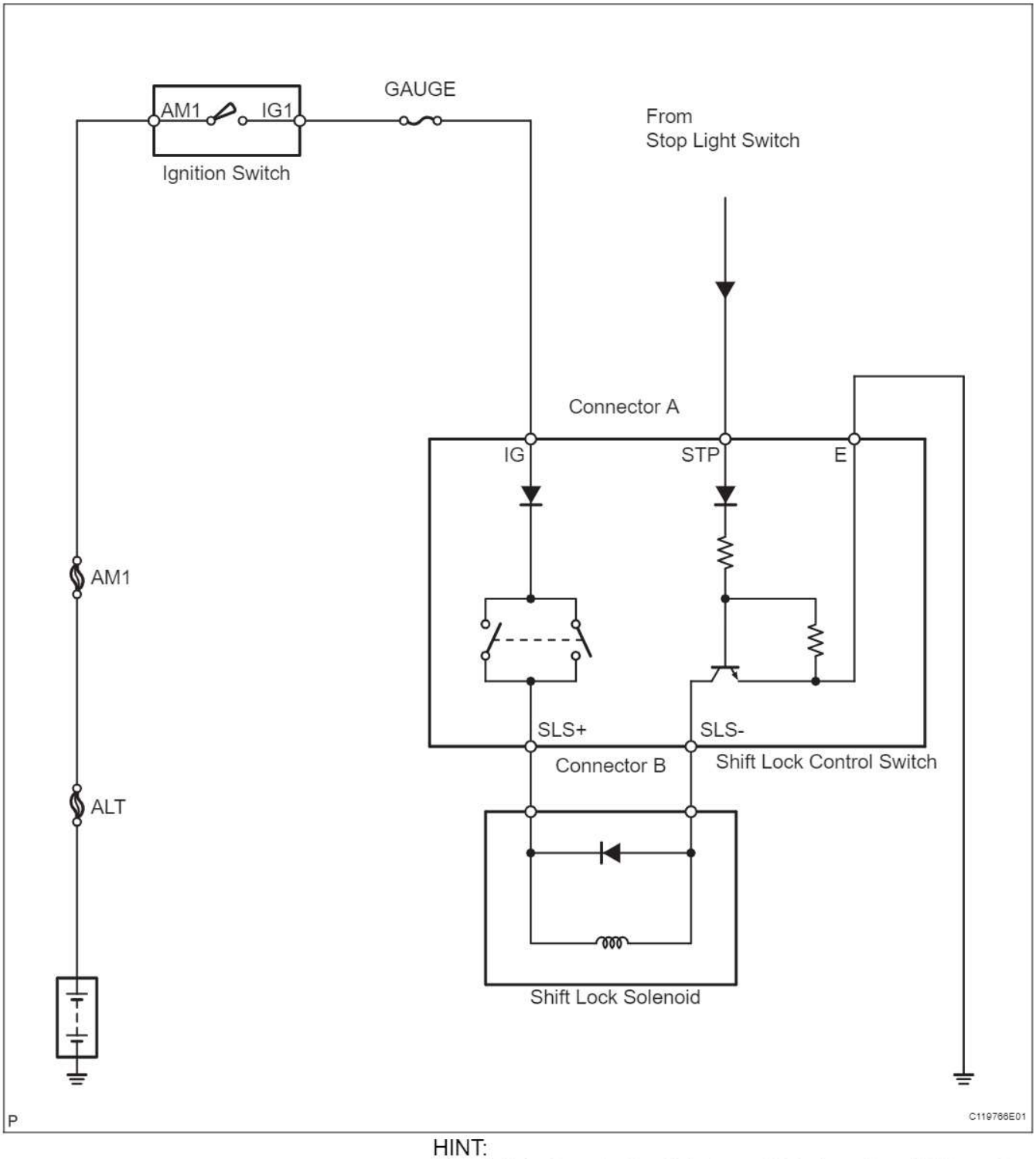
SHIFT LOCK SYSTEM

PARTS LOCATION



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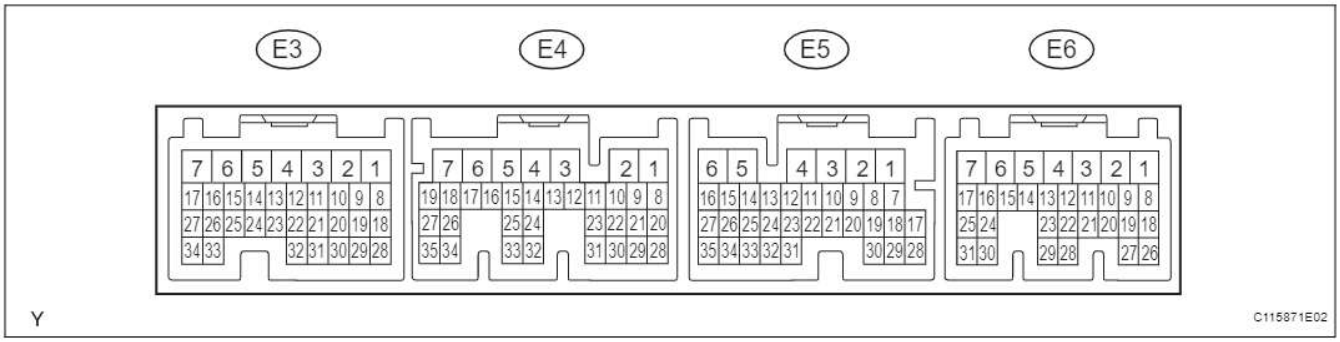
SYSTEM DIAGRAM



HINT:
The shift lock control switch turns ON when the shift lever is in the P position, and turns OFF when the shift lever is not in the P position.

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TERMINALS OF ECM

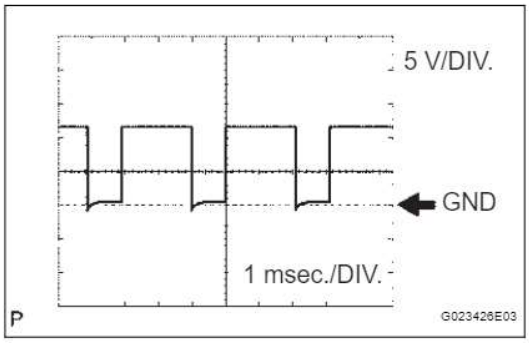


HINT:
Each ECM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition".
Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".
Use the illustration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

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
NSW (E6-30) - E1 (E3-3)	B - BR	Park/Neutral position switch signal	Ignition switch ON and shift lever on P or N	Below 2 V
NSW (E6-30) - E1 (E3-3)	B - BR	Park/Neutral position switch signal	Ignition switch ON and shift lever not on P or N	10 to 14 V
L (E5-9) - E1 (E3-3)	G-W - BR	L shift position switch signal	Ignition switch ON and shift lever on L	10 to 14 V
L (E5-9) - E1 (E3-3)	G-W - BR	L shift position switch signal	Ignition switch ON and shift lever not on L	Below 1 V
2 (E5-10) - E1 (E3-3)	G - BR	2 shift position switch signal	Ignition switch ON and shift lever on 2	10 to 14 V
2 (E5-10) - E1 (E3-3)	G - BR	2 shift position switch signal	Ignition switch ON and shift lever not on 2	Below 1 V
D (E5-21) - E1 (E3-3)	R-Y - BR	D shift position switch signal	Ignition switch ON and shift lever on D	10 to 14 V
D (E5-21) - E1 (E3-3)	R-Y - BR	D shift position switch signal	Ignition switch ON and shift lever not on D	Below 1 V
R (E5-11) - E1 (E3-3)	R-W - BR	R shift position switch signal	Ignition switch ON and shift lever on R	10 to 14 V
R (E5-11) - E1 (E3-3)	R-W - BR	R shift position switch signal	Ignition switch ON and shift lever not on R	Below 1 V
S1 (E4-9) - E1 (E3-3)	W-G - BR	S1 solenoid signal	Ignition switch ON	10 to 14 V
S1 (E4-9) - E1 (E3-3)	W-G - BR	S1 solenoid signal	1st or 2nd gear	10 to 14 V
S1 (E4-9) - E1 (E3-3)	W-G - BR	S1 solenoid signal	3rd or O/D gear	Below 1 V
S2 (E4-8) - E1 (E3-3)	W-R - BR	S2 solenoid signal	Ignition switch ON	Below 1 V
S2 (E4-8) - E1 (E3-3)	W-R - BR	S2 solenoid signal	1st or O/D gear	10 to 14 V
S2 (E4-8) - E1 (E3-3)	W-R - BR	S2 solenoid signal	2nd or 3rd gear	Below 1 V
ST (E4-19) - E1 (E3-3)	B-R - BR	ST solenoid signal	Ignition switch ON	Below 1 V
ST (E4-19) - E1 (E3-3)	B-R - BR	ST solenoid signal	Ignition switch ON and R gear	10 to 14 V
SL (E4-11) - E1 (E3-3)	G - BR	SL solenoid signal	Ignition switch ON	Below 1 V
SL (E4-11) - E1 (E3-3)	G - BR	SL solenoid signal	Vehicle driving under lock-up range	10 to 14 V

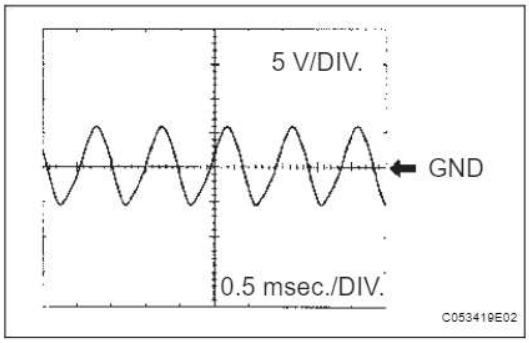
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Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SLT+ (E4-12) - SLT- (E4-13)	W-L - W	SLT solenoid signal	Ignition switch ON	10 to 14 V (see waveform 1)
STP (E5-4) - E1 (E3-3)	G-W - BR	Stop light switch signal	Brake pedal is depressed	7.5 to 14 V
STP (E5-4) - E1 (E3-3)	G-W - BR	Stop light switch signal	Brake pedal is released	Below 1.5 V
SPD (E5-8) - E1 (E3-3)	V-W - BR	Speed signal	Ignition switch ON and rotate driving wheel slowly	Pulse generation
NT+ (E4-35) - NT- (E4-27)	R - B	Speed sensor (NT) signal	Engine is running	Below 1 V and 4 to 5 V (see waveform 2)
THO1 (E4-24) - E2 (E3-28)	Y-G - BR	ATF temperature sensor signal	ATF temperature: 115°C (329°F) or more	Below 1.5 V
ODLP (E5-14) - E1 (E3-3)	G-O - BR	O/D OFF indicator light circuit	Ignition switch ON and O/D OFF indicator light illuminates	Below 3 V
ODLP (E5-14) - E1 (E3-3)	G-O - BR	O/D OFF indicator light circuit	Ignition switch ON and O/D OFF indicator light goes off	10 to 14 V
ODMS (E5-6) - E1 (E3-3)	G-B - BR	O/D main switch signal	Ignition switch ON	10 to 14 V
ODMS (E5-6) - E1 (E3-3)	G-B - BR	O/D main switch signal	Ignition switch ON and continuously press O/D main switch	Below 1 V



1. Waveform 1 (Reference)

Item	Content
Symbols (Terminal No.)	SLT+ (E4-12) - SLT- (E4-13)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Engine idle speed



2. Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	NT+ (E4-35) - NT- (E4-27)
Tool Setting	5 V/DIV., 0.5 msec./DIV.
Condition	Vehicle speed 20 km/h (12 mph)

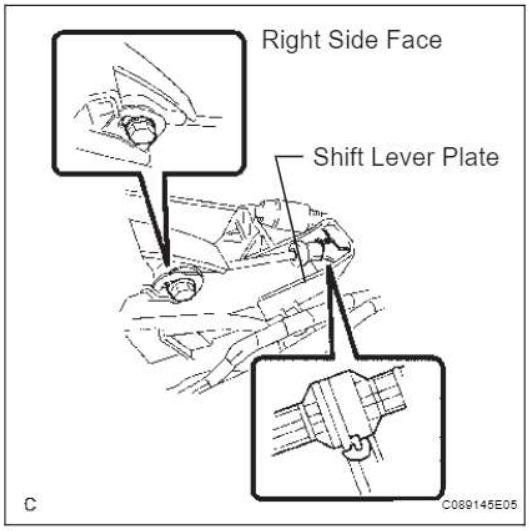
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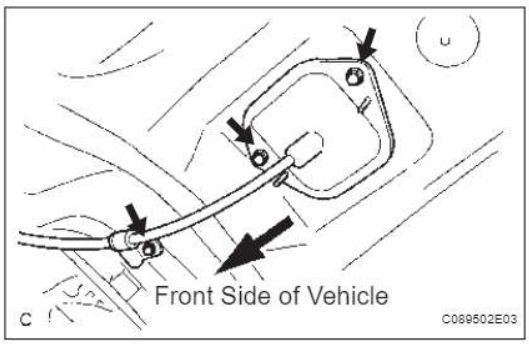
AX

TRANSMISSION CONTROL CABLE ASSEMBLY

REPLACEMENT

1. **REMOVE CONSOLE BOX REAR COVER**
   (a) Remove the console box rear cover (see page IP-26).
2. **REMOVE CONSOLE BOX CARPET**
3. **REMOVE REAR CONSOLE BOX ASSEMBLY**
   (a) Remove the rear console box (see page IP-26).
4. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
   (a) Remove the front exhaust pipe (see page EX-3).
5. **REMOVE FRONT NO. 1 FLOOR HEAT INSULATOR**
6. **REMOVE AIR CLEANER ASSEMBLY**
   (a) Remove the air cleaner assembly (see page ES-346).
7. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the nut, and disconnect the transmission control cable from the floor shift assembly.
   (b) Using a screwdriver, disconnect the transmission control cable assembly from the shift lever plate.

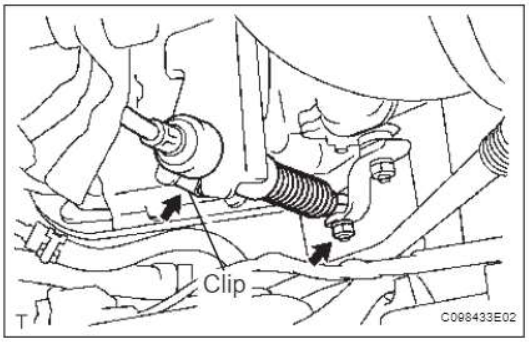




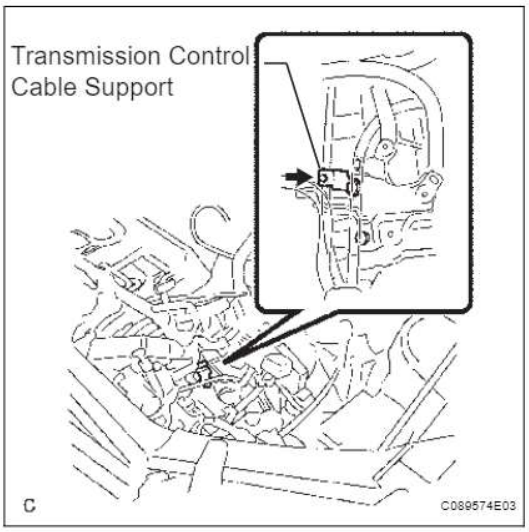
   (c) Remove the 3 bolts.
   (d) Pull out the transmission control cable from the body.

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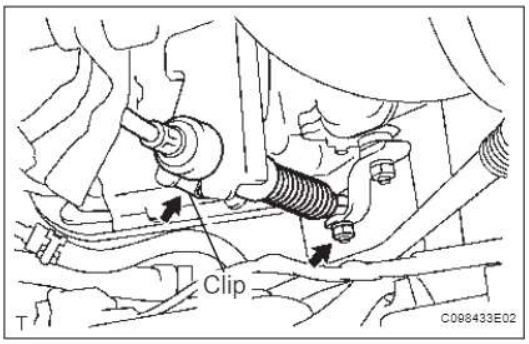
AX



(e) Remove the nut and disconnect the transmission control cable from the control shaft lever.
(f) Remove the clip and disconnect the transmission control cable from the control cable bracket.

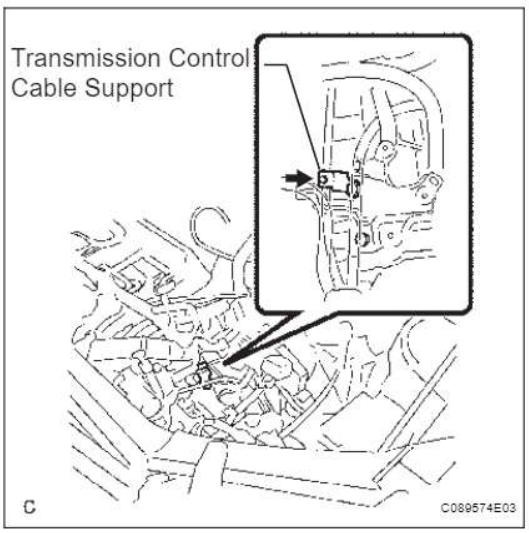


(g) Disconnect the transmission control cable from the transmission control cable support.



8. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

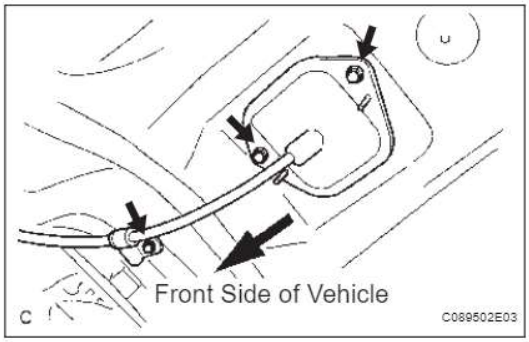
(a) Temporarily install the transmission control cable on the control shaft lever with the nut.
(b) Connect the transmission control cable on the bracket with a new clip.



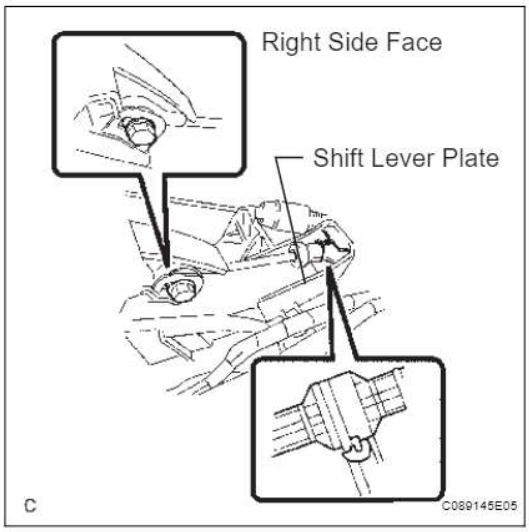
(c) Connect the transmission control cable to the transmission control cable support.

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



(e) Connect the transmission control cable on the shift lever plate.
(f) Temporarily install the transmission control cable on the floor shift.
Torque: 2 N*m (122 kgf*cm, 9 ft.*lbf)

9. INSTALL AIR CLEANER ASSEMBLY
(a) Install the air cleaner (see page ES-348).

10. INSTALL FRONT NO. 1 FLOOR HEAT INSULATOR

11. INSTALL FRONT EXHAUST PIPE ASSEMBLY
(a) Install the front exhaust pipe (see page EX-5).

12. ADJUST SHIFT LEVER POSITION
(a) Adjust the shift lever position (see page AX-121).

13. INSPECT SHIFT LEVER POSITION
(a) Inspect the shift lever position (see page AX-121).

14. INSTALL REAR CONSOLE BOX ASSEMBLY
(a) Install the rear console box (see page IP-27).

15. INSTALL CONSOLE BOX CARPET

16. INSTALL CONSOLE BOX REAR COVER
(a) Install the console box rear cover (see page IP-27).

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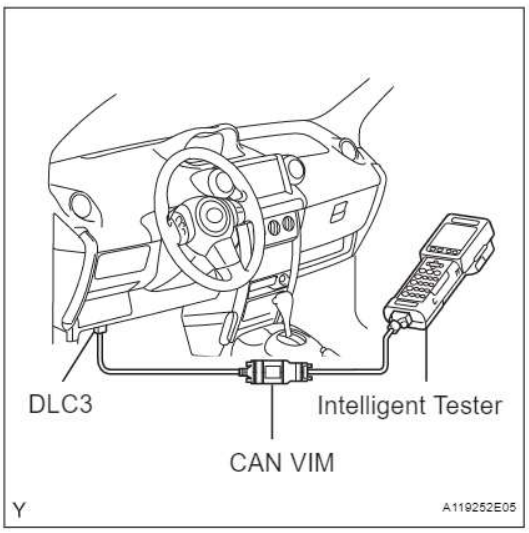
DIAGNOSIS SYSTEM

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 ECM can then be read.



(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 ECM memory.
If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.



(c) To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The 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-30).

(d) The DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by a manufacturer within the prescribed limits (see page AX-36).

2. NORMAL MODE AND CHECK MODE

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

3. 2 TRIP DETECTION LOGIC

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

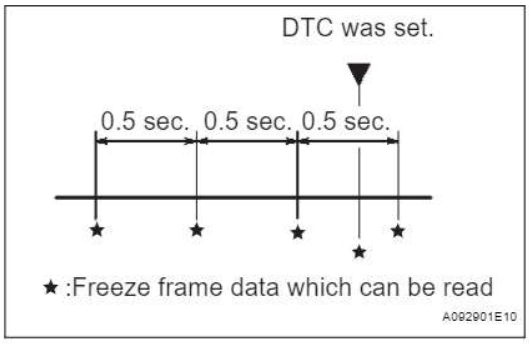
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4. FREEZE FRAME DATA

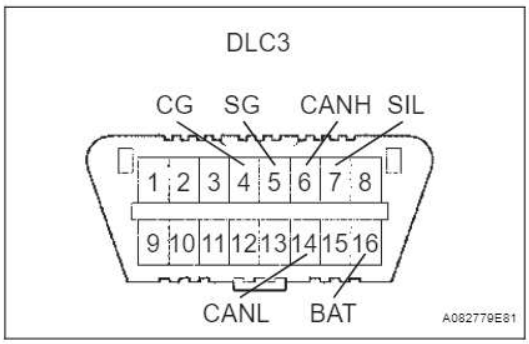
(a) Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine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

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



5. DATA LINK CONNECTOR 3 (DLC3)

(a) The vehicle's ECM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.
HINT:
Connect the cable of the intelligent tester to the DLC3, turn the ignition switch ON and attempt to use the intelligent tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.
If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.



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

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FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

REPLACEMENT

NOTICE:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **REMOVE STEERING PAD ASSEMBLY**
   (a) Remove the steering pad (see page RS-287).
4. **REMOVE STEERING WHEEL ASSEMBLY**
   (a) Remove the steering wheel (see page SR-7).
5. **REMOVE STEERING COLUMN COVER**
   (a) Remove the steering column cover (see page SR-7).
6. **REMOVE INSTRUMENT CLUSTER FINISH PANEL**
   (a) Remove the instrument cluster finish panel (see page IP-5).
7. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
   (a) Remove the No. 2 instrument cluster finish panel garnish (see page IP-5).
8. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
9. **REMOVE INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY CENTER**
   (a) Remove the instrument cluster finish panel center (see page IP-18).
10. **REMOVE FRONT ASH RECEPTACLE ASSEMBLY**
    (a) Remove the front ash receptacle (see page IP-18).
11. **REMOVE INSTRUMENT COVER LOWER CENTER**
    (a) Remove the instrument cover lower center (see page IP-19).
12. **REMOVE INSTRUMENT PANEL FINISH PANEL LOWER CENTER**
    (a) Remove the instrument panel finish panel lower center (see page IP-19).
13. **REMOVE CONSOLE BOX REAR COVER**
14. **REMOVE CONSOLE BOX CARPET**

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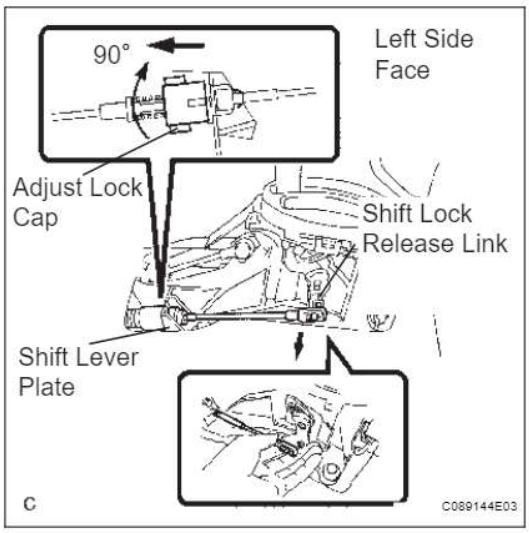
15. REMOVE REAR CONSOLE BOX ASSEMBLY

(a) Remove the rear console box (see page IP-26).

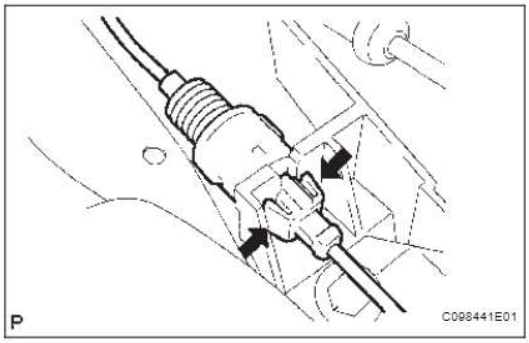
16. DISCONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

(a) Rotate the adjust lock cap clockwise 90°so that it faces the front of the vehicle, and release it.

(b) Push the claw and disconnect the floor shift parking lock cable from the shift lock release link.



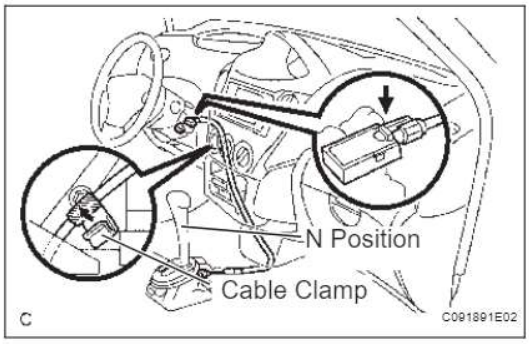
(c) Using a screwdriver, disconnect the floor shift parking lock cable from the shift lever plate.



(d) Disconnect the cable clamp.

(e) Adjust the shift lever to the N position.

(f) Disconnect the floor shift parking lock cable from the upper bracket.



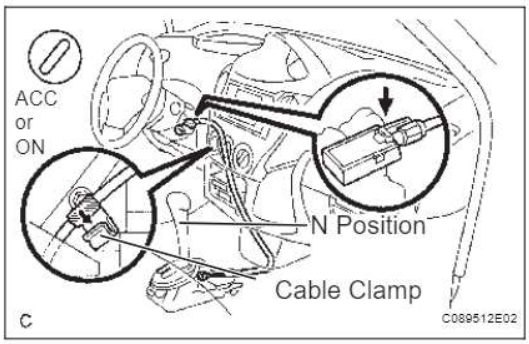
17. CONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

(a) Turn the ignition switch to the ACC or ON position.

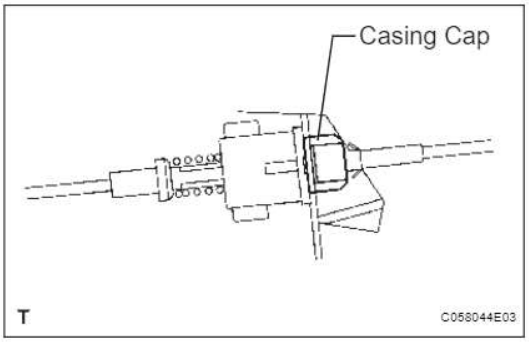
(b) Connect the cable to the upper bracket.
HINT:
After installation, make sure that the lever pin is pulled by the cable and is stopped with the stopper.

(c) Connect the cable clamp.

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

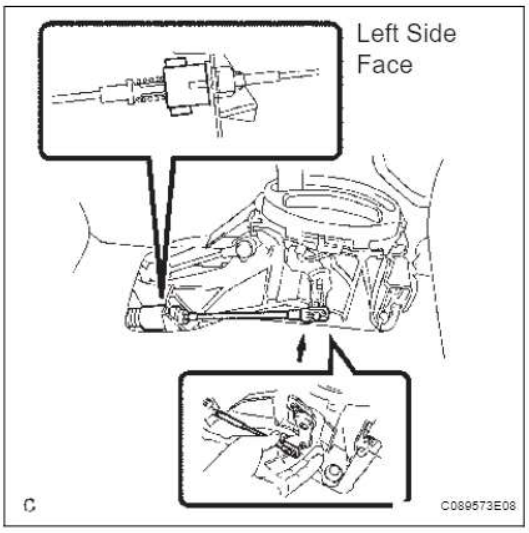


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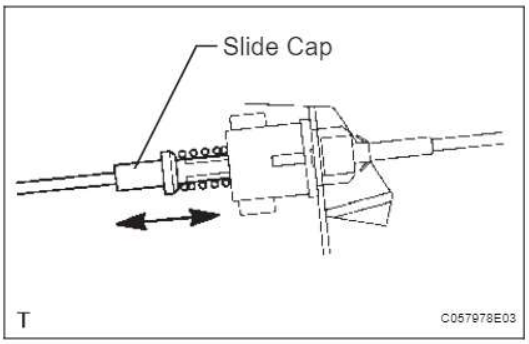


(e) Insert the floor shift parking lock cable end rod in the slit of the shift lever plate.

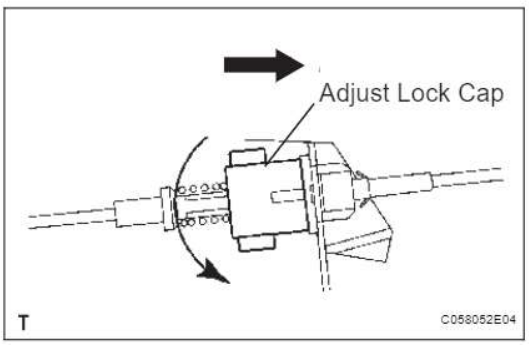
(f) Insert the casing cap of the cable into the shift lever plate through-hole.
HINT:
Check that it is inserted securely.



(g) Insert the lever pin into the hole in the floor shift parking lock cable end.
HINT:
- At this time, ensure that the shift lever is in the N position.
- After installation, make sure that the lever pin is pulled by the floor shift parking lock cable and is stopped with the stopper.



(h) Hold the slide cap and move it back and forth. Check that the spring for automatic adjustment works properly.



(i) Rotate the adjust lock cap counterclockwise by 90° so that it faces the front of the vehicle, and attach it.
HINT:
- Install the floor shift parking lock cable on the shift lever side with the ignition switch in the ACC position.
- Make sure the slide amount of the spring for automatic adjustment is 8 mm (0.31 in.).

18. INSTALL REAR CONSOLE BOX ASSEMBLY

(a) Install the rear console box (see page IP-27).

19. INSTALL CONSOLE BOX CARPET

20. INSTALL CONSOLE BOX REAR COVER

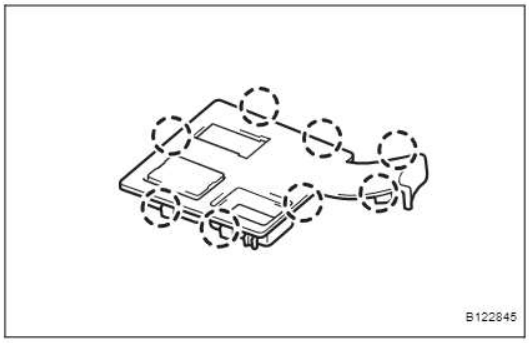
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21. **INSTALL INSTRUMENT PANEL FINISH PANEL LOWER CENTER**
    (a) Install the instrument panel finish panel lower center (see page IP-23).
22. **INSTALL INSTRUMENT COVER LOWER CENTER**
    (a) Install the instrument cover lower center (see page IP-23).
23. **INSTALL FRONT ASH RECEPTACLE ASSEMBLY**
    (a) Install the front ash receptacle (see page IP-23).
24. **INSTALL INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY CENTER**
    (a) Install the instrument cluster finish panel center (see page IP-23).
25. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
26. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
27. **INSTALL INSTRUMENT CLUSTER FINISH PANEL**
    (a) Install the instrument cluster finish panel (see page IP-12).
28. **INSTALL STEERING COLUMN COVER**
    (a) Install the steering column cover (see page SR-13).
29. **INSTALL STEERING WHEEL ASSEMBLY**
    (a) Install the steering wheel (see page SR-13).
30. **INSTALL STEERING PAD ASSEMBLY**
    (a) Install the steering pad (see page RS-291).
31. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
32. **INSPECT STEERING PAD ASSEMBLY**
    (a) Inspect the steering pad (see page RS-287).
33. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (see page RS-28).
34. **CHECK KEY INTERLOCK OPERATION**
    (a) Check the key interlock operation (see page AX-104).
35. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

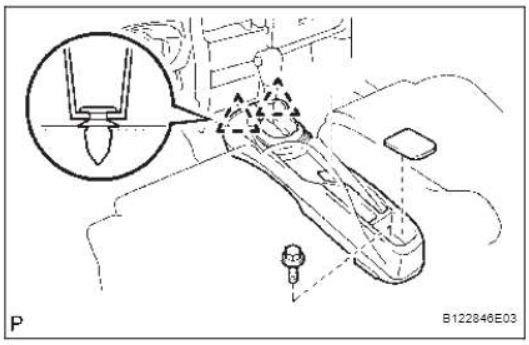
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REMOVAL

1. **REMOVE CONSOLE BOX REAR COVER**
2. **REMOVE CONSOLE BOX CARPET**
3. **REMOVE REAR CONSOLE BOX ASSEMBLY**

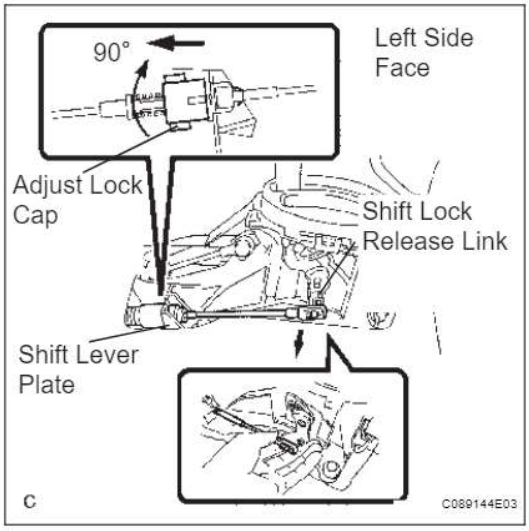


(a) Using a screwdriver, detach the 8 claws and remove the rear console box cover.
NOTICE:
Tape the screwdriver tip before use.

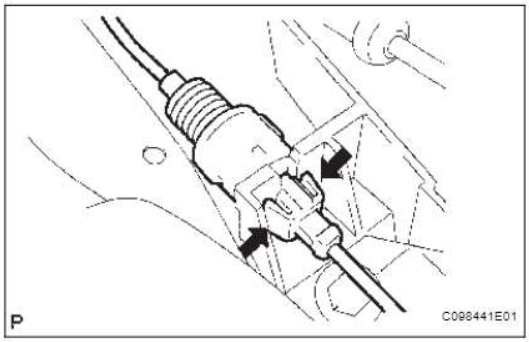


(b) Remove the console box carpet.
(c) Remove the screw.
(d) Disconnect the connector.
(e) Using a screwdriver, detach the 2 clips and remove the console box.

4. **DISCONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY**

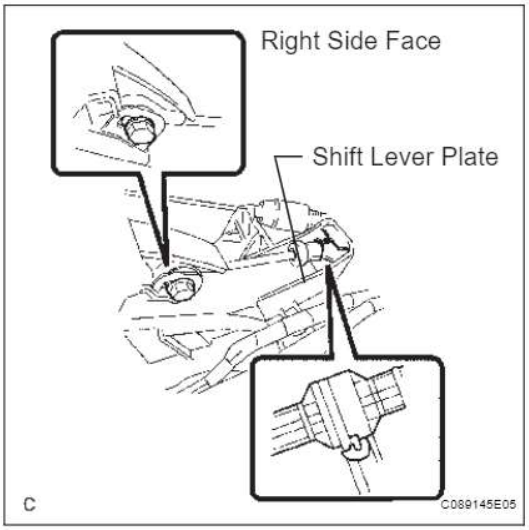


(a) Rotate the adjust lock cap clockwise 90° so that it faces the front of the vehicle, and release it.
(b) Push the claw and disconnect the floor shift parking lock cable from the shift lock release link.



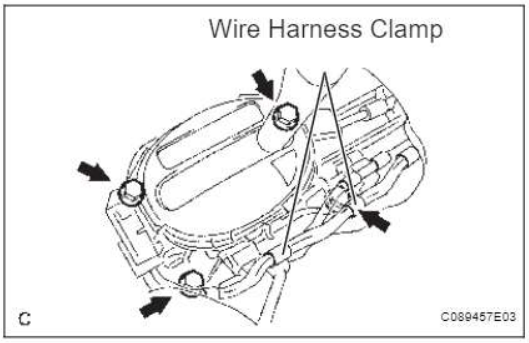
(c) Using a screwdriver, disconnect the floor shift parking lock cable from the shift lever plate.

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5. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

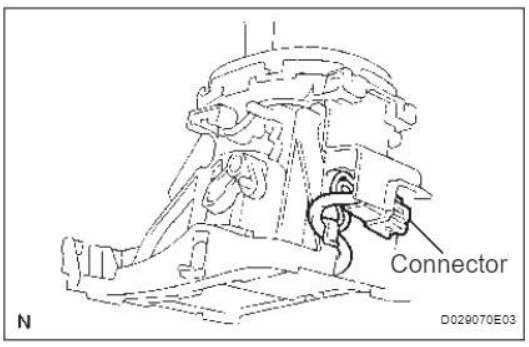
(a) Remove the nut, and disconnect the transmission control cable from the floor shift.
(b) Using a screwdriver, disconnect the transmission control cable from the shift lever plate.



6. REMOVE FLOOR SHIFT ASSEMBLY

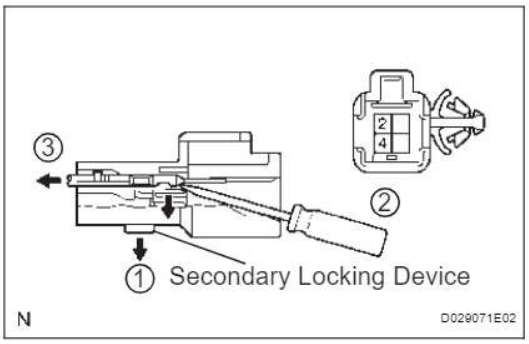
(a) Disconnect the 2 connectors.
(b) Remove the 2 wire harness clamps from the floor shift.
(c) Remove the 4 bolts and floor shift.

DISASSEMBLY



1. REMOVE TRANSMISSION CONTROL SWITCH

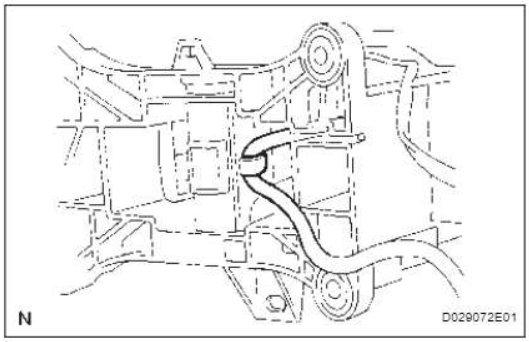
(a) Disconnect the connector from the shift lever plate.



(b) Remove the transmission control switch connector from the shift lever plate.
(c) Disengage the secondary locking device.
(d) Release the locking lug of terminals 2 and 4, and then pull out the terminals from the rear.

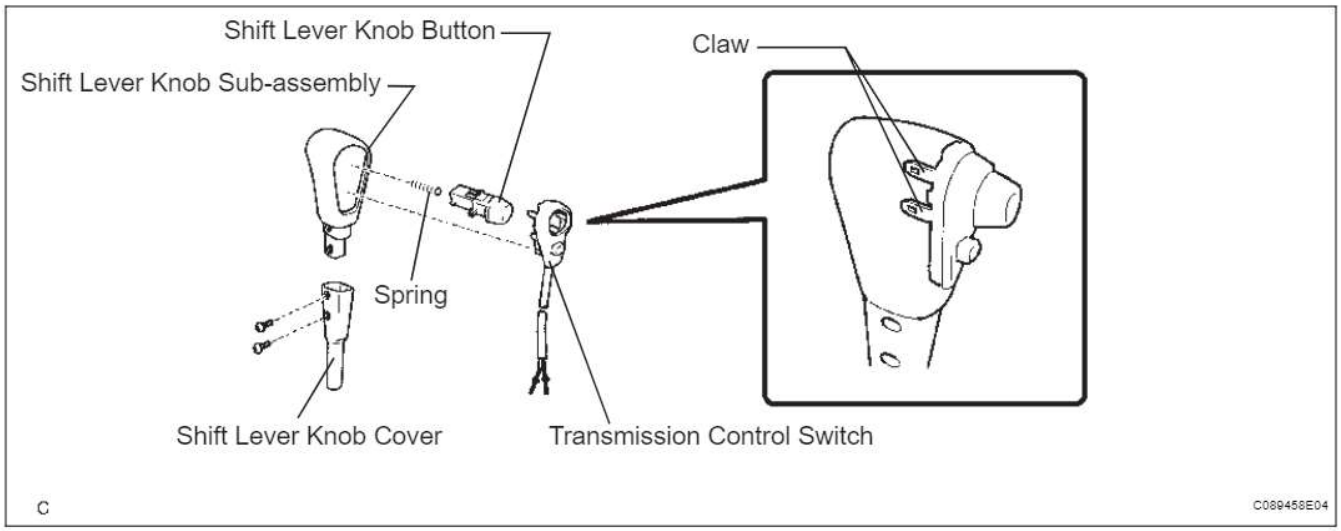
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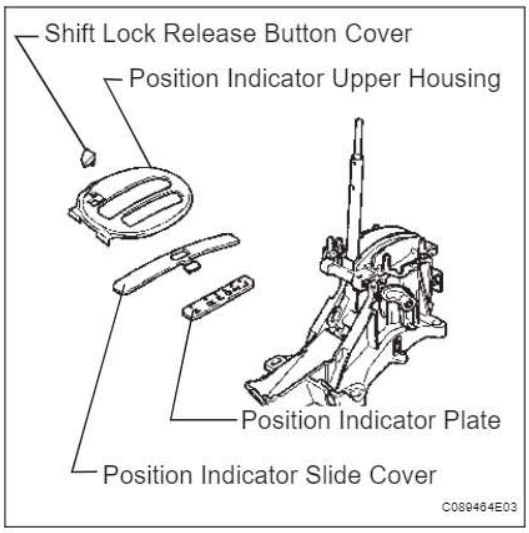
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2. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY

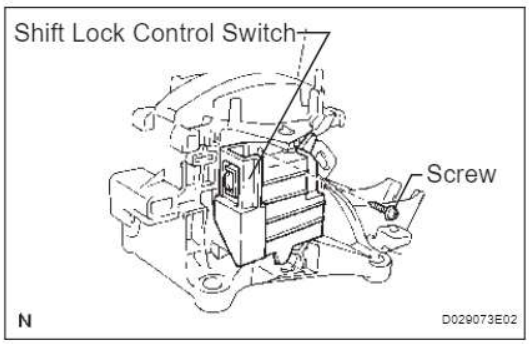
(a) Separate the wire harness of the transmission control switch from the shift lever plate.
(b) Remove the 2 screws and shift lever knob.
NOTICE:
Be careful not to apply excessive force to the transmission control switch wire harness.
(c) Remove the shift lever knob cover.
(d) Remove the shift lever knob button and spring.
(e) Detach the 2 claws and remove the transmission control switch.





3. REMOVE POSITION INDICATOR UPPER HOUSING

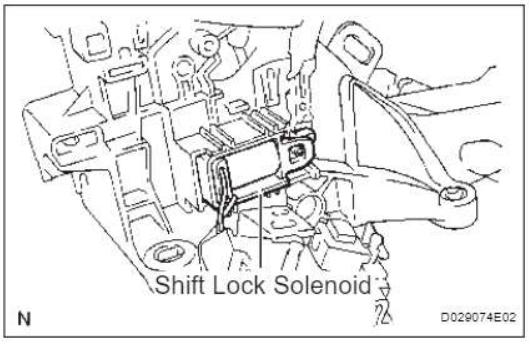
(a) Remove the shift lock release button cover from the position indicator upper housing.
(b) Remove the position indicator upper housing from the shift lever.
(c) Remove the position indicator slide cover from the shift lever plate.
(d) Remove the position indicator plate from the position indicator upper housing.



4. REMOVE SHIFT LOCK CONTROL SWITCH

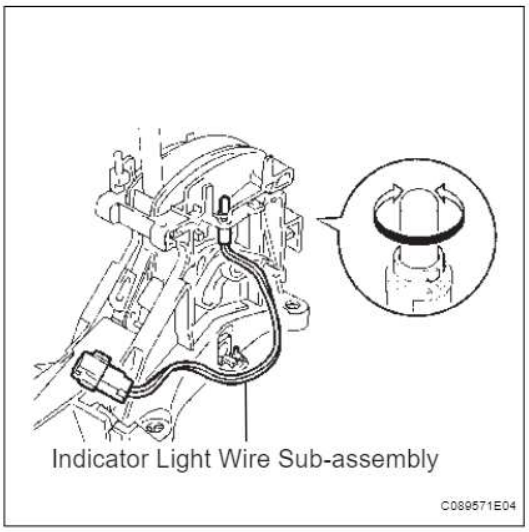
(a) Remove the screw and shift lock control switch.

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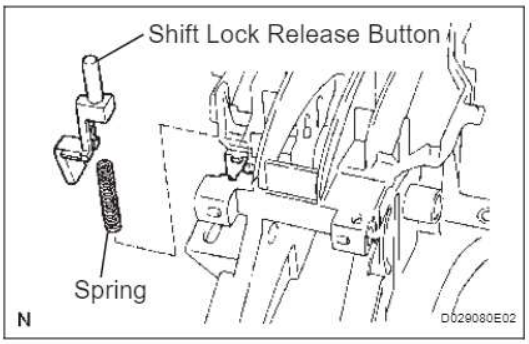
5. REMOVE SHIFT LOCK SOLENOID

(a) Remove the shift lock solenoid from the floor shift.



6. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Remove the indicator light wire from the floor shift.



7. REMOVE SHIFT LOCK RELEASE BUTTON

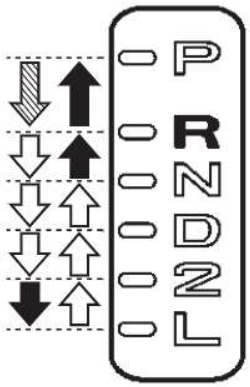
(a) Remove the shift lock release button and spring from the floor shift.

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ADJUSTMENT

1. INSPECT SHIFT LEVER POSITION



HINT:
This illustration shows the positions that the shift lever can be moved to depending on other factors.



The ignition switch is ON, the brake pedal is depressed and the shift lever knob button is pressed.
Or, the ignition switch is ON and the shift lever release button is pressed.



The shift lever knob button is pressed.

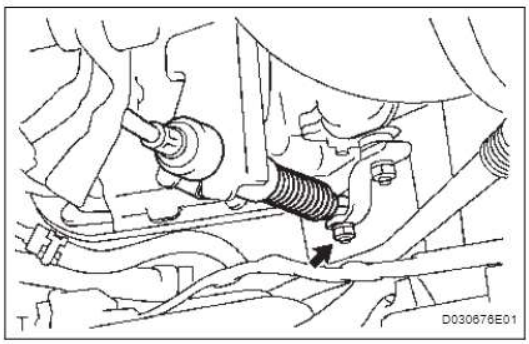


Nothing is pressed.

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(a) When adjusting the shift lever to each position, make sure that it moves smoothly, can be properly operated and the position indicator displays correctly.
Positions which can be operated without pressing the shift lever knob button:
R → N → D → 2, L → 2 → D → N
Positions which can be operated only while pressing the shift lever knob button:
2 → L, N → R → P
Positions which can be operated only while pressing the shift lever knob button, the ignition switch is in the ON position and the brake pedal is depressed:
P → R

(b) When starting the engine, make sure that the vehicle moves forward when shifting from the N to D position, and moves rearward when shifting to the R position.

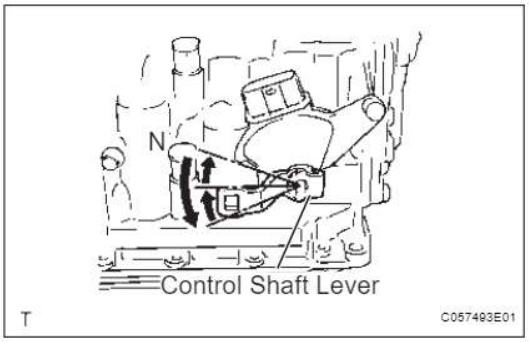


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2. ADJUST SHIFT LEVER POSITION

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

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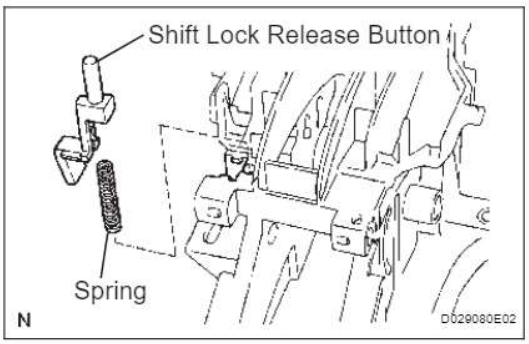
(b) Turn the control shaft lever counterclockwise until it stops.
(c) Turn it clockwise 2 notches to set it to the N position.
(d) Move the shift lever to the N position and install the control cable to the control shaft lever with the nut while pushing the end of the control cable up.
Torque: 12.7 N*m (130 kgf*cm, 9 ft.*lbf)
NOTICE:
- **The shift lever cannot be moved if the end of the control cable is excessively pushed up.**
- **Tighten the nut while the control cable is properly stretched.**

(e) After adjustment, check that the shift lever moves smoothly, and that the shift lever and gear operate correctly.

REASSEMBLY

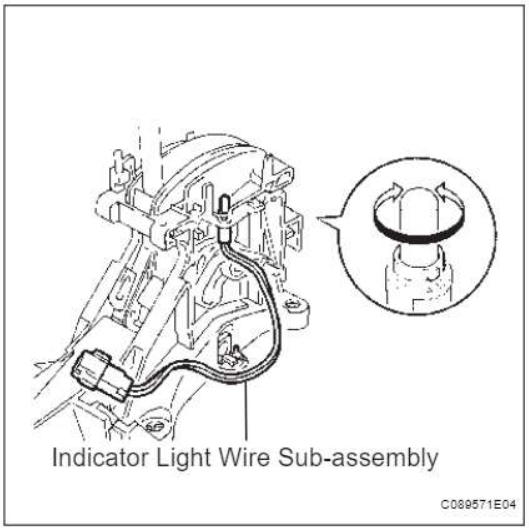
1. INSTALL SHIFT LOCK RELEASE BUTTON

(a) Apply MP grease on the shift lock release button and spring.
(b) Install the shift lock release button and spring to the floor shift.
HINT:
Ensure that the claws fit tightly.



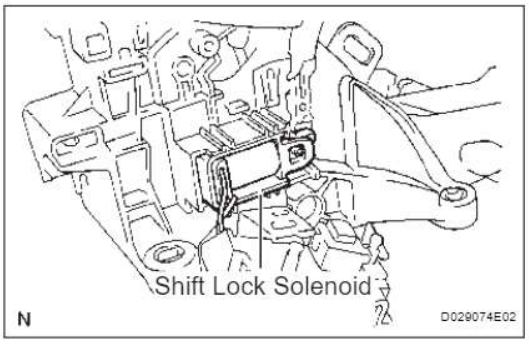
2. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Install the indicator light wire to the floor shift assembly.



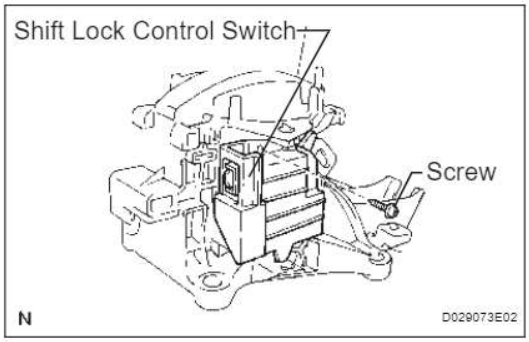
3. INSTALL SHIFT LOCK SOLENOID

(a) Install the shift lock solenoid to the floor shift.



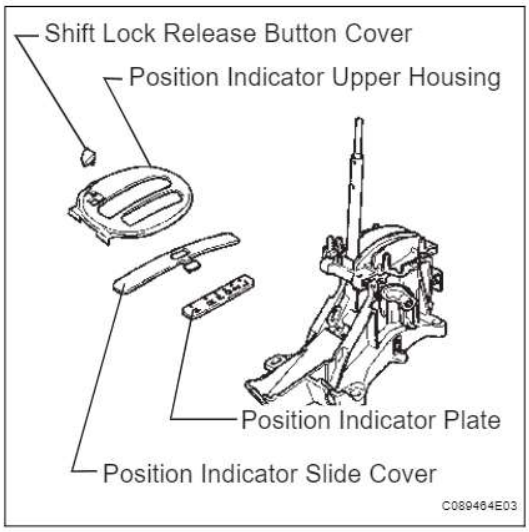
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4. INSTALL SHIFT LOCK CONTROL SWITCH

(a) Install the shift lock control switch to the floor shift with the screw.
Torque: 2.2 N*m (22 kgf*cm, 19 in.*lbf)



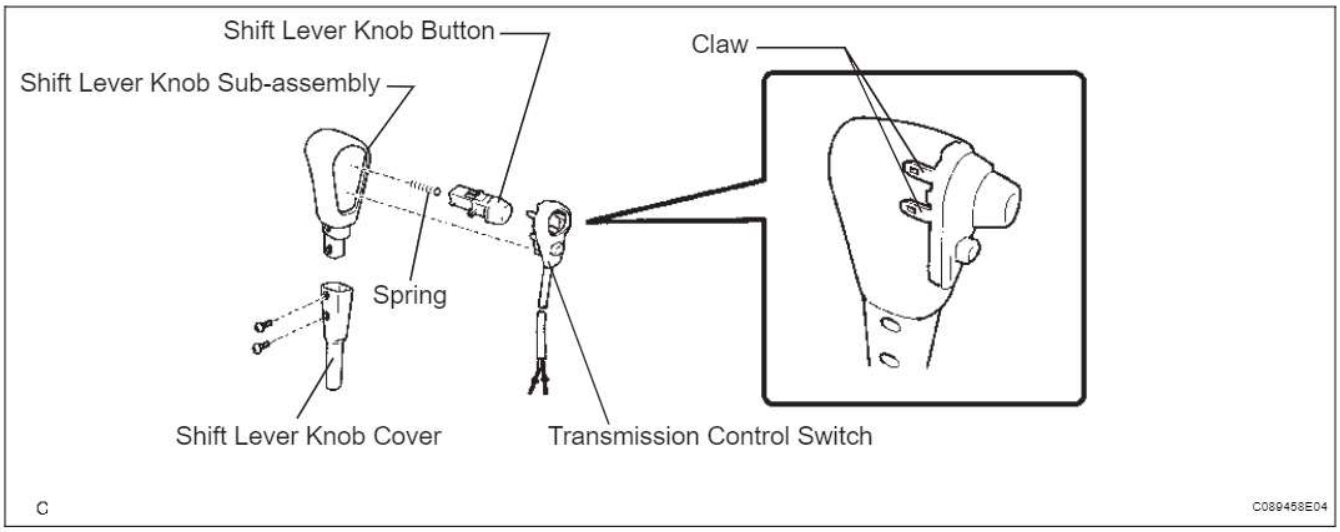
5. INSTALL POSITION INDICATOR UPPER HOUSING

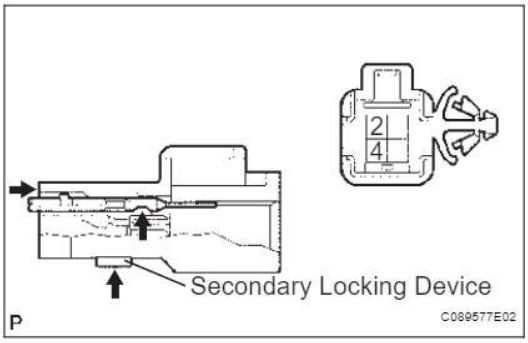
(a) Install the position indicator plate on the position indicator upper housing.
(b) Install the position indicator slide cover on the shift lever plate.
(c) Install the position indicator upper housing on the shift lever.
(d) Install the shift lock release button cover on the position indicator upper housing.

6. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY

(a) Apply MP grease to the shift lever knob button and spring.
(b) Install the shift lever knob button and spring to the shift lever knob.
(c) Install the transmission control switch to the shift lever knob.
NOTICE:
Ensure that the claws fit tightly.
(d) Install the shift lever knob cover to the shift lever knob with the 2 screws.
HINT:
Coat the threads of the screws with sealant.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
NOTICE:
Be careful that the transmission control switch wire harness is not caught between the shift lever knob cover and shift lever knob.

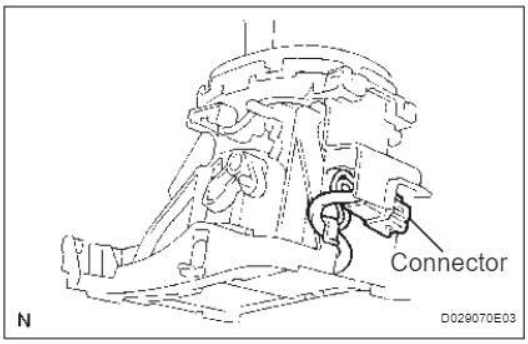
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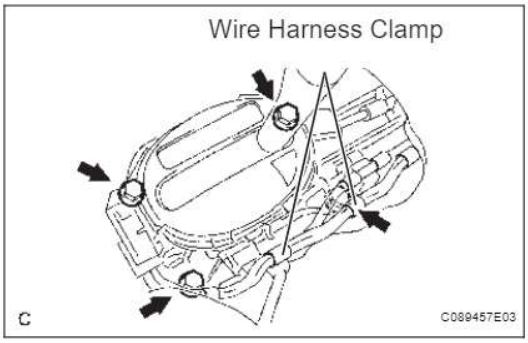


7. INSTALL TRANSMISSION CONTROL SWITCH

(a) Install the 2 terminals into the indicator light wire connector.



(b) Clamp the wire harness onto the shift lever plate. Then connect the connector to the shift lever plate.



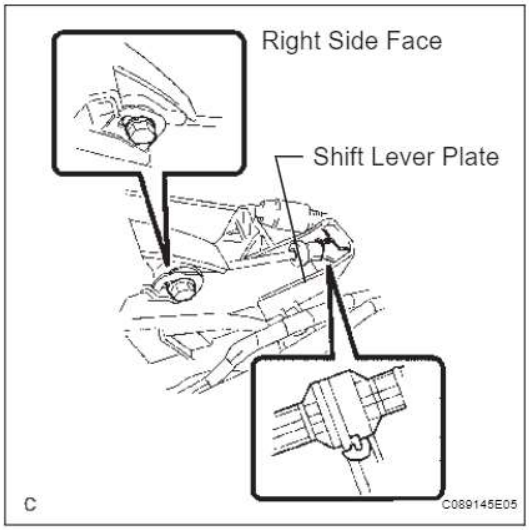
INSTALLATION

1. INSTALL FLOOR SHIFT ASSEMBLY

(a) Install the floor shift with the 4 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)
HINT:
Tighten them in the order A, B, C and D.

(b) Install the 2 wire harness clamps on the shift lever plate.

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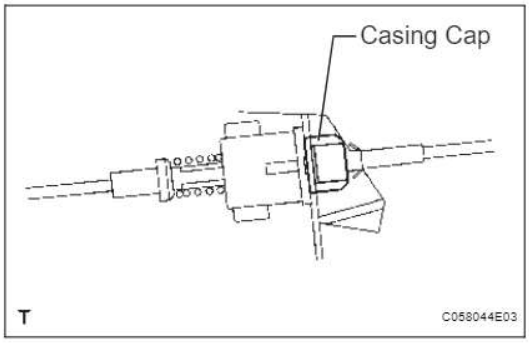


2. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Adjust the shift lever to the N position, push the lever to the R position side and hold it in place.

(b) While pulling the cable, connect the transmission control cable with the nut.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

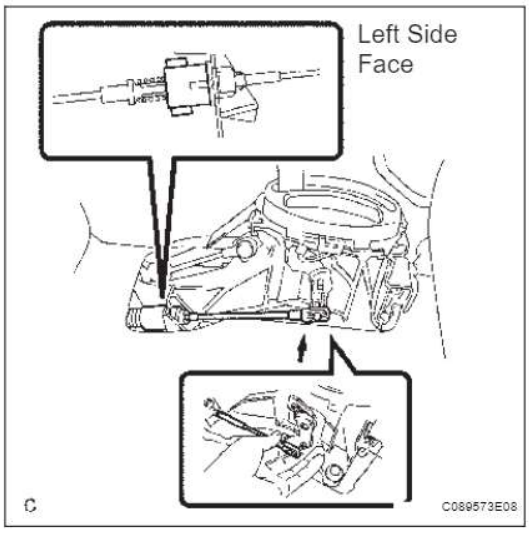
(c) Connect the 2 connectors.



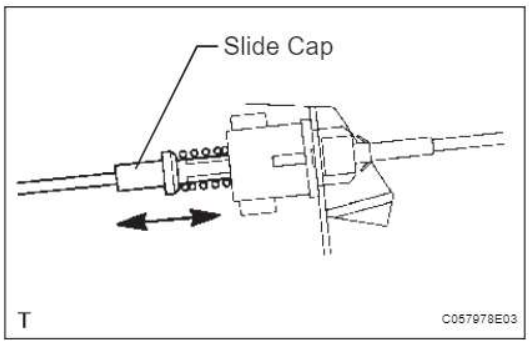
3. CONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

(a) Insert the floor shift parking lock cable end rod in the slit of the shift lever plate.

(b) Insert the casing cap of the cable into the shift lever plate through-hole.
HINT:
Check that it is inserted securely.

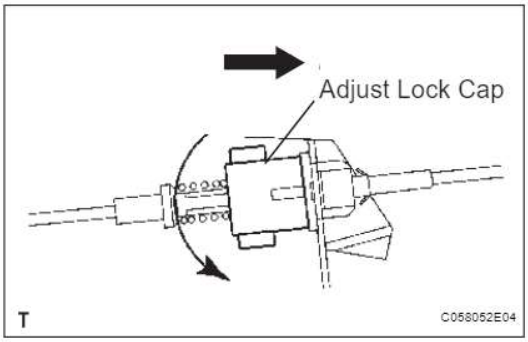


(c) Insert the lever pin into the hole in the floor shift parking lock cable end.
HINT:
- At this time, ensure that the shift lever is in the N position.
- After installation, make sure that the lever pin is pulled by the floor shift parking lock cable and is stopped with the stopper.



(d) Hold the slide cap and move it back and forth. Check that the spring for automatic adjustment works properly.

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(e) Rotate the adjust lock cap counterclockwise by 90°so that it faces the front of the vehicle, and attach it.
HINT:
- Install the floor shift parking lock cable on the shift lever side with the ignition switch in the ACC position.
- Make sure the slide amount of the spring for automatic adjustment is 8 mm (0.31 in.).

4. INSPECT AND ADJUST SHIFT LEVER POSITION

(a) Check that the starter operates when the shift lever is in the P or N position and does not operate in other position.
(b) Operate the shift lever and check that the reading on the indicator matches the actual position.
(c) Check that the ignition key can be pulled out with the shift lever in the P position.
(d) Check that the ignition switch cannot be turned to the LOCK position with the shift lever in any position other than P.
(e) Check that the shift lever can be shifted from the P position to other positions when the shift lock release button is pressed.

5. INSPECT SHIFT LEVER POSITION

(a) Inspect the shift lever position (see page AX-121).

6. ADJUST SHIFT LEVER POSITION

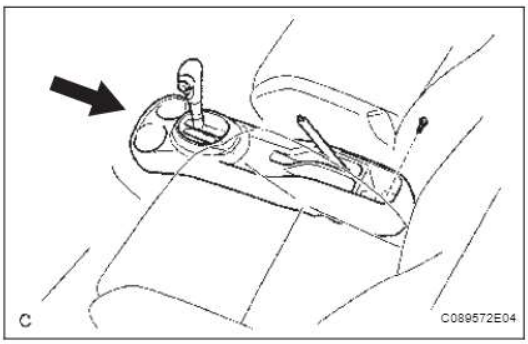
(a) Adjust the shift lever position (see page AX-121).

7. INSTALL REAR CONSOLE BOX ASSEMBLY

(a) Install the console box to the vehicle with the screw.
NOTICE:
While installing the console box sub-assembly, pay attention not to damage the shift lever knob and the indicator housing.

8. INSTALL CONSOLE BOX CARPET

9. INSTALL CONSOLE BOX REAR COVER

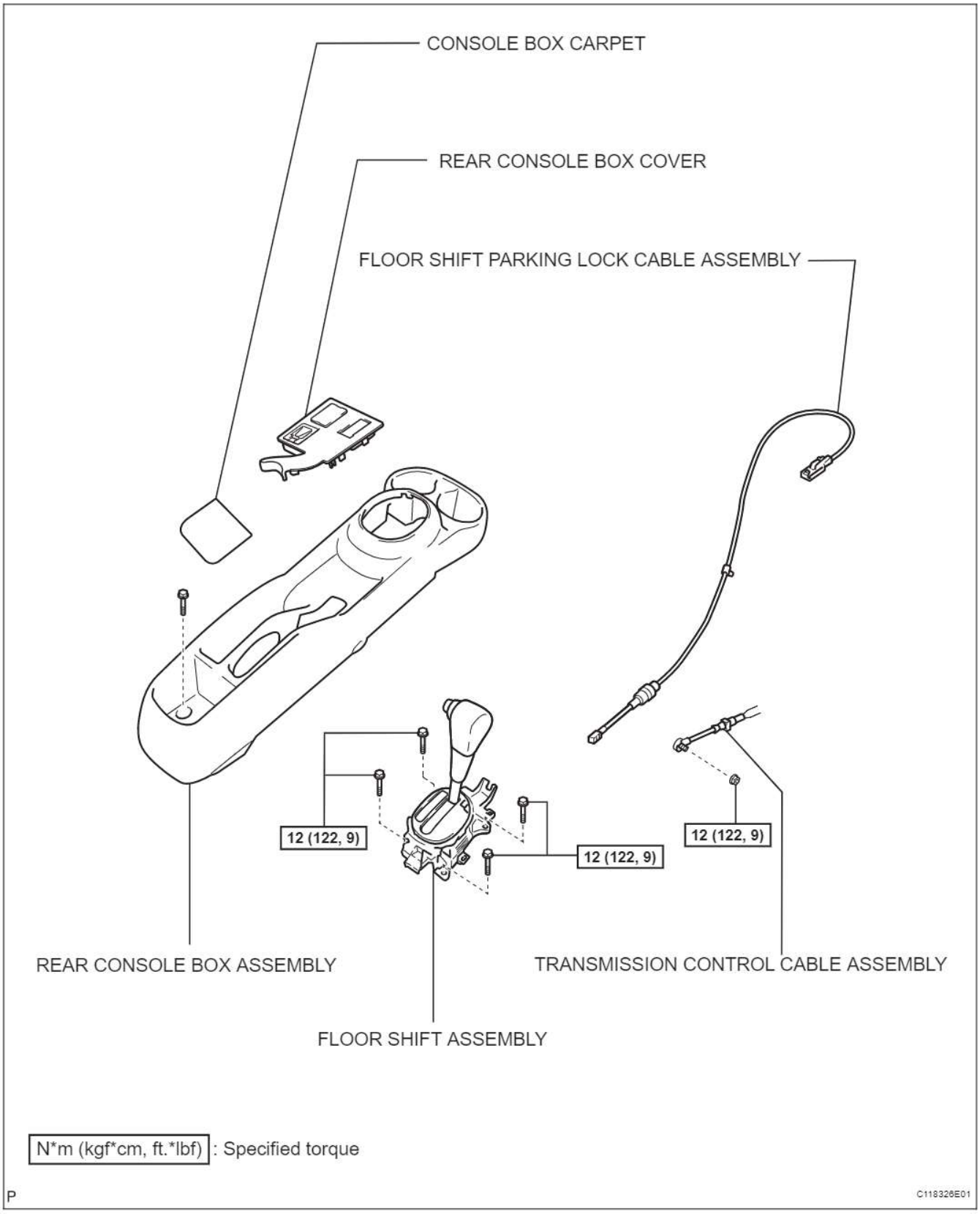


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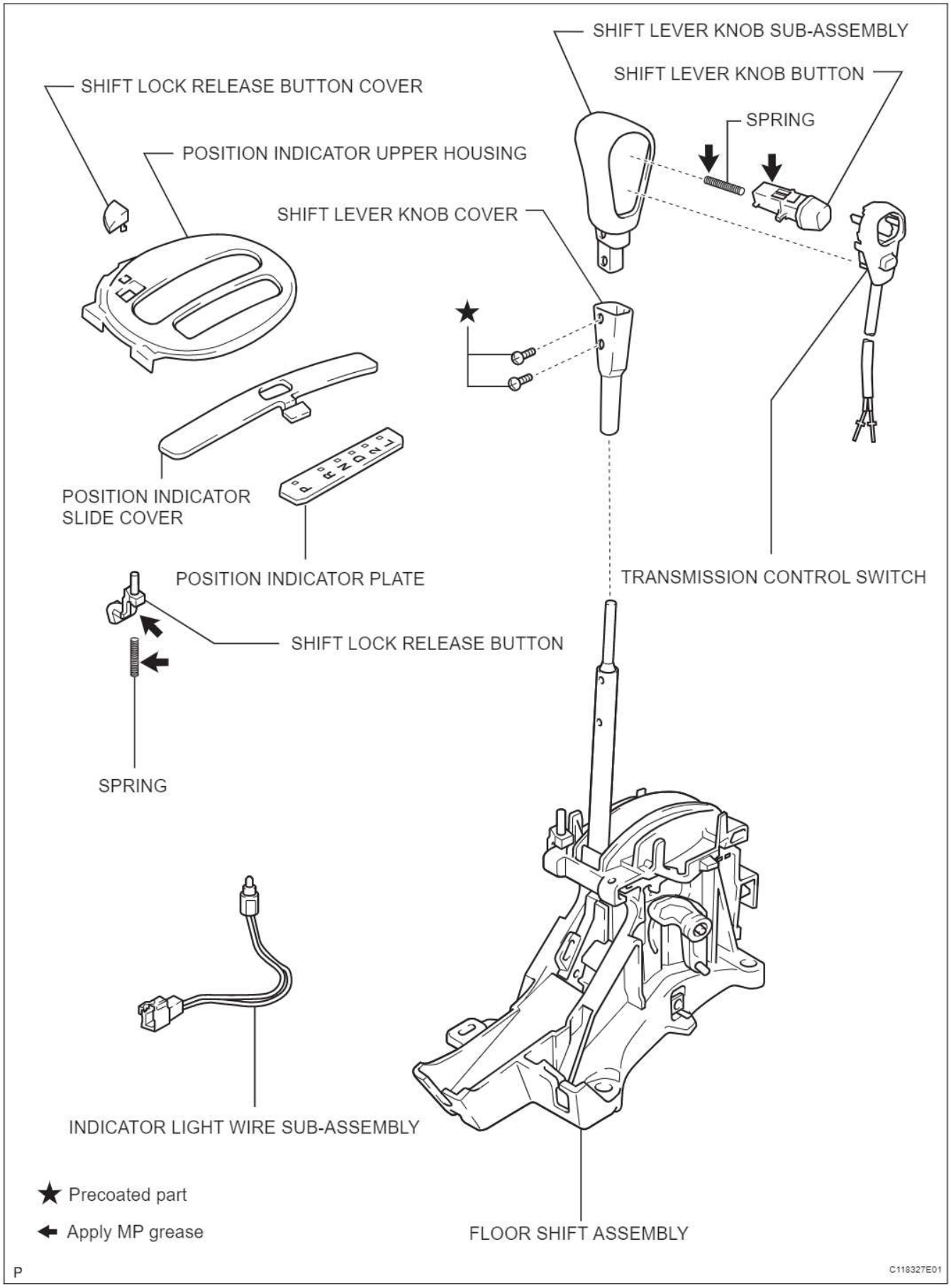
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FLOOR SHIFT ASSEMBLY

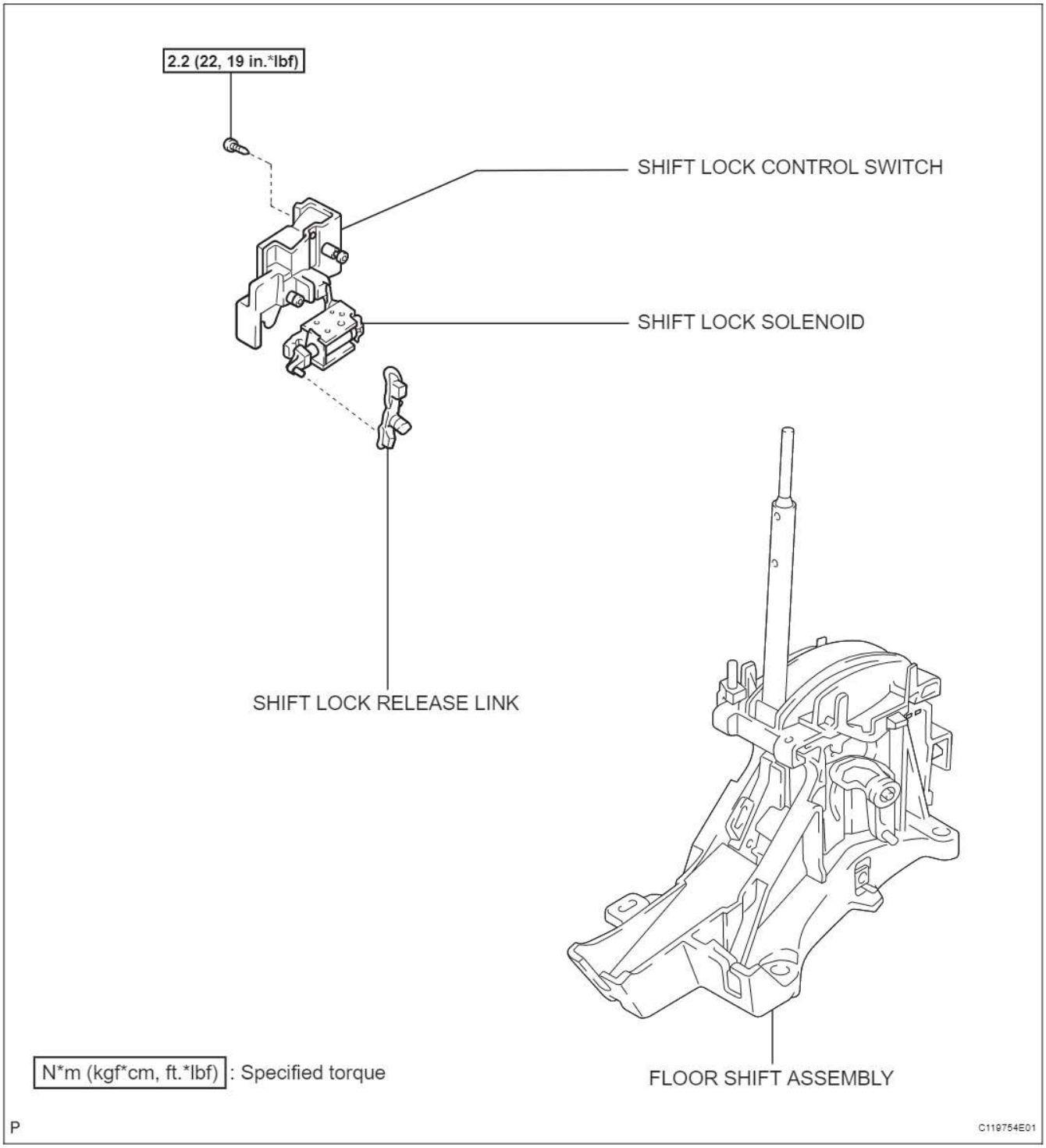
COMPONENTS



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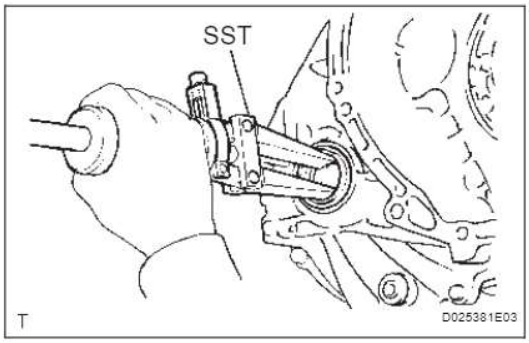


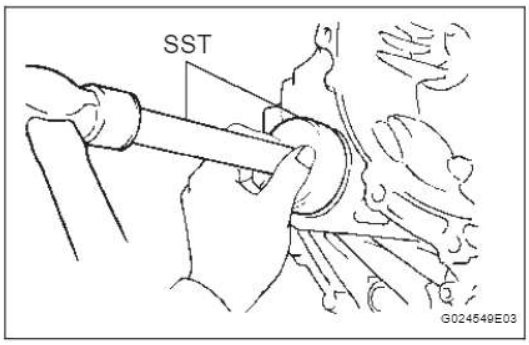
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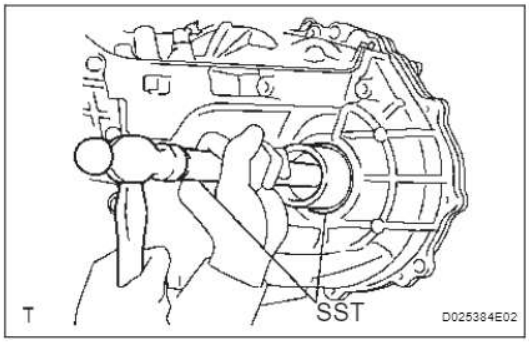
REPLACEMENT

1. **REMOVE FRONT WHEEL**
2. **REMOVE ENGINE UNDER COVER RH**
3. **REMOVE ENGINE UNDER COVER LH**
4. **DRAIN AUTOMATIC TRANSAXLE FLUID**
   (a) Remove the drain plug and gasket, and drain ATF.
   (b) Install a new gasket and the drain plug.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
5. **REMOVE FRONT DRIVE SHAFT ASSEMBLY**
   (a) Remove the front drive shaft (see page DS-4).
6. **REMOVE FRONT TRANSAXLE CASE OIL SEAL**
   (a) Using SST, pull out the oil seal.
   SST 09308-00010





7. **INSTALL FRONT TRANSAXLE CASE OIL SEAL (for RH Side)**
   (a) Using SST and a hammer, tap in a new oil seal.
   SST 09554-14010, 09950-70010 (09951-07200)
   Standard oil seal drive in depth:
   1.5 to 2.5 mm (0.059 to 0.098 in.)
   (b) Coat the lip of the oil seal with MP grease.



8. **INSTALL FRONT TRANSAXLE CASE OIL SEAL (for LH Side)**
   (a) Using SST and a hammer, drive in a new oil seal.
   SST 09726-27012 (09726-02041), 09950-70010 (09951-07200)
   Standard oil seal drive in depth:
   5.4 to 6.4 mm (0.213 to 0.252 in.)
   (b) Coat the lip of the oil seal with MP grease.
9. **INSTALL FRONT DRIVE SHAFT ASSEMBLY**
   (a) Install the front drive shaft (see page DS-13).
10. **INSTALL ENGINE UNDER COVER LH**
11. **INSTALL ENGINE UNDER COVER RH**
12. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
13. **ADD AUTOMATIC TRANSAXLE FLUID**
    Fluid type:
    Toyota Genuine ATF TYPE T-IV

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Standard capacity:
2.9 liters (3.1 US qts, 2.6 Imp. qts)

14. INSPECT AUTOMATIC TRANSAXLE FLUID

(a) Inspect the automatic transaxle fluid (see page AX-82).

15. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

(a) Inspect and adjust the front wheel alignment (see page SP-2).

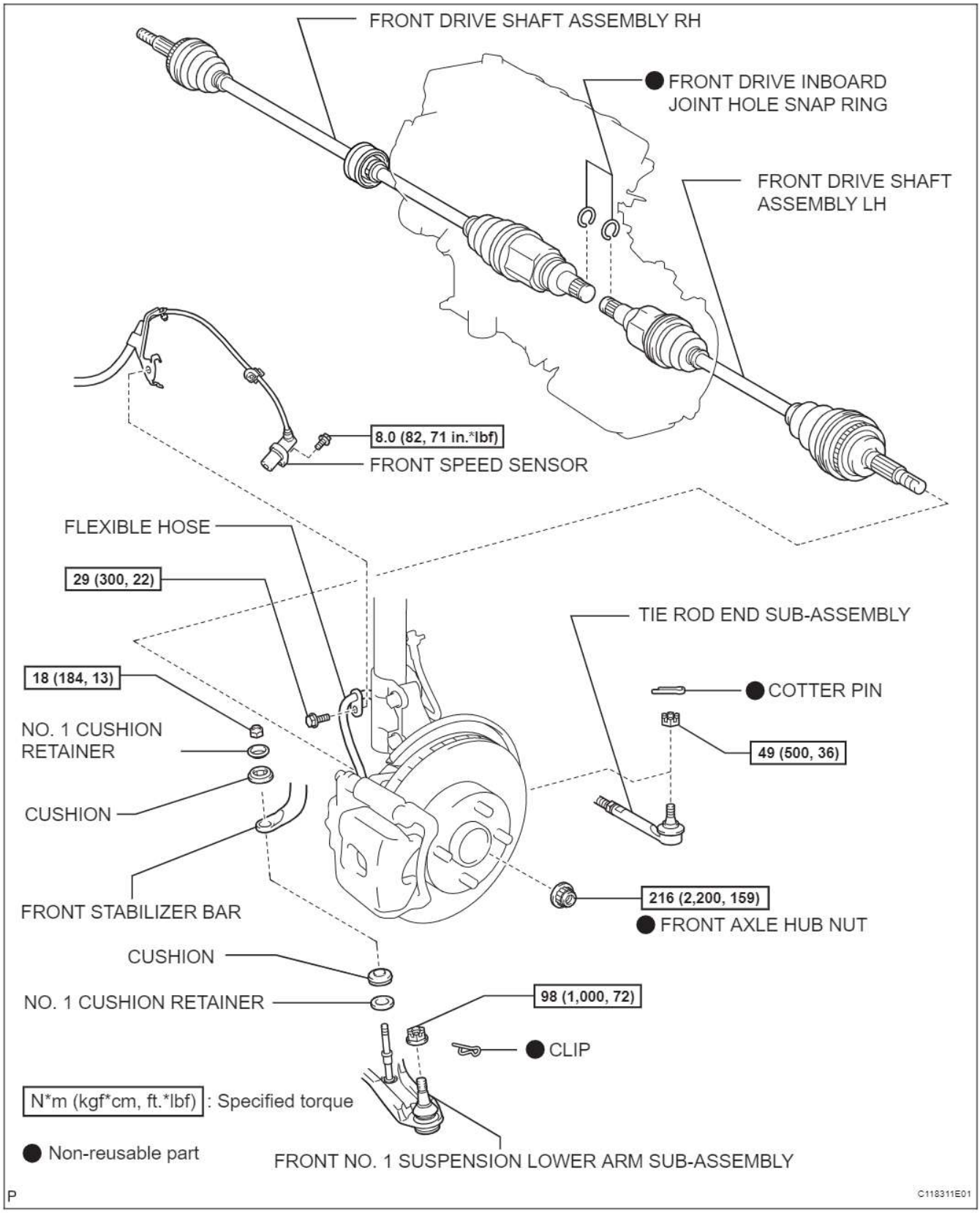
16. CHECK ABS SPEED SENSOR SIGNAL

(a) Check the ABS speed sensor signal (see page BC-5).

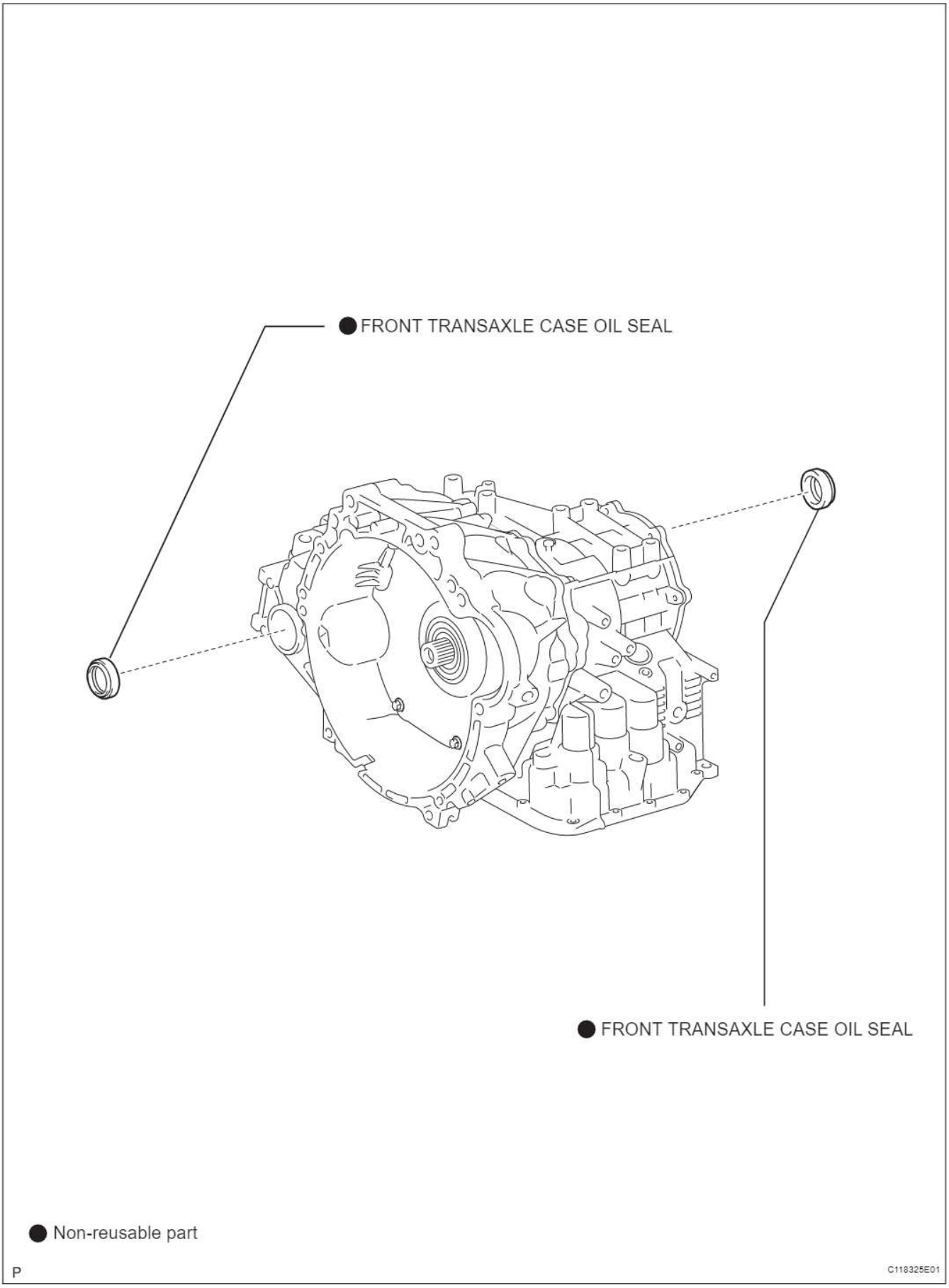
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DIFFERENTIAL OIL SEAL

COMPONENTS



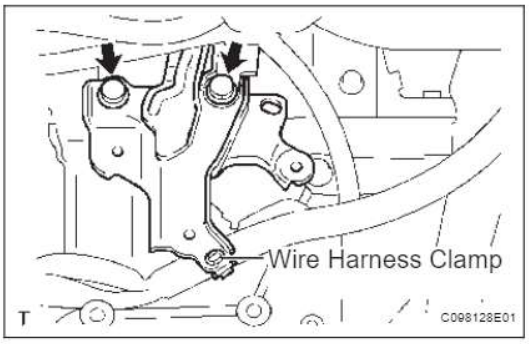
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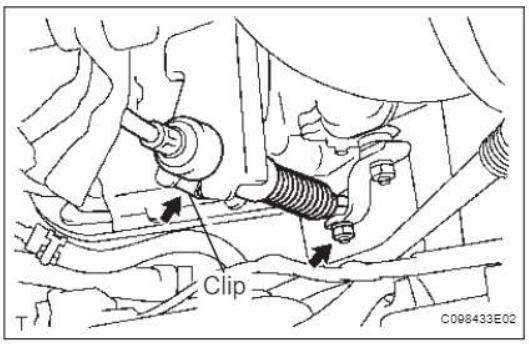
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REMOVAL

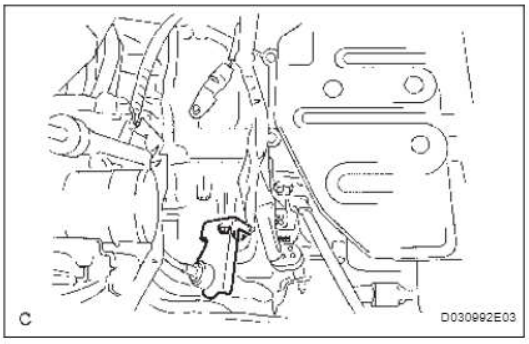
1. **REMOVE HOOD SUB-ASSEMBLY**
2. **REMOVE BATTERY**
   NOTICE:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
3. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY**
   (a) Remove the windshield wiper link (see page WW-7).
4. **REMOVE COWL TOP PANEL OUTER**
5. **REMOVE NO. 2 CYLINDER HEAD COVER**
6. **REMOVE AIR CLEANER ASSEMBLY**
   (a) Remove air cleaner (see page ES-346).
7. **REMOVE AIR CLEANER BRACKET**
   (a) Disconnect the wire harness clamp.
   (b) Remove the 2 bolts, air cleaner bracket and transmission control cable support.



8. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the nut from the control shaft lever.
   (b) Disconnect the control cable from the control shaft lever.
   (c) Remove the clip and disconnect the control cable from the control cable bracket.

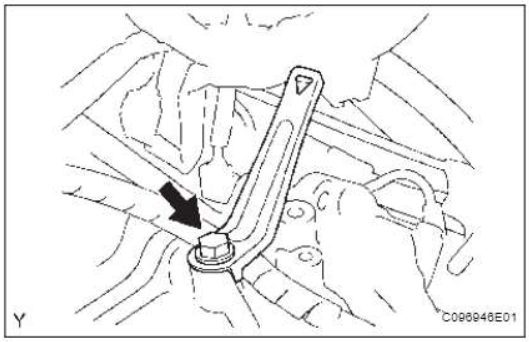


9. **REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET**
   (a) Remove the 2 bolts and bracket.



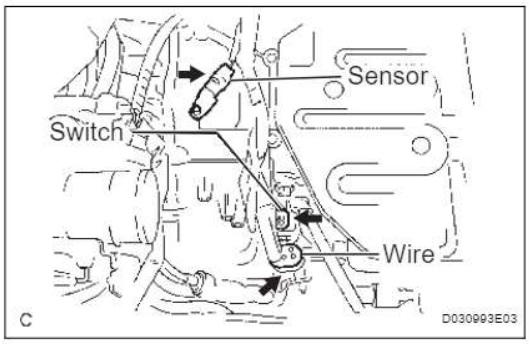
AX

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10. DISCONNECT WIRE HARNESS

(a) Remove the bolt and disconnect the wire harness clamp bracket.



11. DISCONNECT CONNECTOR

(a) Disconnect the transmission wire connector.
(b) Disconnect the park/neutral position switch connector.
(c) Disconnect the transmission revolution sensor connector.

12. REMOVE FRONT WHEEL

13. REMOVE ENGINE UNDER COVER RH

14. REMOVE ENGINE UNDER COVER LH

15. REMOVE FRONT EXHAUST PIPE ASSEMBLY

(a) Remove the front exhaust pipe (see page EX-3).

16. DRAIN AUTOMATIC TRANSAXLE FLUID

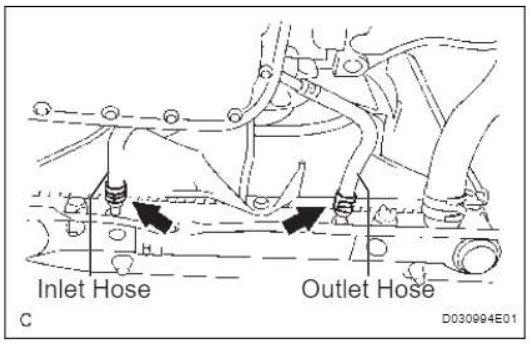
(a) Remove the drain plug and gasket, and drain ATF.
(b) Install a new gasket and the drain plug.

17. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH

(a) Remove the front drive shaft (see page DS-4).

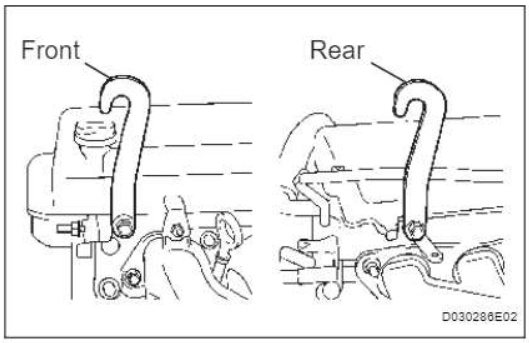
18. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

(a) Remove the front drive shaft (see page DS-4).



19. DISCONNECT OIL COOLER HOSE

(a) Using pliers, grip the claws of the 2 clips and disconnect the oil cooler hoses (inlet and outlet).
HINT:
Use a container to catch the fluid.

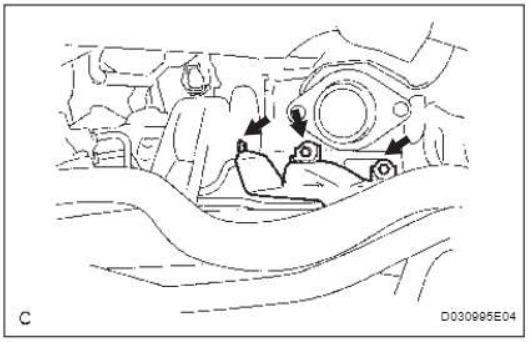


20. SUSPEND ENGINE ASSEMBLY

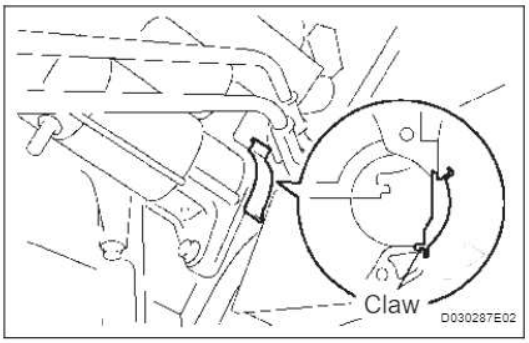
(a) Install the engine hangers with the bolts in the correct direction.
Engine hanger:
Part No. 12281-21010
Bolt:
Part No. 91642-81025
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

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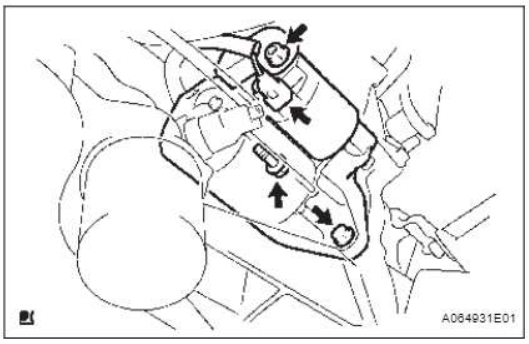
(b) Attach the engine chain hoist to the engine hangers.
NOTICE:
Do not attempt to hang the engine by hooking the chain to any other parts.



21. REMOVE DRIVE SHAFT HEAT INSULATOR SUB-ASSEMBLY
(a) Remove the 3 bolts and drive shaft heat insulator.

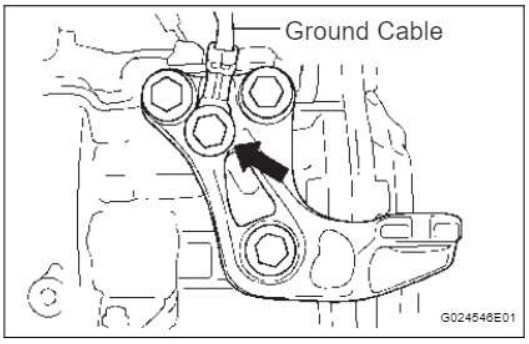


22. REMOVE STARTER ASSEMBLY
(a) Remove the flywheel housing side cover.



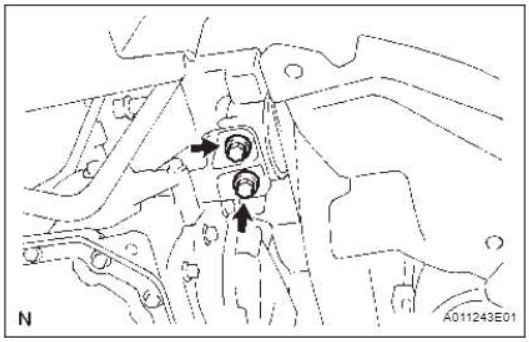
(b) Remove the nut and disconnect the starter wire.
(c) Disconnect the connector.
(d) Remove the 2 bolts and starter.

23. SUPPORT AUTOMATIC TRANSAXLE ASSEMBLY
(a) Support the automatic transaxle with a transmission jack.

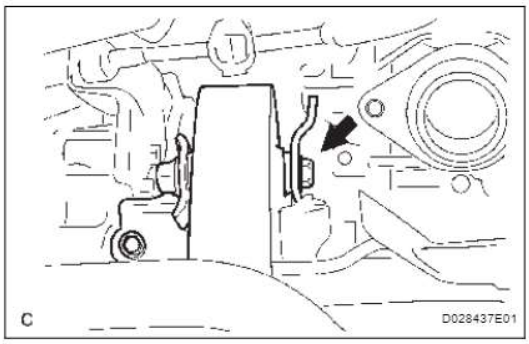


24. DISCONNECT ENGINE MOUNTING BRACKET LH
(a) Remove the bolt and ground cable from the engine mounting bracket.

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(b) Remove the 2 bolts and disconnect the engine mounting bracket from the engine mounting insulator.

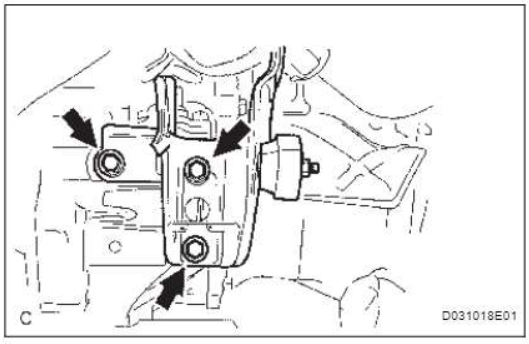


25. DISCONNECT ENGINE MOUNTING INSULATOR REAR

(a) Remove the bolt and nut, and disconnect the engine mounting insulator rear from the engine mounting bracket.

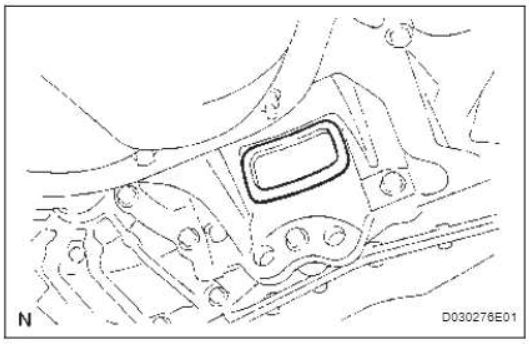
26. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

(a) Remove the front suspension crossmember (see page EM-75).



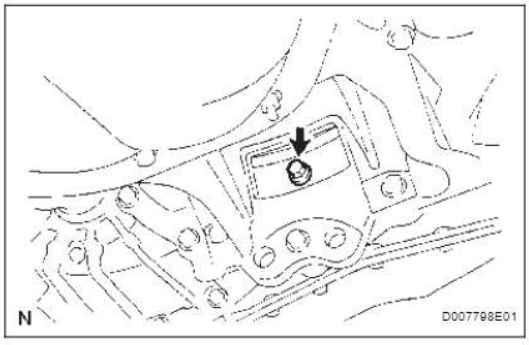
27. REMOVE ENGINE MOUNTING BRACKET REAR

(a) Remove the 3 bolts and engine mounting bracket from the automatic transaxle.



28. REMOVE FLYWHEEL HOUSING UNDER COVER

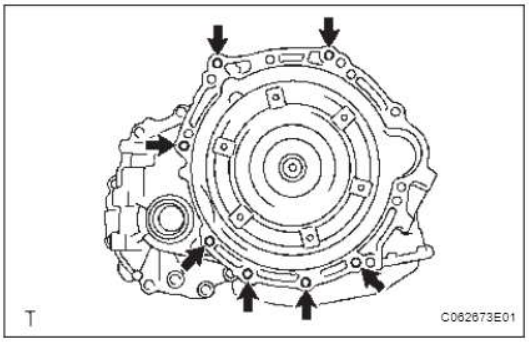
(a) Remove the flywheel housing under cover.



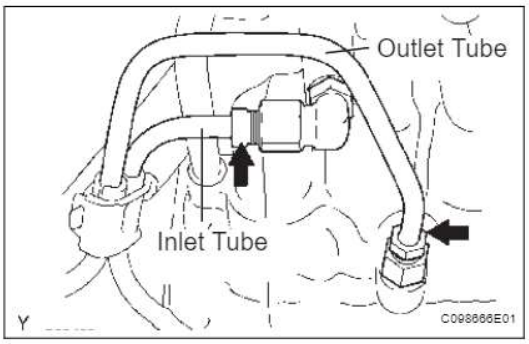
29. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

(a) Turn the crankshaft to gain access and remove the 6 torque converter mounting bolts while holding the crankshaft pulley bolt with a wrench.
HINT:
There will be one white colored bolt.

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(b) Remove the 7 bolts.
(c) Remove the automatic transaxle from the engine.

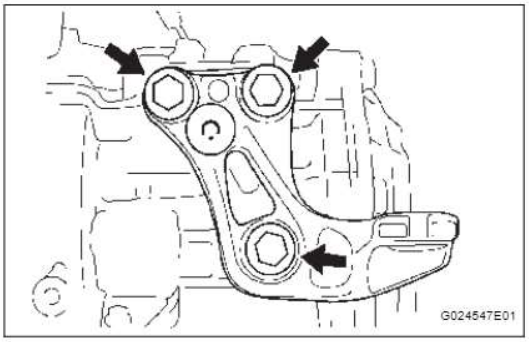


30. DISCONNECT NO. 1 OIL COOLER INLET TUBE

(a) Using SST, disconnect the oil cooler inlet tube.
SST 09023-12701

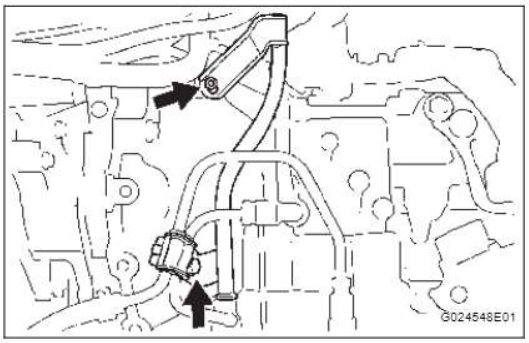
31. DISCONNECT NO. 1 OIL COOLER OUTLET TUBE

(a) Using SST, disconnect the oil cooler outlet tube.
SST 09023-12701



32. REMOVE ENGINE MOUNTING BRACKET LH

(a) Remove the 3 bolts and engine mounting bracket from the automatic transaxle.



33. REMOVE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

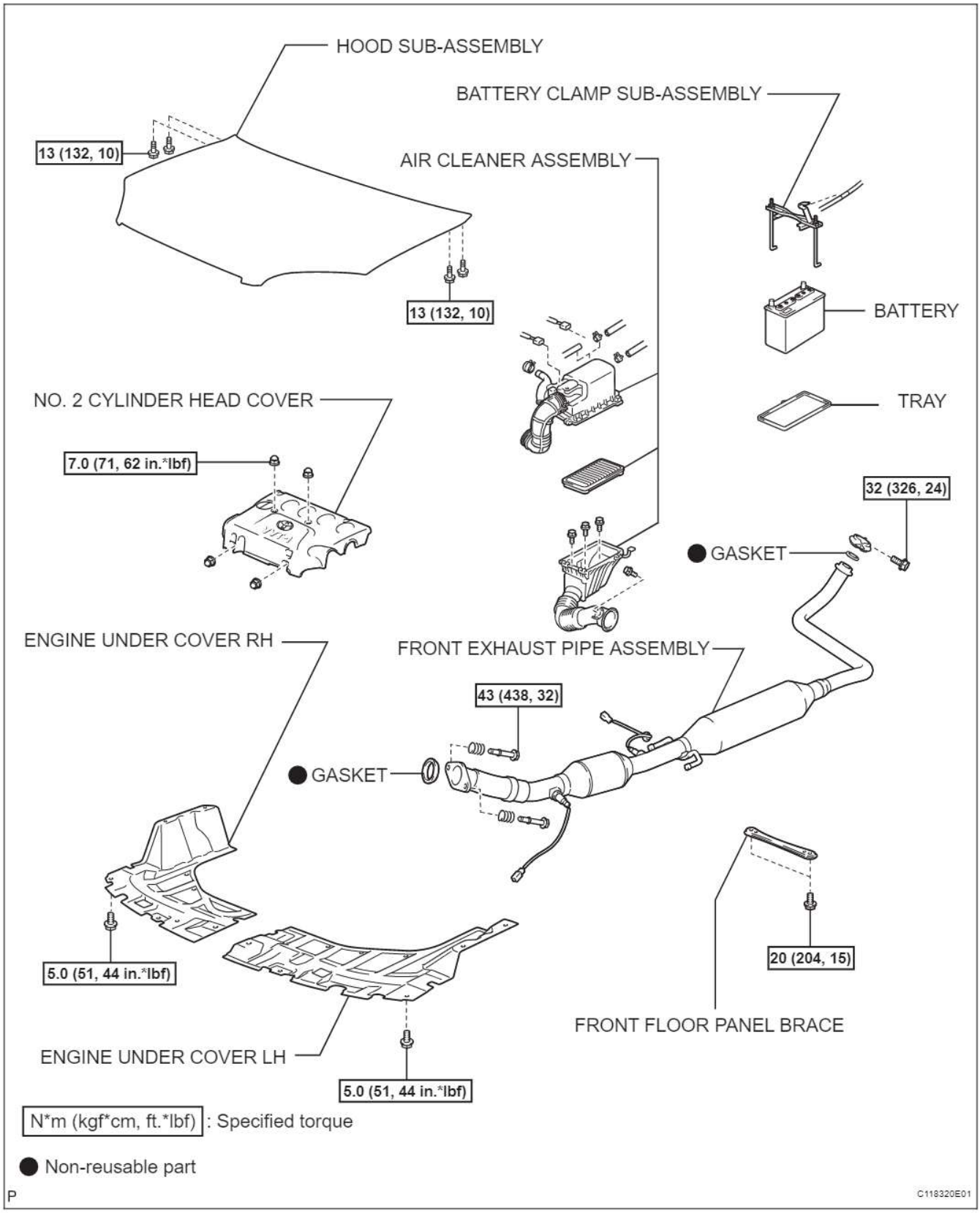
34. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

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

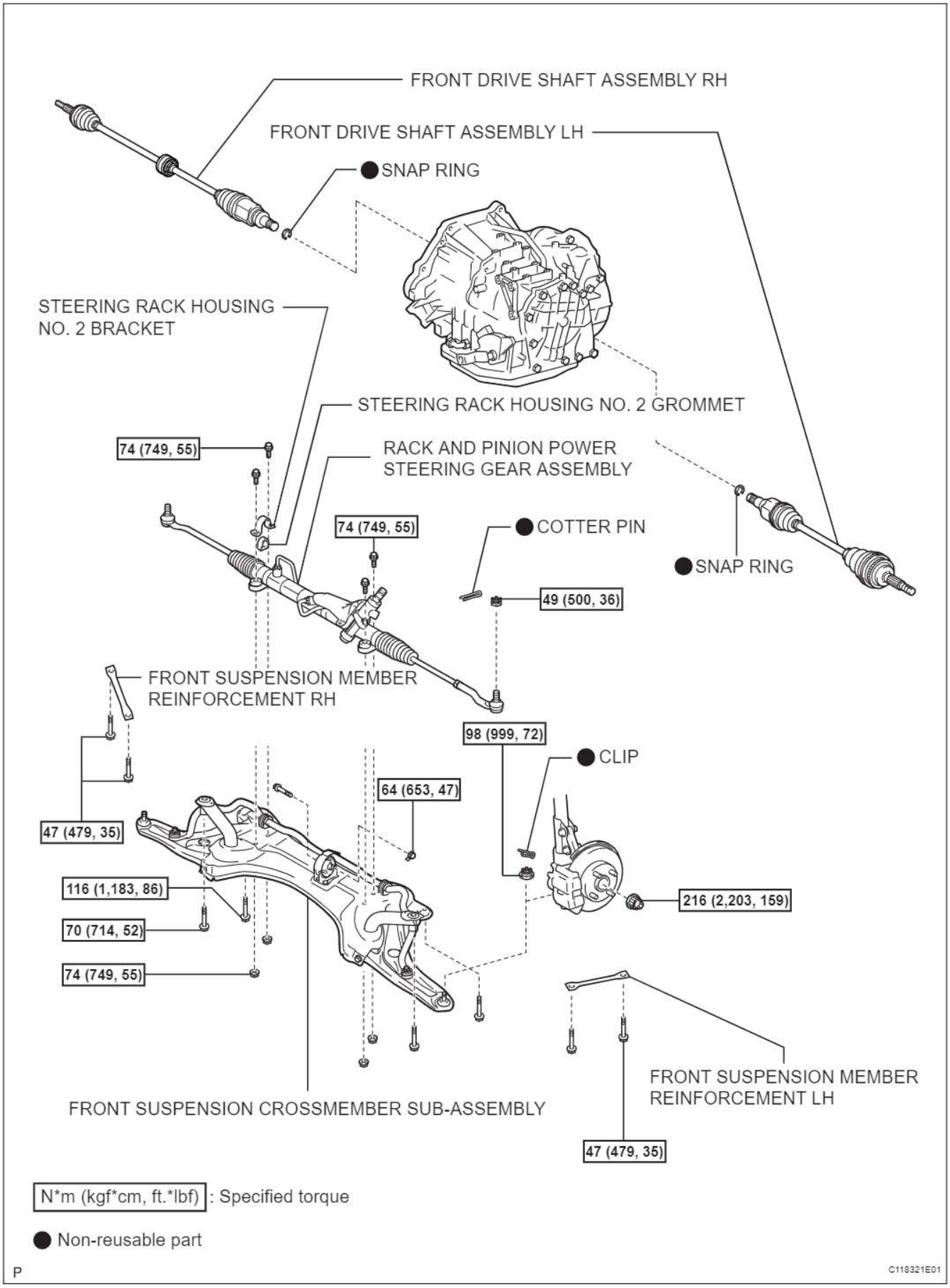
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AUTOMATIC TRANSAXLE ASSEMBLY

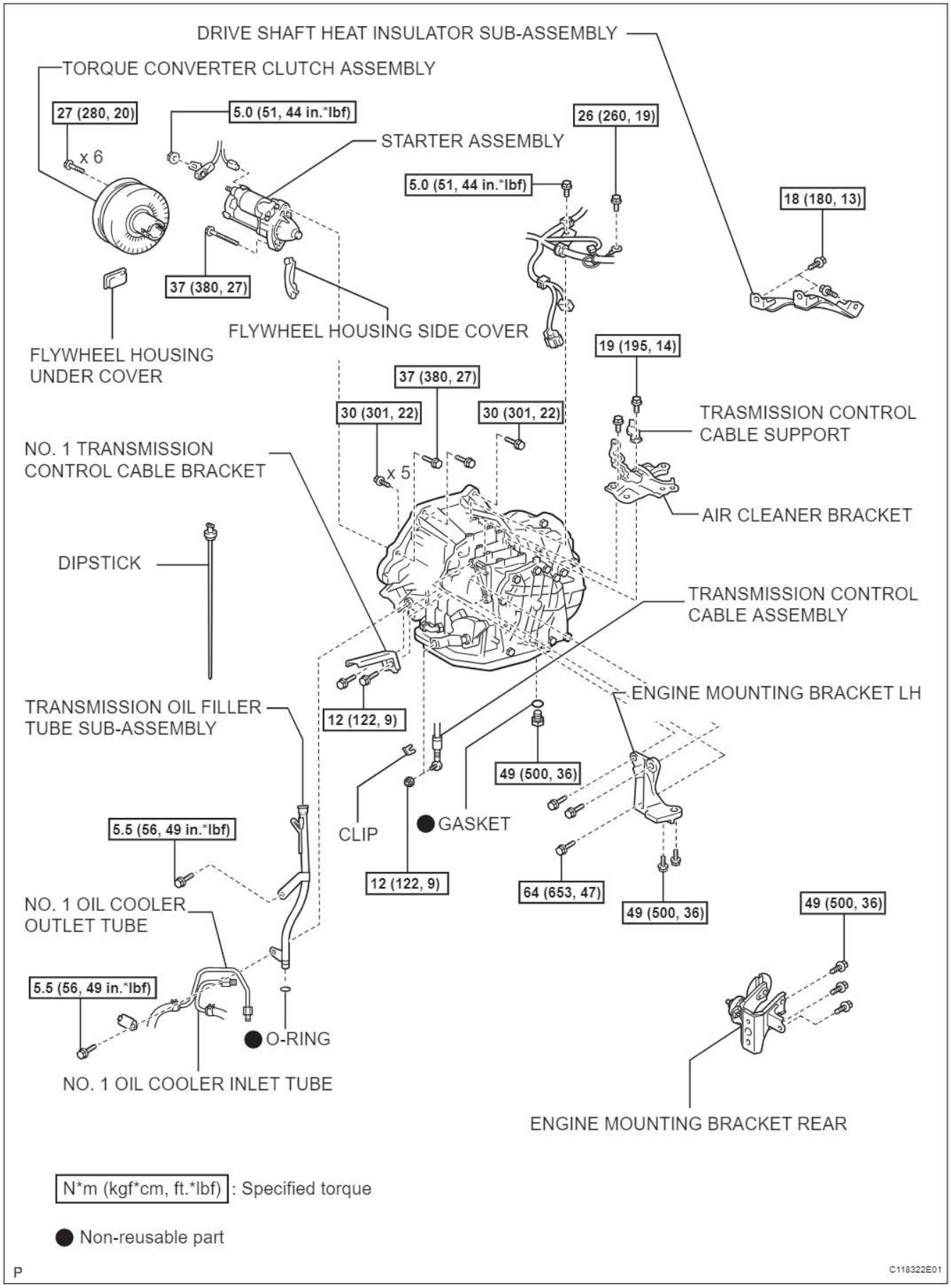
COMPONENTS



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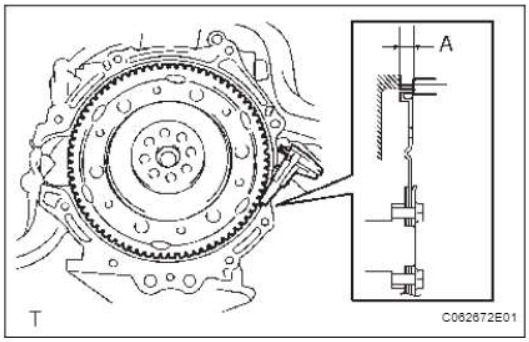
INSTALLATION

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

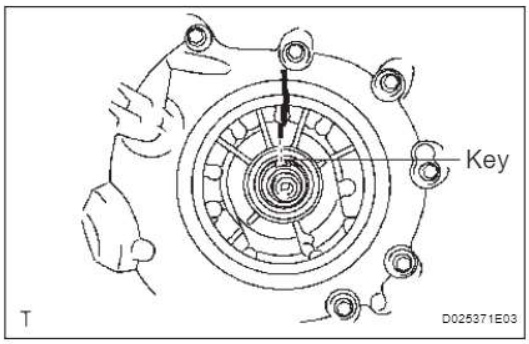
(a) Inspect the torque converter clutch (see page AX-146).

2. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

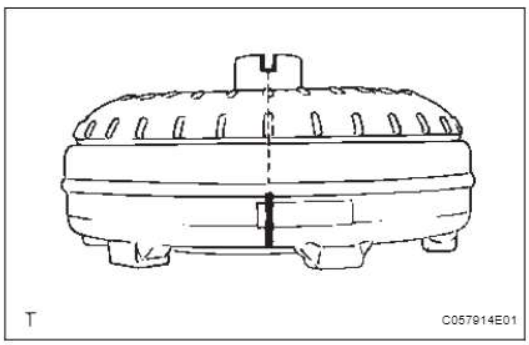
(a) Using a vernier caliper, measure the dimension "A" between the transaxle fitting part of the engine and the converter clutch fitting part of the drive plate.



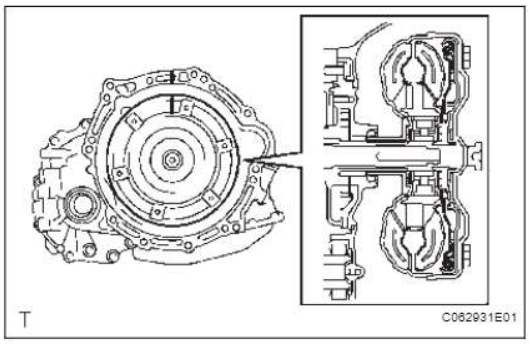
(b) Set the key at the top of the front oil pump drive gear and put a mark on the housing.



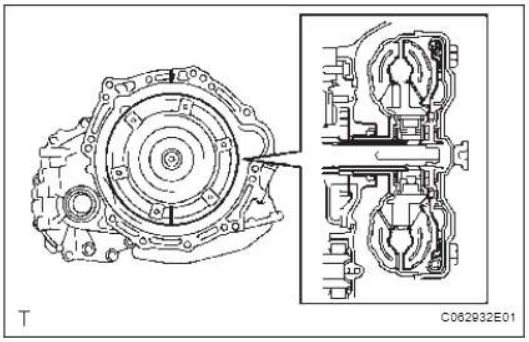
(c) Put a mark on the torque converter clutch so that its groove is clearly indicated.



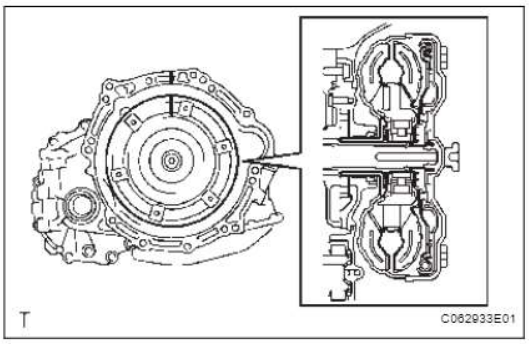
(d) Align the marks on the case and converter clutch, and fit the splined part of the input shaft to the spline part of the turbine runner.



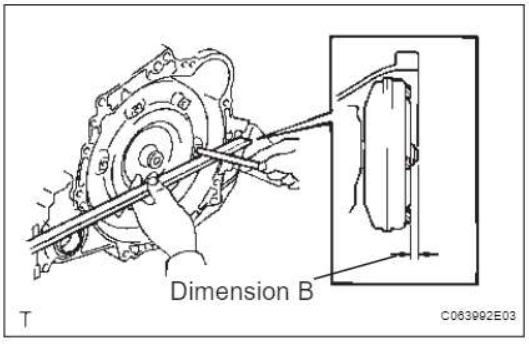
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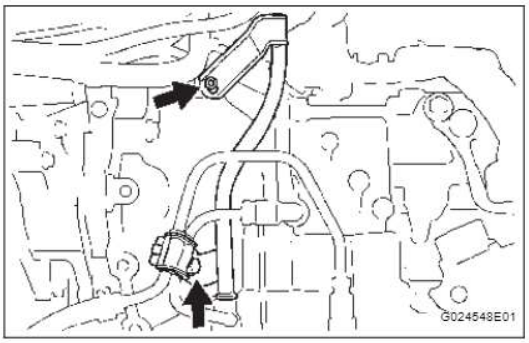
(e) Rotating the converter clutch, fit the spline part of the stator shaft with that of the stator.
HINT:
Rotate it approximately 180°.



(f) Rotating the converter clutch, align the marks on the case and converter clutch again, and fit the key of the oil pump drive gear into the keyway of the converter.
NOTICE:
When rotating the converter, do not push it with excessive force.



(g) Using a vernier caliper and straightedge, measure the dimension "B" shown in the illustration and check that "B" is greater than "A".
HINT:
Dimension "A" is the measurement between the transaxle fitting part of the engine and the converter clutch fitting part of the drive plate.
Standard dimension:
A + 1 mm (0.04 in.) or more
NOTICE:
Remember to subtract the thickness of the straightedge.

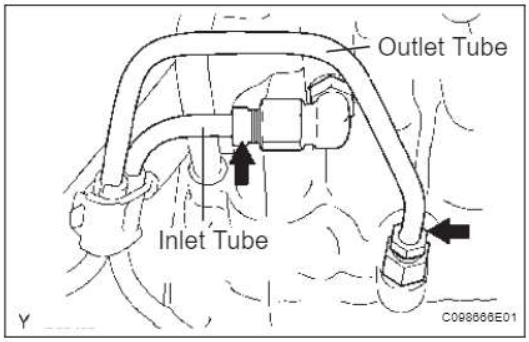


3. INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

(a) Temporarily install the oil cooler outlet tube.
(b) Temporarily install the oil cooler inlet tube.
(c) Coat a new O-ring with ATF, and install it on the oil filler tube.
(d) Install the oil filler tube on the automatic transaxle.
(e) Install the breather hose on the oil filler tube.
(f) Install the oil cooler tube clamp with the 2 bolts.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
(g) Install the ATF level gauge.

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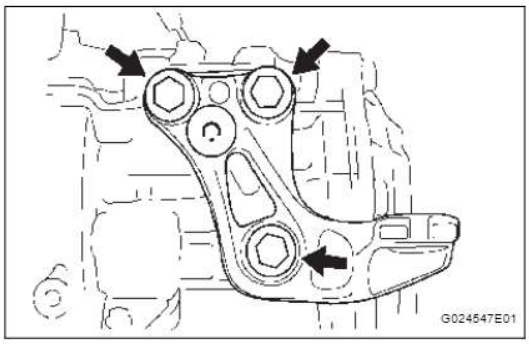


4. INSTALL NO. 1 OIL COOLER OUTLET TUBE

(a) Using SST, tighten the oil cooler outlet tube.
SST 09023-12701
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)

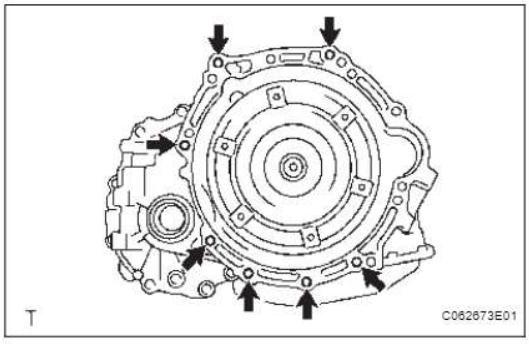
5. INSTALL NO. 1 OIL COOLER INLET TUBE

(a) Using SST, tighten the oil cooler inlet tube.
SST 09023-12701
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)



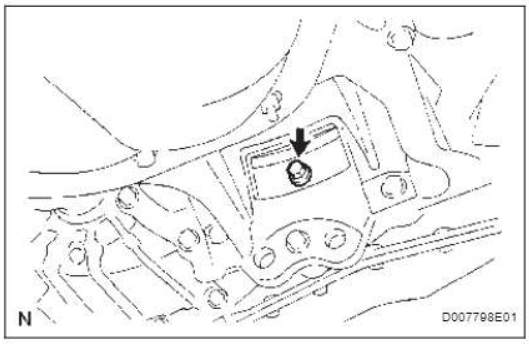
6. INSTALL ENGINE MOUNTING BRACKET LH

(a) Install the engine mounting bracket LH on the automatic transaxle with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

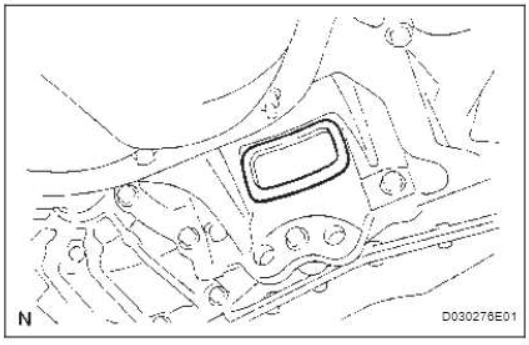


7. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

(a) Install the automatic transaxle on the engine with the 7 bolts.
Torque: 30 N*m (301 kgf*cm, 22 ft.*lbf)



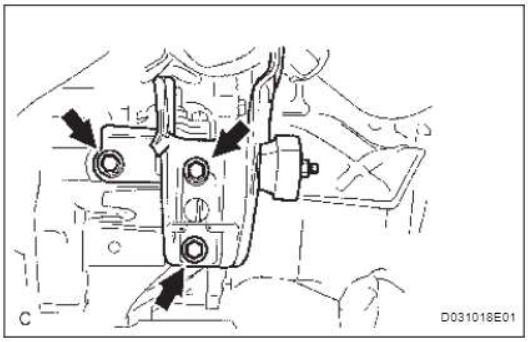
(b) Install the 6 torque converter mounting bolts.
Torque: 27 N*m (280 kgf*cm, 20 ft.*lbf)
HINT:
First install the white colored bolt, and then the remaining 5 bolts.



8. INSTALL FLYWHEEL HOUSING UNDER COVER

(a) Install the flywheel housing under cover.

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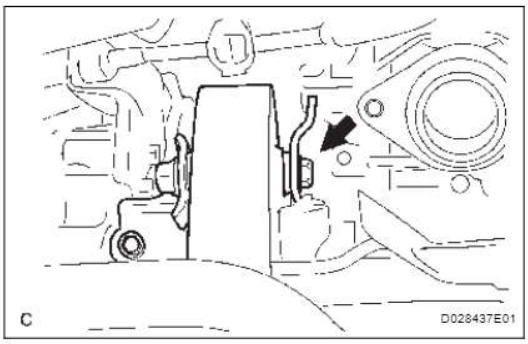


9. INSTALL ENGINE MOUNTING BRACKET REAR

(a) Install the engine mounting bracket on the automatic transaxle with the 3 bolts.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

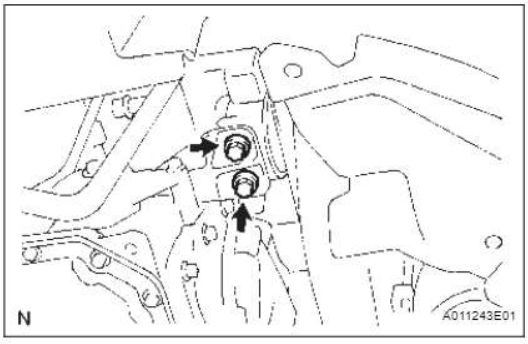
10. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

(a) Install the front suspension crossmember (see page EM-80).



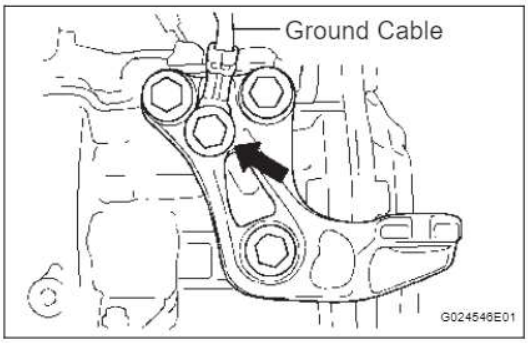
11. INSTALL ENGINE MOUNTING INSULATOR REAR

(a) Install the engine mounting insulator rear on the engine mounting bracket with the bolt and nut.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

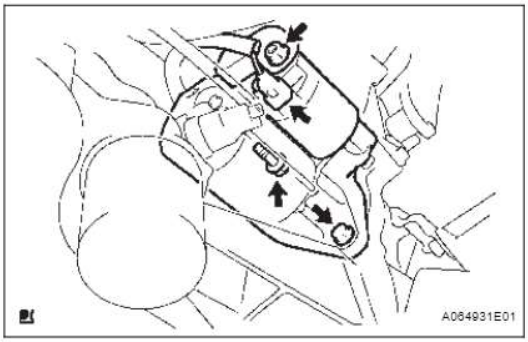


12. CONNECT ENGINE MOUNTING BRACKET LH

(a) Connect the engine mounting bracket to the engine mounting insulator with the 2 bolts.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



(b) Connect the ground cable to the engine mounting bracket with the bolt.
Torque: 26 N*m (260 kgf*cm, 19 ft.*lbf)



13. INSTALL STARTER ASSEMBLY

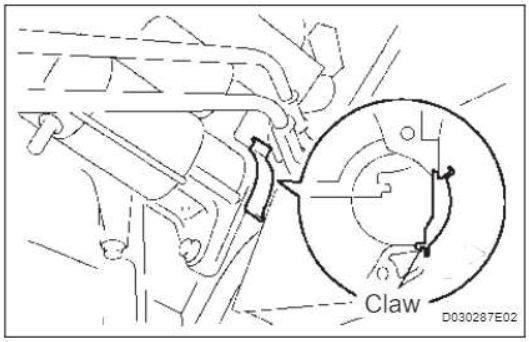
(a) Install the starter with the 2 bolts.
Torque: 37 N*m (380 kgf*cm, 27 ft.*lbf)

(b) Connect the connecter.

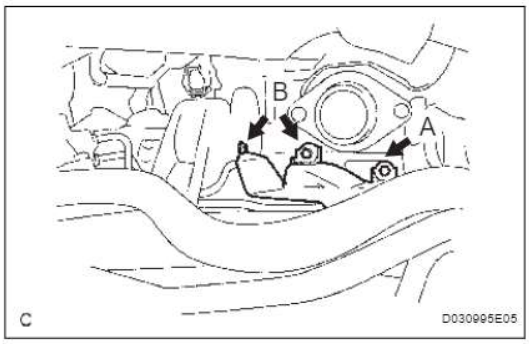
(c) Install the starter wire with the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

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(d) Install the flywheel housing side cover.



14. INSTALL DRIVE SHAFT HEAT INSULATOR SUB-ASSEMBLY

(a) Temporarily tighten the bolt labeled A.
(b) Fully tighten the 2 bolts labeled B.
Torque: 18 N*m (180 kgf*cm, 13 ft.*lbf)
(c) Fully tighten the bolt labeled A.
Torque: 18 N*m (180 kgf*cm, 13 ft.*lbf)

15. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

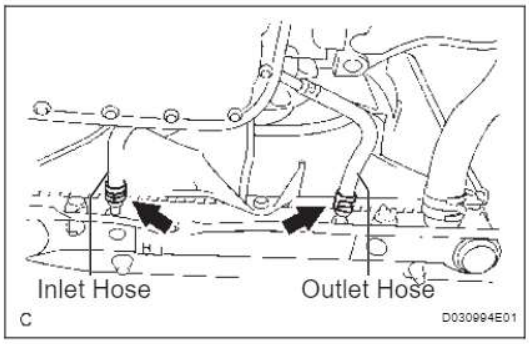
(a) Install the front drive shaft (see page DS-13).

16. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

(a) Install the front drive shaft (see page DS-13).

17. INSTALL FRONT EXHAUST PIPE ASSEMBLY

(a) Install the front exhaust pipe (see page EX-5).

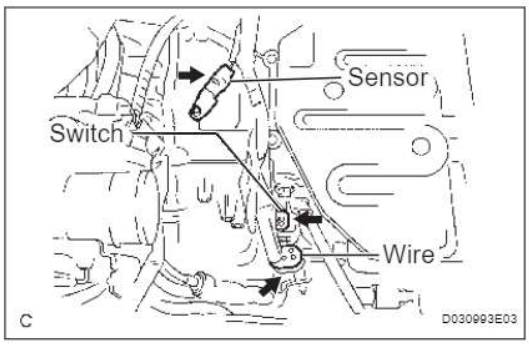


18. CONNECT OIL COOLER HOSE

19. INSTALL ENGINE UNDER COVER LH

20. INSTALL ENGINE UNDER COVER RH

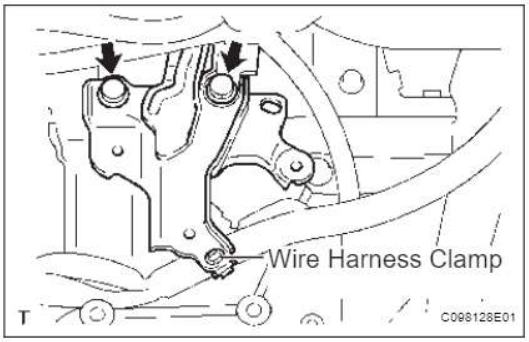
21. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



22. CONNECT CONNECTOR

(a) Connect the transmission wire connector.
(b) Connect the park/neutral position switch connector.
(c) Connect the transmission revolution sensor connector.

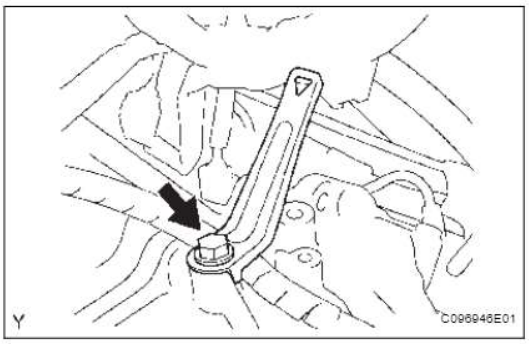
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23. INSTALL AIR CLEANER BRACKET

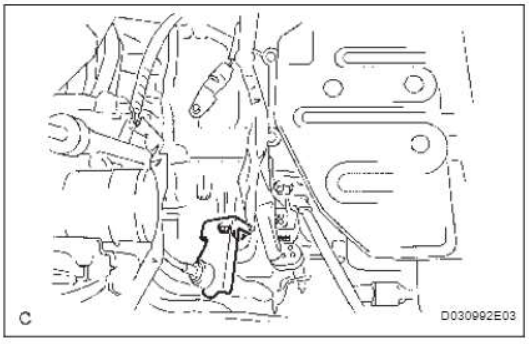
(a) Install the air cleaner bracket and transmission control cable support with the 2 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)

(b) Connect the wire harness clamp to the air cleaner bracket.



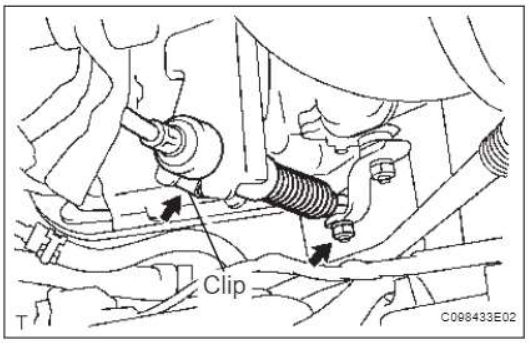
24. INSTALL WIRE HARNESS

(a) Install the wire harness clamp bracket with the bolt.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



25. INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET

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



26. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Temporarily install the control cable on the control shaft lever with the nut.

(b) Install the control cable and a new clip on the bracket.

27. INSTALL AIR CLEANER ASSEMBLY

(a) Install the air cleaner (see page ES-348).

28. INSTALL NO. 2 CYLINDER HEAD COVER

29. INSTALL COWL TOP PANEL OUTER

(a) Install the cowl top panel outer (see page SP-14).

30. INSTALL WINDSHIELD WIPER LINK ASSEMBLY

(a) Install the windshield wiper link (see page WW-10).

31. INSTALL BATTERY

32. INSTALL HOOD SUB-ASSEMBLY
Torque: 13 N*m (132 kgf*cm, 10 ft.*lbf)

33. INSPECT AND ADJUST HOOD SUB-ASSEMBLY

(a) Inspect and adjust the hood (see page ED-1).

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34. ADD AUTOMATIC TRANSAXLE FLUID

35. INSPECT AUTOMATIC TRANSAXLE FLUID

(a) Inspect the automatic transaxle fluid (see page AX-82).

36. ADJUST SHIFT LEVER POSITION

(a) Adjust the shift lever position (see page AX-121).

37. INSPECT SHIFT LEVER POSITION

(a) Inspect the shift lever position (see page AX-121).

38. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

(a) Inspect and adjust the front wheel alignment (see page SP-2).

39. CHECK ABS SPEED SENSOR SIGNAL

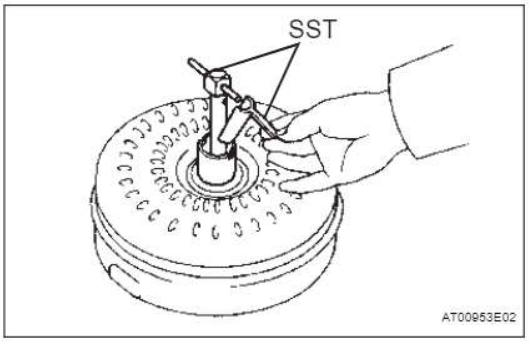
(a) Check the ABS speed sensor signal (see page BC-5).

40. PERFORM INITIALIZATION

(a) Perform initialization (see page AX-19).

NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

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TORQUE CONVERTER CLUTCH AND DRIVE PLATE

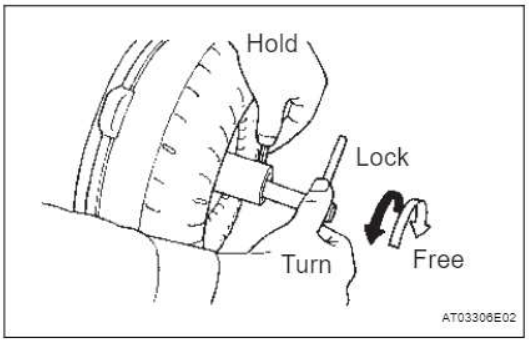
INSPECTION

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

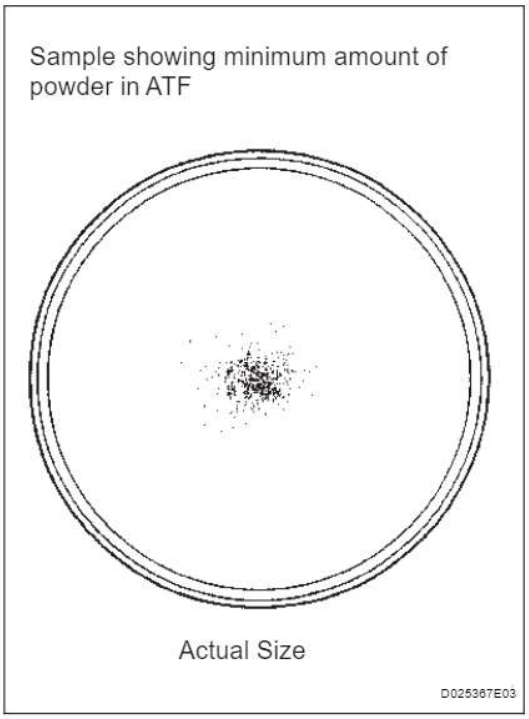
(a) Inspect the one-way clutch.

(1) Install SST in the inner race of the one-way clutch.
SST 09350-32014 (09351-32010)

(2) Set SST so that it fits in the notch of the converter hub and in the outer race of the one-way clutch.
SST 09350-32014 (09351-32020)



(3) With the torque converter standing on its side, check that the clutch locks when SST is turned counterclockwise and rotates freely and smoothly when turned clockwise. If the results are not as specified, clean the converter and recheck the one-way clutch. If the results still are not as specified, replace the converter.



(b) Determine the condition of the torque converter clutch.

(1) Check that the following conditions are met:
- During the stall test or when the shift lever is on N, metallic sounds are not emitted from the torque converter clutch.
- The one-way clutch turns in one direction and locks in the other direction.
- The amount of powder in the ATF is not greater than the sample shown in the illustration.

If the results are not as specified, replace the torque converter clutch assembly.

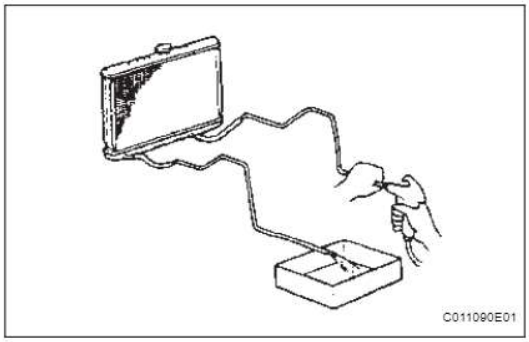
HINT:
The sample illustration shows approximately 0.25 liters (0.26 US qts, 0.22 Imp. qts) of the ATF taken from a removed torque converter clutch.

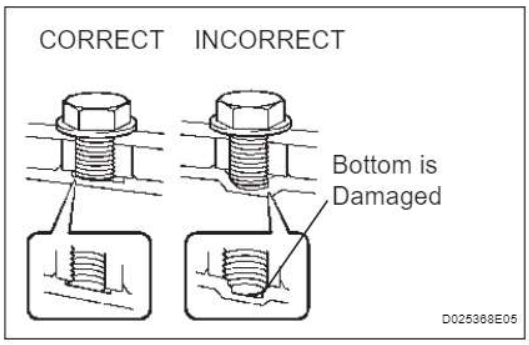
(c) Replace the ATF in the torque converter clutch.

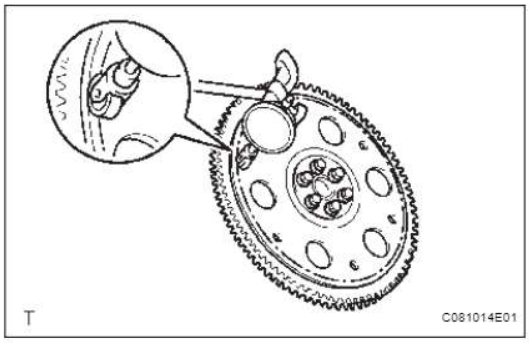
(1) If the ATF is discolored and/or has a foul odor, stir the ATF in the torque converter clutch thoroughly and drain the ATF with the torque converter facing upward.

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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 replaced, clean the oil cooler and oil pipe line.
    • Apply compressed air of 196 kPa (2 kgf/cm^2, 28 psi) into the inlet hose.
    • If a large amount of powder is found in the ATF, add new ATF using a bucket pump and clean the oil cooler and oil pipe line again.
  (2) If the ATF is cloudy, inspect the oil cooler (radiator).

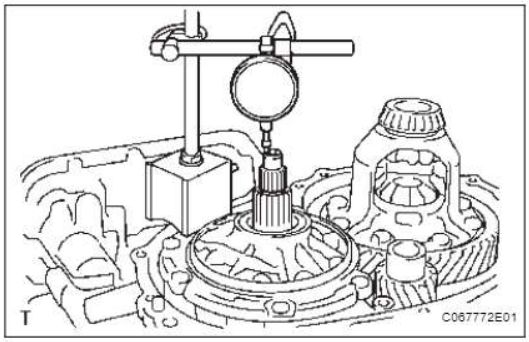
(e) Prevent deformation of the torque converter clutch and damage to the oil pump gear.
  (1) When any marks due to interference are found on the end of the bolt for the torque converter clutch and on the bottom of the bolt hole, replace the bolt and torque converter clutch.
  (2) All of the bolts should be the same length.
  (3) Make sure no spring washers are missing.

2. INSPECT DRIVE PLATE AND RING GEAR SUB-ASSEMBLY

(a) Set up a dial indicator and measure the drive plate runout.
Maximum runout:
0.20 mm (0.0079 in.)
If the runout is greater than the maximum or if the ring gear is damaged, replace the drive plate. If installing a new drive plate, note the orientation of the spacers and tighten the bolts.
Torque: 88 N*m (900 kgf*cm, 65 ft.*lbf)

(b) Check the ring gear for any damage.
If the ring gear is damaged, replace the drive plate.

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INSPECTION

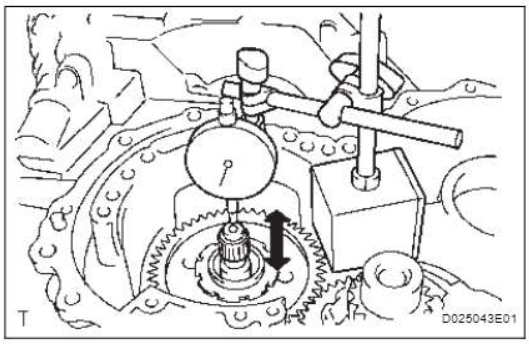
1. INSPECT INPUT SHAFT END PLAY

(a) Using a dial indicator, measure the end play in the axial direction.

Standard end play:

0.374 to 1.292 mm (0.0147 to 0.0509 in.)

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

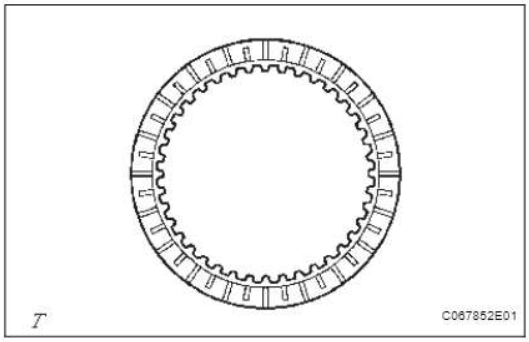


2. INSPECT INTERMEDIATE SHAFT ASSEMBLY

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

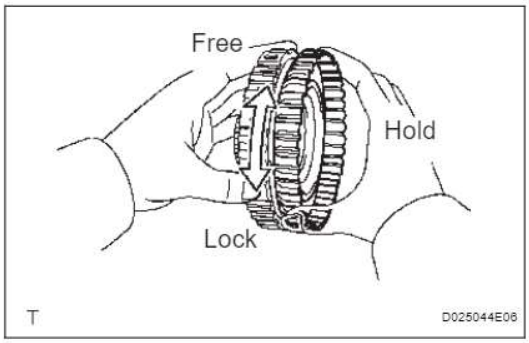
Standard end play:

0.204 to 0.966 mm (0.008 to 0.038 in.)



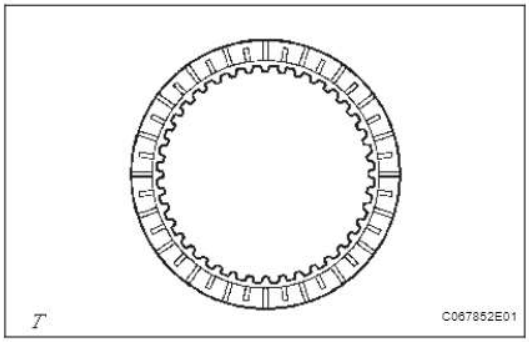
3. INSPECT 2ND COAST AND OVERDRIVE BRAKE DISC

(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc is peeling off or discolored, or even if a part of the printed number is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



4. INSPECT 1-WAY CLUTCH ASSEMBLY

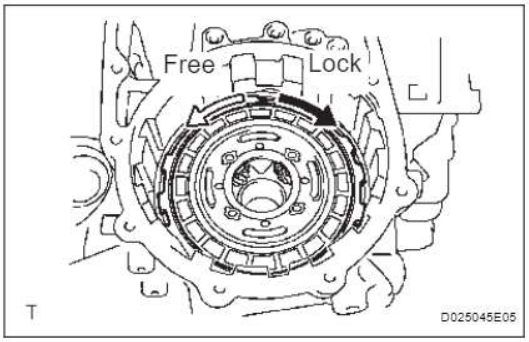
(a) Hold the rear planetary sun gear and turn the 1-way clutch. The 1-way clutch should turn freely clockwise and should lock counterclockwise.



5. INSPECT 2ND BRAKE BRAKE DISC

(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

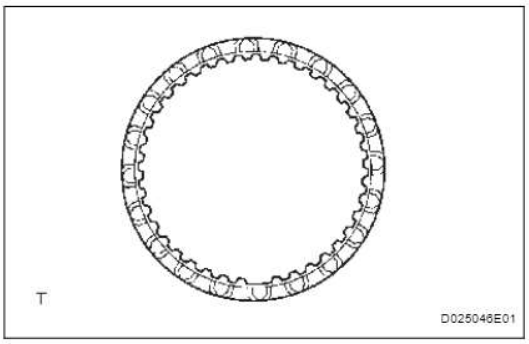
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6. INSPECT NO. 2 1-WAY CLUTCH

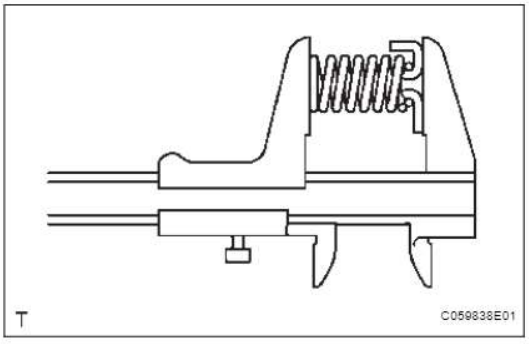
(a) Install the 1-way clutch and thrust washer to the rear planetary sun gear.

(b) Hold the rear planetary sun gear and turn the 1-way clutch. The 1-way clutch should turn freely counterclockwise and should lock clockwise.



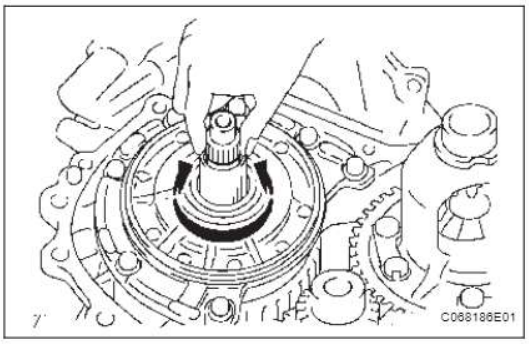
7. INSPECT 1ST AND REVERSE BRAKE DISC

(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



8. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
Standard free length:
13.96 mm (0.5496 in.)



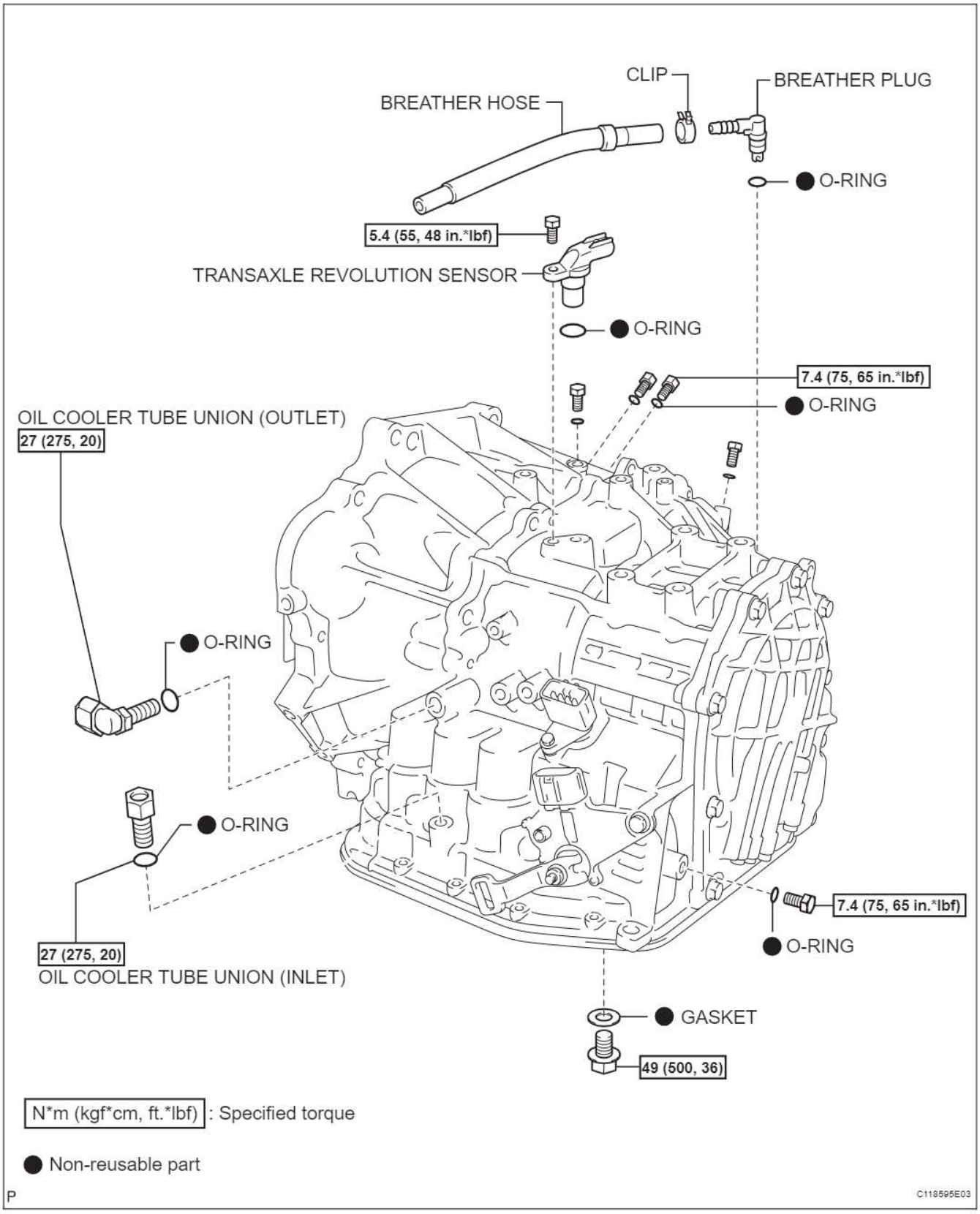
9. INSPECT INPUT SHAFT ASSEMBLY

(a) Make sure that the input shaft turns smoothly.

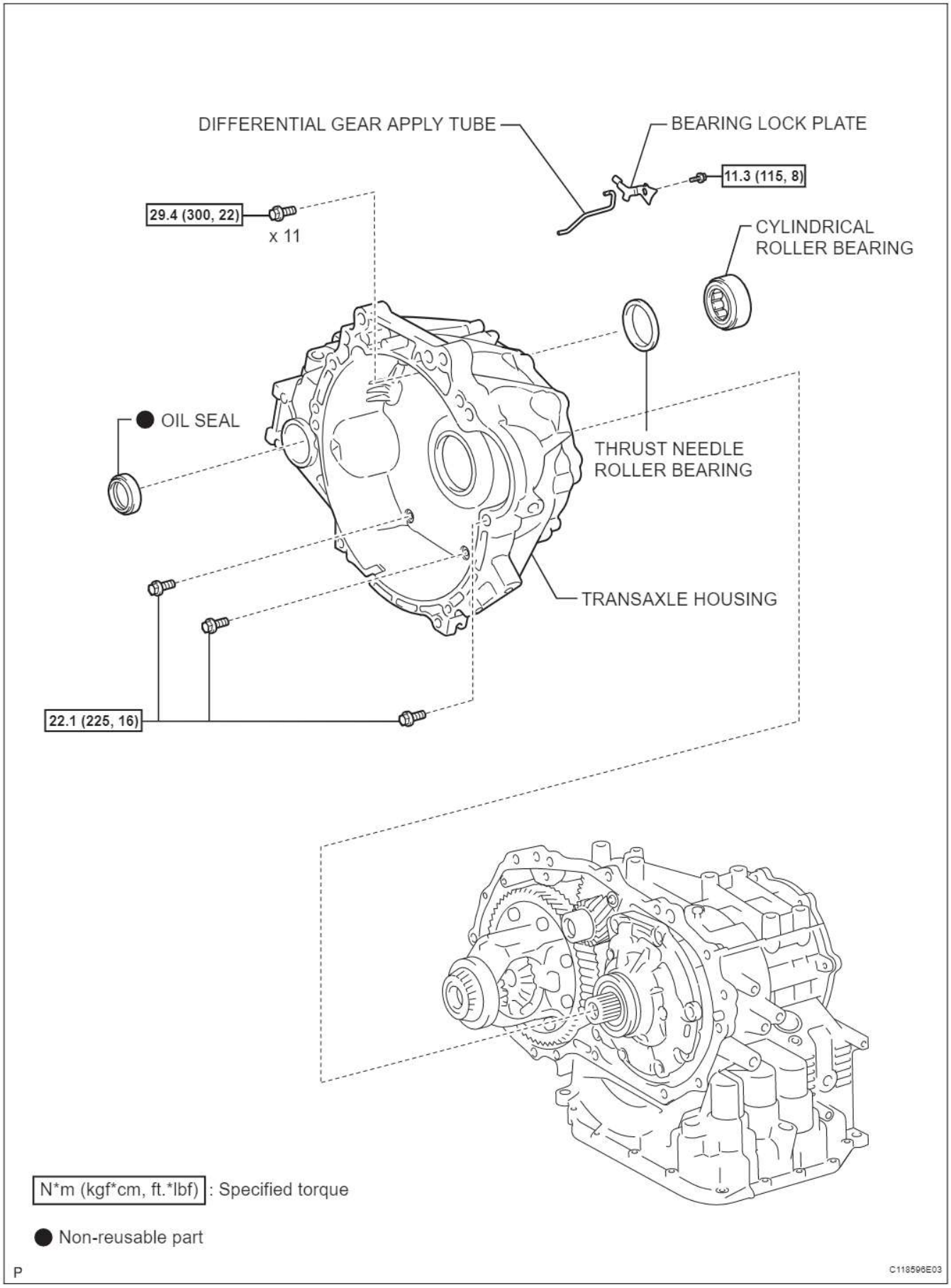
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AUTOMATIC TRANSAXLE UNIT

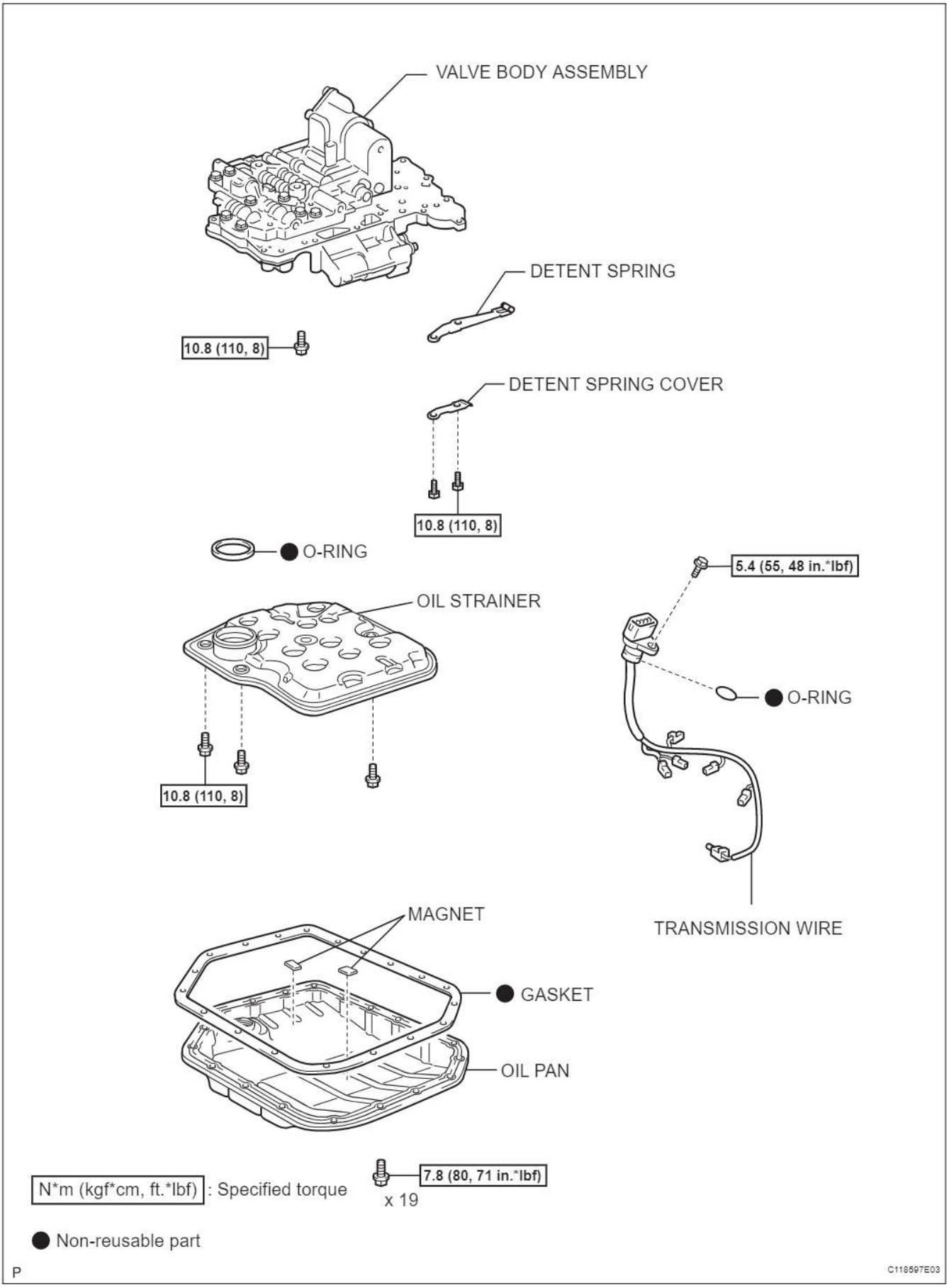
COMPONENTS



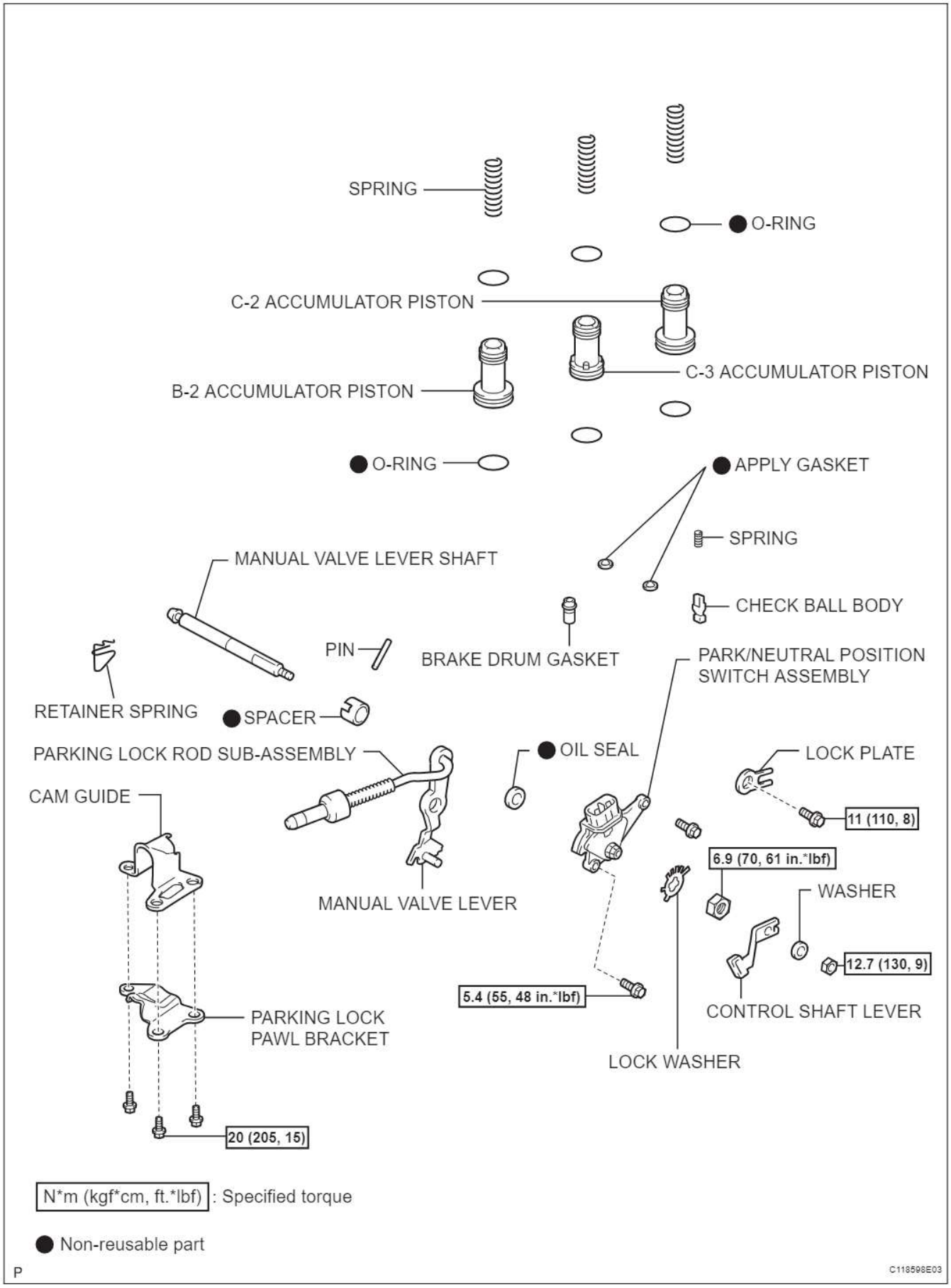
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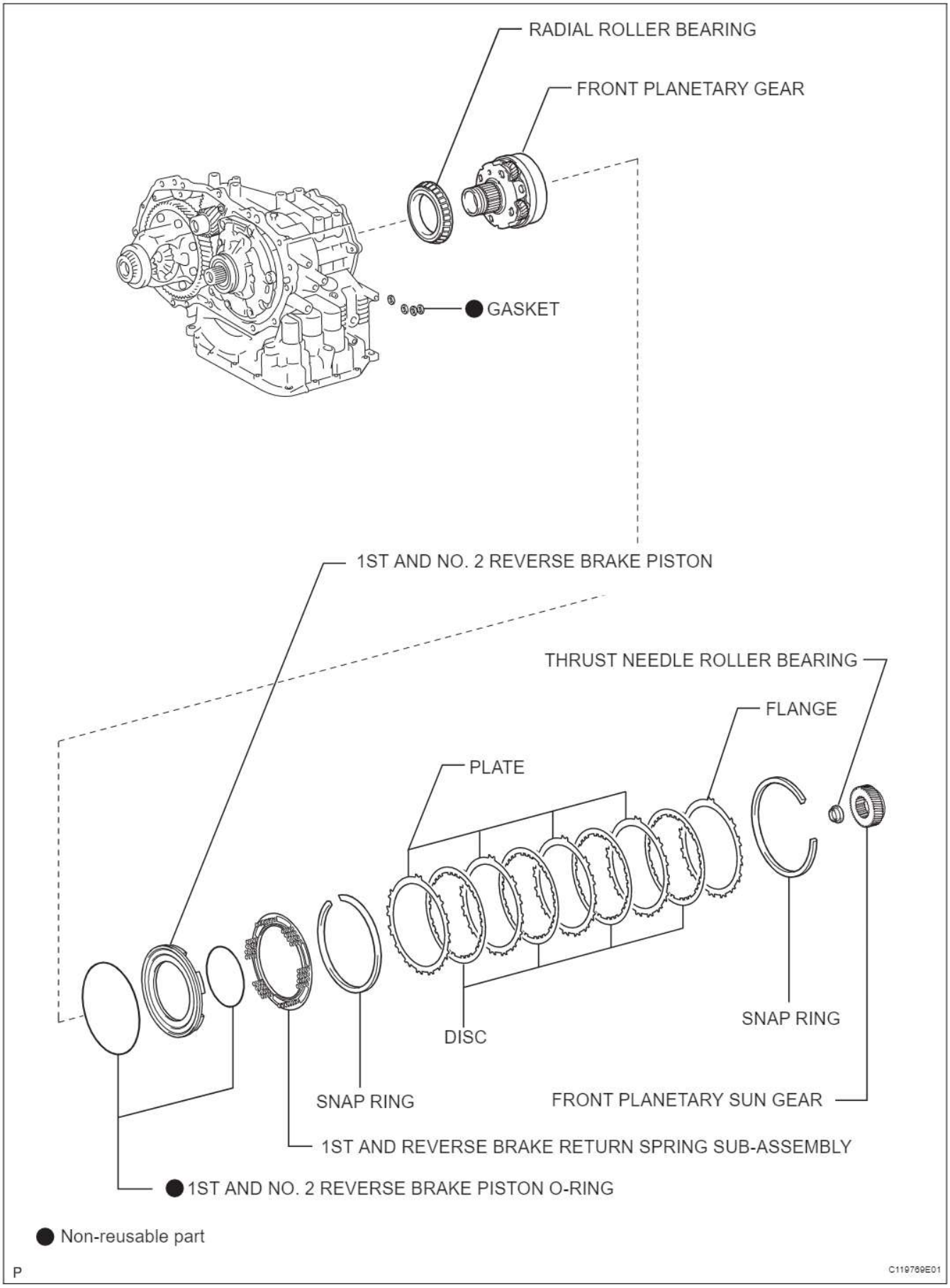
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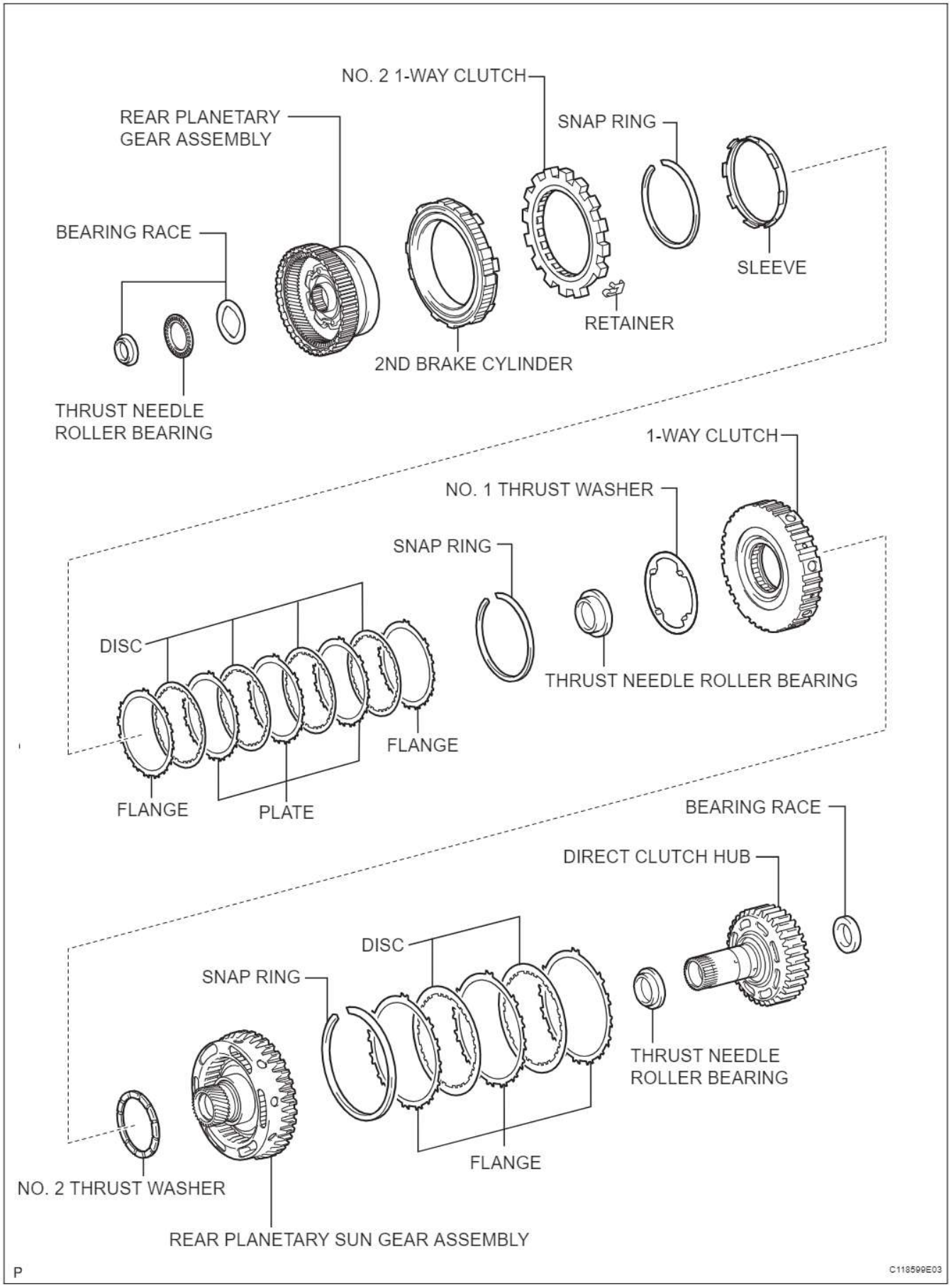
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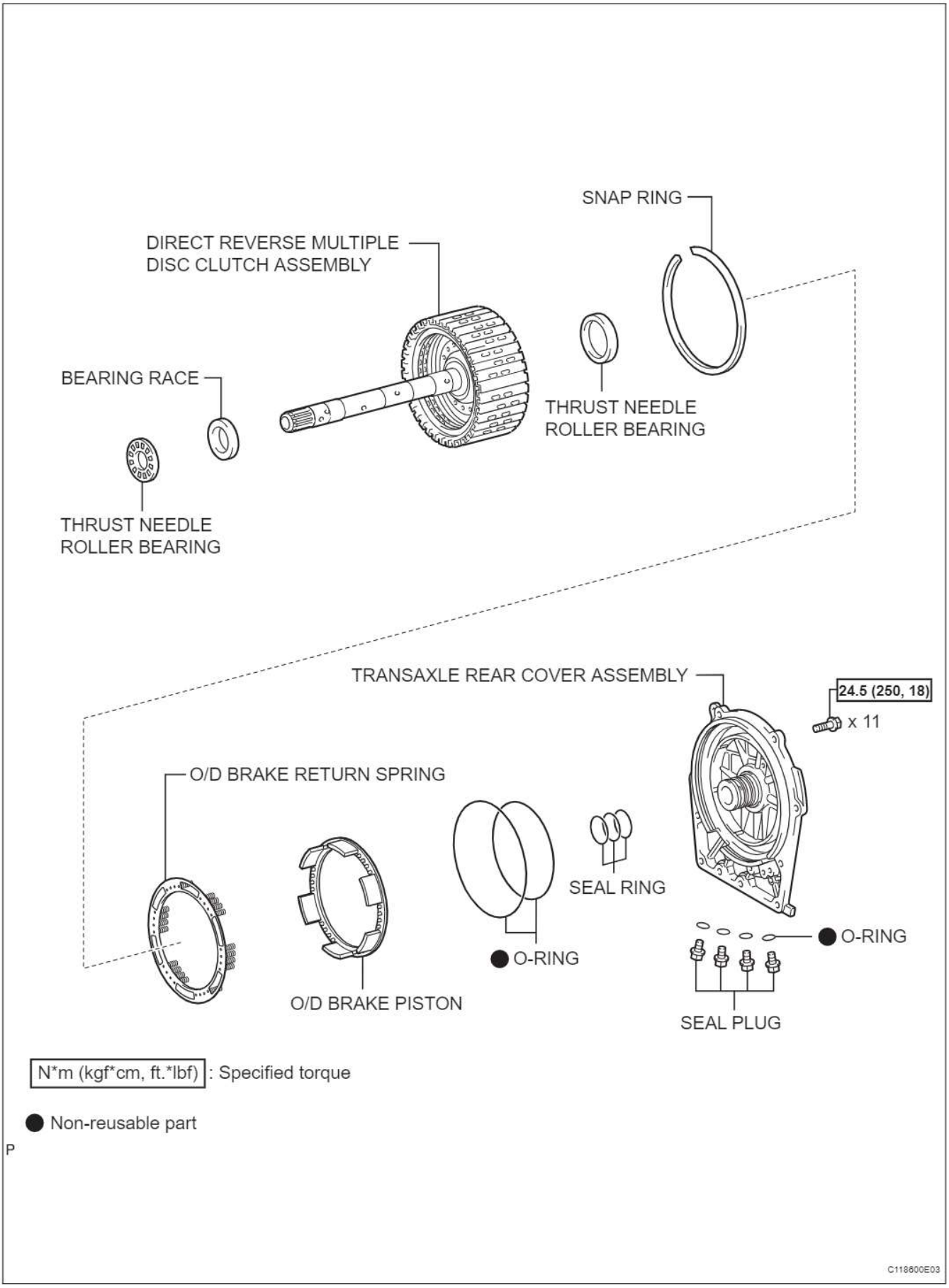
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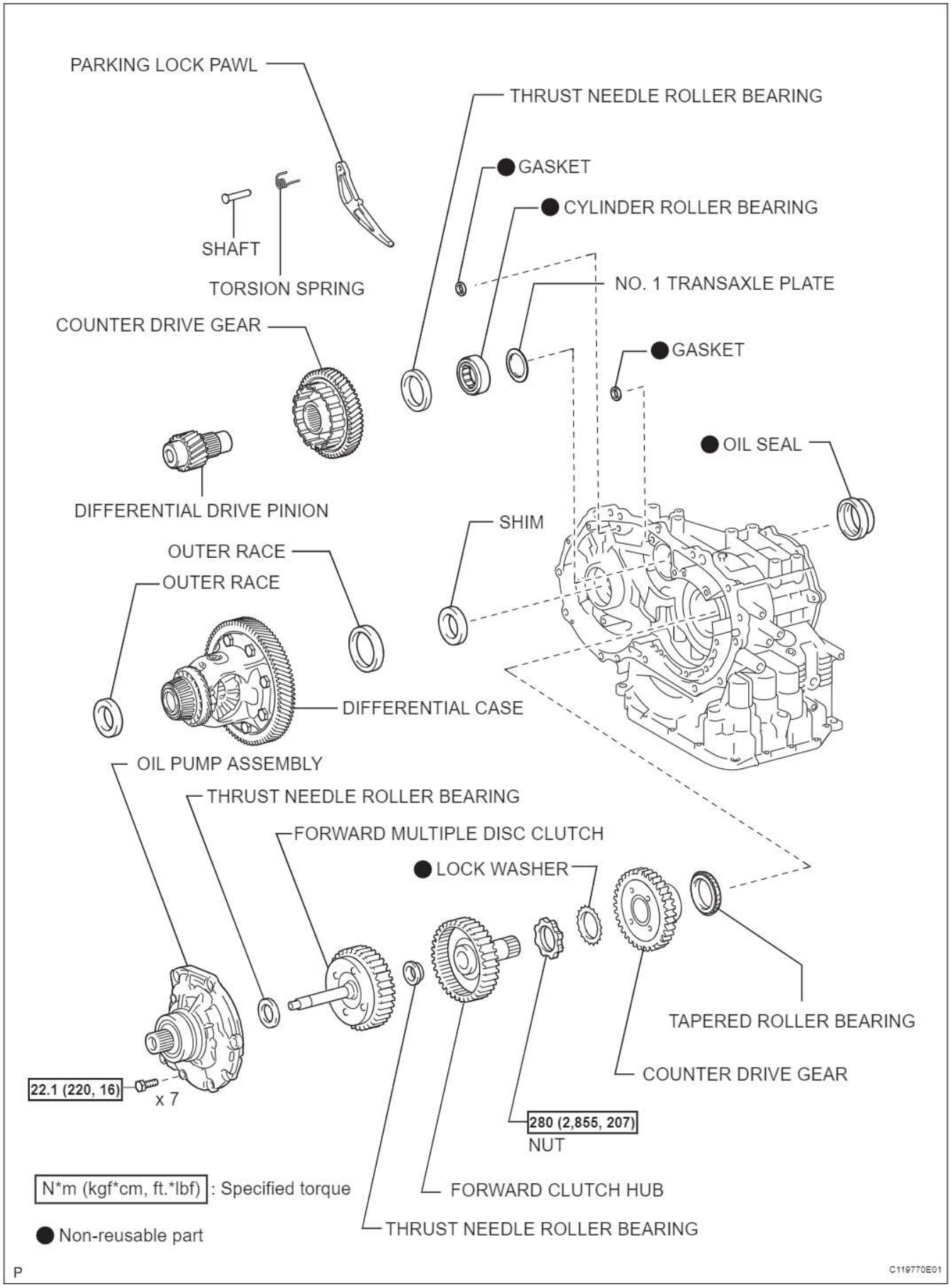
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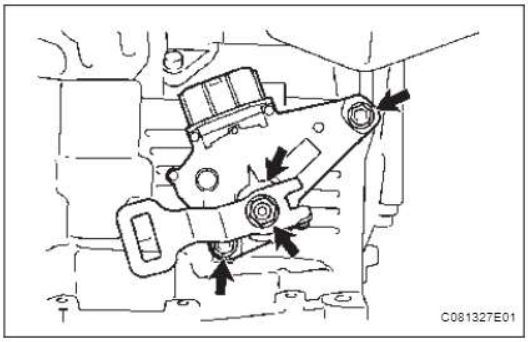
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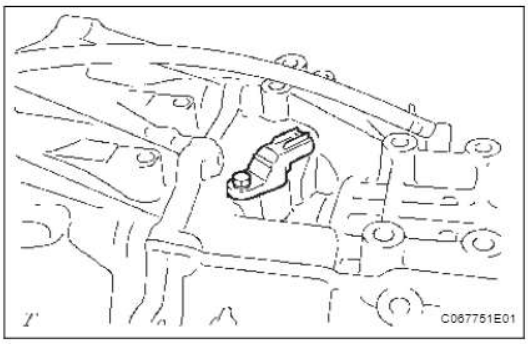
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DISASSEMBLY

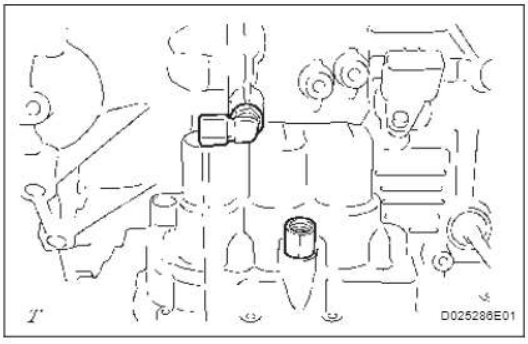
1. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Remove the nut, washer and control shaft lever.
(b) Using a screwdriver, unstake the lock nut and remove the lock washer and lock nut.
(c) Remove the 2 bolts and pull out the position switch.



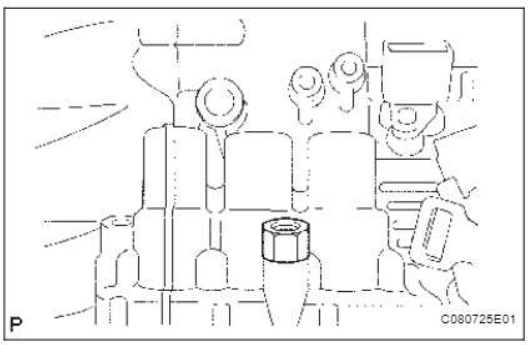
2. REMOVE TRANSMISSION REVOLUTION SENSOR

(a) Remove the bolt and transmission revolution sensor.



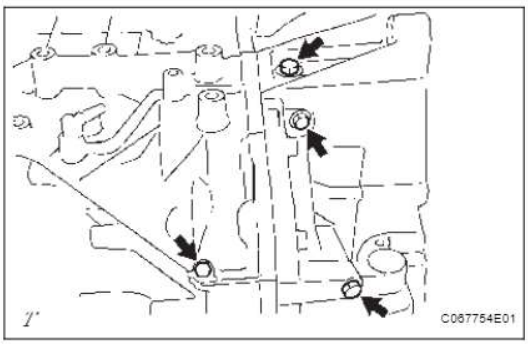
3. REMOVE OIL COOLER TUBE UNION (OUTLET)

(a) Remove the oil cooler tube union.
(b) Remove the O-ring from the oil cooler tube union.



4. REMOVE OIL COOLER TUBE UNION (INLET)

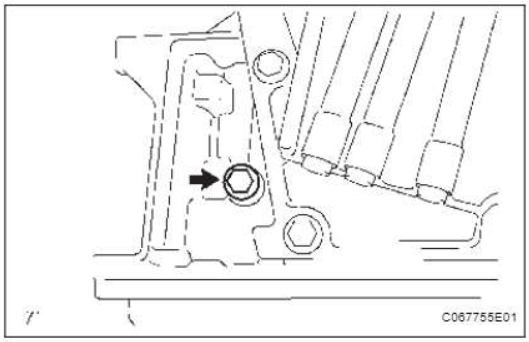
(a) Remove the oil cooler tube union.
(b) Remove the O-ring from the oil cooler tube union.



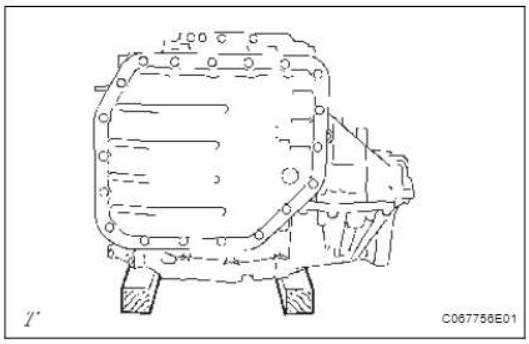
5. REMOVE NO. 1 TRANSAXLE CASE PLUG

(a) Remove the 4 case plugs from the transaxle housing and transaxle case.

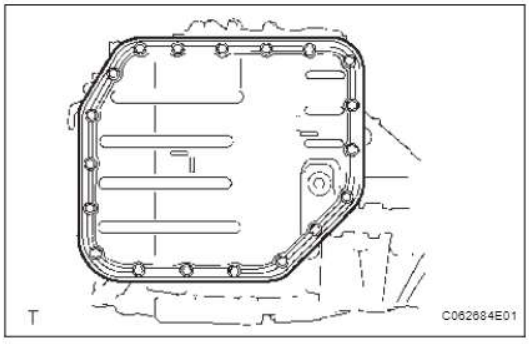
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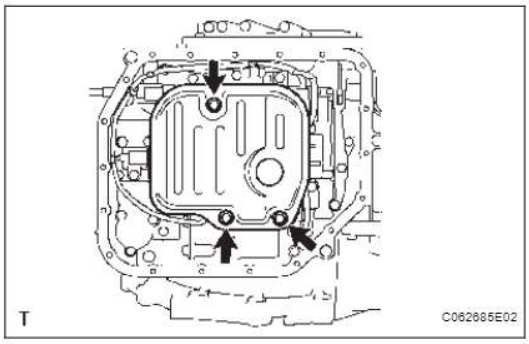
(b) Remove the case plug from the transaxle case.
(c) Remove the 5 O-rings from the case plugs.



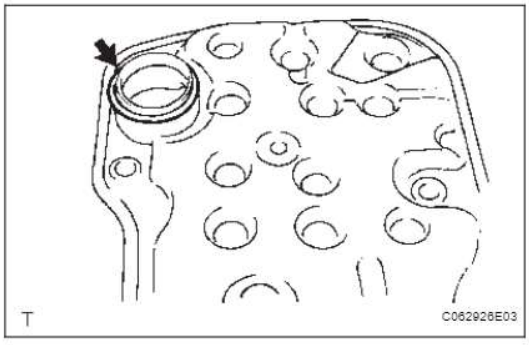
6. PLACE AUTOMATIC TRANSAXLE ASSEMBLY
NOTICE:
Be careful not to damage the oil seal.



7. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY
(a) Remove the drain plug and gasket from the oil pan.
(b) Remove the 19 bolts.
(c) Remove the oil pan and gasket.

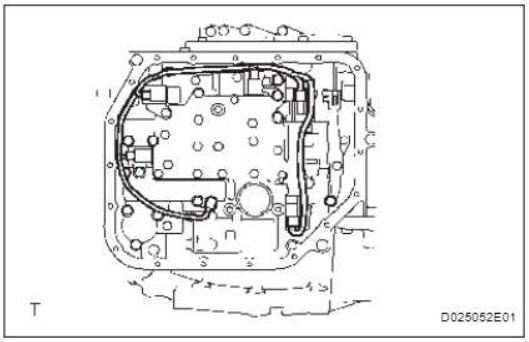


8. REMOVE VALVE BODY OIL STRAINER ASSEMBLY
(a) Remove the 3 bolts and oil strainer.



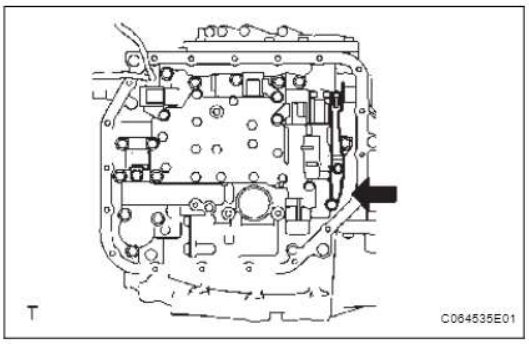
(b) Remove the O-ring from the oil strainer.

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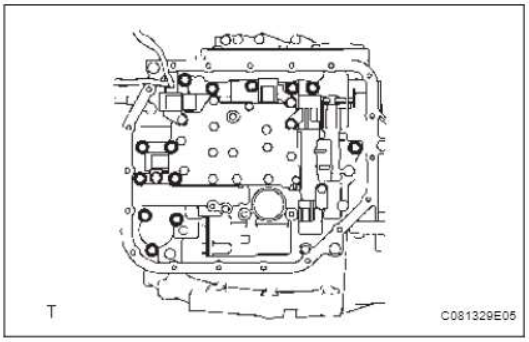


9. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Disconnect the 5 solenoid connectors.
(b) Remove the bolt, lock plate and ATF temperature sensor.
(c) Remove the O-ring from the ATF temperature sensor.



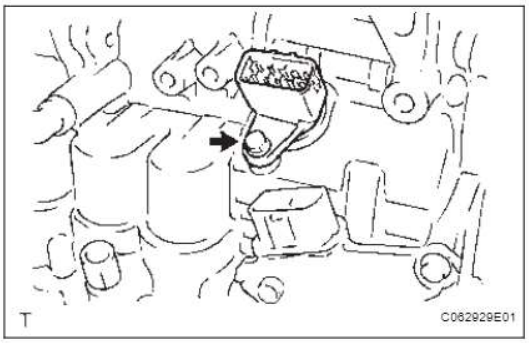
(d) Remove the 2 bolts, detent spring cover and detent spring.



(e) Remove 13 bolts and valve body.

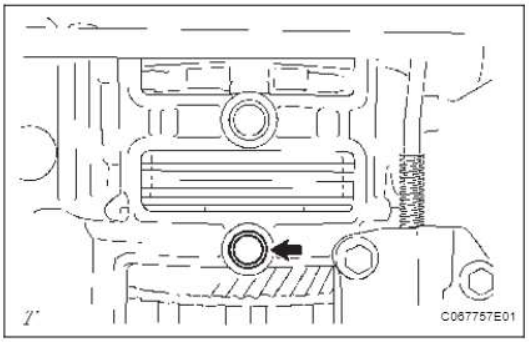
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10. REMOVE TRANSMISSION WIRE

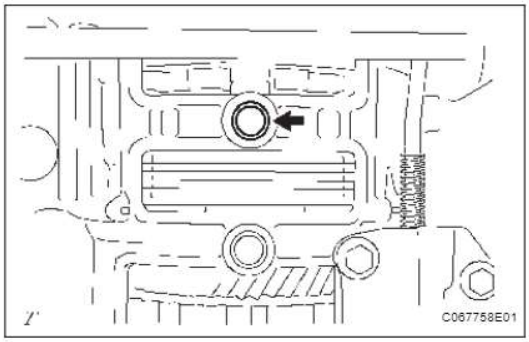


(a) Remove the bolt.
(b) Remove the transmission wire from the transaxle case.
(c) Remove the O-ring from the transmission wire.

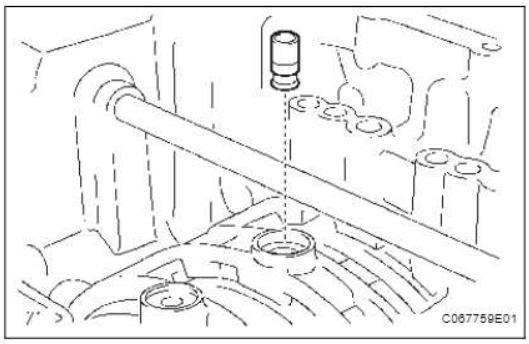
11. REMOVE TRANSAXLE CASE 2ND BRAKE GASKET



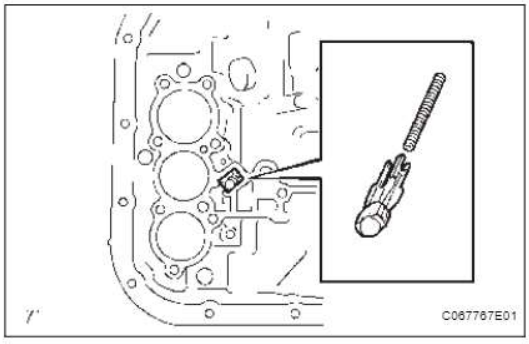
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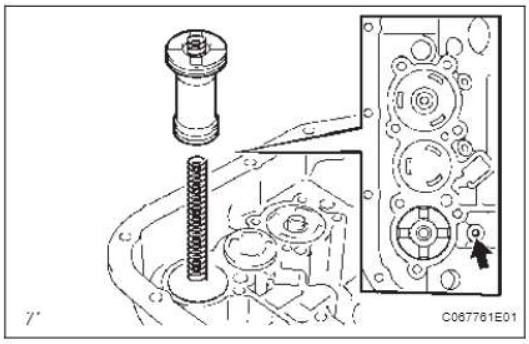
12. REMOVE TRANSAXLE CASE GASKET



13. REMOVE BRAKE DRUM GASKET

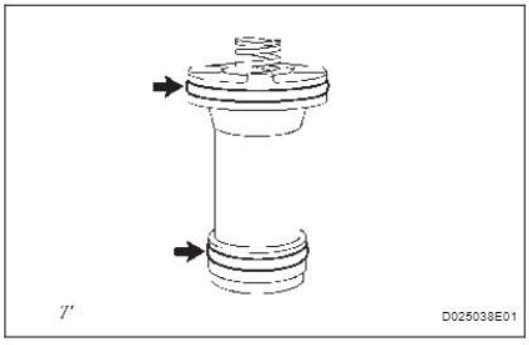


14. REMOVE CHECK BALL BODY



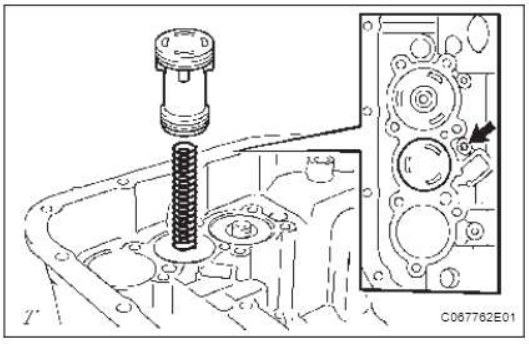
15. REMOVE B-2 ACCUMULATOR PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the B-2 accumulator piston and spring.
Remove the spring.
NOTICE:
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**



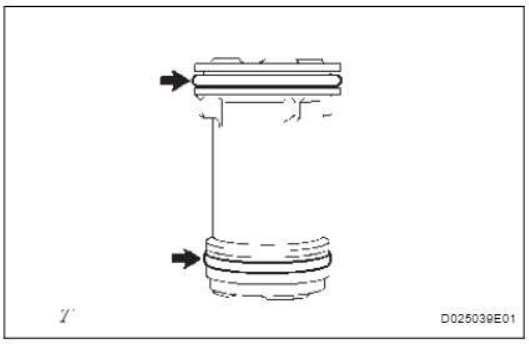
(b) Remove the 2 O-rings from the B-2 accumulator piston.

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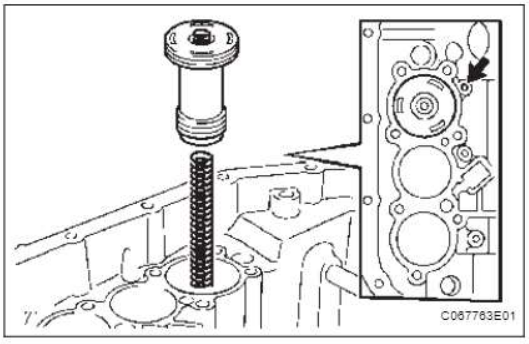


16. REMOVE C-3 ACCUMULATOR PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the C-3 accumulator piston and spring.
Remove the spring.
NOTICE:
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**

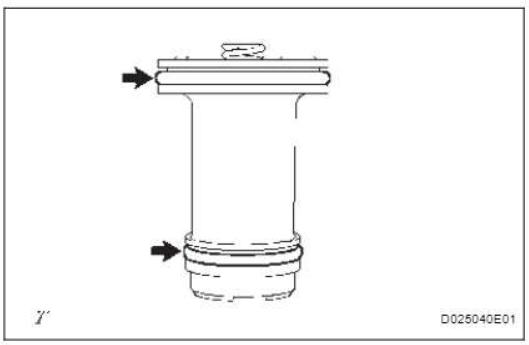


(b) Remove the 2 O-rings from the C-3 accumulator piston.

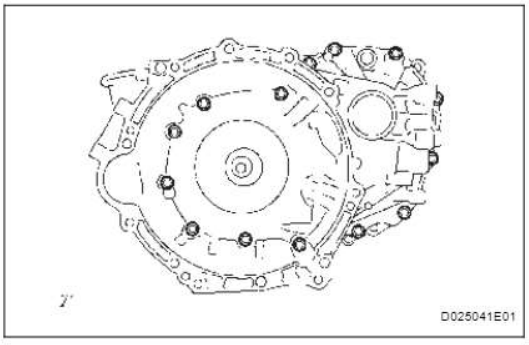


17. REMOVE C-2 ACCUMULATOR PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the C-2 accumulator piston and spring.
Remove the spring.
NOTICE:
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**



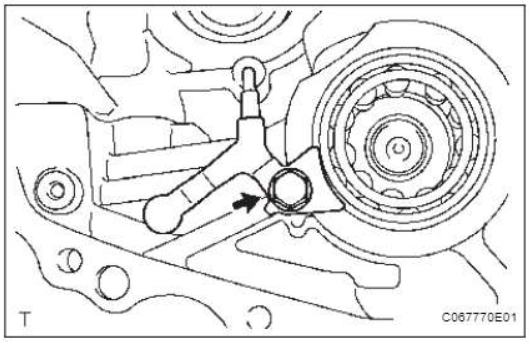
(b) Remove the 2 O-rings from the C-2 accumulator piston.



18. REMOVE TRANSAXLE HOUSING

(a) Remove the 14 bolts.
(b) Tap on the circumference of the transaxle housing with a plastic-faced hammer to remove the transaxle housing from the transaxle case.
NOTICE:
When removing the transaxle housing, do not accidentally remove the differential gear assembly.

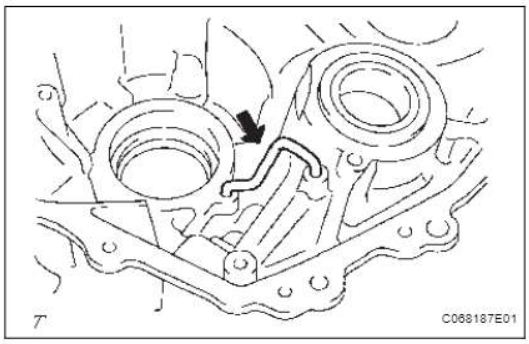
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19. REMOVE BEARING LOCK PLATE

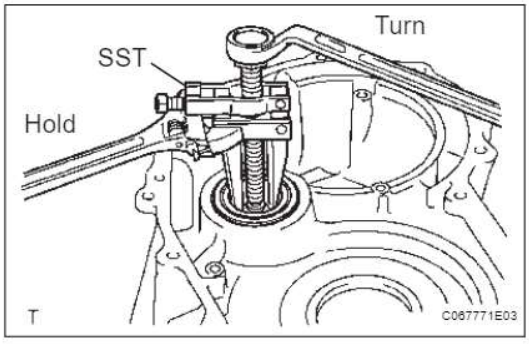
(a) Remove the bolt.

(b) Remove the bearing lock plate.



20. REMOVE DIFFERENTIAL GEAR LUBE APPLY TUBE

(a) Remove the bolt and differential gear lube apply tube from the transaxle housing.

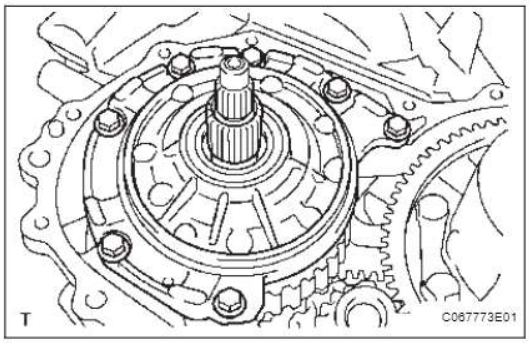


21. REMOVE FRONT DRIVE PINION FRONT TAPERED ROLLER BEARING (RH Side)

(a) Using SST, remove the RH cylindrical roller bearing from the transaxle housing.

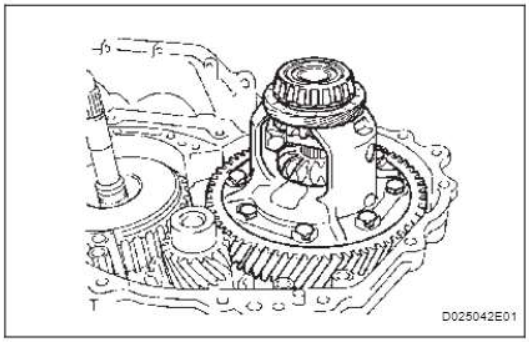
SST 09308-10010

22. INSPECT INPUT SHAFT END PLAY (See page AX-173)



23. REMOVE OIL PUMP ASSEMBLY

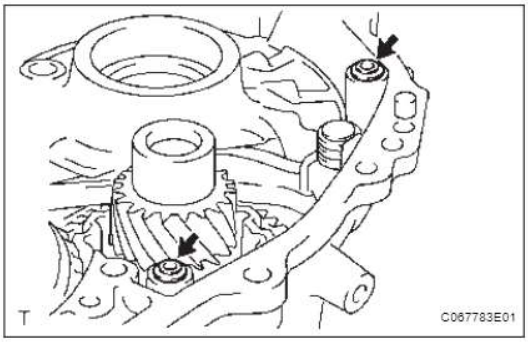
(a) Remove the 7 bolts and oil pump.



24. REMOVE DIFFERENTIAL GEAR ASSEMBLY

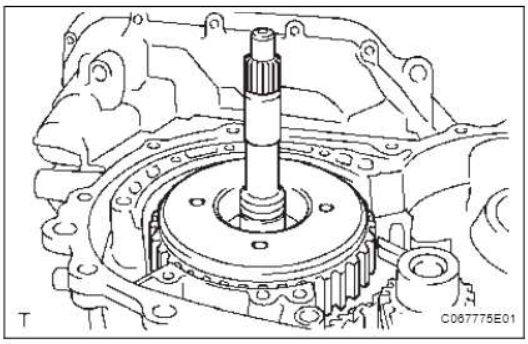
(a) Remove the differential gear.

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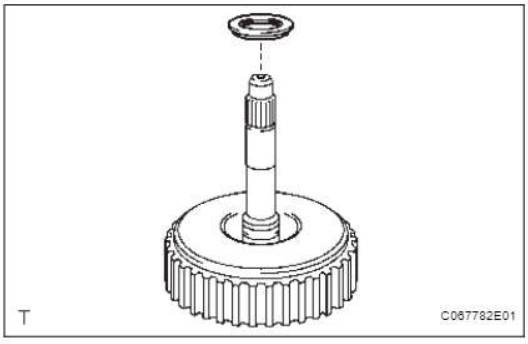
25. REMOVE OVERDRIVE BRAKE GASKET

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



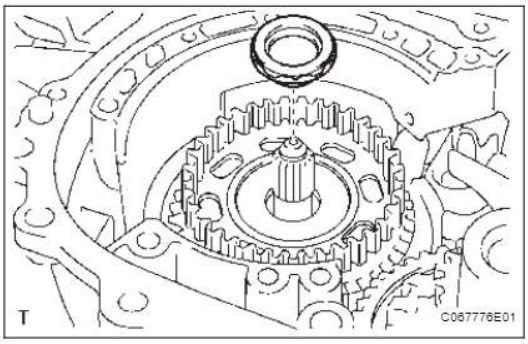
26. REMOVE INPUT SHAFT ASSEMBLY

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



27. REMOVE STATOR SHAFT THRUST NEEDLE ROLLER BEARING

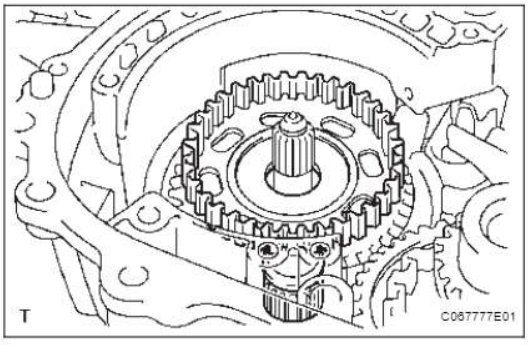
(a) Remove the thrust needle roller bearing from the input shaft.



28. REMOVE FORWARD CLUTCH HUB THRUST NEEDLE ROLLER BEARING

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

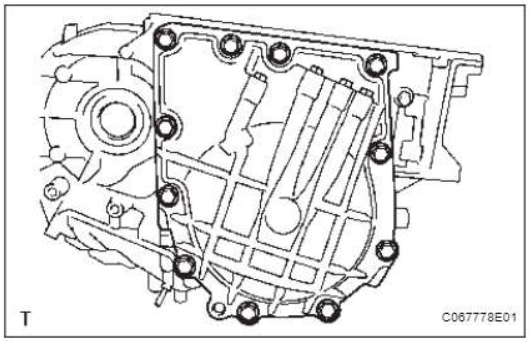
29. INSPECT INTERMEDIATE SHAFT ASSEMBLY (See page AX-173)



30. REMOVE FORWARD CLUTCH HUB SUB-ASSEMBLY

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

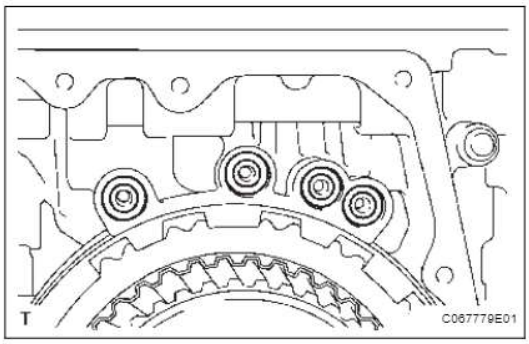
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31. REMOVE TRANSAXLE REAR COVER ASSEMBLY

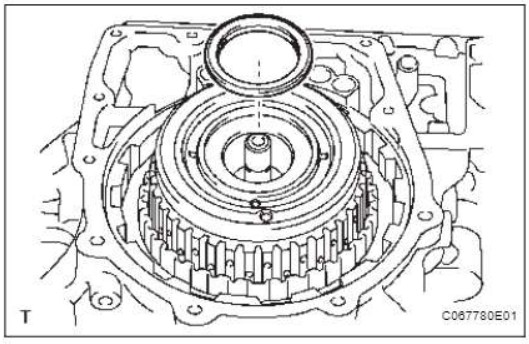
(a) Remove the 11 bolts.

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



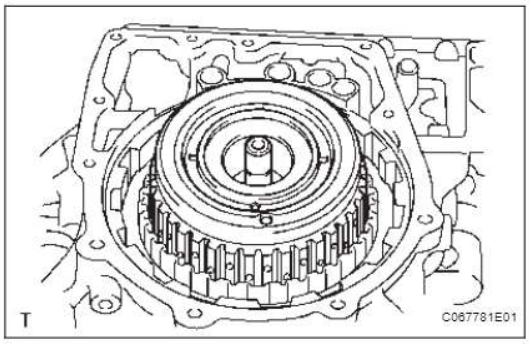
32. REMOVE TRANSAXLE CASE GASKET

(a) Remove the 4 transaxle case gaskets.



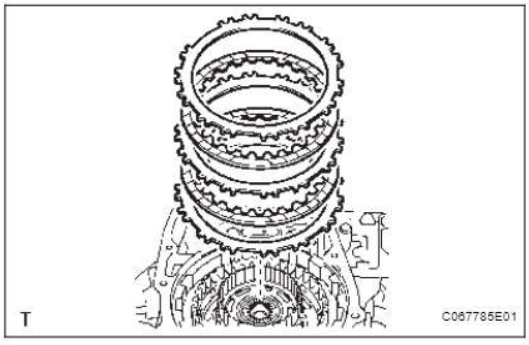
33. REMOVE REAR CLUTCH DRUM THRUST NEEDLE ROLLER BEARING

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



34. REMOVE INTERMEDIATE SHAFT ASSEMBLY

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

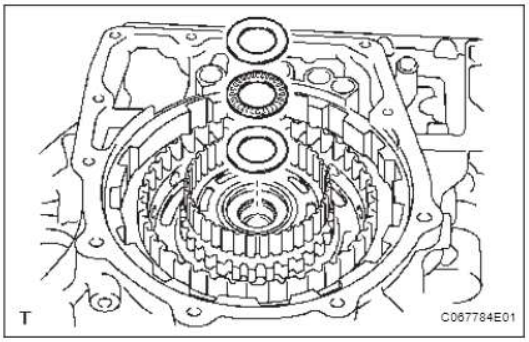


35. REMOVE 2ND COAST AND OVERDRIVE BRAKE DISC

(a) Remove the 2 flanges, 2 discs and 2 plates from the transaxle case.

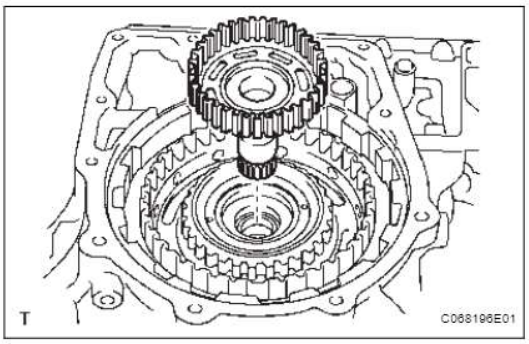
36. INSPECT 2ND COAST AND OVERDRIVE BRAKE DISC (See page AX-173)

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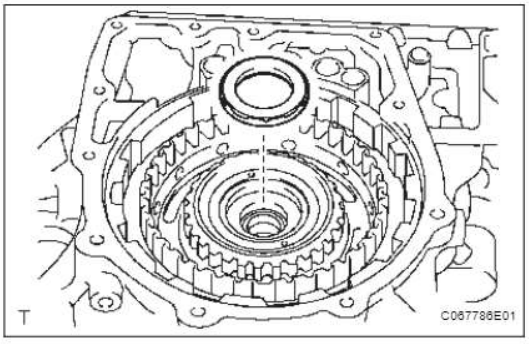
37. REMOVE THRUST NEEDLE ROLLER BEARING

(a) Using a magnetic finger, remove the C-2 hub thrust bearing race, thrust needle roller bearing and No. 3 thrust bearing race from the direct clutch hub.



38. REMOVE DIRECT CLUTCH HUB

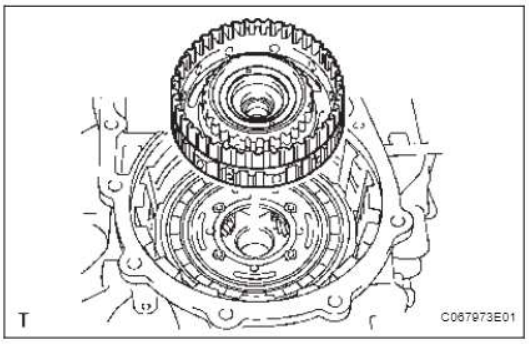
(a) Remove the direct clutch hub from the transaxle case.



39. REMOVE REAR PLANETARY SUN GEAR, NO. 2 THRUST NEEDLE BEARING

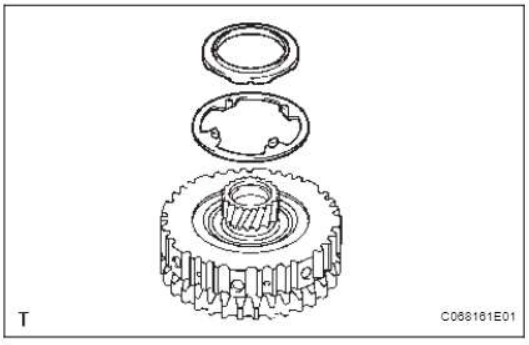
(a) Using a magnetic finger, remove the thrust bearing from the rear thrust needle bearing.

AX



40. REMOVE REAR PLANETARY SUN GEAR ASSEMBLY

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

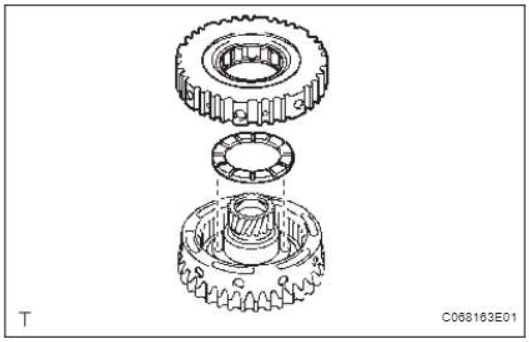


41. REMOVE REAR PLANETARY SUN GEAR THRUST NEEDLE ROLLER BEARING

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

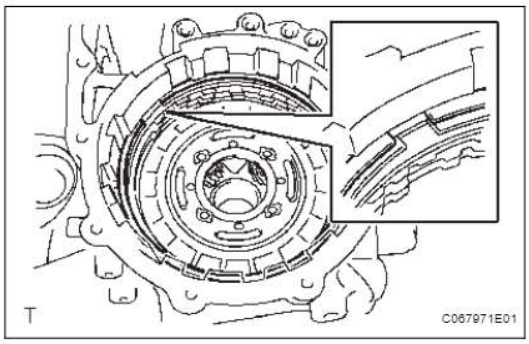
42. INSPECT 1-WAY CLUTCH ASSEMBLY (See page AX-173)

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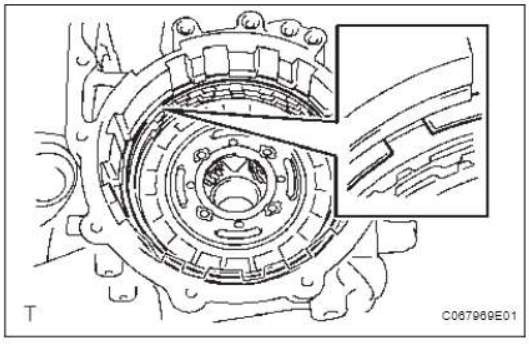
43. REMOVE 1-WAY CLUTCH ASSEMBLY

(a) Remove the 1-way clutch and planetary carrier No. 2 thrust washer from the rear planetary sun gear.



44. REMOVE 2ND COAST AND OVERDRIVE BRAKE FLANGE HOLE SNAP RING

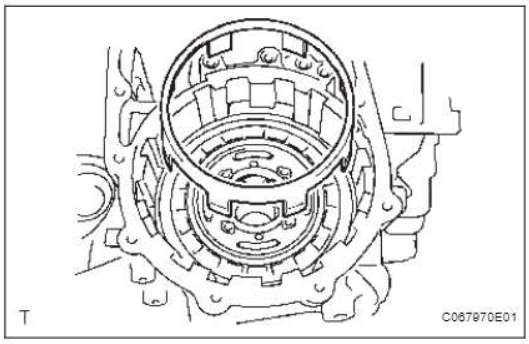
(a) Using a screwdriver, remove the snap ring from the transaxle case.



45. REMOVE 2ND BRAKE DISC

(a) Using a screwdriver, remove the snap ring.
(b) Remove the flange, 3 discs and 3 plates from the transaxle.

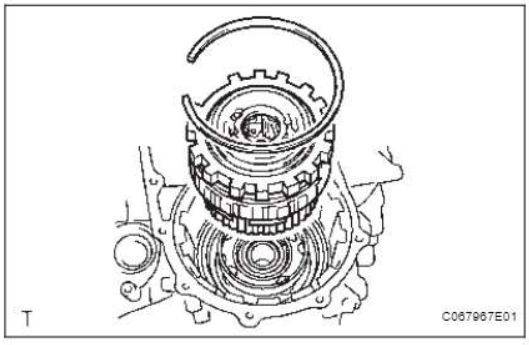
46. INSPECT 2ND BRAKE DISC (See page AX-173)



47. REMOVE 2ND BRAKE PISTON SLEEVE

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

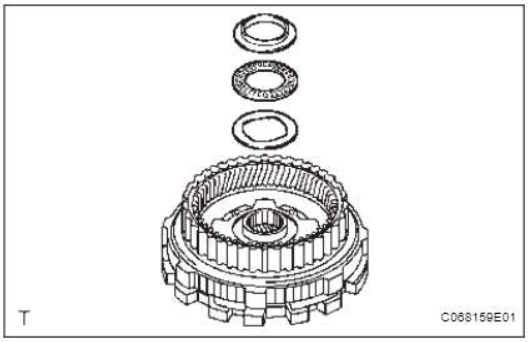
48. INSPECT NO. 2 1-WAY CLUTCH (See page AX-174)



49. REMOVE REAR PLANETARY GEAR ASSEMBLY

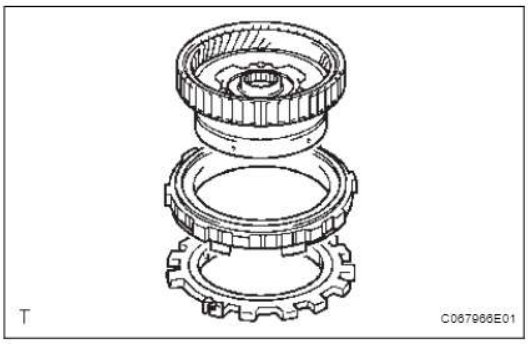
(a) Using a screwdriver, remove the snap ring.
(b) Remove the rear planetary gear from the transaxle case.

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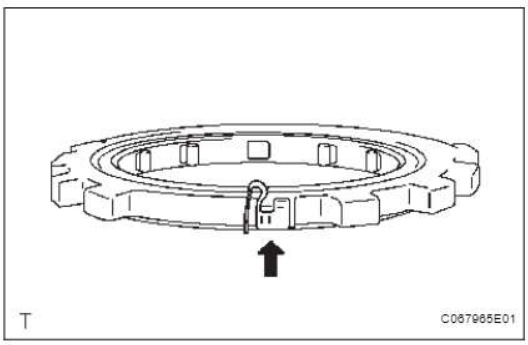
50. REMOVE PLANETARY GEAR REAR THRUST NEEDLE ROLLER BEARING

(a) Remove the thrust needle roller bearing and 2 bearing races from the rear planetary gear.



51. REMOVE NO. 2 1-WAY CLUTCH

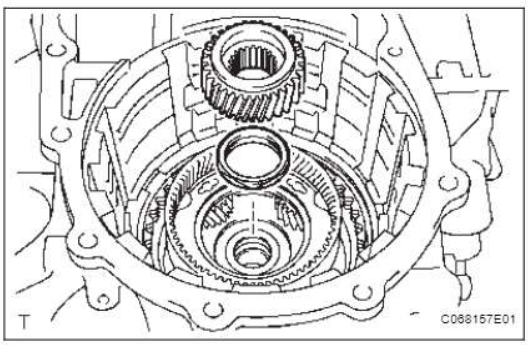
(a) Separate the 2nd brake piston assembly, No. 2 1-way clutch and rear planetary gear.



52. REMOVE OUTER RACE RETAINER

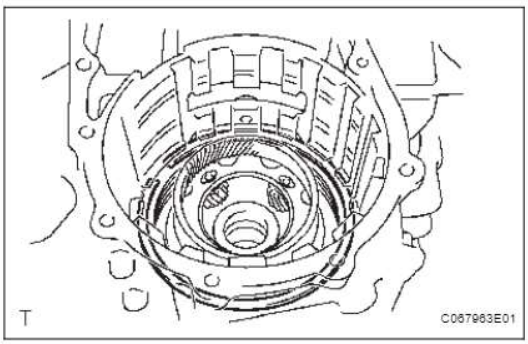
(a) Remove the retainer from the No. 2 1-way clutch.

AX



53. REMOVE FRONT PLANETARY SUN GEAR

(a) Remove the front planetary sun gear and thrust needle roller bearing from the transaxle case.



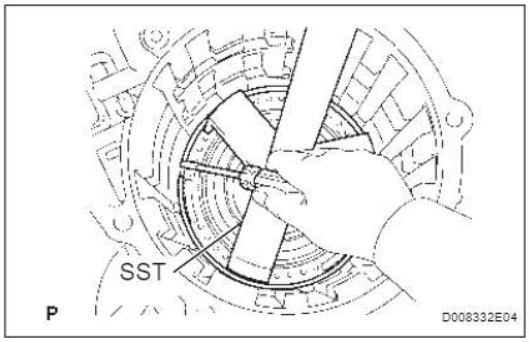
54. REMOVE 1ST AND REVERSE BRAKE DISC

(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange, 4 discs and 4 plates from the transaxle case.

55. INSPECT 1ST AND REVERSE BRAKE DISC (See page AX-174)

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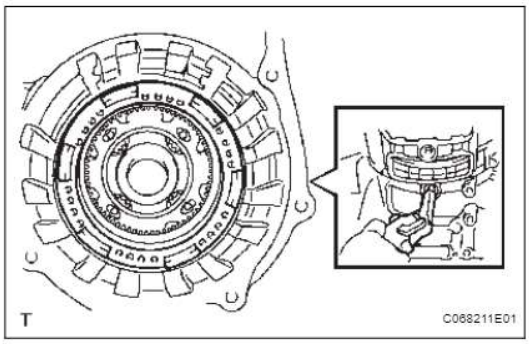


56. REMOVE 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using SST, a press and screwdriver, remove the snap ring.
SST 09387-00070

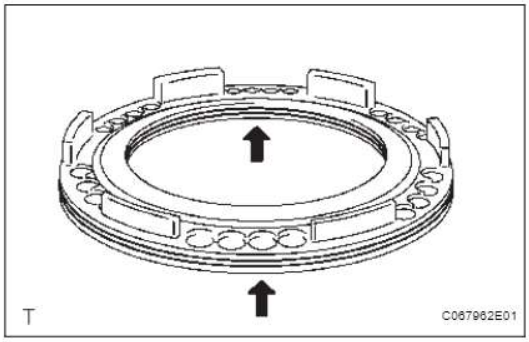
(b) Remove the 1st and reverse brake return spring sub-assembly.

57. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY (See page AX-174)



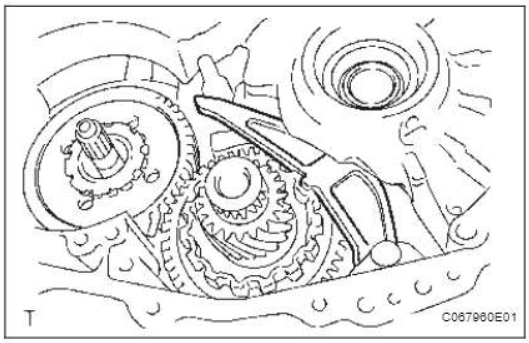
58. REMOVE 1ST AND NO. 2 REVERSE BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle case to remove the 1st and reverse brake piston.
NOTICE:
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**



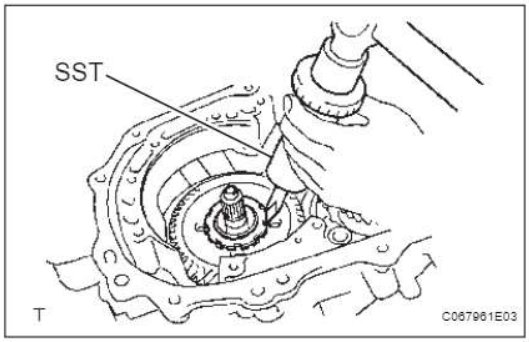
59. REMOVE 1ST AND NO. 2 REVERSE BRAKE PISTON O-RING

(a) Remove the 2 O-rings from the 1st and No. 2 reverse brake piston.



60. REMOVE COUNTER DRIVE GEAR NUT

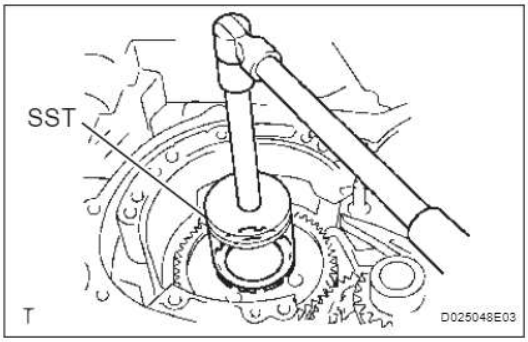
(a) Fix the counter driven gear with the parking lock pawl.



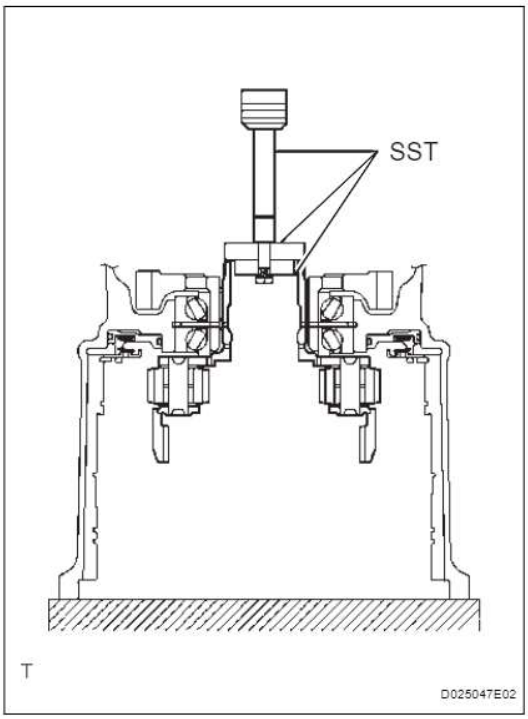
(b) Using SST and a hammer, unstake the lock washer.
SST 09930-00010

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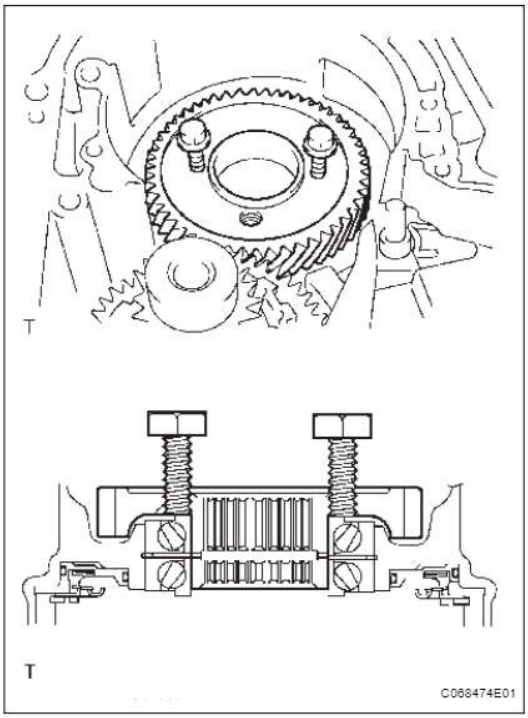


(c) Using SST, remove the nut and lock washer.
SST 09387-00120



61. REMOVE PLANETARY GEAR ASSEMBLY

(a) Using SST and a press, press out the planetary gear from the transaxle case.
SST 09950-60010 (09951-00400, 09951-00320, 09952-06010), 09950-70010 (09951-07100)



62. REMOVE COUNTER DRIVE GEAR

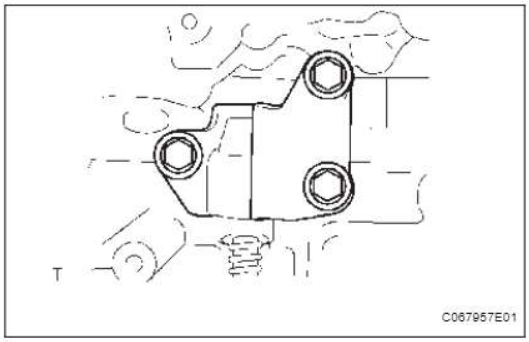
(a) Install the 2 bolts to the counter drive gear.
Bolt (M6):
Length = 40 to 80 mm
Pitch = 1.0 mm

(b) Rotate the 2 bolts in order and remove the counter drive gear and front planetary sun gear.

(c) Remove the 2 radial ball bearings from the counter drive gear and front planetary sun gear.

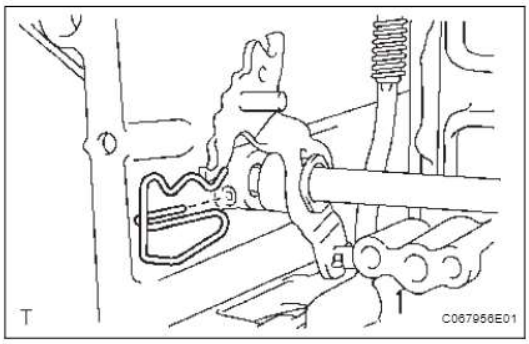
AX

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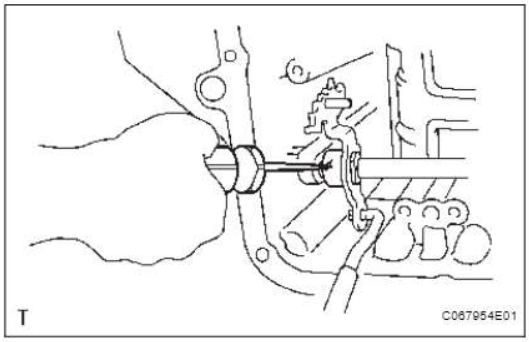
63. REMOVE PARKING LOCK PAWL BRACKET

(a) Remove the 3 bolts, cam guide and bracket.



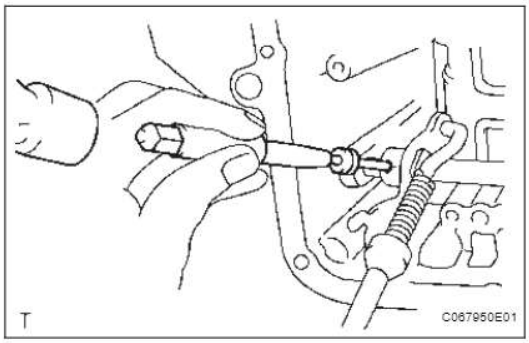
64. REMOVE MANUAL VALVE LEVER SHAFT RETAINER SPRING

(a) Remove the retainer spring.



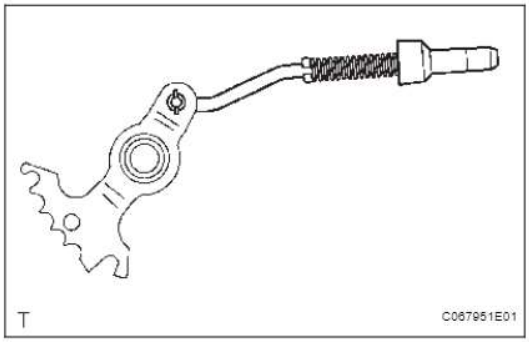
65. REMOVE MANUAL VALVE LEVER SUB-ASSEMBLY

(a) Using a screwdriver, unstake and remove the spacer.



(b) Using a pin punch and hammer, tap out the pin.

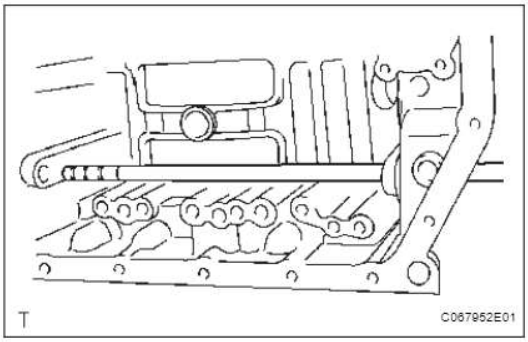
(c) Remove the manual valve lever shaft and manual valve lever.



66. REMOVE PARKING LOCK ROD SUB-ASSEMBLY

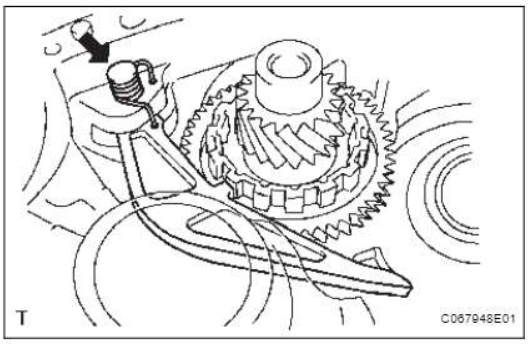
(a) Remove the parking lock rod from the manual valve lever.

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67. REMOVE MANUAL VALVE LEVER SHAFT

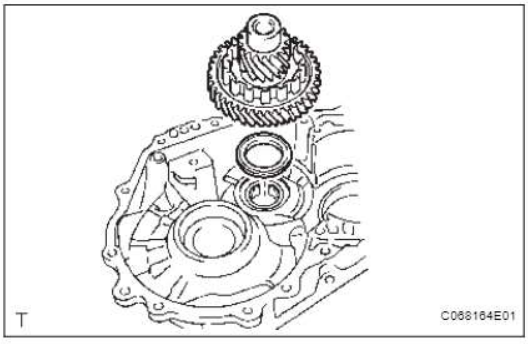
(a) Remove the manual valve lever shaft from the transaxle case.



68. REMOVE PARKING LOCK PAWL

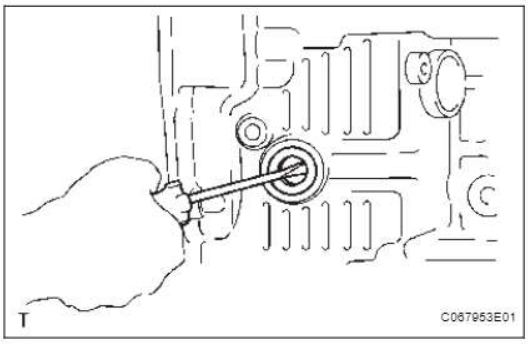
(a) Using a screwdriver, remove the parking lock pawl shaft.

(b) Remove the torsion spring and parking lock pawl.



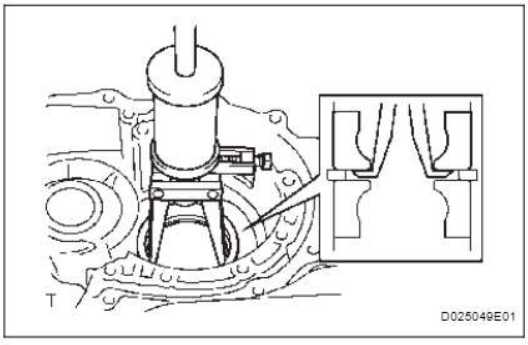
69. REMOVE COUNTER DRIVEN GEAR

(a) Remove the counter driven gear, drive pinion and thrust needle roller bearing from the transaxle case.



70. REMOVE MANUAL VALVE LEVER SHAFT OIL SEAL

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



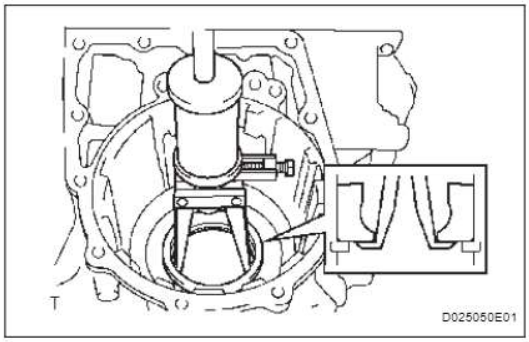
71. REMOVE COUNTER DRIVE GEAR BEARING

(a) Remove the 2 counter drive gear bearing inner races RH from the transaxle case.

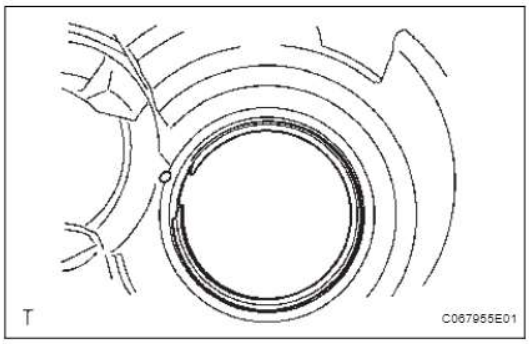
(b) Using SST, remove the counter drive gear bearing LH outer race from the transaxle case.

SST 09308-00010

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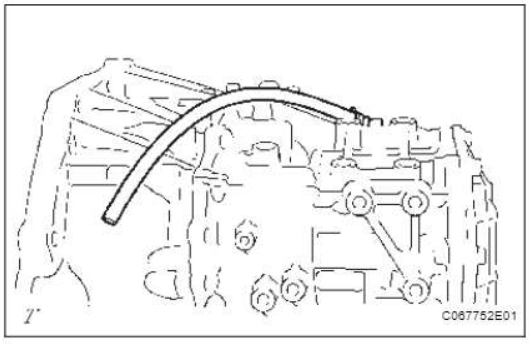


(c) Using SST, remove the counter drive gear bearing RH outer race from the transaxle case.
SST 09308-00010

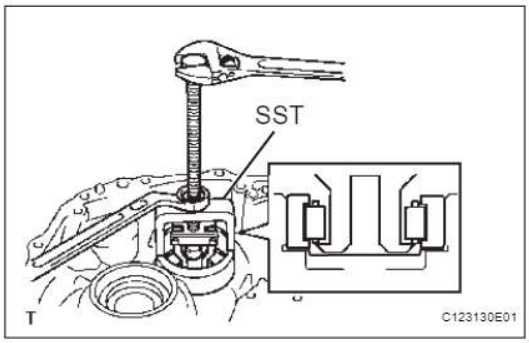


72. REMOVE COUNTER DRIVE GEAR HOLE SNAP RING

(a) Using a screwdriver, remove the counter drive gear hole snap ring from the transaxle case.



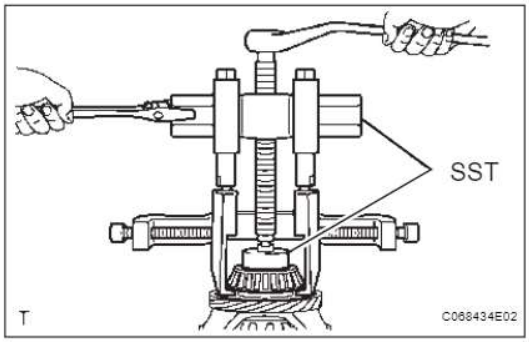
73. REMOVE BREATHER PLUG HOSE



74. REMOVE FRONT DRIVE PINION REAR TAPERED ROLLER BEARING (for LH Side)

(a) Using SST, remove the drive pinion roller bearing from the transaxle case.
SST 09612-65014 (09612-01040)

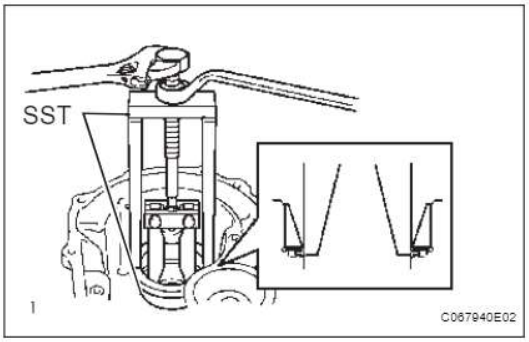
(b) Remove the No. 1 transaxle case plate.



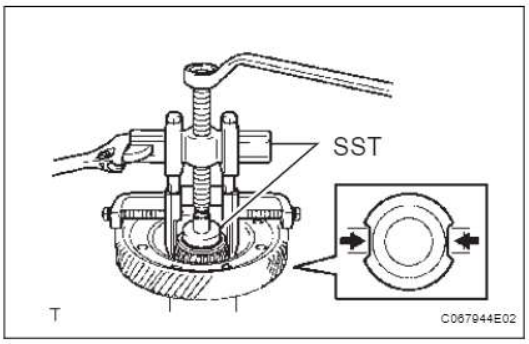
75. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST, remove the front differential case front tapered roller bearing from the differential case.
SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00390)

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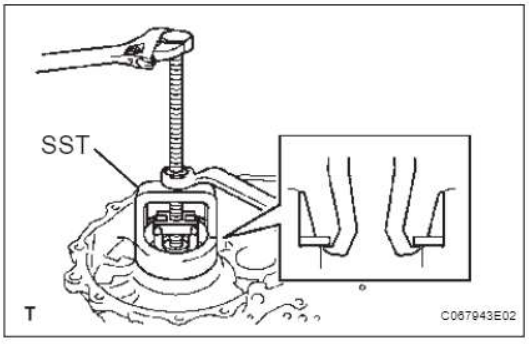


(b) Using SST, remove the front differential case tapered roller bearing outer race from the transaxle housing.
SST 09387-00041 (09387-02020, 09387-02010)



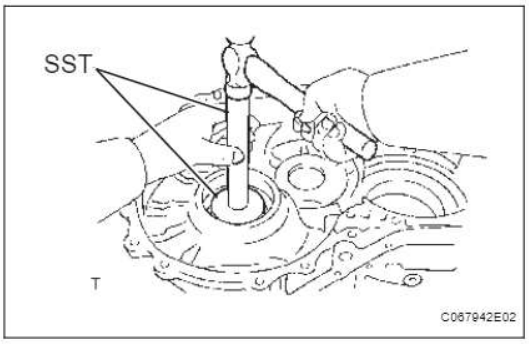
76. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST, remove the front differential case rear tapered roller bearing from the differential case.
SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00430)



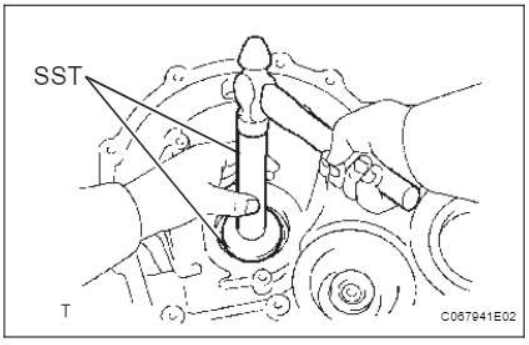
(b) Using SST, remove the front differential case tapered roller bearing outer race from the transaxle housing.
SST 09612-65014 (09612-01010)

AX



77. REMOVE FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap out the oil seal from the transaxle case.
SST 09950-60010 (09951-00550), 09950-70010 (09951-07100)



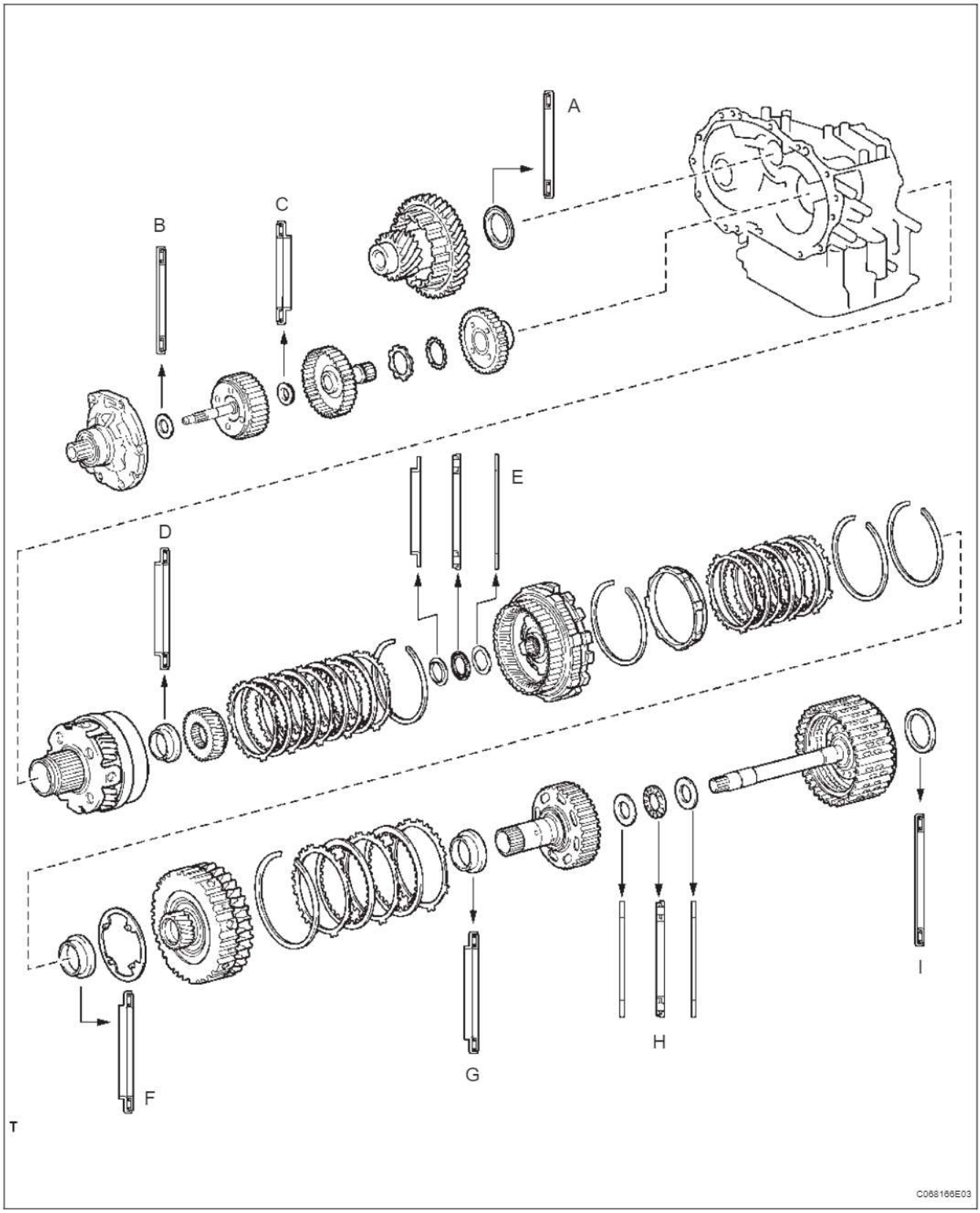
78. REMOVE TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap out the transaxle case oil seal from the transaxle housing.
SST 09950-60010 (09951-00530), 09950-70010 (09951-07100)

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REASSEMBLY

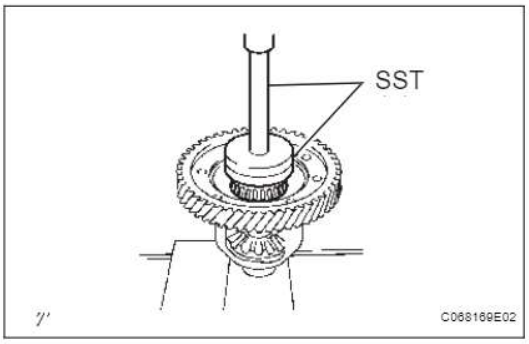
1. BEARING POSITION



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Bearing Position

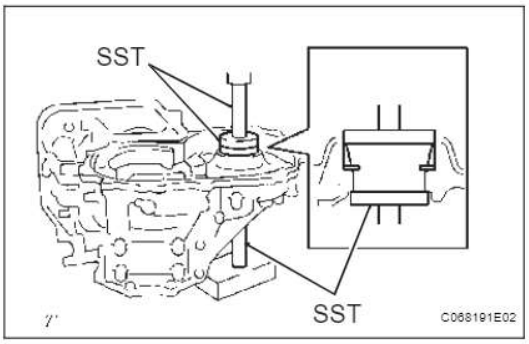
Mark	Front Race Diameter Inside / Outside	Thrust Bearing Diameter Inside / Outside	Rear Race Diameter Inside / Outside
A	-	45.1 mm (1.7756 in.) / 65.1 mm (2.5630 in.)	-
B	-	26 mm (1.0236 in.) / 43.4 mm (1.7087 in.)	-
C	-	21 mm (0.8268 in.) / 34.85 mm (1.3721 in.)	-
D	-	32.0 mm (1.260 in.) / 48.0 mm (1.890 in.)	-
E	36.75 mm (1.447 in.) / 49.95 mm (1.967 in.)	33.9 mm (1.335 in.) / 52.0 mm (2.047 in.)	- / 51.7 mm (2.035 in.)
F	-	43.45 mm (1.7101 in.) / 58.5 mm (2.3031 in.)	-
G	-	29.4 mm (1.1574 in.) / 44.4 mm (1.7480 in.)	-
H	23.5 mm (0.9252) / 37.3 mm (1.4685 in.)	22.5 mm (0.8858 in.) / 37.3 mm (1.4685 in.)	20.3 mm (0.7992 in.) / 33.8 mm (1.3307 in.)
I	-	43.45 mm (1.7101 in.) / 61.2 mm (2.4094 in.) or 43.45 mm (1.7101 in.) / 61.74 mm (2.4307 in.)	-



2. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

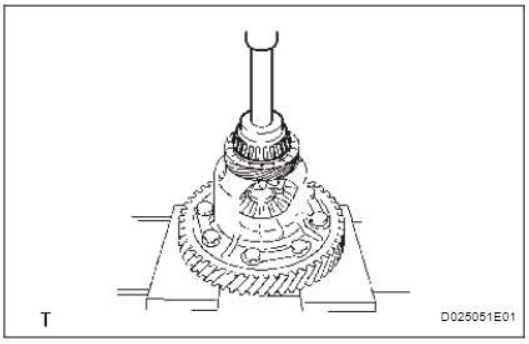
(a) Using SST and a press, press in the front differential case rear tapered roller bearing inner race to the differential case.

SST 09726-40010, 09950-60020 (09951-00790)



(b) Using SST and a press, press in the shim and bearing outer race to the transaxle case.

SST 09950-60010 (09951-00650, 09950-60020 (09951-00720), 09950-70010 (09951-07100, 09951-07200)

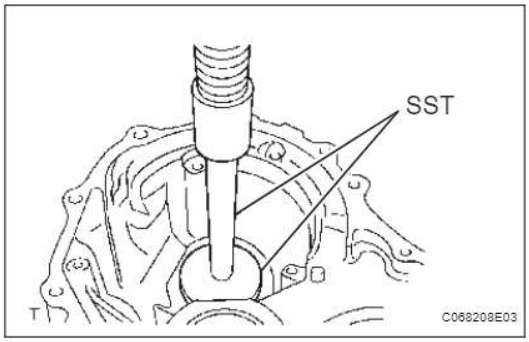


3. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

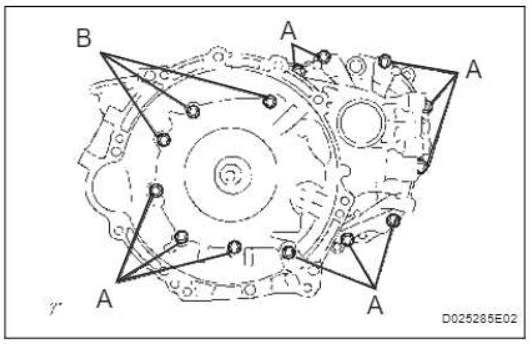
(a) Using SST and a press, press in the bearing inner race to the differential case.

SST 09950-60010 (09951-00460), 09950-70010 (09951-07100)

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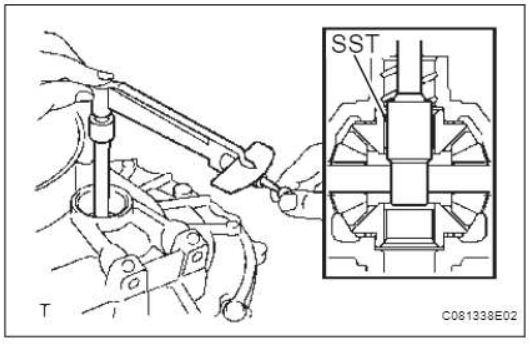
(b) Using SST and a press, press in the tapered roller bearing to the transaxle housing.
SST 09950-60020 (09951-00680 09950-70010 (09951-07150)



4. ADJUST TAPERED ROLLER BEARING PRELOAD

(a) Coat the front differential case and bearing with ATF and install them to the transaxle case.

(b) Install the transaxle housing with the 14 bolts.
Torque: 29.4 N*m (300 kgf*cm, 22 ft.*lbf) for bolt A
22.1 N*m (225 kgf*cm, 16 ft.*lbf) for bolt B



(c) Using SST and a small torque wrench, measure the preload of the differential gear.
SST 09564-32011
Standard preload:
New bearing:
0.98 to 1.57 N*m (10.0 to 16.0 kgf*cm, 8.7 to 13.9 in.*lbf)
Used bearing:
0.49 to 0.78 N*m (5.0 to 8.0 kgf*cm, 4.3 to 6.9 in.*lbf)

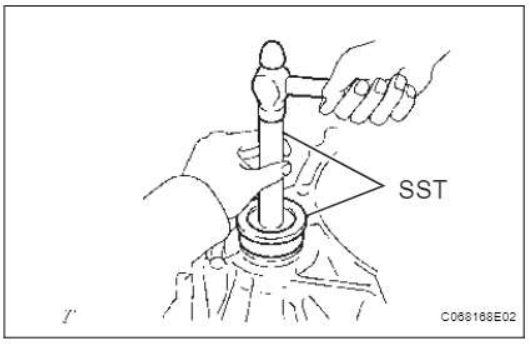
If the preload is not within the specification, remove the differential from the transaxle case. Reselect the transaxle case side adjusting shim according to the following table.

Standard adjusting shim thickness

Mark	Thickness	Mark	Thickness
01	1.90 mm (0.0748 in.)	11	2.40 mm (0.0945 in.)
02	1.95 mm (0.0768 in.)	12	2.45 mm (0.0965 in.)
03	2.00 mm (0.0787 in.)	13	2.50 mm (0.0984 in.)
04	2.05 mm (0.0807 in.)	14	2.55 mm (0.1004 in.)
05	2.10 mm (0.0827 in.)	15	2.60 mm (0.1024 in.)
06	2.15 mm (0.0846 in.)	16	2.65 mm (0.1043 in.)
07	2.20 mm (0.0866 in.)	17	2.70 mm (0.1063 in.)
08	2.25 mm (0.0885 in.)	18	2.75 mm (1.1082 in.)
09	2.30 mm (0.0906 in.)	19	2.80 mm (0.1102 in.)

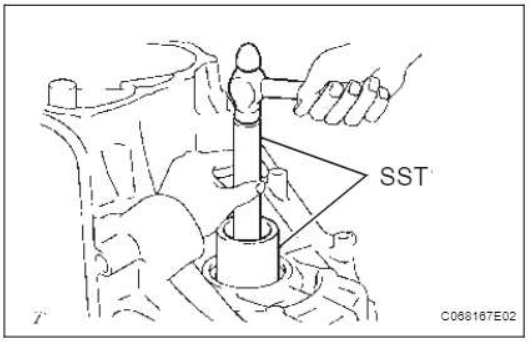
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Mark	Thickness	Mark	Thickness
10	2.35 mm (0.0925 in.)	-	-



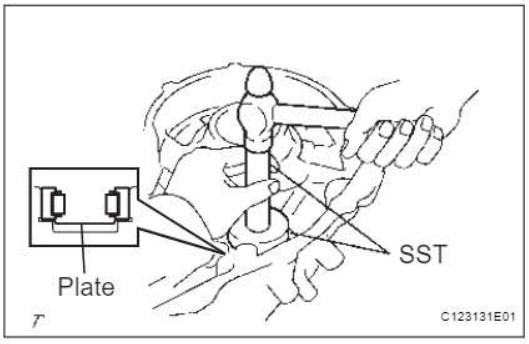
5. INSTALL TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap in a new oil seal.
SST 09554-14010, 09950-70010 (09951-07100)
Standard depth:
2 +-0.5 mm (0.079 +-0.020 in.)



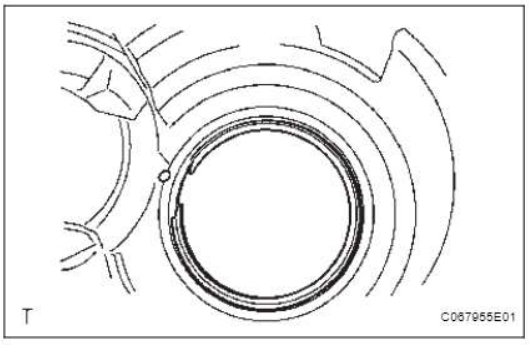
6. INSTALL FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap in a new oil seal.
SST 09726-27012 (09726-02041), 09950-70010 (09951-07150)
Standard depth:
5.9 +-0.5 mm (0.232 +-0.020 in.)



7. INSTALL FRONT DRIVE PINION REAR CYLINDRICAL ROLLER BEARING

(a) Install the No. 1 transaxle case plate.
(b) Using SST and a hammer, tap in the roller bearing into the transaxle case.
SST 09950-60010 (09951-00610), 09950-70010 (09951-07150)

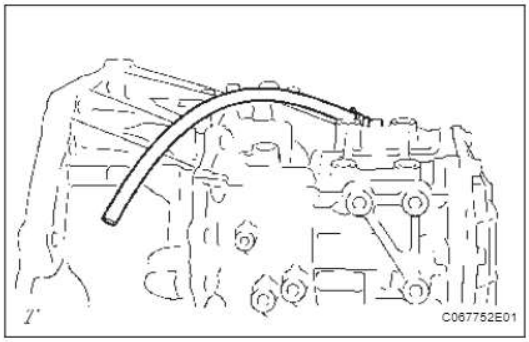


8. INSTALL COUNTER DRIVE GEAR HOLE SNAP RING

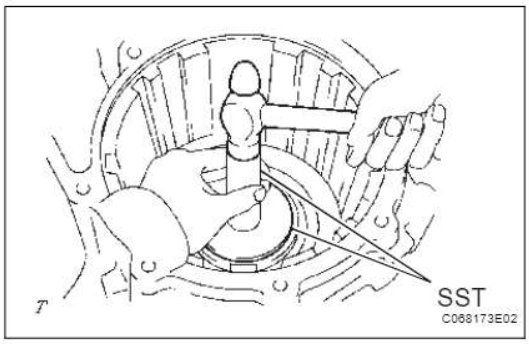
(a) Using a screwdriver, install the counter drive gear hole snap ring to the transaxle case.

AX

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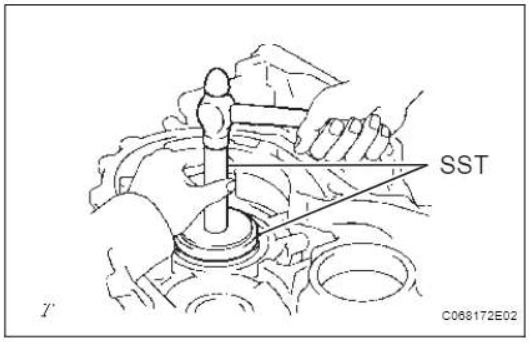


9. INSTALL BREATHER PLUG HOSE



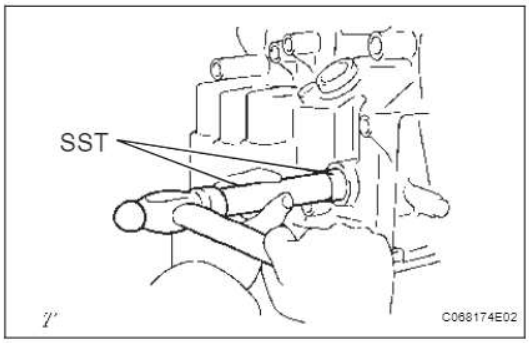
10. INSTALL COUNTER DRIVE GEAR BEARING

(a) Using SST and a hammer, tap in the counter drive gear bearing LH outer race to the transaxle case.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07150)



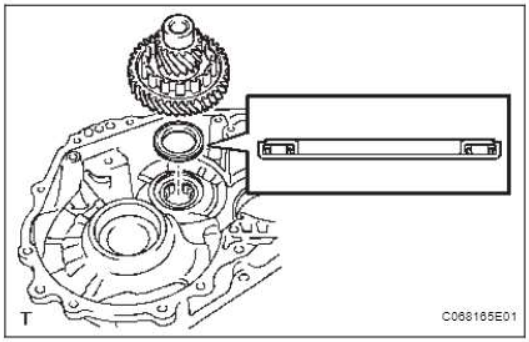
(b) Using SST and a hammer, tap in the counter drive gear bearing RH outer race to the transaxle case.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07150)

(c) Install the counter drive gear bearing to the transaxle case.



11. INSTALL MANUAL VALVE LEVER SHAFT OIL SEAL

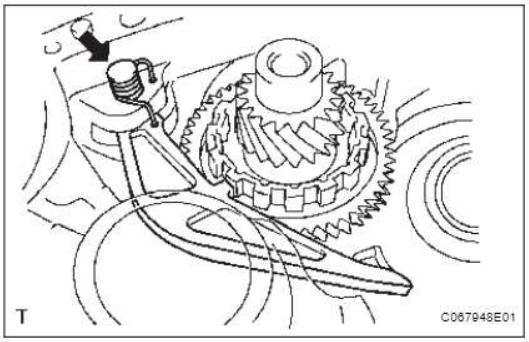
(a) Using SST and a hammer, tap in a new manual valve lever shaft oil seal.
SST 09950-60010 (09951-00220), 09950-70010 (09951-07100)
Standard depth:
0 +-0.5 mm (0 +-0.020 in.)



12. INSTALL COUNTER DRIVEN GEAR

(a) Install the counter driven gear and drive pinion thrust bearing to the transaxle case.

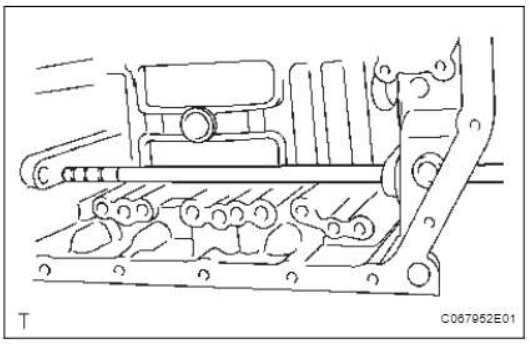
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13. INSTALL PARKING LOCK PAWL

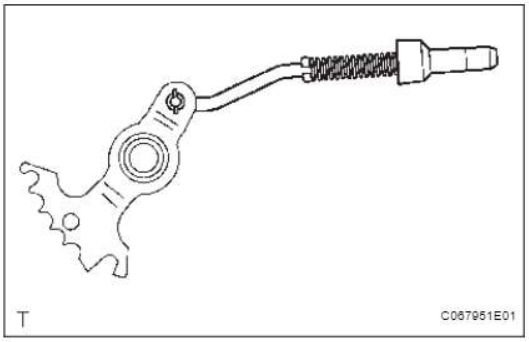
(a) Coat the parking lock pawl shaft with ATF.

(b) Install the parking lock pawl, torsion spring and shaft to the transaxle case.
HINT:
Check that the parking lock pawl can move smoothly.



14. INSTALL MANUAL VALVE LEVER SHAFT

(a) Install the manual valve lever shaft to the transaxle case.
NOTICE:
Be careful not to damage the lip of the oil seal.

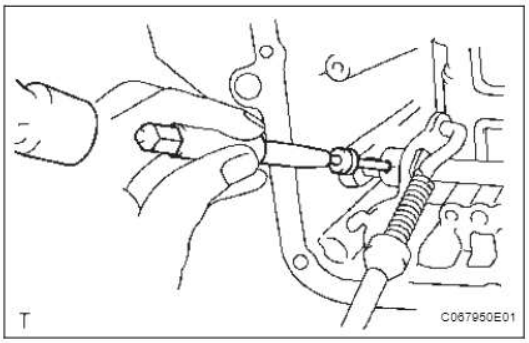


15. INSTALL PARKING LOCK ROD SUB-ASSEMBLY

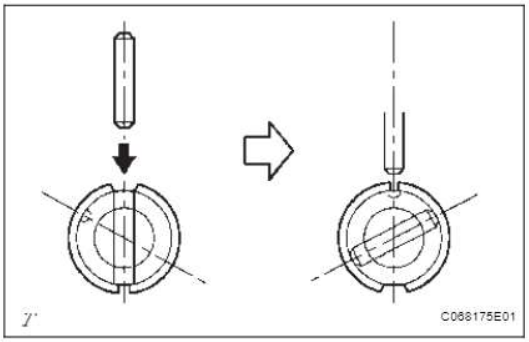
16. INSTALL MANUAL VALVE LEVER SUB-ASSEMBLY

(a) Coat the manual valve lever sub-assembly with ATF.

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



(c) Using a pin punch and hammer, drive in the pin.

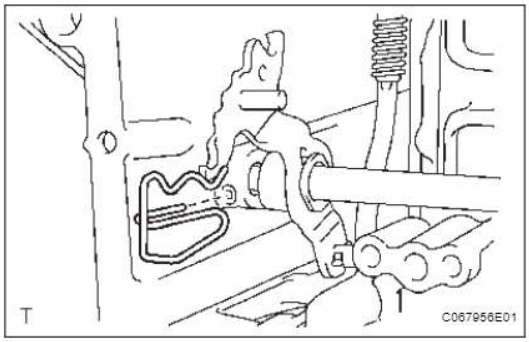


(d) Align the small hole of the spacer and the staking position mark on the lever shaft.

(e) Using a pin punch, stake the spacer through the small hole.

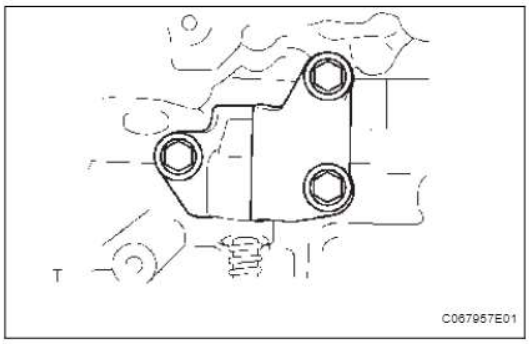
(f) Check that the spacer does not turn.

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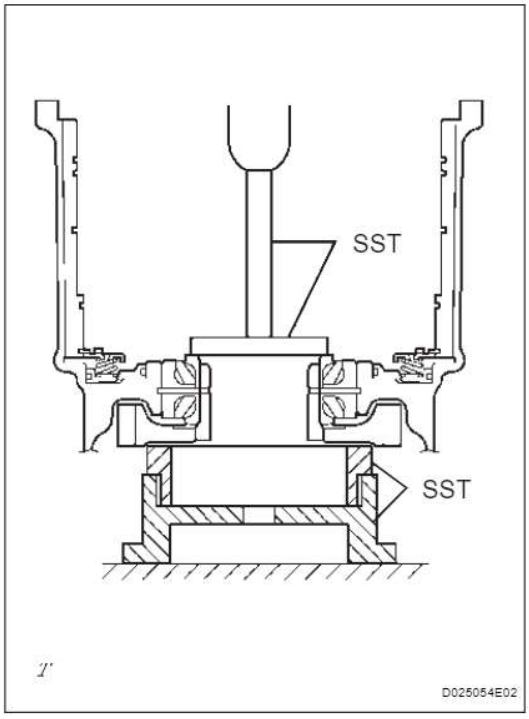
17. INSTALL MANUAL VALVE LEVER SHAFT RETAINER SPRING

(a) Install the retainer spring.



18. INSTALL PARKING LOCK PAWL BRACKET

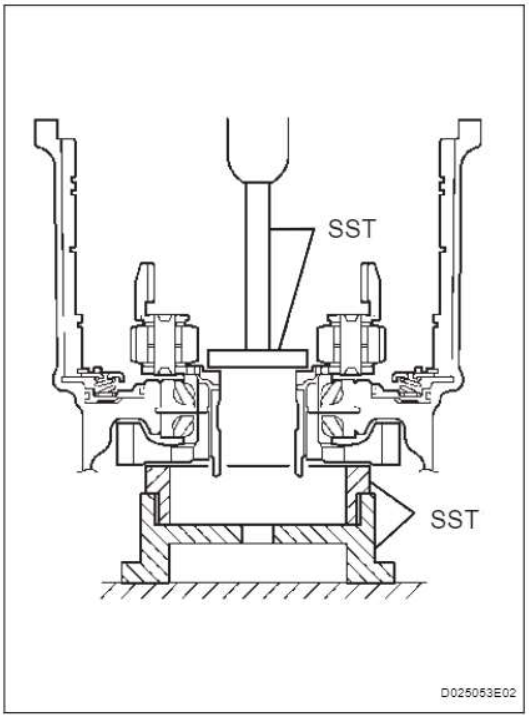
(a) Install the cam guide and bracket with the 3 bolts.
Torque: 20.1 N*m (205 kgf*cm, 15 ft.*lbf)



19. INSTALL COUNTER DRIVE GEAR

(a) Using SST and a press, press in the counter drive gear to the transaxle case.
SST 09223-15030, 09527-17011, 09950-60010 (09951-00650), 09950-70010 (09951-07150)

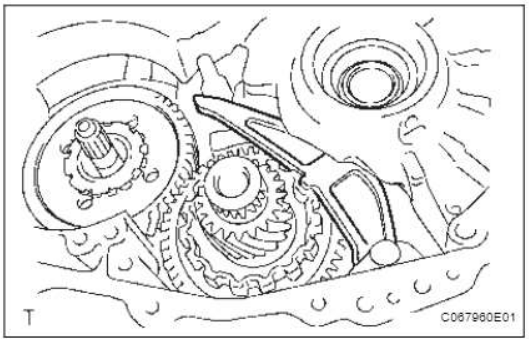
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20. INSTALL PLANETARY GEAR ASSEMBLY

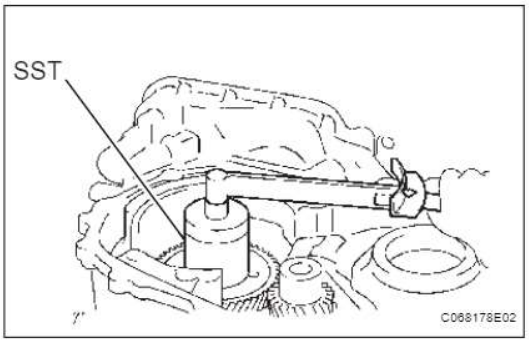
(a) Using SST and a press, press in the planetary gear to the transaxle case.

SST 09950-60010 (09951-00480), 09223-15030, 09527-17011, 09950-70010 (09951-07150)



21. INSTALL COUNTER DRIVE GEAR NUT

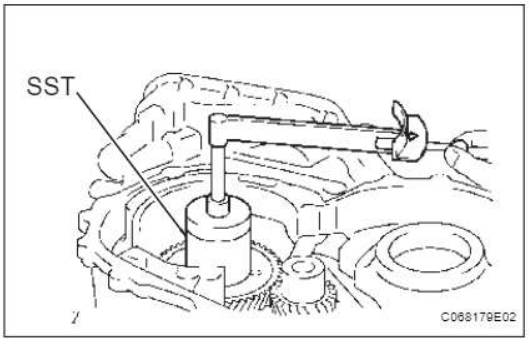
(a) Fix the counter driven gear with the parking lock pawl.



(b) Using SST, install a new lock washer and nut.

SST 09387-00120

Torque: 280 N*m (2,855 kgf*cm, 207 ft.*lbf)



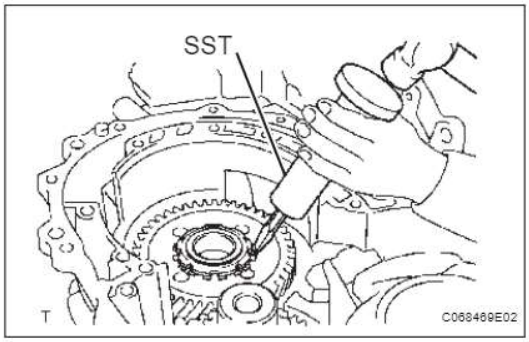
(c) Using SST and a small torque wrench, turn the counter drive gear at 60 turns per minute and measure the rotating torque.

SST 09387-00120

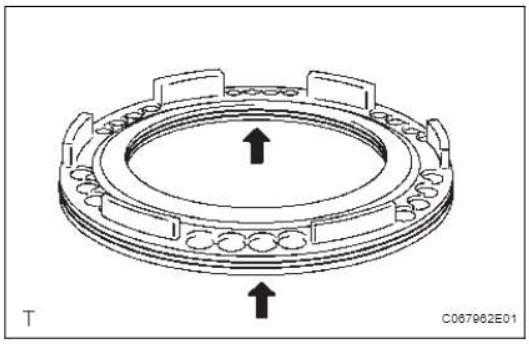
Standard rotating torque:

0.20 to 0.49 N*m (2 to 5 kgf*cm, 2 to 4 in.*lbf)

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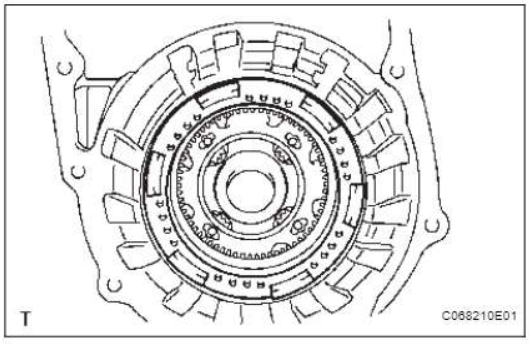


(d) Using SST and a hammer, stake the lock washer.
SST 09930-00010



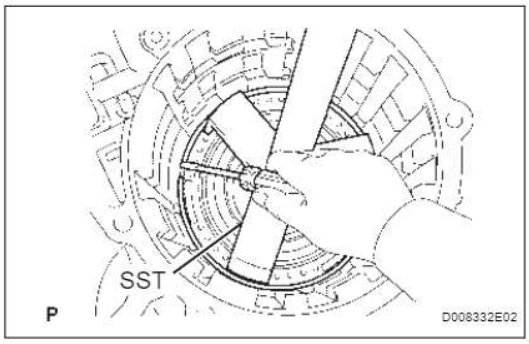
22. INSTALL 1ST AND NO. 2 REVERSE BRAKE PISTON O-RING

(a) Install the 2 O-rings.



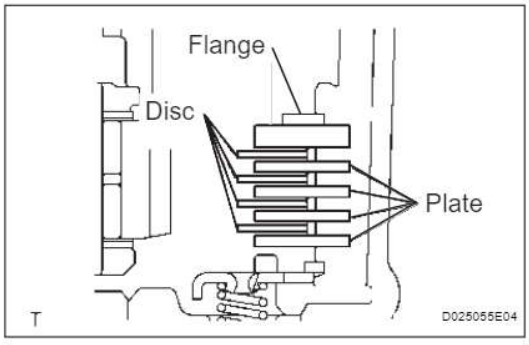
23. INSTALL 1ST AND NO. 2 REVERSE BRAKE PISTON

(a) Install the 1st and reverse brake piston to the transaxle case.
NOTICE:
Be careful not to damage the lip of the oil seal.



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

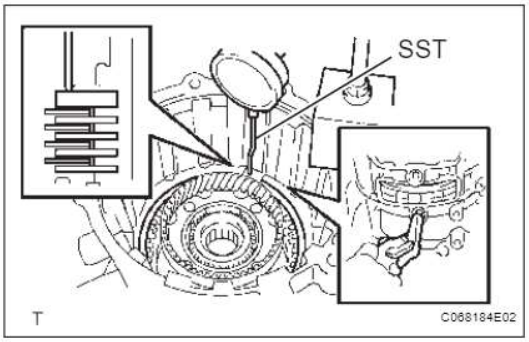
(a) Install the 1st and reverse brake return spring sub-assembly to the transaxle case.
(b) Using SST, a press and screwdriver, install the snap ring.
SST 09387-00070



25. INSTALL 1ST AND REVERSE BRAKE DISC

(a) Install the 4 plates, 4 discs and flange to the transaxle case.
(b) Using a screwdriver, install the snap ring.

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26. INSPECT PACK CLEARANCE OF 1ST AND REVERSE BRAKE DISC

(a) Using SST and a dial indicator, measure the dimension "A" in the illustration while pressing the disc and plate from the rear side.

SST 09350-36010

Standard pack clearance:

0.806 to 1.206 mm (0.0317 to 0.0475 in.)

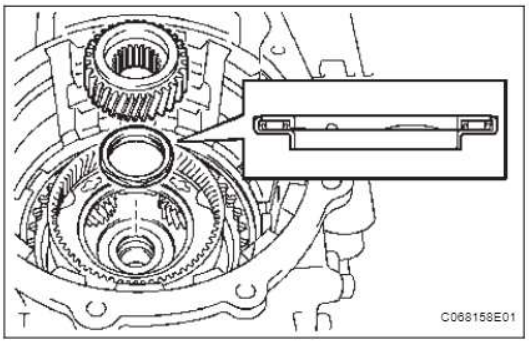
HINT:

Pack clearance = Dimension A - Flange thickness - Snap ring thickness

Standard select flange thickness

Mark	Thickness	Mark	Thickness
-	3.4 mm (0.134 in.)	2	3.8 mm (0.150 in.)
1	3.6 mm (0.142 in.)	3	4.0 mm (0.157 in.)

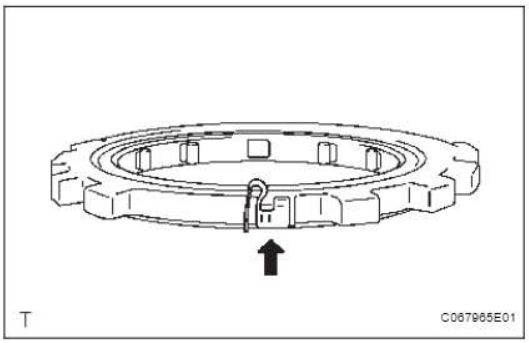
(b) Check that the 1st and reverse brake piston moves when applying compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole.



27. INSTALL FRONT PLANETARY SUN GEAR

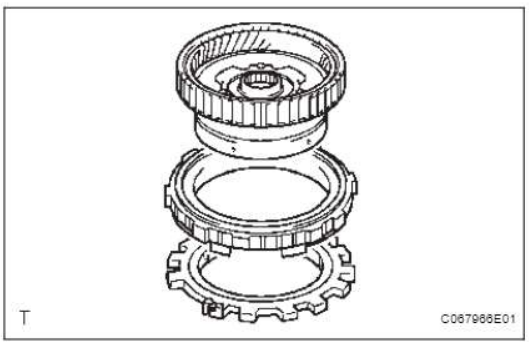
(a) Install the planetary sun gear and needle roller bearing to the planetary gear.

AX



28. INSTALL OUTER RACE RETAINER

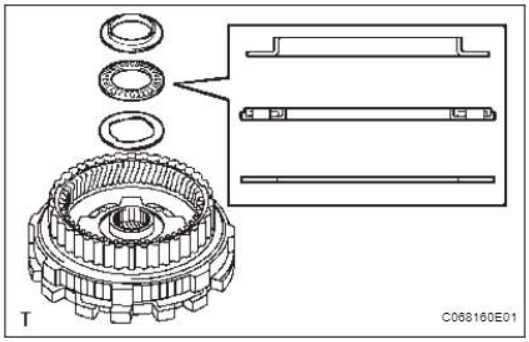
(a) Install the retainer to the No. 2 1-way clutch.



29. INSTALL NO. 2 1-WAY CLUTCH

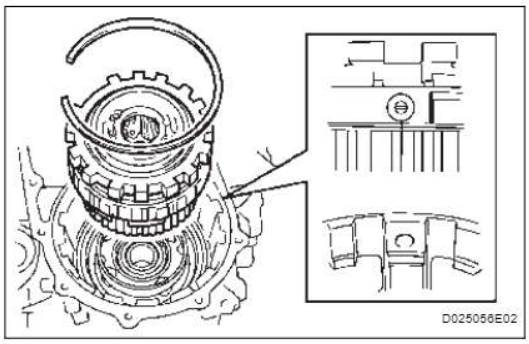
(a) Install the 1-way clutch and 2nd brake piston assembly to the rear planetary gear.

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30. INSTALL PLANETARY GEAR REAR THRUST NEEDLE ROLLER BEARING

(a) Install the No. 2 thrust bearing race, planetary gear thrust needle roller bearing and No. 1 thrust bearing race to the rear planetary gear.

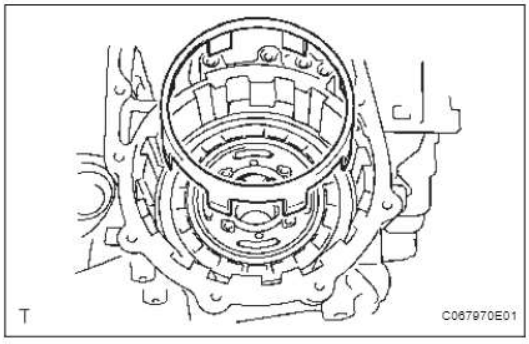


31. INSTALL REAR PLANETARY GEAR ASSEMBLY

(a) Install the rear planetary gear to the transaxle case.

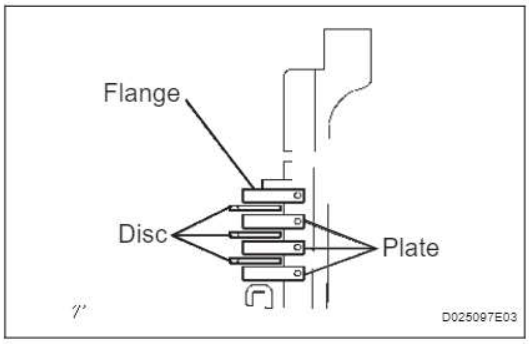
(b) Using a screwdriver, install the snap ring.

32. INSPECT NO. 2 1-WAY CLUTCH (See page AX-174)



33. INSTALL 2ND BRAKE PISTON SLEEVE

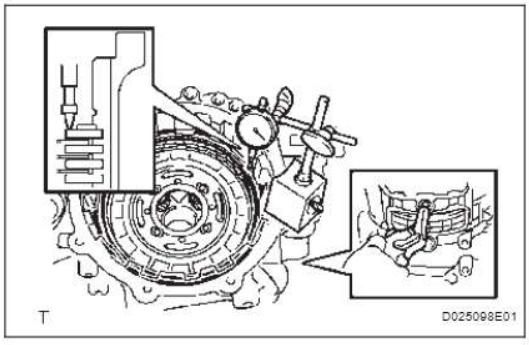
(a) Install the 2nd brake piston sleeve to the transaxle case.



34. INSTALL 2ND BRAKE DISC

(a) Install the 3 discs, 3 plates and flange to the transaxle case.

(b) Using a screwdriver, install the snap ring to the transaxle case.



35. INSPECT PACK CLEARANCE OF 2ND BRAKE

(a) Using a dial indicator, measure the 2nd brake pack clearance while applying and releasing compressed air (392 to 785 kPa, 4 to 8 kgf/cm^2, 57 to114 psi).

Standard pack clearance:

0.847 to 1.247 mm (0.0333 to 0.0491 in.)

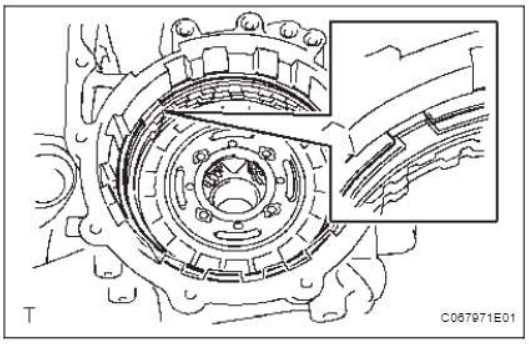
HINT:

Pack clearance = Dimension A - Selected flange thickness - Snap ring thickness.

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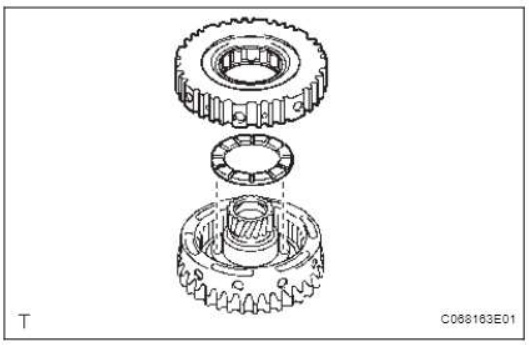
Standard selected flange thickness

Mark	Thickness	Mark	Thickness
-	3.0 mm (0.118 in.)	2	3.4 mm (0.134 in.)
1	3.2 mm (0.126 in.)	3	3.6 mm (0.142 in.)



36. INSTALL 2ND COAST AND OVERDRIVE BRAKE FLANGE HOLE SNAP RING

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

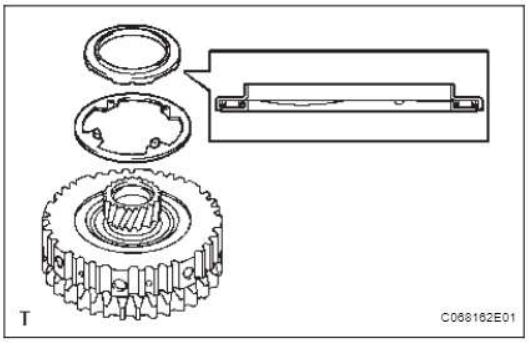


37. INSTALL 1-WAY CLUTCH ASSEMBLY

(a) Install the No. 2 thrust washer to the rear planetary gear.

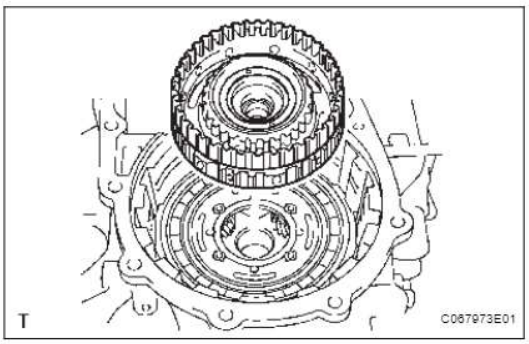
(b) Install the 1-way clutch to the rear planetary sun gear.

38. INSPECT 1-WAY CLUTCH ASSEMBLY (See page AX-173)



39. INSTALL REAR PLANETARY SUN GEAR THRUST NEEDLE ROLLER BEARING

(a) Install the thrust bearing and washer to the rear planetary sun gear.

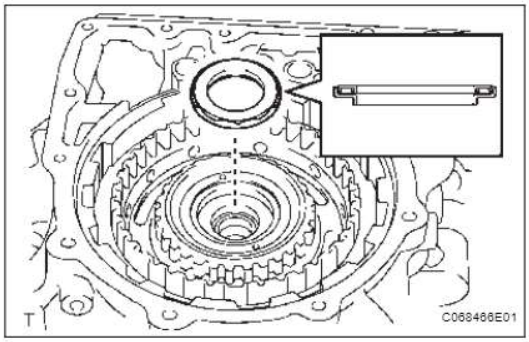


40. INSTALL REAR PLANETARY SUN GEAR ASSEMBLY

(a) Install the rear planetary sun gear assembly.

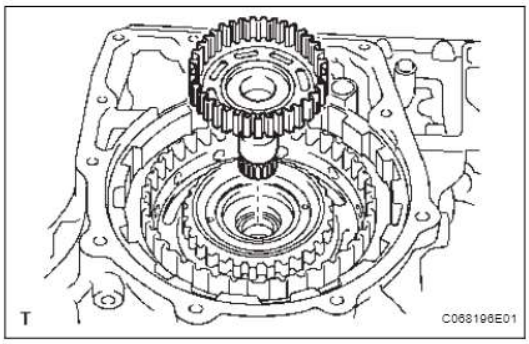
AX

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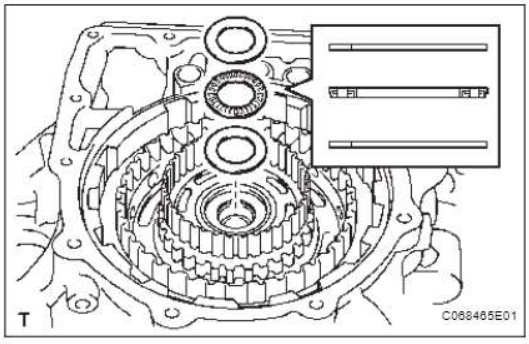
41. INSTALL REAR PLANETARY SUN GEAR, NO. 2 THRUST NEEDLE BEARING

(a) Install the thrust bearing to the rear planetary sun gear.



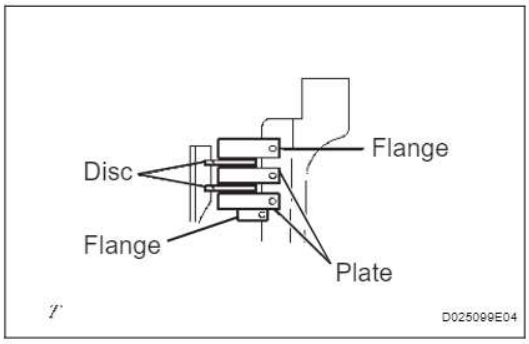
42. INSTALL DIRECT CLUTCH HUB

(a) Install the direct clutch hub.



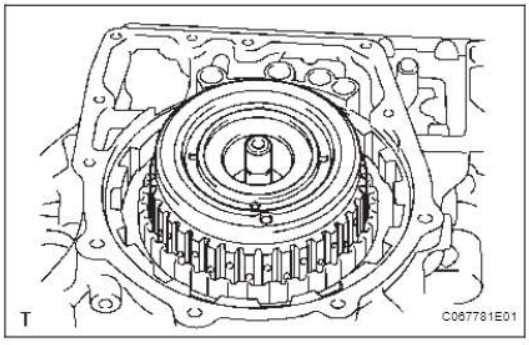
43. INSTALL THRUST NEEDLE ROLLER BEARING

(a) Install the No. 3 thrust bearing race, thrust needle roller bearing and C-2 hub thrust bearing race to the direct clutch hub.



44. INSTALL 2ND COAST AND OVERDRIVE BRAKE DISC

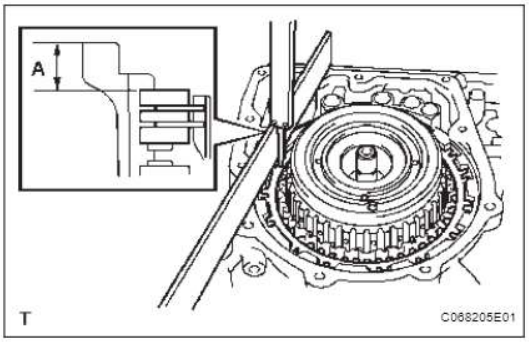
(a) Install the 2 discs, 2 plates and 2 flanges to the transaxle case.



45. INSTALL INTERMEDIATE SHAFT ASSEMBLY

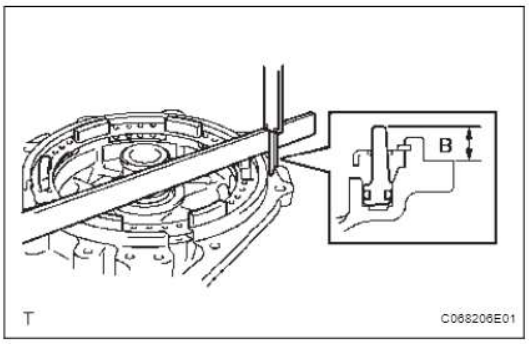
(a) Install the intermediate shaft to the transaxle case.

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46. INSPECT PACK CLEARANCE OF 2ND COAST AND OVERDRIVE BRAKE

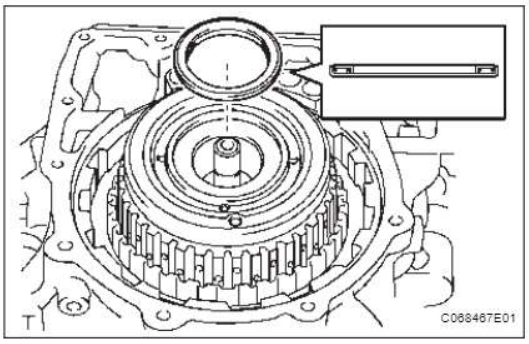
(a) As shown in the illustration, place a straightedge on the transaxle case and measure the distance between the 2nd coast and O/D brake flange and straightedge using a vernier caliper (Dimension A).



(b) As shown in the illustration, place a straightedge on the O/D brake piston and measure the distance between the transaxle rear cover and straightedge using a vernier caliper (Dimension B).
Calculate the piston stroke valve using the following formula. Select a flange which satisfies the piston stroke valve and install it.
Standard pack clearance:
2.091 to 2.491 mm (0.0823 to 0.0981 in.)
HINT:
Pack clearance = Dimension "A" - Dimension "B" - Selected flange thickness.
Selected flange thickness

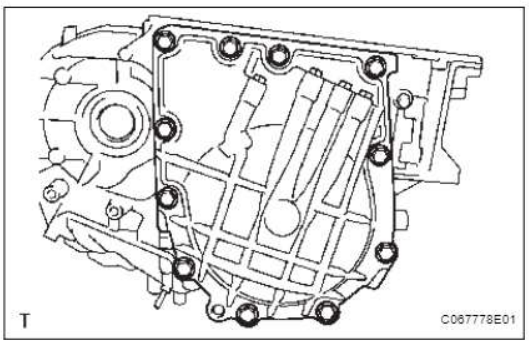
Mark	Thickness	Mark	Thickness
4	4.0 mm (0.1575 in.)	6	4.4 mm (0.1732 in.)
5	4.2 mm (0.1654 in.)	7	4.6 mm (0.1811 in.)

AX



47. INSTALL REAR CLUTCH DRUM THRUST NEEDLE ROLLER BEARING

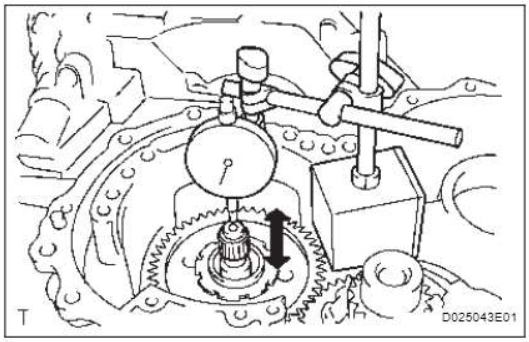
(a) Install the bearing to the intermediate shaft.



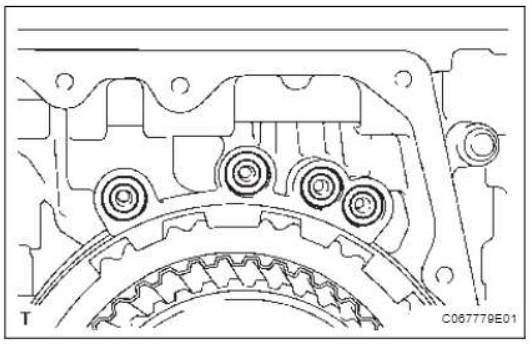
48. INSPECT INTERMEDIATE SHAFT ASSEMBLY

(a) Install the transaxle rear cover with the 11 bolts.
Torque: 24.5 N*m (250 kgf*cm, 18 ft.*lbf)

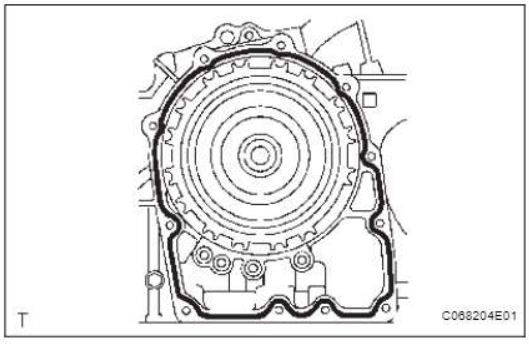
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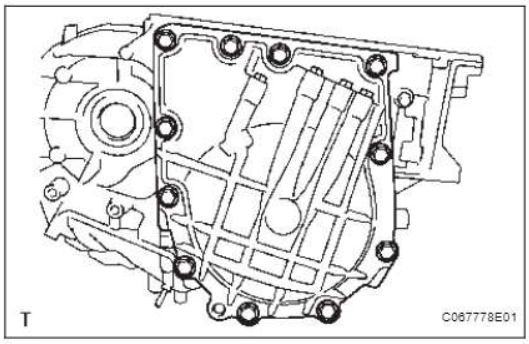
(b) Using a dial indicator, measure the end play of intermediate shaft.
Standard end play:
0.204 to 0.966 mm (0.008 to 0.038 in.)
(c) Remove 11 bolts and transaxle rear cover.



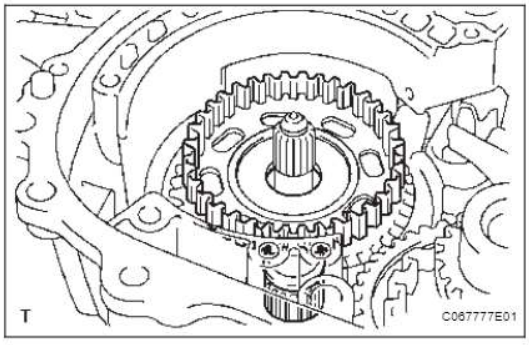
49. INSTALL TRANSAXLE CASE GASKET
(a) Install 4 new gaskets to the transaxle case.



50. INSTALL TRANSAXLE REAR COVER ASSEMBLY
(a) Apply FIPG to the transaxle case.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent

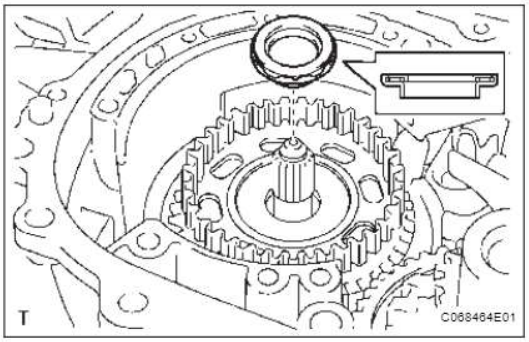


(b) Install the transaxle rear cover with the 11 bolts.
Torque: 24.5 N*m (250 kgf*cm, 18 ft.*lbf)



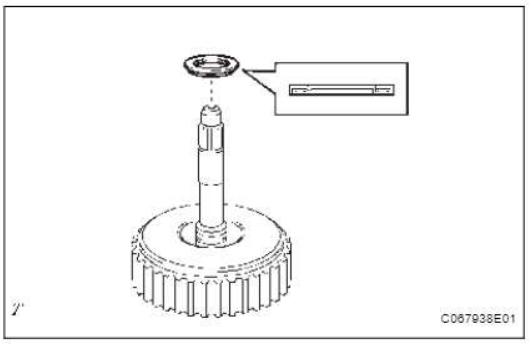
51. INSTALL FORWARD CLUTCH HUB SUB-ASSEMBLY
(a) Install the forward clutch hub to the transaxle case.

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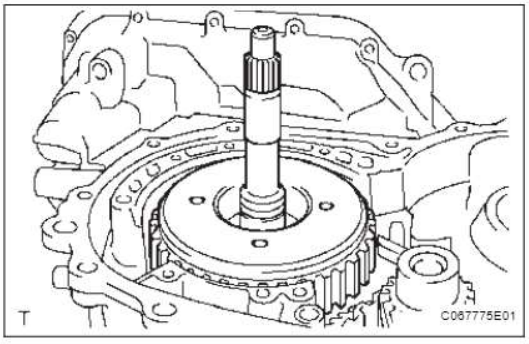
52. INSTALL FORWARD CLUTCH HUB THRUST NEEDLE ROLLER BEARING

(a) Install the bearing to the forward clutch hub.



53. INSTALL STATOR SHAFT THRUST NEEDLE ROLLER BEARING

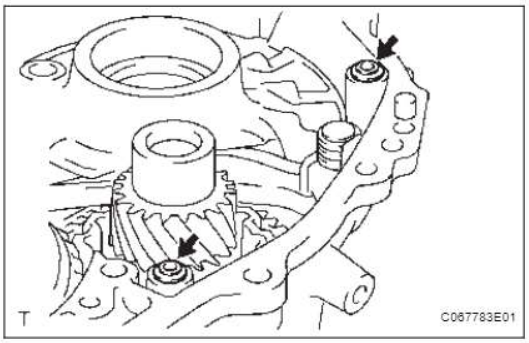
(a) Install the bearing to the input shaft.



54. INSTALL INPUT SHAFT ASSEMBLY

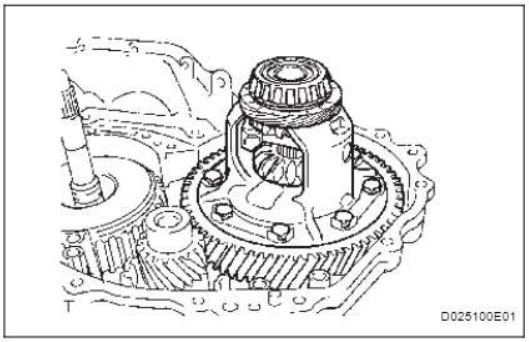
(a) Install the input shaft to the transaxle case.

AX



55. INSTALL OVERDRIVE BRAKE GASKET

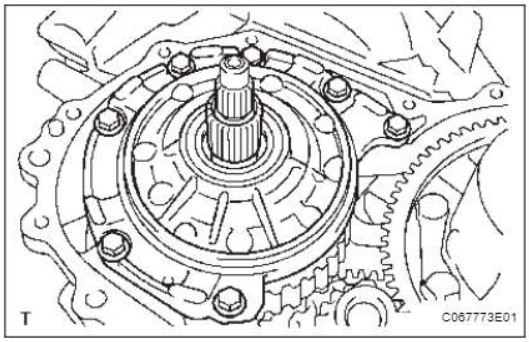
(a) Install 2 new gaskets to the transaxle case.



56. INSTALL DIFFERENTIAL GEAR ASSEMBLY

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

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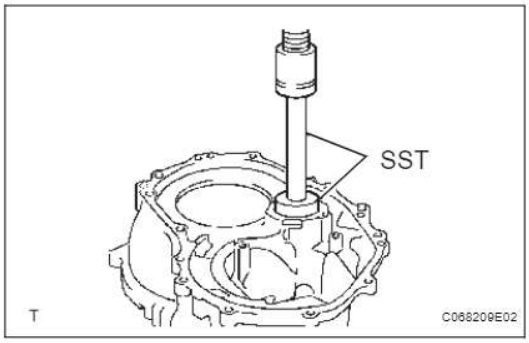


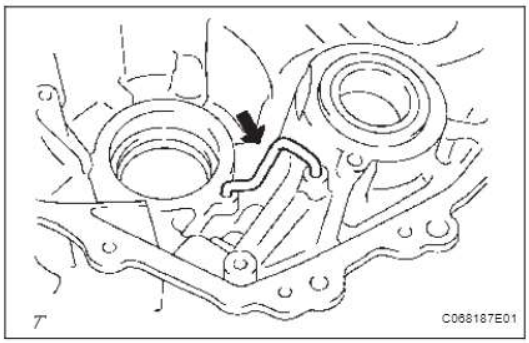
57. **INSTALL OIL PUMP ASSEMBLY**
    (a) Install the oil pump with the 7 bolts.
    Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)

58. **INSPECT INPUT SHAFT ASSEMBLY (See page AX-174)**

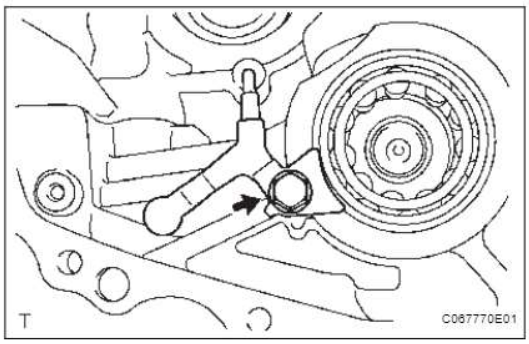
59. **INSPECT INPUT SHAFT END PLAY (See page AX-173)**

60. **INSTALL FRONT DRIVE PINION FRONT TAPERED ROLLER BEARING**
    (a) Install the thrust bearing to the transaxle housing.
    (b) Using SST and a press, press in the cylindrical roller bearing to the transaxle housing.
    SST 09950-60010 (09951-00650), 09950-70010



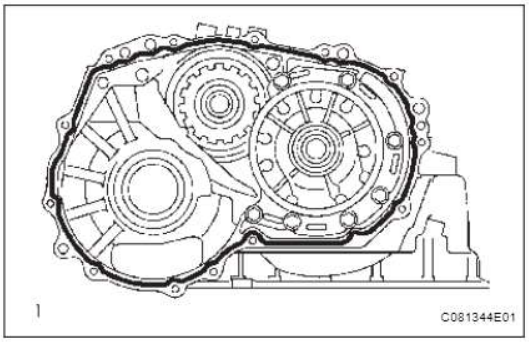


61. **INSTALL DIFFERENTIAL GEAR LUBE APPLY TUBE**



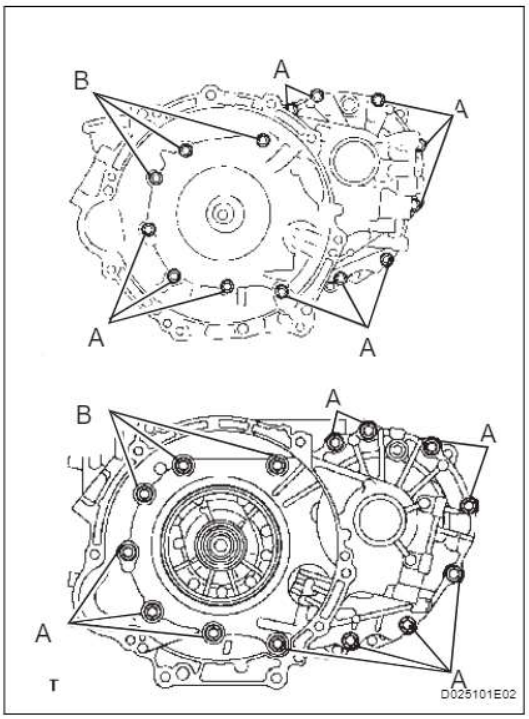
62. **INSTALL BEARING LOCK PLATE**
    (a) Install the bearing lock plate to the transaxle housing with the bolt.
    Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

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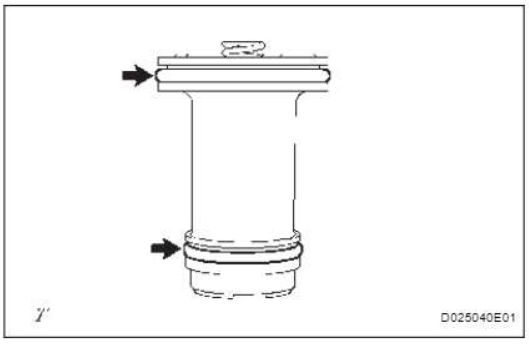


63. INSTALL TRANSAXLE HOUSING

(a) Apply FIPG to the transaxle case.
FIPG:
Part No. 08826-0090, THREE BOND 1281 or equivalent

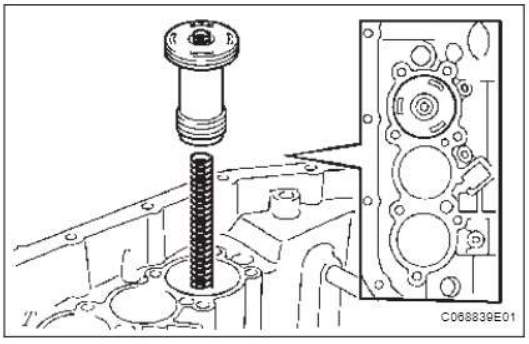


(b) Install the transaxle housing with the 14 bolts.
Torque: 29.4 N*m (300 kgf*cm, 22 ft.*lbf) for bolt A
22.1 N*m (225 kgf*cm, 16 ft.*lbf) for bolt B



64. INSTALL C-2 ACCUMULATOR PISTON

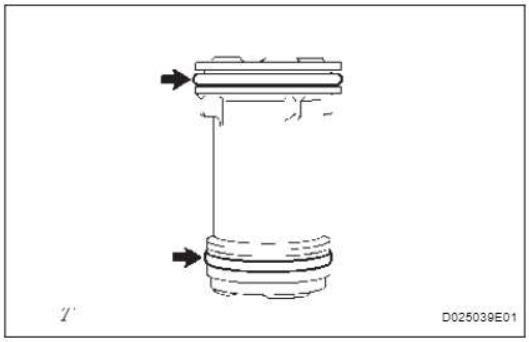
(a) Coat 2 new O-rings with ATF and install them to the C-2 accumulator piston.
NOTICE:
Be careful not to damage the O-rings.



(b) Install the spring and C-2 accumulator piston.
Standard accumulator spring

Spring	Free length / Outer diameter	Color
C-2	66.90 mm (2.6339 in.) / 17.20 mm (0.6772 in.)	-

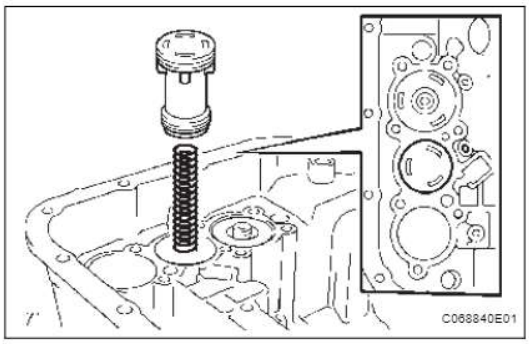
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65. INSTALL C-3 ACCUMULATOR PISTON

(a) Coat 2 new O-rings with ATF and install them to the C-3 accumulator piston.

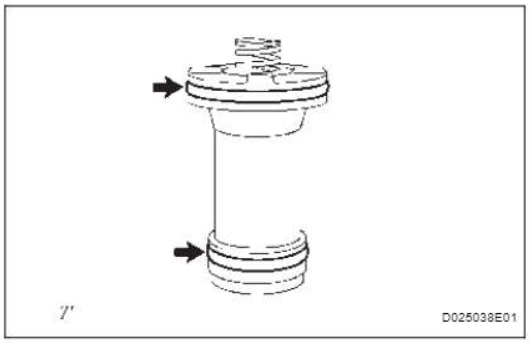
NOTICE:
Be careful not to damage the O-rings.



(b) Install the spring and C-3 accumulator piston.

Standard accumulator spring

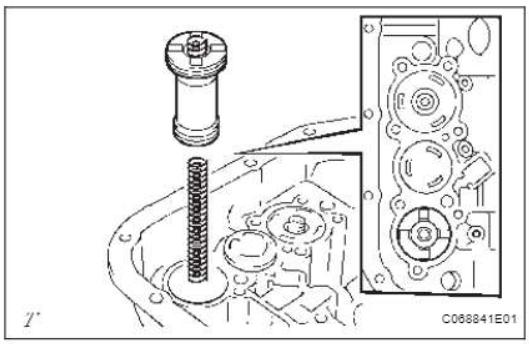
Spring	Free length / Outer diameter	Color
C-3	80.20 mm (3.1575 in.) / 18.70 mm (0.7362 in.)	Blue



66. INSTALL B-2 ACCUMULATOR PISTON

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

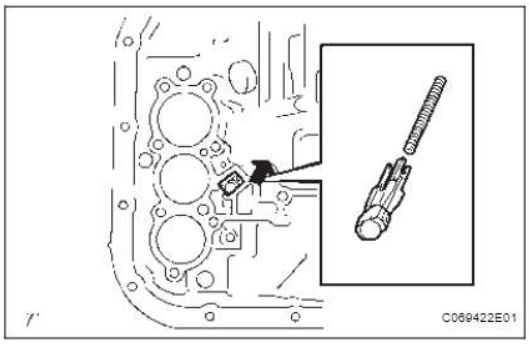
NOTICE:
Be careful not to damage the O-rings.



(b) Install the spring and B-2 accumulator piston.

Standard accumulator spring

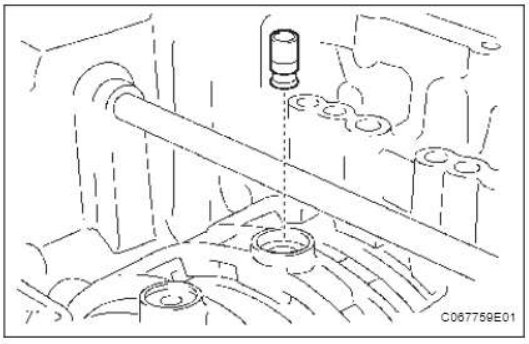
Spring	Free length / Outer diameter	Color
B-2	66.90 mm (2.6339 in.) / 15.50 mm (0.6102 in.)	Green



67. INSTALL CHECK BALL BODY

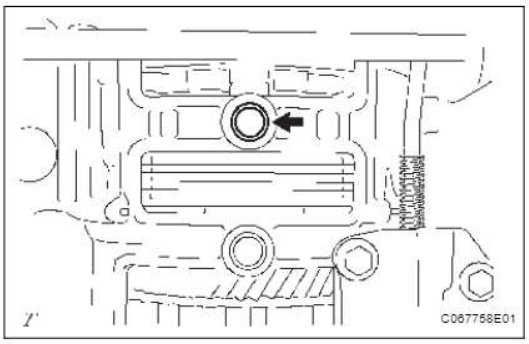
(a) Install the spring and check ball body.

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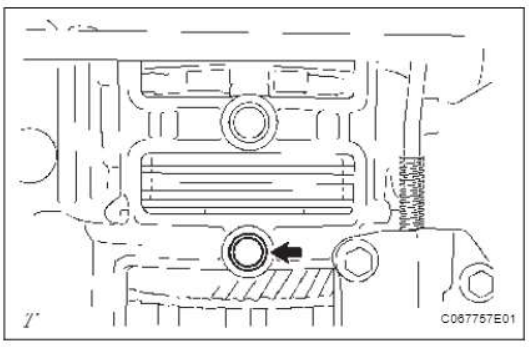
68. INSTALL BRAKE DRUM GASKET

(a) Install a new brake drum gasket.



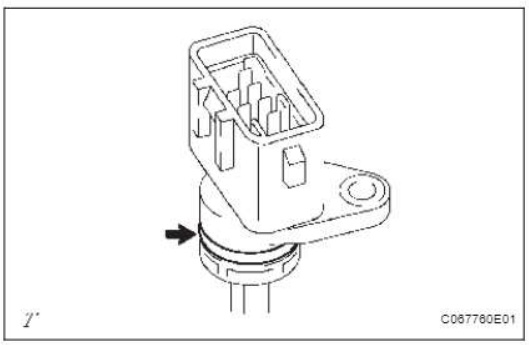
69. INSTALL TRANSAXLE CASE GASKET

(a) Install a new transaxle case gasket.



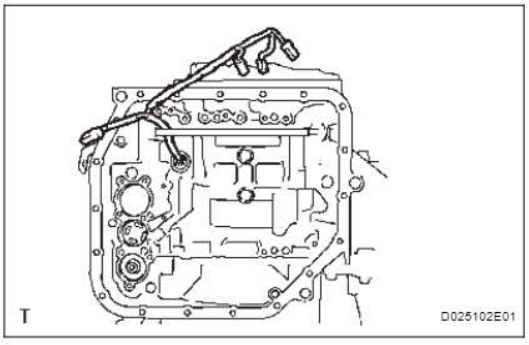
70. INSTALL TRANSAXLE CASE 2ND BRAKE GASKET

(a) Install a new transaxle case 2nd brake gasket.



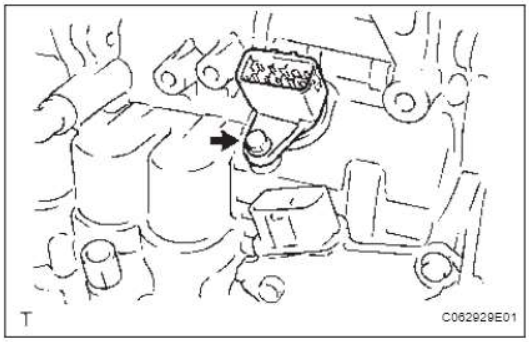
71. INSTALL TRANSMISSION WIRE

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

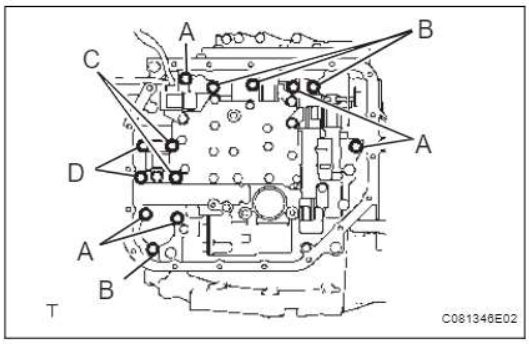


(b) Pass the transmission wire through the transaxle.

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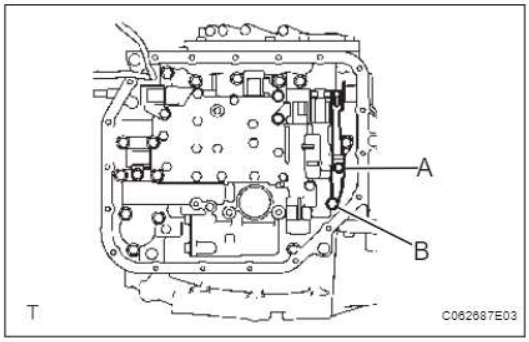


(c) Install the bolt and transmission wire.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



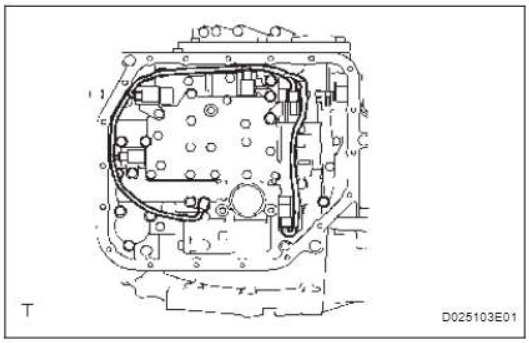
72. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Install the valve body with the 13 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)
HINT:
Bolt length:
32 mm (1.26 in.) for bolt A
22 mm (0.87 in.) for bolt B
55 mm (2.17 in.) for bolt C
45 mm (1.77 in.) for bolt D



(b) Install the detent spring, detent spring cover with the 2 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)
HINT:
Bolt length:
14 mm (0.55 in.) for bolt A
45 mm (1.77 in.) for bolt B

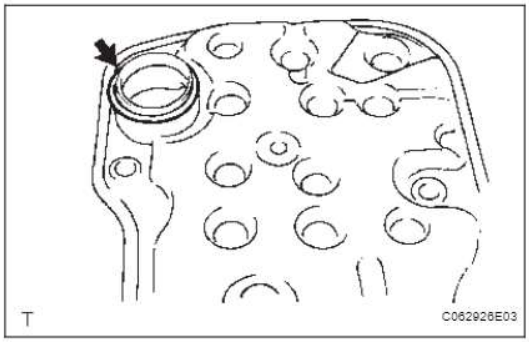
(c) Check that the manual valve lever is touching the center of the detent spring tip roller.



(d) Connect the 5 solenoid connectors.

(e) Coat a new O-ring with ATF, and install it to the ATF temperature sensor.

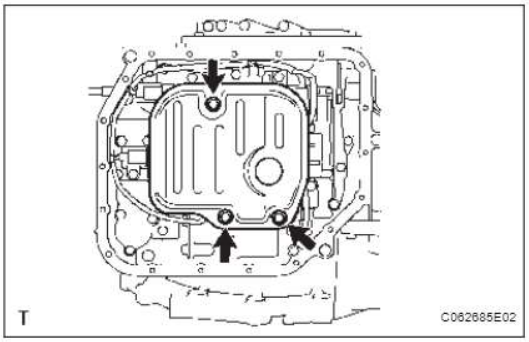
(f) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)
HINT:
Bolt length:
55 mm (2.17 in.)



73. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

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

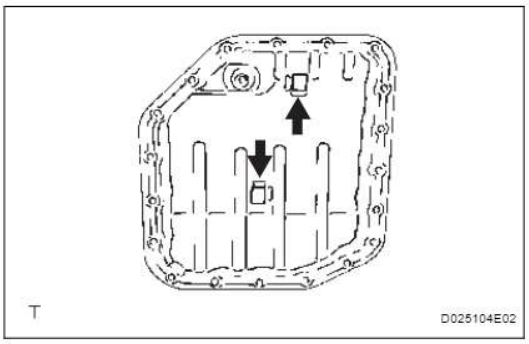
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(b) Install the oil strainer with the 3 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

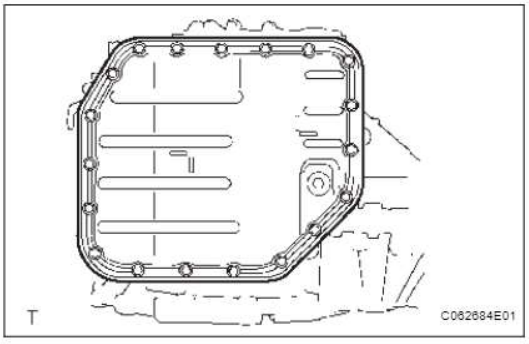
74. INSTALL AUTOMATIC TRANSAXLE OIL PAN GASKET

(a) Install a new gasket to the oil pan.

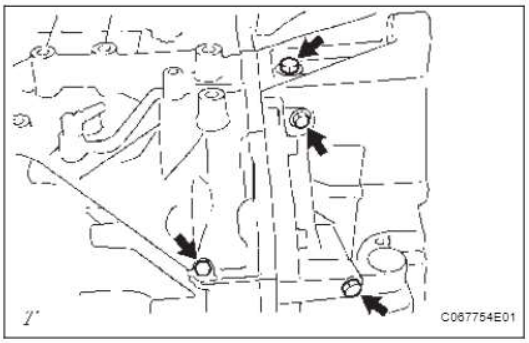


75. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the oil pan.



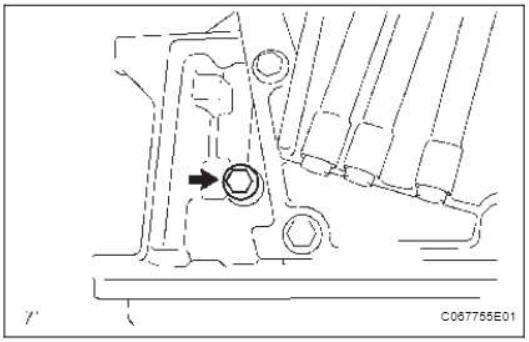
(b) Install the oil pan with the 19 bolts.
Torque: 7.8 N*m (80 kgf*cm, 71 in.*lbf)



76. INSTALL NO. 1 TRANSAXLE CASE PLUG

(a) Coat 5 new O-rings with ATF, and install them to the case plugs.

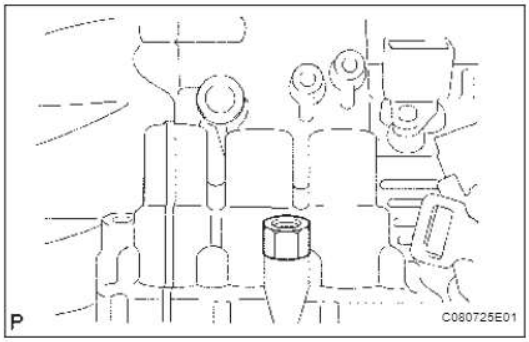
(b) Install the 4 case plugs.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



(c) Install the case plug.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)

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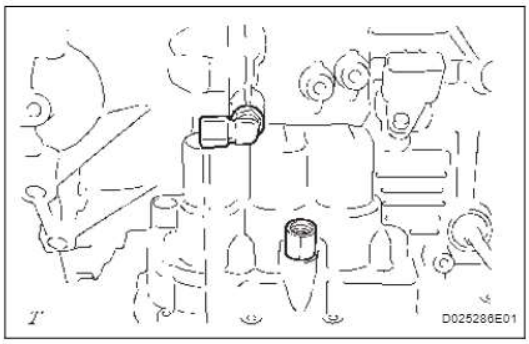


77. INSTALL OIL COOLER TUBE UNION (OUTLET)

(a) Coat 2 new O-rings with ATF, and install them to the union.

(b) Install the union.

Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

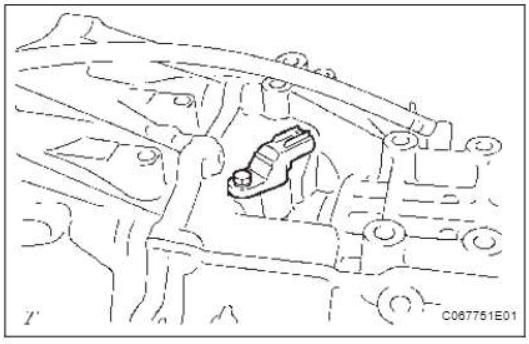


78. INSTALL OIL COOLER TUBE UNION (INLET)

(a) Coat 2 new O-rings with ATF, and install them to the union.

(b) Install the union.

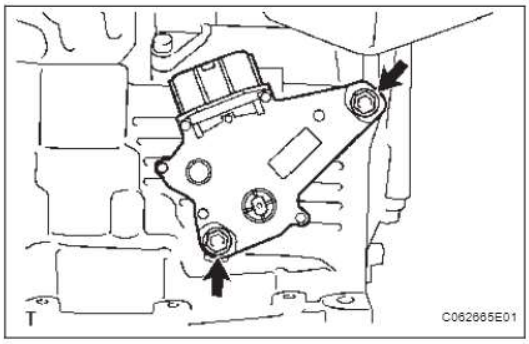
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)



79. INSTALL TRANSMISSION REVOLUTION SENSOR

(a) Install the transmission revolution sensor with the bolt.

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



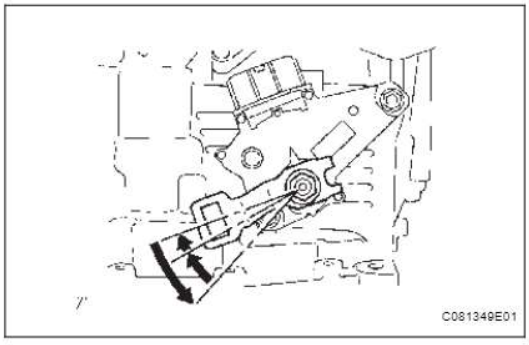
80. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Install the park/neutral position switch onto the manual valve lever shaft and temporarily install the 2 adjusting bolts.

(b) Install a new lock washer with the nut.

Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

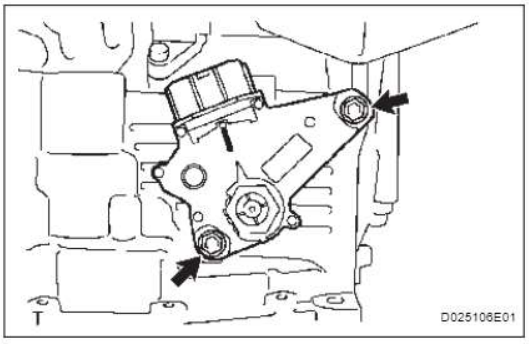
(c) Temporarily install the control shaft lever.



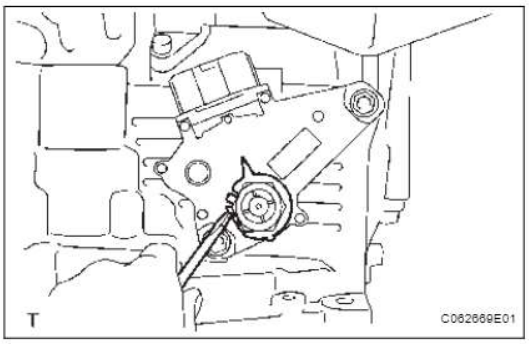
(d) Turn the lever counterclockwise until it stops, and then turn it clockwise 2 notches.

(e) Remove the control shaft lever.

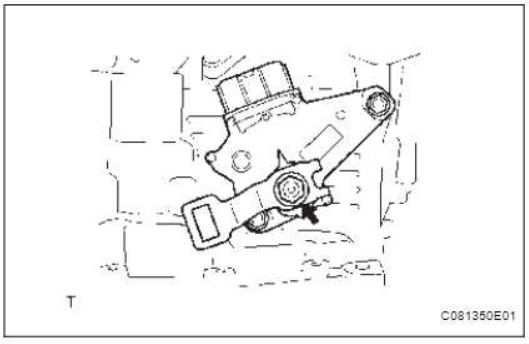
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(f) Align the groove with the neutral basic line.
(g) Tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



(h) Using a screwdriver, stake the nut with the lock washer.



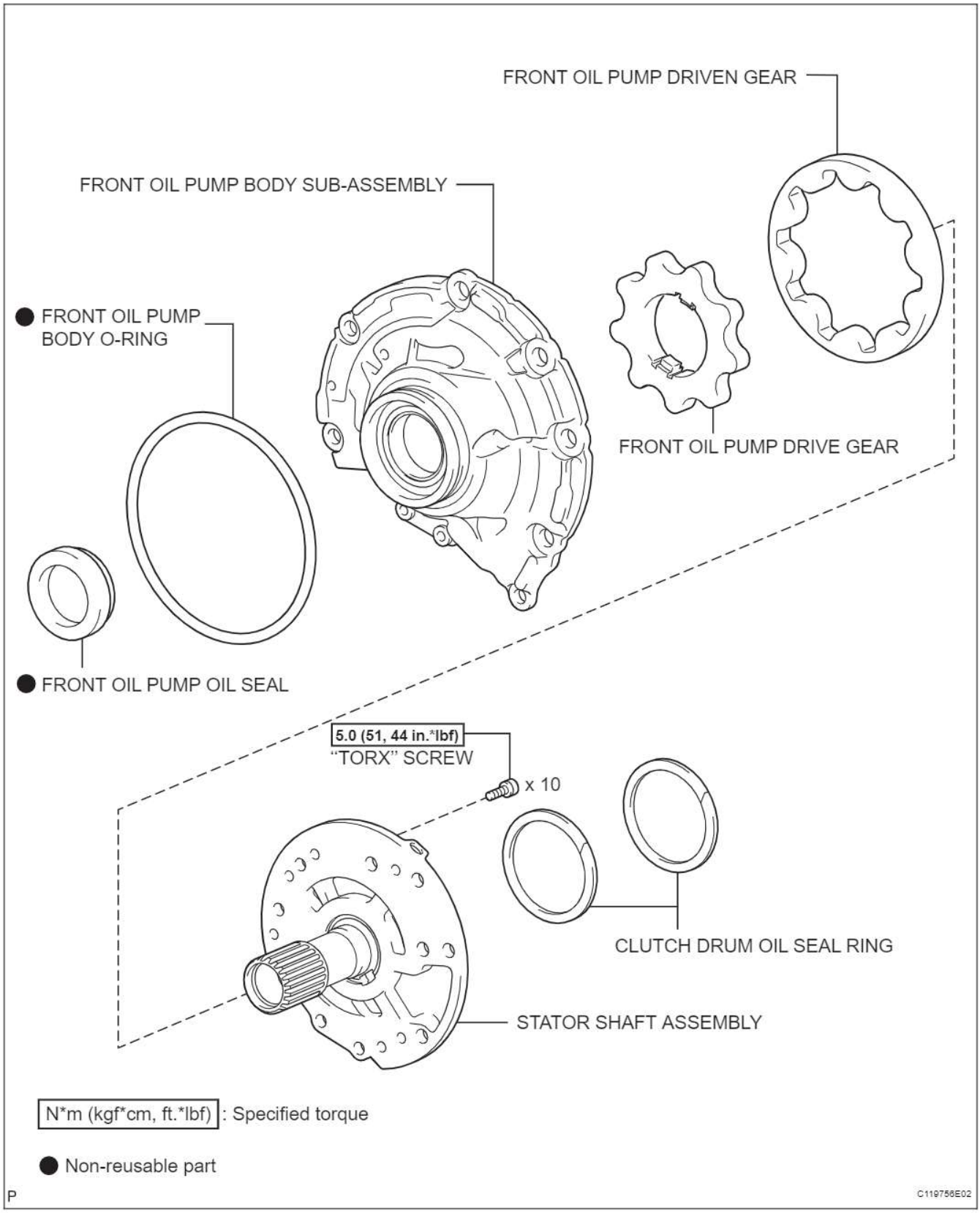
(i) Install the control shaft lever, washer and nut.
Torque: 12.7 N*m (130 kgf*cm, 9 ft.*lbf)

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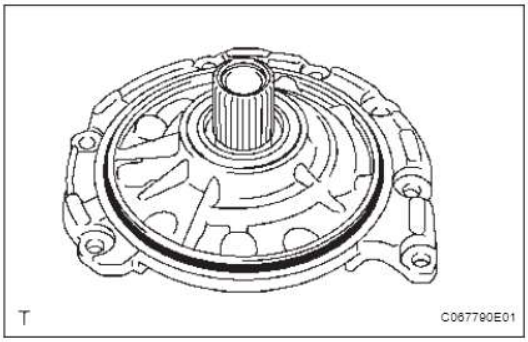
OIL PUMP

COMPONENTS

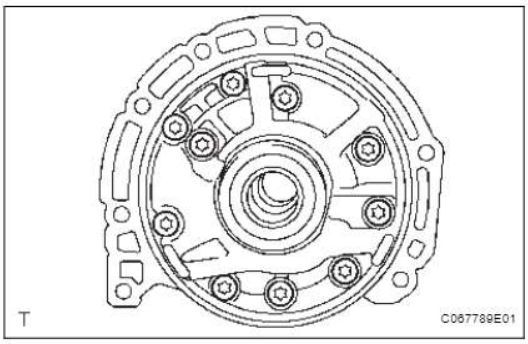


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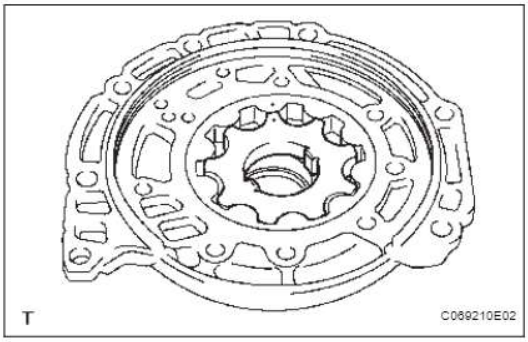
DISASSEMBLY



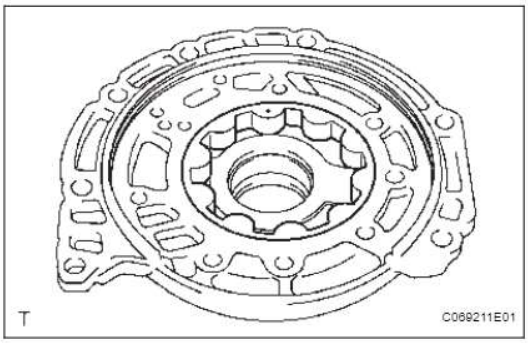
1. **REMOVE FRONT OIL PUMP BODY O-RING**
   (a) Remove the O-ring from the oil pump.
2. **INSPECT STATOR SHAFT ASSEMBLY (See page AX-201)**



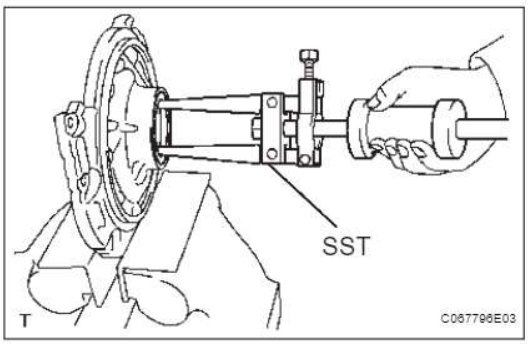
3. **REMOVE STATOR SHAFT ASSEMBLY**
   (a) Using a T30 "torx" socket wrench, remove the 10 screws.
4. **INSPECT CLEARANCE OF OIL PUMP ASSEMBLY (See page AX-201)**



5. **REMOVE FRONT OIL PUMP DRIVE GEAR**
   (a) Remove the front oil pump drive gear from the oil pump body.

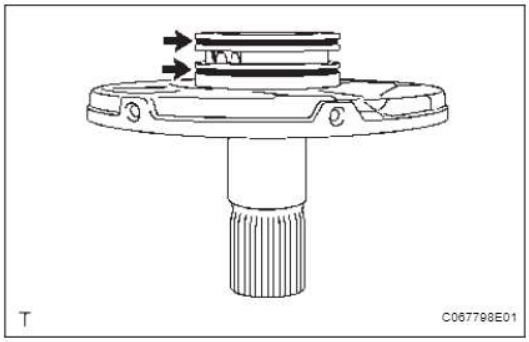


6. **REMOVE FRONT OIL PUMP DRIVEN GEAR**
   (a) Remove the front oil pump driven gear from the oil pump body.



7. **REMOVE FRONT OIL PUMP OIL SEAL**
   (a) Using SST, tap out the oil seal from the oil pump body.
   SST 09308-00010
8. **INSPECT FRONT OIL PUMP BODY SUB-ASSEMBLY (See page AX-202)**

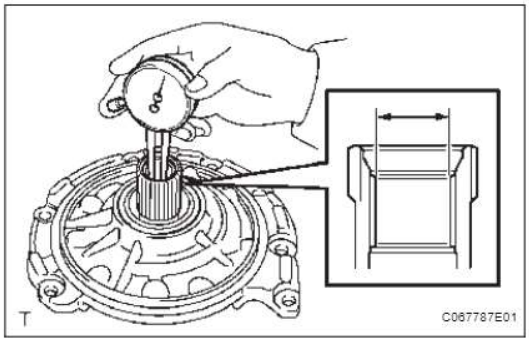
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9. REMOVE CLUTCH DRUM OIL SEAL RING

(a) Using a screwdriver, remove the 2 oil seals from the stator shaft.

INSPECTION

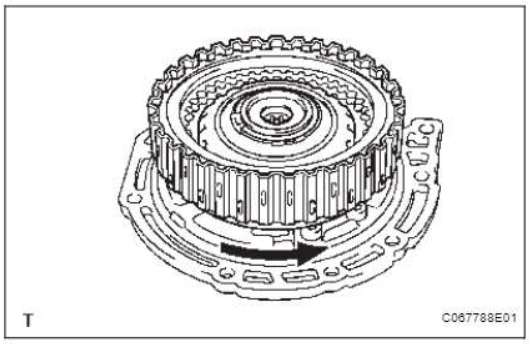


1. INSPECT STATOR SHAFT ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the stator shaft bushings.

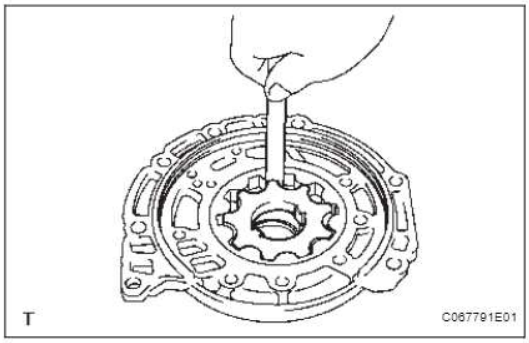
Standard inside diameter:
21.500 to 21.526 mm (0.84646 to 0.84748 in.)
Maximum inside diameter:
21.526 mm (0.84748 in.)

If the inside diameter is greater than the maximum, replace the stator shaft.



(b) Install the input shaft assembly to the stator shaft assembly, check that the input shaft assembly turns smoothly.

NOTICE:
Replace the stator shaft assembly with a new one if rough movement or unusual noise is identified. When replacing, inspect the input shaft's contact surface with the bearing and if any damage or discoloring is found, replace the input shaft with a new one.

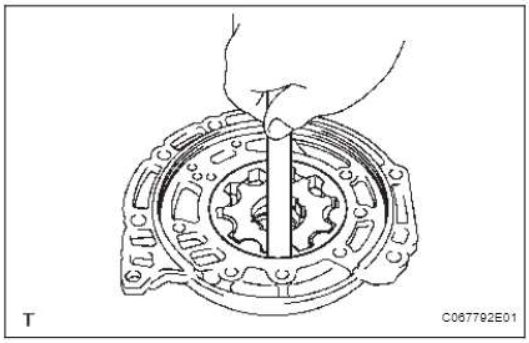


2. INSPECT CLEARANCE OF OIL PUMP ASSEMBLY

(a) Using a feeler gauge, measure the tip clearance between the driven gear teeth and drive gear teeth.

Standard tip clearance:
0.10 to 1.15 mm (0.0039 to 0.0059 in.)
Maximum tip clearance:
0.15 mm (0.0059 in.)

If the tip clearance is greater than the maximum, replace the oil pump body sub-assembly.



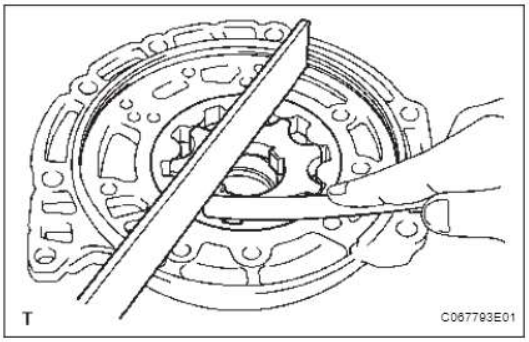
(b) Push the driven gear to one side of the body. Using a feeler gauge, measure the clearance.

Standard body clearance:
0.07 to 0.15 mm (0.0028 to 0.0059 in.)
Maximum body clearance:
0.15 mm (0.0059 in.)

If the body clearance is greater than the maximum, replace the oil pump body sub-assembly.

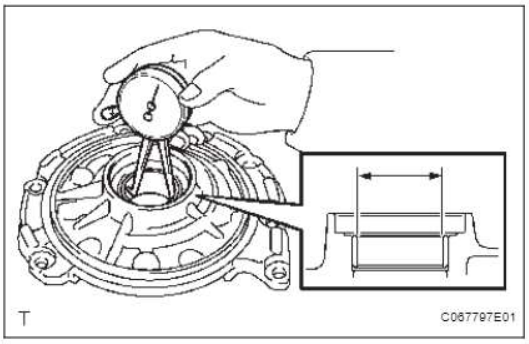
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AX



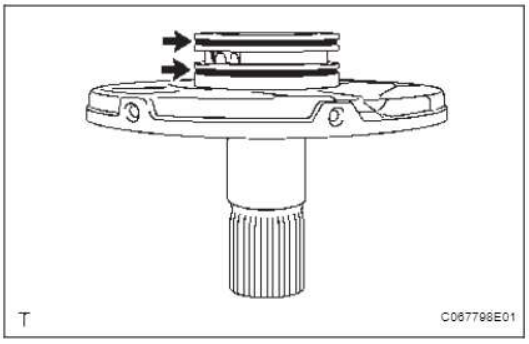
(c) Using a steel straightedge and feeler gauge, measure the side clearance of both gears.
Standard side clearance:
0.02 to 0.05 mm (0.0008 to 0.0020 in.)
Maximum side clearance:
0.05 mm (0.0020 in.)
If the side clearance is greater than the maximum, replace the drive gear, driven gear or pump body.
Standard driven gear thickness

No.	Thickness
1	9.44 to 9.45 mm (0.3709 to 0.3713 in.)
2	9.45 to 9.46 mm (0.3713 to 0.3717 in.)
3	9.46 to 9.47 mm (0.3717 to 0.3721 in.)
4	9.47 to 9.48 mm (0.3721 to 0.3725 in.)
5	9.48 to 9.49 mm (0.3725 to 0.3729 in.)



3. INSPECT FRONT OIL PUMP BODY SUB-ASSEMBLY

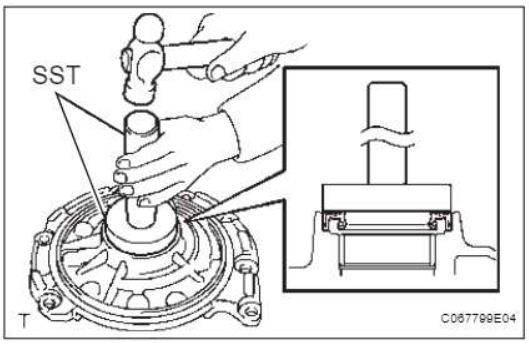
(a) Using a caliper gauge, measure the inside diameter of the oil pump body bushing.
Standard inside diameter:
38.113 to 38.138 mm (1.5005 to 1.5015 in.)
Maximum inside diameter:
38.138 mm (1.5015 in.)
If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.



REASSEMBLY

1. INSTALL CLUTCH DRUM OIL SEAL RING

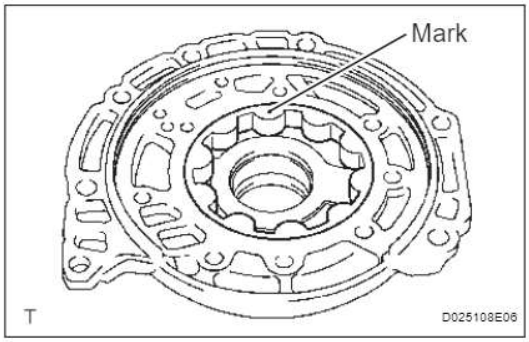
(a) Install the 2 seal rings to the stator shaft assembly.



2. INSTALL FRONT OIL PUMP OIL SEAL

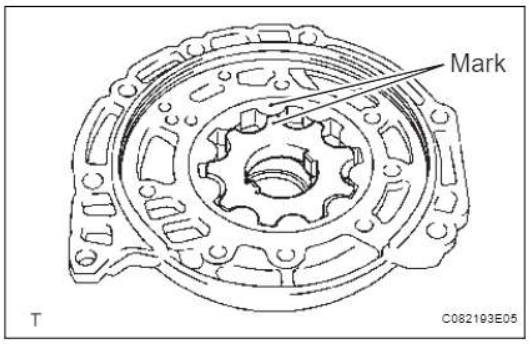
(a) Using SST and a hammer, tap in the oil seal to the oil pump body.
SST 09950-60010 (09951-00550), 09950-70010 (09951-07100)
Standard oil seal depth:
0 +-0.5 mm (0 +-0.020 in.)

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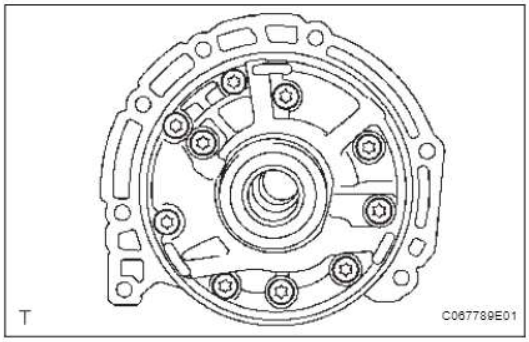
3. INSTALL FRONT OIL PUMP DRIVEN GEAR

(a) Apply ATF to the front oil pump driven gear and install it to the oil pump body with the marked side facing upward.



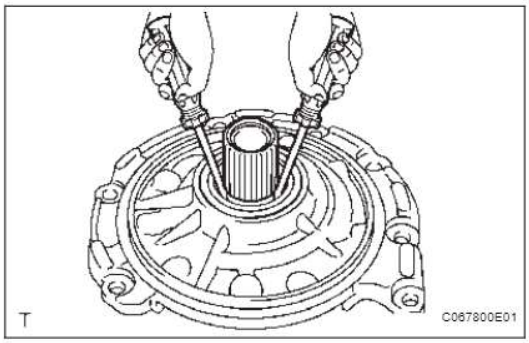
4. INSTALL FRONT OIL PUMP DRIVE GEAR

(a) Apply ATF to the front oil pump drive gear and install it to the oil pump body with the marked side facing upward.



5. INSTALL STATOR SHAFT ASSEMBLY

(a) Using a T30 "torx" socket wrench, install the 10 screws.

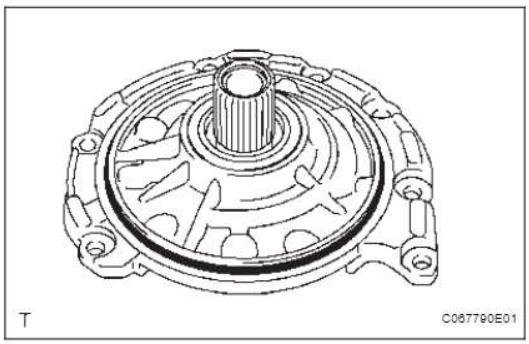


6. INSPECT OIL PUMP ASSEMBLY

(a) Turn the drive gear with 2 screwdrivers and make sure it rotates smoothly.

NOTICE:

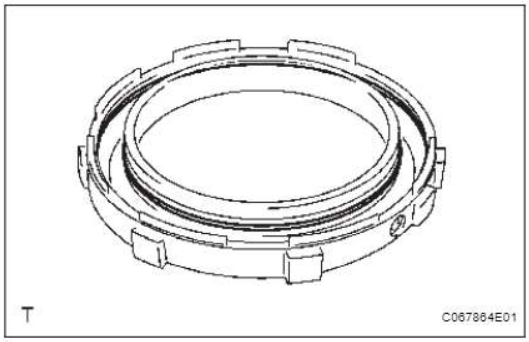
Be careful not to damage the lip of the oil seal.



7. INSTALL FRONT OIL PUMP BODY O-RING

(a) Apply ATF to the O-ring and install it to the oil pump.

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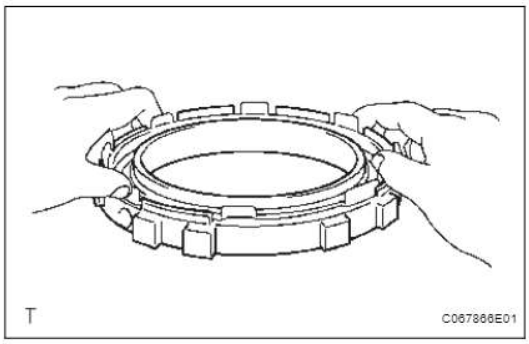
REASSEMBLY

1. INSTALL 2ND BRAKE CYLINDER O-RING

(a) Install 2 new O-rings to the 2nd brake cylinder.

NOTICE:

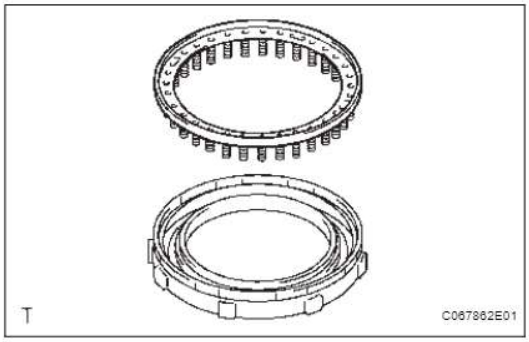
Be careful not to damage the O-rings.



2. INSTALL 2ND BRAKE PISTON

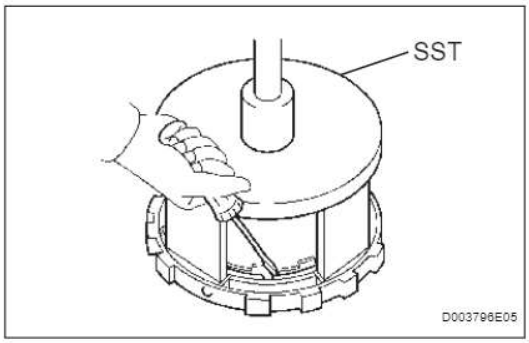
(a) Coat 2 new O-rings with ATF and install them in the 2nd brake cylinder.

(b) Be careful not to damage the O-rings and press in the 2nd brake piston into the 2nd brake cylinder with your hands.



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

(a) Install the piston return spring.



(b) Place SST on the piston return spring, and compress the piston return spring with a press.

SST 09387-00060

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

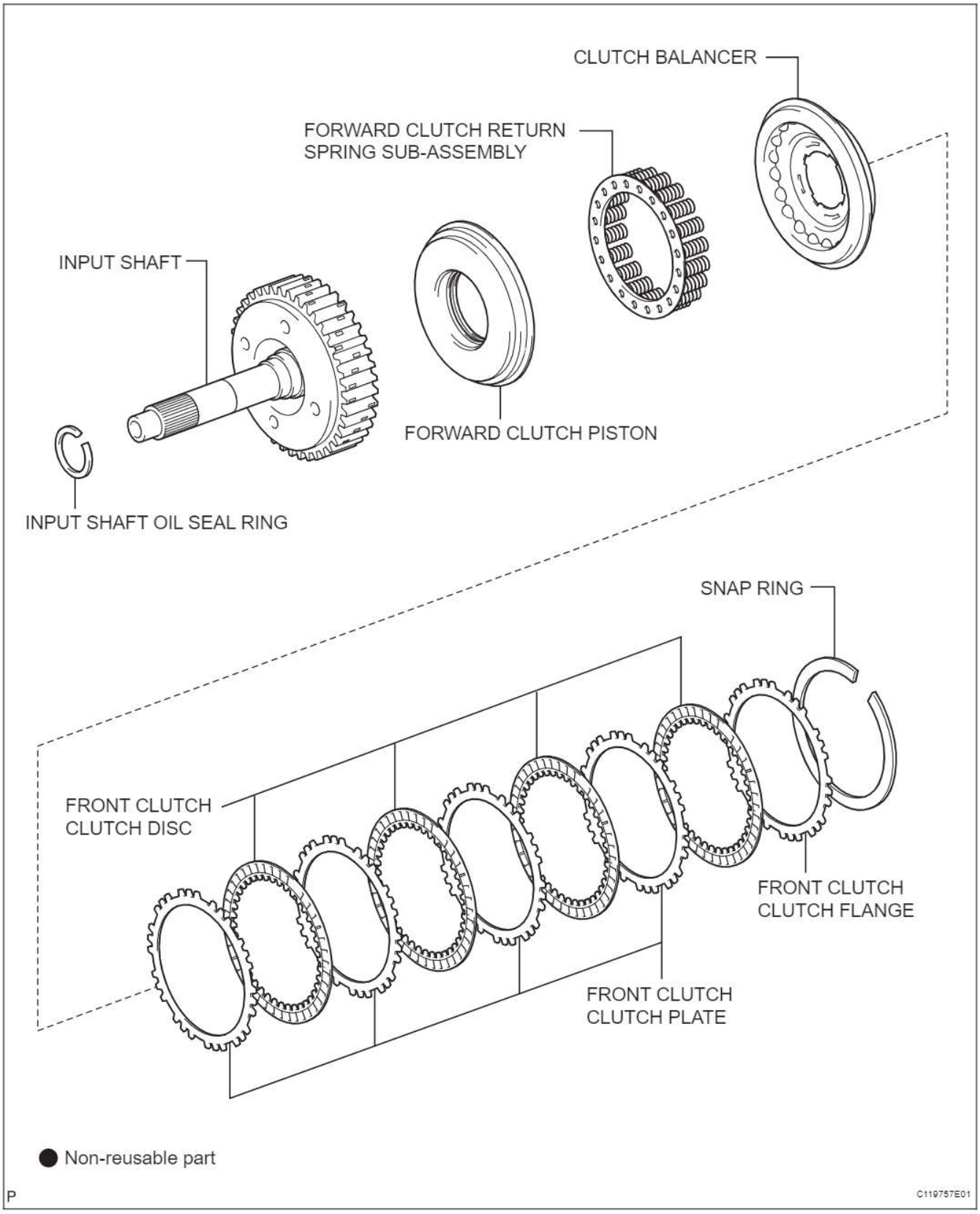
NOTICE:

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

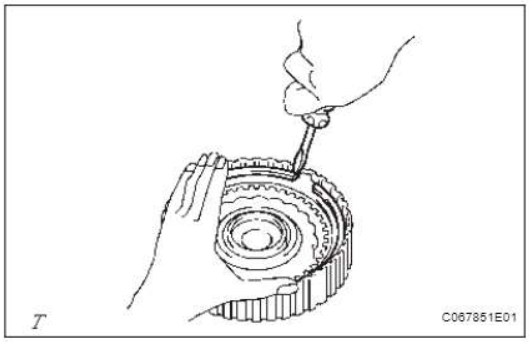
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INPUT SHAFT

COMPONENTS

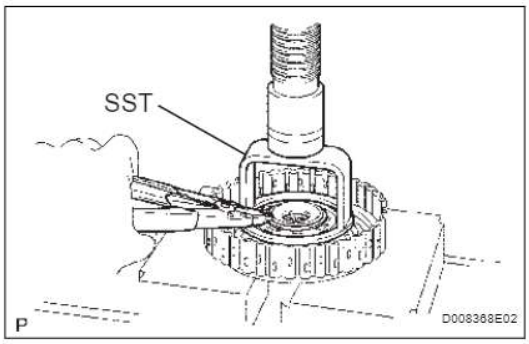


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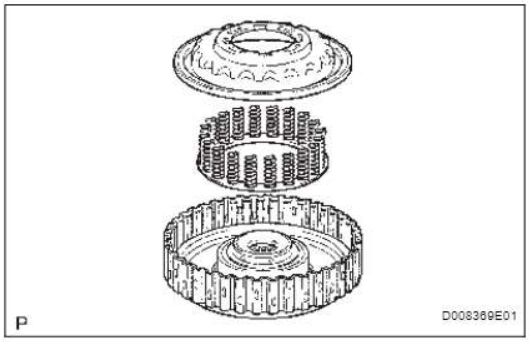


DISASSEMBLY

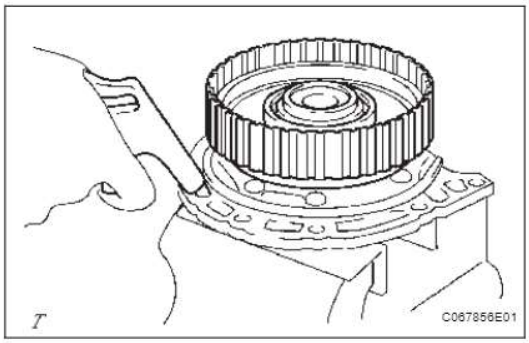
1. **REMOVE FRONT CLUTCH CLUTCH DISC**
   (a) Using a screwdriver, remove the snap ring.
   (b) Remove the flange, 4 discs and 4 plates.
2. **INSPECT FRONT CLUTCH CLUTCH DISC (See page AX-206)**



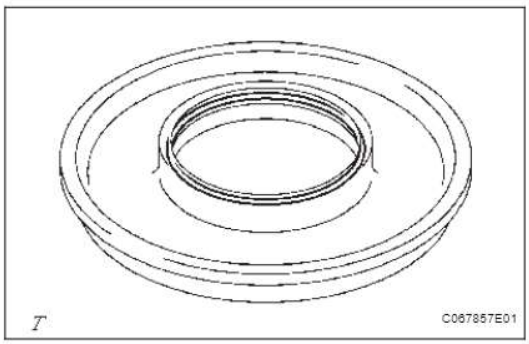
3. **REMOVE FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY**
   (a) Using SST on the clutch balancer, and compress the return spring with a press.
   SST 09320-89010
   NOTICE:
   Do not compress the return spring excessively.
   (b) Using a snap ring expander, remove the snap ring.



   (c) Remove the clutch balancer and piston return spring.
4. **INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY (See page AX-206)**

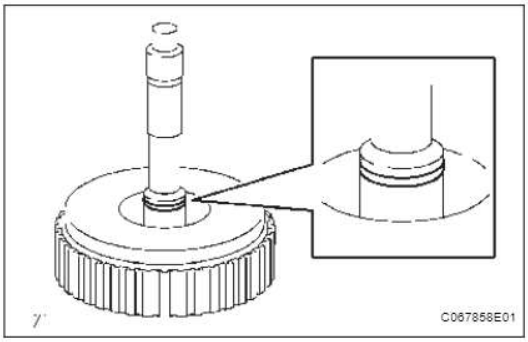


5. **REMOVE FORWARD CLUTCH PISTON**
   (a) Place the input shaft onto the oil pump.
   (b) Holding the forward clutch piston with your hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil pump to remove the forward clutch piston.
   HINT:
   When the piston cannot be removed because it is slanted, either blow air again with the protruding side pushed, or remove the piston using needle nose pliers with vinyl tape on its tip.

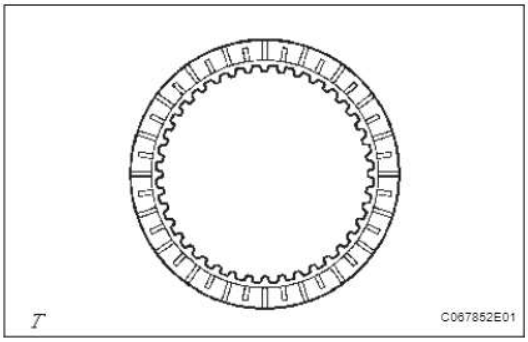


6. **REMOVE FORWARD CLUTCH PISTON O-RING**
   (a) Using a screwdriver, remove the O-ring.

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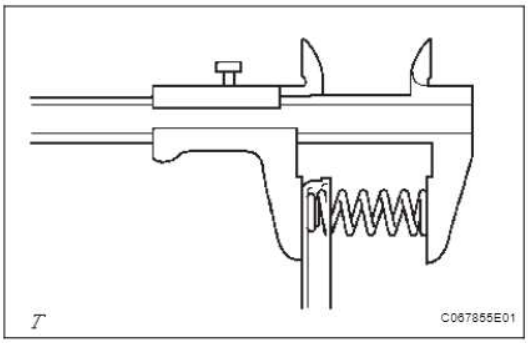


7. **REMOVE INPUT SHAFT OIL SEAL RING**
   (a) Using a screwdriver, remove the oil seal ring from the input shaft.



INSPECTION

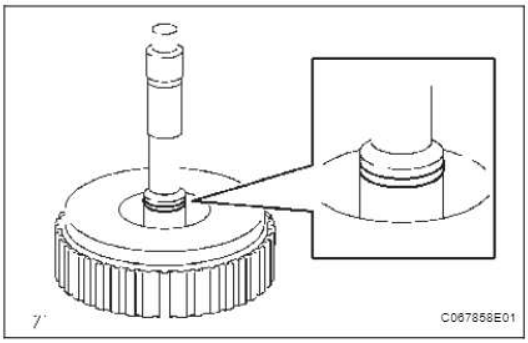
1. **INSPECT FRONT CLUTCH CLUTCH DISC**
   (a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
   HINT:
   - If the lining of the disc is peeling off or discolored, or even if a part of the printed number is defaced, replace all discs.
   - Before assembling new discs, soak them in ATF for at least 15 minutes.



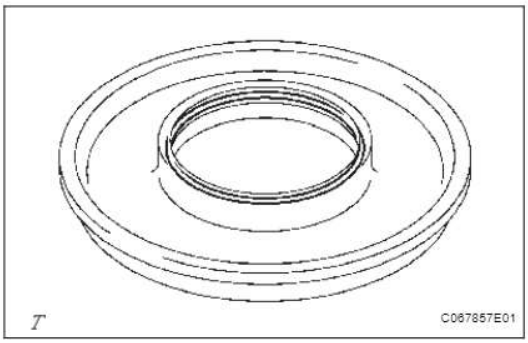
2. **INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY**
   (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
   Standard free length:
   21.69 mm (0.8540 in)

AX

REASSEMBLY

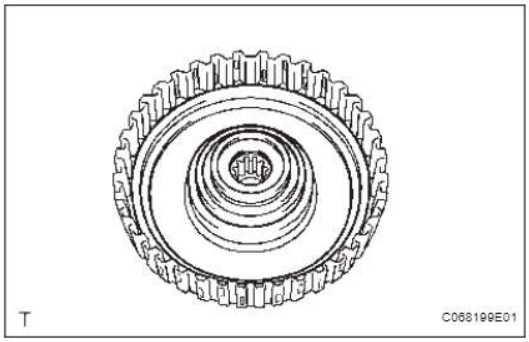


1. **INSTALL INPUT SHAFT OIL SEAL RING**
   (a) Coat a new oil seal ring with ATF, and install it to the input shaft.



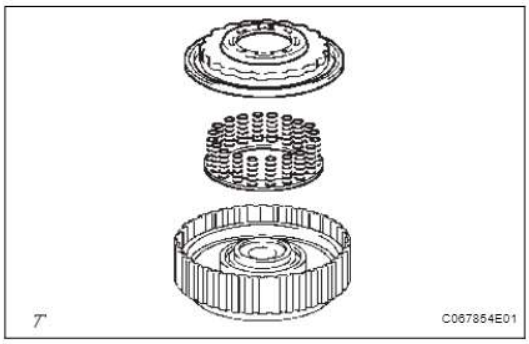
2. **INSTALL FORWARD CLUTCH PISTON O-RING**
   (a) Coat a new O-ring with ATF, and install it to the forward clutch piston.

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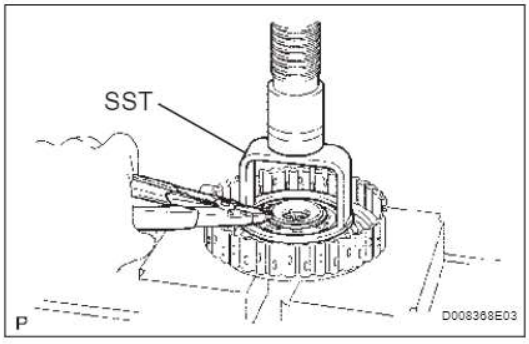
3. INSTALL FORWARD CLUTCH PISTON

(a) Install the forward clutch piston to the input shaft.
NOTICE:
Be careful not to damage the O-ring.

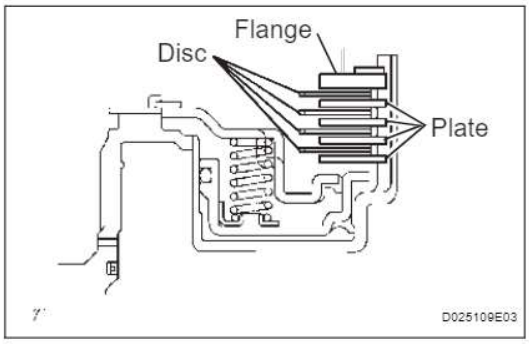


4. INSTALL FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Install the clutch balancer and return spring to the input shaft.

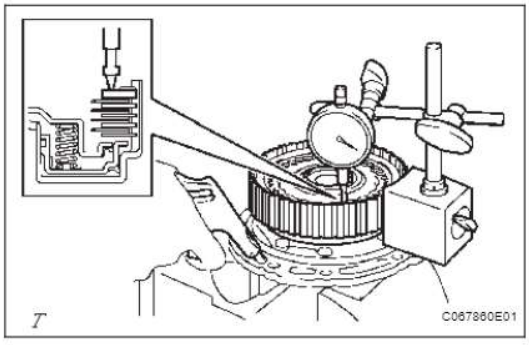


(b) Using SST, a press and snap ring pliers, install the snap ring to the forward clutch return spring.
SST 09320-89010



5. INSTALL FRONT CLUTCH CLUTCH DISC

(a) Install the 4 plates, 4 discs and flange.
(b) Using a screwdriver, install the snap ring.



6. INSPECT PACK CLEARANCE OF FORWARD CLUTCH

(a) Using a dial indicator, measure the pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).
Standard pack clearance:
1.406 to 1.806 mm (0.05535 to 0.07110 in.)
If the pack clearance is less than the limit, parts may have been assembled incorrectly. Check and reassemble.

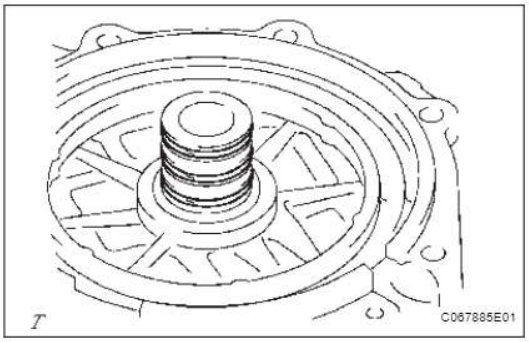
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If the clearance is non-standard, select another flange.

Standard flange thickness

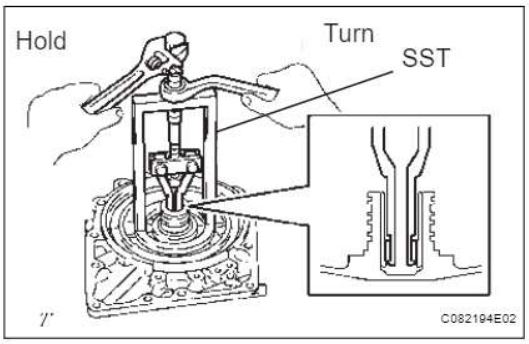
No.	Thickness	No.	Thickness
-	3.00 mm (0.1181 in.)	2	3.40 mm (0.1339 in.)
1	3.20 mm (0.1260 in.)	3	3.60 mm (0.1417 in.)

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6. REMOVE CLUTCH DRUM OIL SEAL RING

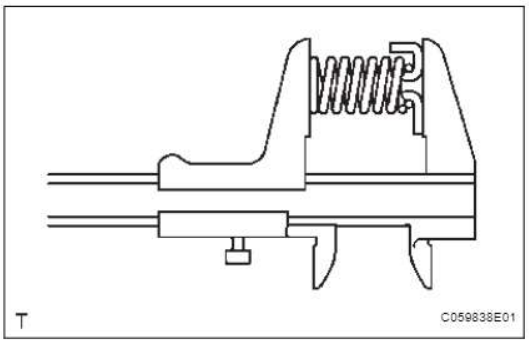
(a) Remove the 3 oil seal rings.



7. REMOVE TRANSAXLE REAR COVER NEEDLE ROLLER BEARING

(a) Using SST, remove the bearing.
SST 09387-00041 (09387-01021)

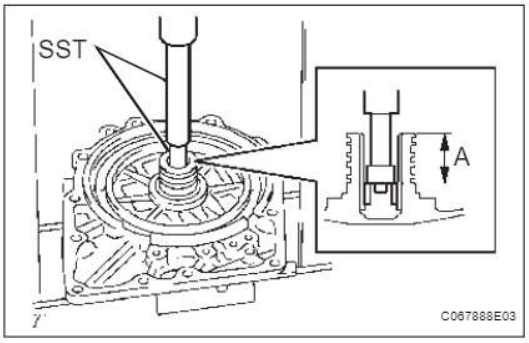
INSPECTION



1. INSPECT OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

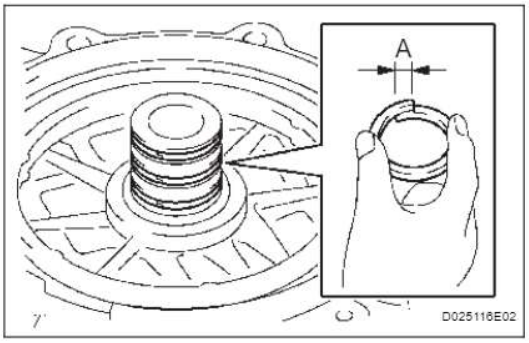
(a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
Standard free length:
17.88 mm (0.7039 in.)

REASSEMBLY



1. INSTALL TRANSAXLE REAR COVER NEEDLE ROLLER BEARING

(a) Using SST and a press, press in the new bearing to the transaxle rear cover.
SST 09950-60010 (09951-00190, 09952-06010), 09950-70010 (09951-07100)
Standard clearance A:
25.2 mm (0.992 in.)

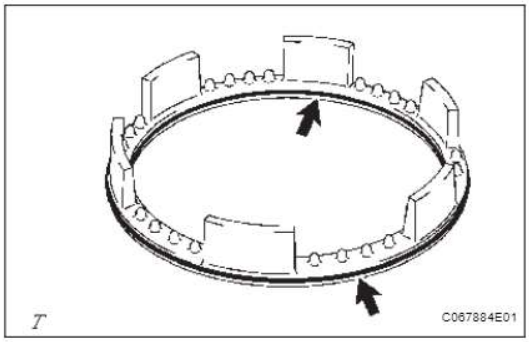


2. INSTALL CLUTCH DRUM OIL SEAL RING

(a) Compress the oil seal ring from both sides to reduce dimension A.
Standard dimension A:
5.0 mm (0.197 in.)

(b) Coat the oil seal ring with ATF and install it to the transaxle rear cover.

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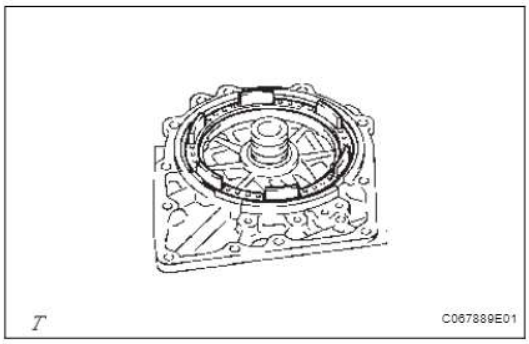


3. INSTALL 2ND COAST AND OVERDRIVE O-RING

(a) Coat 2 new O-rings with ATF, and install them to the transaxle rear cover.

NOTICE:

Be careful not to damage the lip of the oil seal.

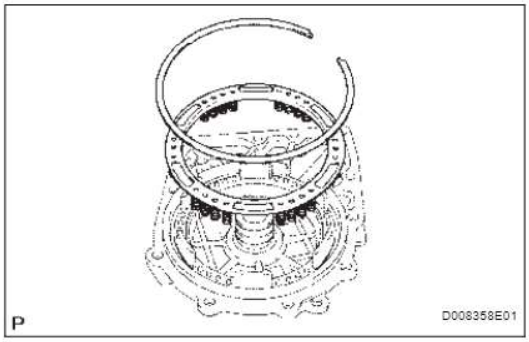


4. INSTALL 2ND COAST AND OVERDRIVE BRAKE PISTON

(a) Coat the piston with ATF, and install it to the transaxle rear cover.

NOTICE:

Be careful not to damage the lip of the oil seal.



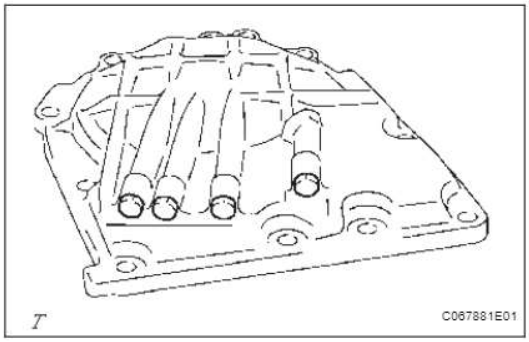
5. INSTALL OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using SST and a press, press in the overdrive brake return spring and snap ring to the transaxle rear cover.

SST 09387-00070

NOTICE:

Stop the press when the overdrive brake piston is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, preventing the overdrive brake piston from being deformed.



6. INSTALL TRANSAXLE REAR COVER PLUG

(a) Install 4 new O-rings and the 4 cover plugs to the transaxle rear cover.

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

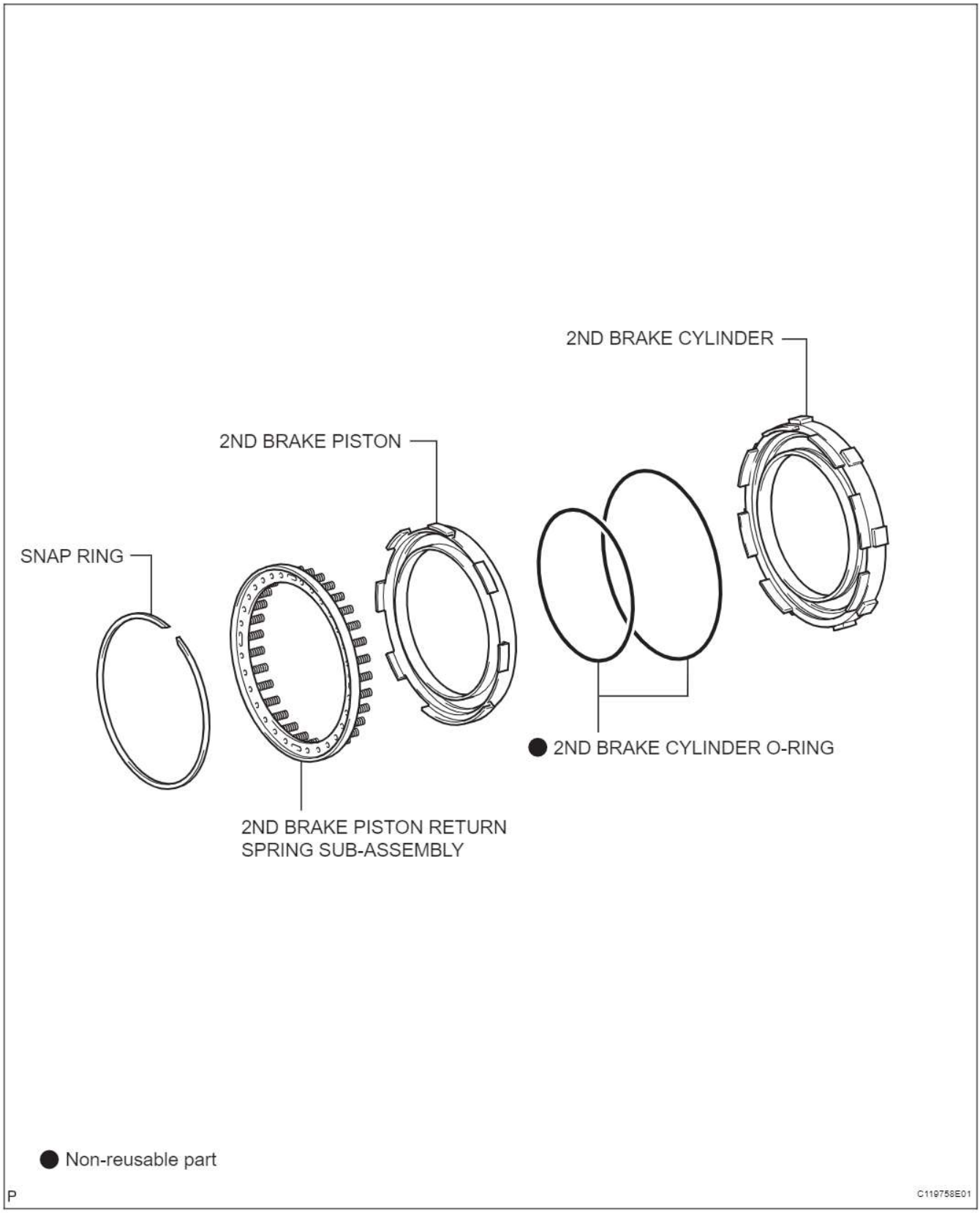
NOTICE:

Be careful not to damage the lip of the oil seal.

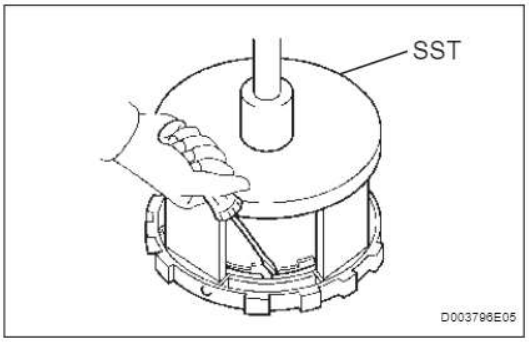
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SECOND BRAKE PISTON

COMPONENTS

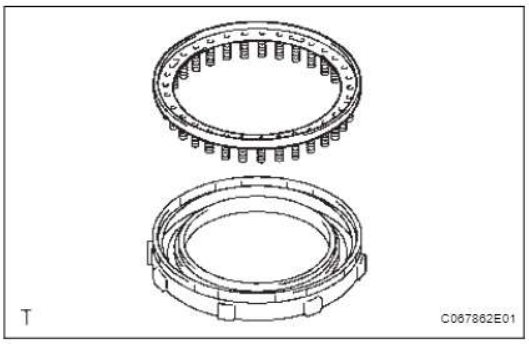


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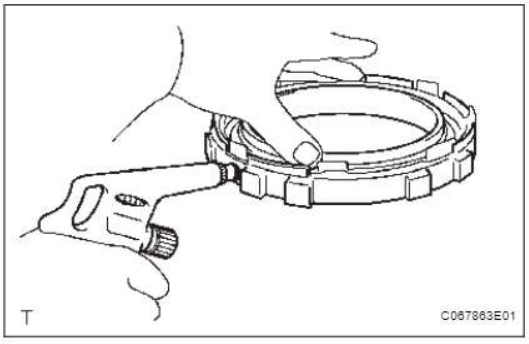
DISASSEMBLY

1. **REMOVE 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY**
   (a) Place SST on the piston return spring and compress the piston return spring with a press.
   SST 09387-00060
   (b) Using a screwdriver, remove the snap ring.

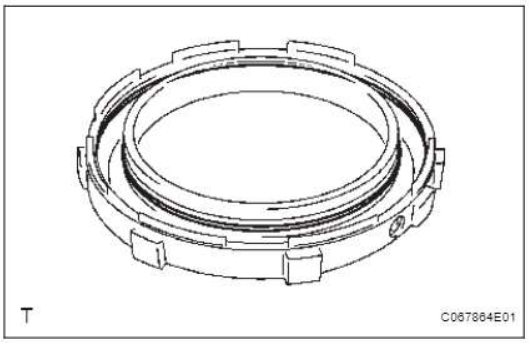


   (c) Remove the piston return spring from the 2nd brake cylinder.

2. **INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY (See page AX-210)**

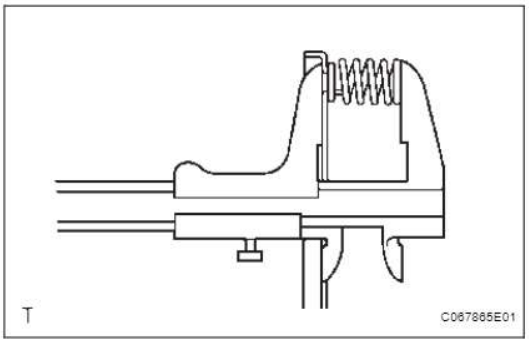


3. **REMOVE 2ND BRAKE PISTON**
   (a) Hold the 2nd brake piston and apply compressed air (392 kPa,4.0 kgf/cm^2, 57 psi) to the 2nd brake cylinder to remove the 2nd brake piston.



4. **REMOVE 2ND BRAKE CYLINDER O-RING**
   (a) Using a screwdriver, remove the 2 O-rings from the 2nd brake cylinder.

INSPECTION

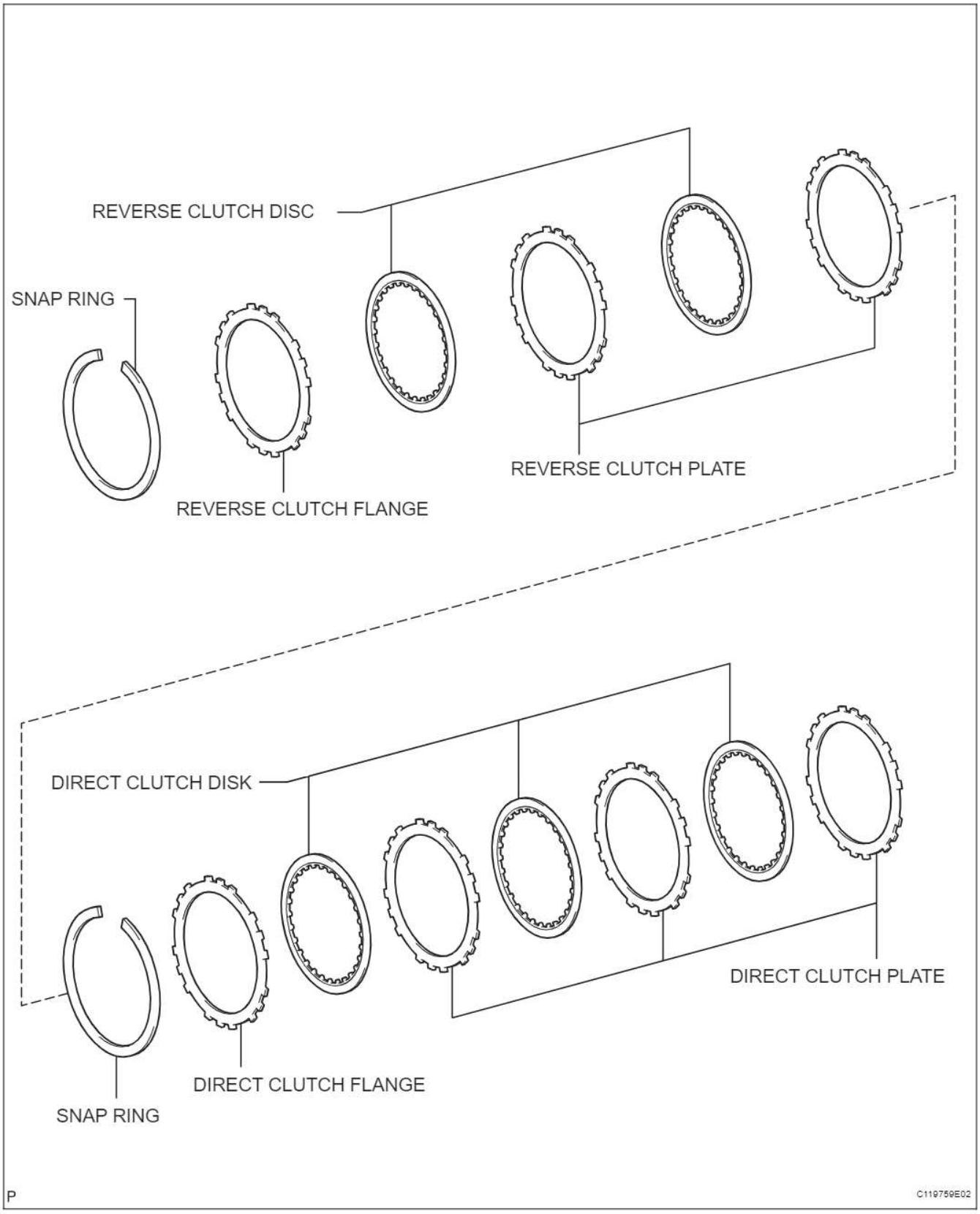


1. **INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY**
   (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
   Standard free length:
   14.65 mm (0.5768 in.)

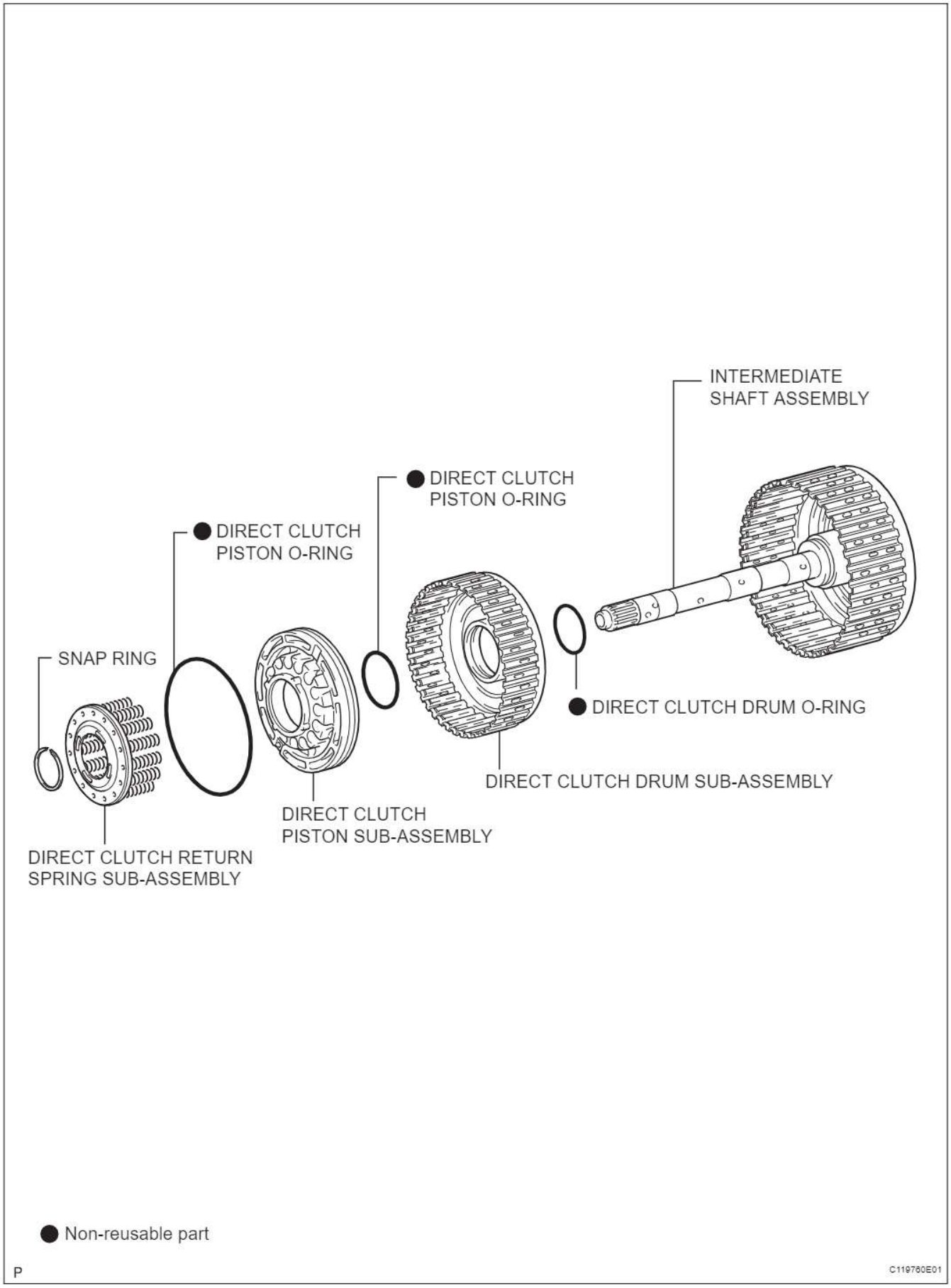
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INTERMEDIATE SHAFT

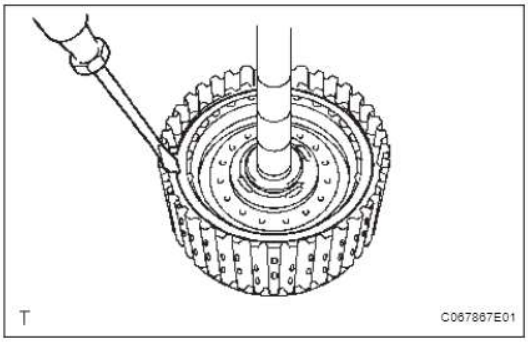
COMPONENTS



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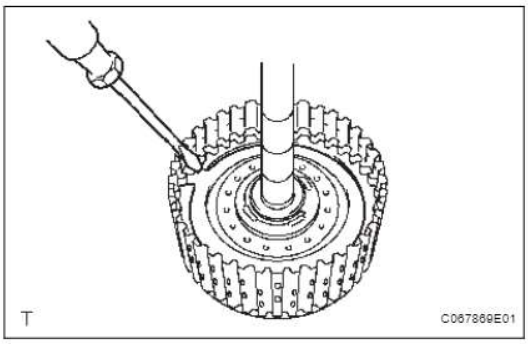


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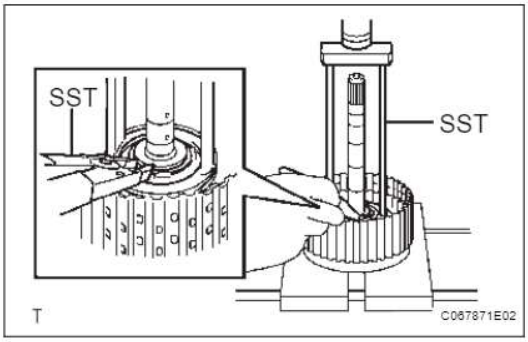


DISASSEMBLY

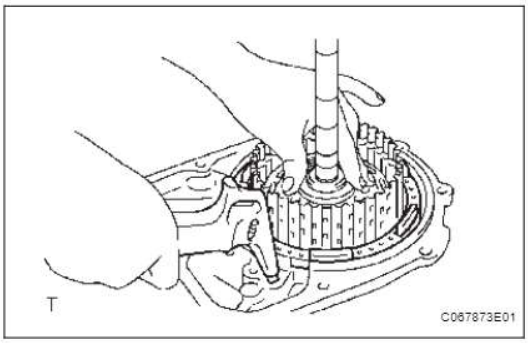
1. **REMOVE REVERSE CLUTCH DISC**
   (a) Using a screwdriver, remove the snap ring.
   (b) Remove the flange, 2 discs and 2 plates.
2. **INSPECT REVERSE CLUTCH DISC (See page AX-215)**



3. **REMOVE DIRECT CLUTCH DISK**
   (a) Using a screwdriver, remove the snap ring.
   (b) Remove the 3 plates, flange and 3 discs.
4. **INSPECT DIRECT CLUTCH DISK (See page AX-215)**



5. **REMOVE DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY**
   (a) Using SST and a press, remove the snap ring and direct clutch return spring from the intermediate shaft.
6. **INSPECT DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY (See page AX-216)**

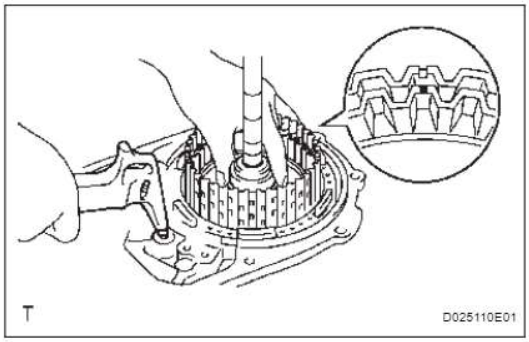


7. **REMOVE DIRECT CLUTCH PISTON SUB-ASSEMBLY**
   (a) Install the direct and reverse clutch on the transaxle rear cover.
   (b) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle rear cover to remove the direct clutch drum and direct clutch piston.
   NOTICE:
   - **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
   - **Take care not to splash ATF when blowing air.**

   HINT:
   When the piston cannot be removed because it is slanted, either blow air again with the protruding side pushed, or remove the piston using needle nose pliers with vinyl tape on its tip.
8. **INSPECT DIRECT CLUTCH PISTON SUB-ASSEMBLY (See page AX-216)**

AX

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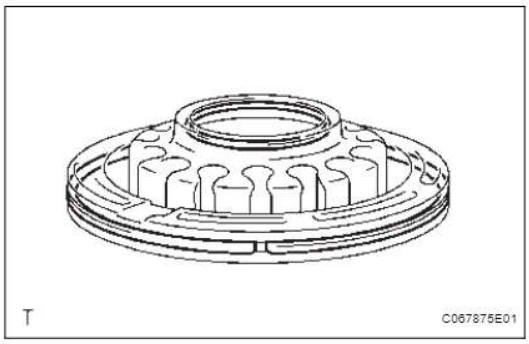


9. REMOVE DIRECT CLUTCH DRUM SUB-ASSEMBLY

(a) Put a matchmark on the direct clutch drum at the same position with the cutout of the intermediate shaft.

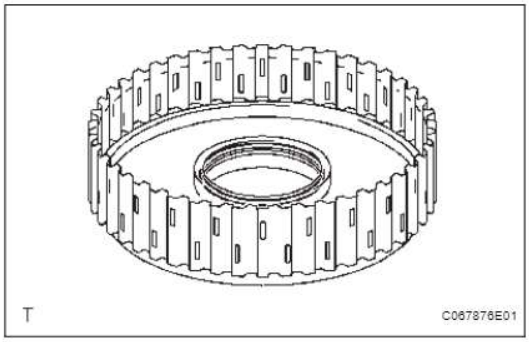
(b) Apply compressed air into the oil hole shown in the illustration and remove the direct clutch drum from the intermediate shaft.

10. INSPECT INTERMEDIATE SHAFT SUB-ASSEMBLY
(See page AX-216)



11. REMOVE DIRECT CLUTCH PISTON O-RING

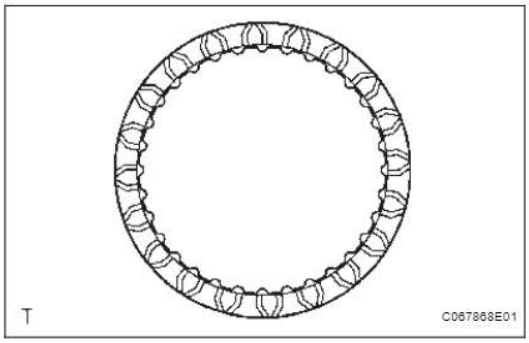
(a) Using a screwdriver, remove the 2 O-rings.



12. REMOVE DIRECT CLUTCH DRUM O-RING

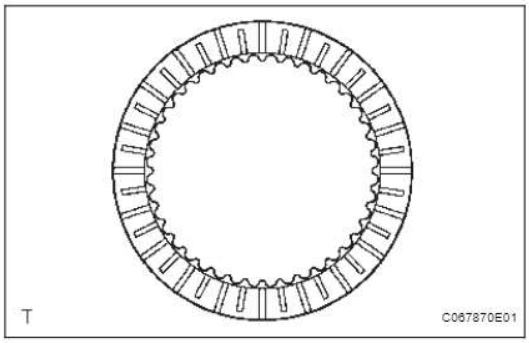
(a) Using a screwdriver, remove the 2 O-rings.

INSPECTION



1. INSPECT REVERSE CLUTCH DISC

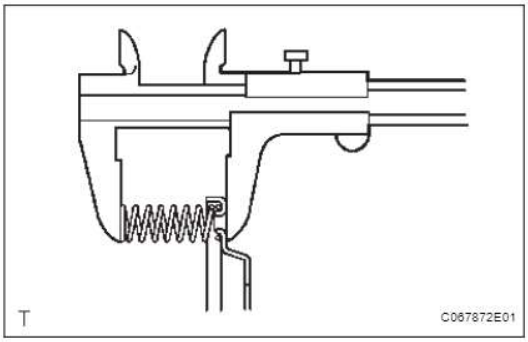
(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



2. INSPECT DIRECT CLUTCH DISK

(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

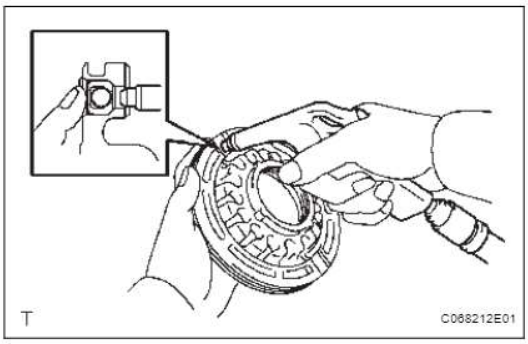
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3. INSPECT DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

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

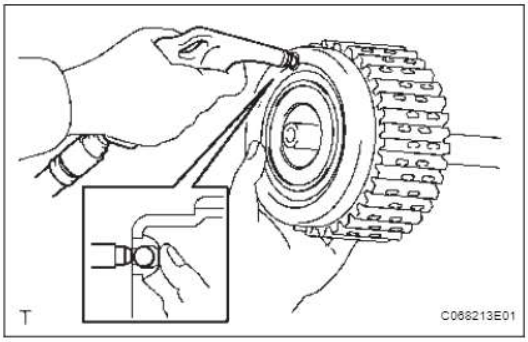
Standard free length:
32.9 mm (1.2953 in.)



4. INSPECT DIRECT CLUTCH PISTON SUB-ASSEMBLY

(a) Shake the direct clutch pin and check that a check ball is not stuck.

(b) Apply low pressure air to the check ball with compressed air and check that no air leak is identified.



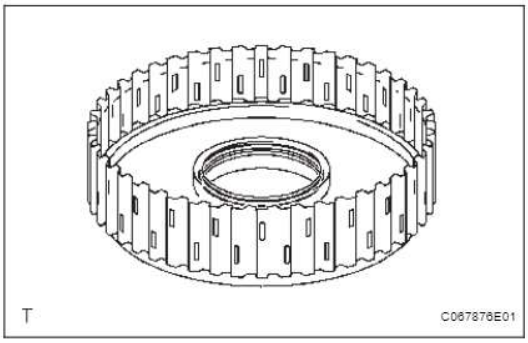
5. INSPECT INTERMEDIATE SHAFT SUB-ASSEMBLY

(a) Shake the direct clutch pin and check that a check ball is not stuck.

(b) Apply low pressure compressed air to the check ball and check that no air leak is identified.

AX

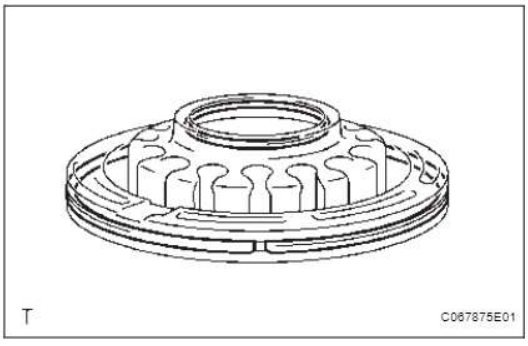
REASSEMBLY



1. INSTALL DIRECT CLUTCH DRUM O-RING

(a) Coat the 2 O-rings with ATF, and install it to the direct clutch drum.

NOTICE:
Be careful not to damage the O-rings.



2. INSTALL DIRECT CLUTCH PISTON O-RING

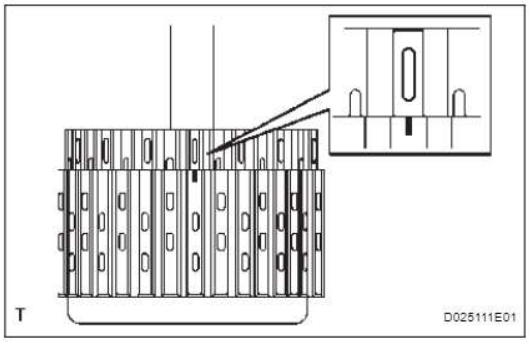
(a) Coat the 2 O-rings with ATF, and install it to the direct clutch piston.

NOTICE:
Be careful not to damage the O-rings.

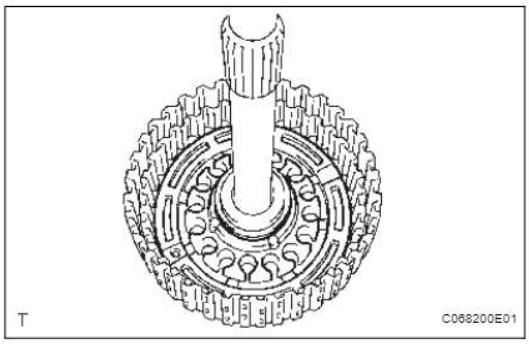
3. INSTALL DIRECT CLUTCH DRUM SUB-ASSEMBLY

(a) Coat the direct clutch drum with ATF.

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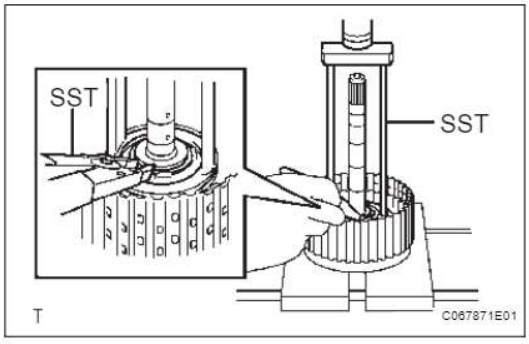


(b) Aligning the cutout in the intermediate shaft with the matchmark on the direct clutch drum, install the direct clutch drum to the intermediate shaft.
NOTICE:
Be careful not to damage the O-ring and the lip of the clutch drum.



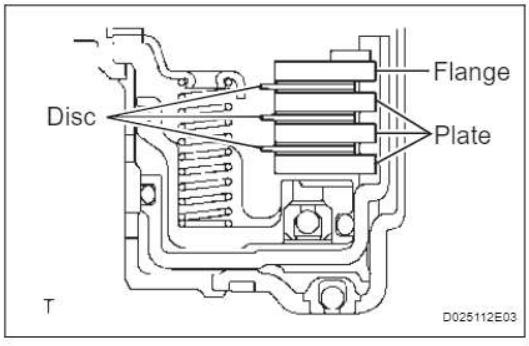
4. INSTALL DIRECT CLUTCH PISTON SUB-ASSEMBLY

(a) Coat the direct clutch piston with ATF, and install it to the intermediate shaft.
NOTICE:
Do not damage the O-ring of the direct clutch piston.



5. INSTALL DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

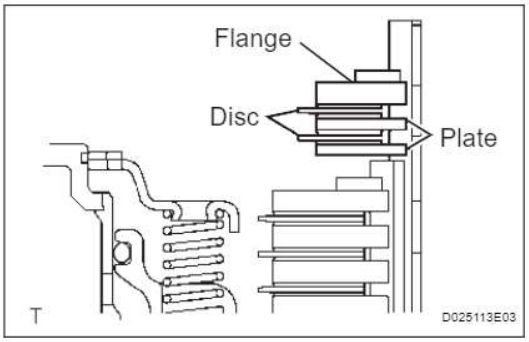
(a) Install the direct clutch return spring on the direct clutch piston.
(b) Place SST on the piston return spring and compress the springs with a press.
SST 09387-00020
(c) Using a snap ring expander, install the snap ring from the direct clutch drum.
NOTICE:
- **Stop the press when the spring sheet is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, preventing the spring sheet from being deformed.**
- **Do not expand the snap ring excessively.**



6. INSTALL DIRECT CLUTCH DISK

(a) Coat the 3 plates, 3 discs and flange with ATF, and install them to the intermediate shaft.
(b) Install the snap ring.

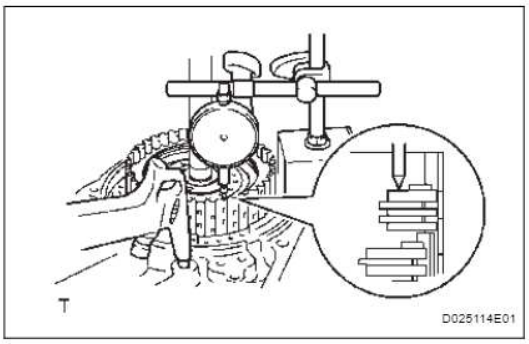
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7. INSTALL REVERSE CLUTCH DISC

(a) Install the 2 plates, 2 discs and flange.

(b) Install the snap ring.



8. INSPECT PACK CLEARANCE OF REVERSE CLUTCH

(a) Install the forward reverse clutch and thrust needle roller bearing on the transaxle rear cover.

(b) Using a dial indicator, measure the reverse clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Standard pack clearance:

0.86 to 1.26 mm (0.0339 to 0.0496 in.)

If the pack clearance is less than the limit of pack clearance, parts may have been assembled incorrectly. Check and reassemble.

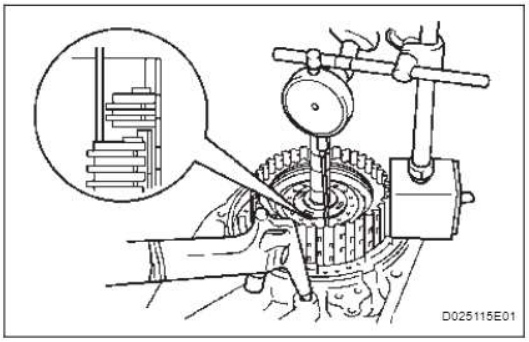
If the pack clearance is non-standard, select another flange.

HINT:

There are 4 flanges with different thickness.

Standard flange thickness

No.	Thickness	No.	Thickness
-	3.0 mm (0.118 in.)	2	3.4 mm (0.134 in.)
1	3.2 mm (0.126 in.)	3	3.6 mm (0.142 in.)



9. INSPECT PACK CLEARANCE OF DIRECT CLUTCH

(a) Install the direct and reverse clutch and thrust needle roller bearing on the transaxle rear cover.

(b) Using a dial indicator and measuring terminal (SST), measure the forward clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

SST 09350-36010

HINT:

The direct and reverse clutch will come out as you apply the compressed air. Therefore, while the checking is being done, press on the input shaft of the direct and reverse clutch using a stamping machine or equivalent so that the pressure is not applied on the direct and reverse clutch.

Standard pack clearance:

0.62 to 1.02 mm (0.0244 to 0.0402 in.)

If the pack clearance is less than the limit of pack clearance, parts may have been assembled incorrectly. Check and reassemble.

If the pack clearance is non-standard, select another flange.

AX

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HINT:
There are 4 flanges with different thickness.

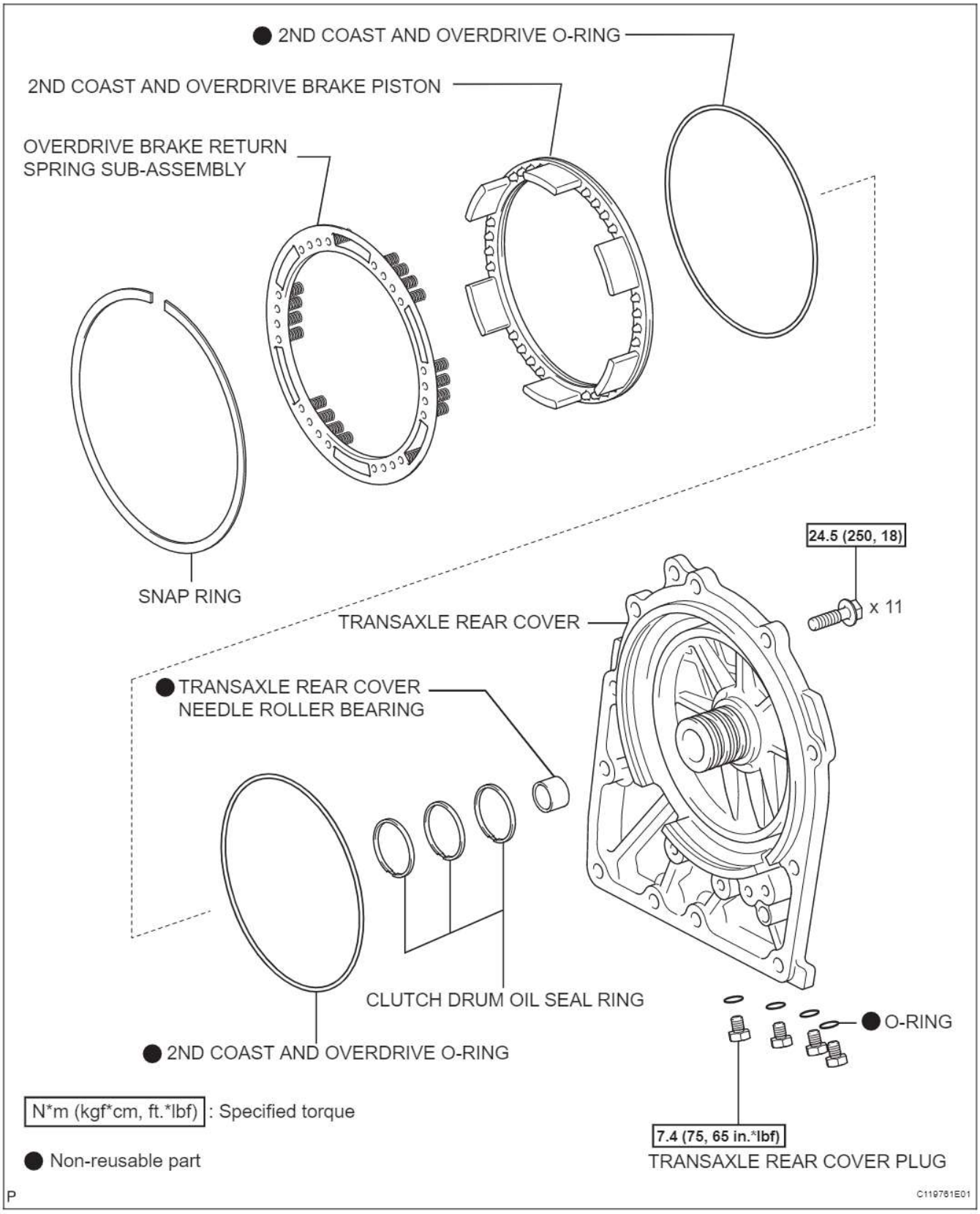
Standard flange thickness

No.	Thickness	No.	Thickness
-	3.0 mm (0.118 in.)	2	3.4 mm (0.134 in.)
1	3.2 mm (0.126 in.)	3	3.6 mm (0.142 in.)

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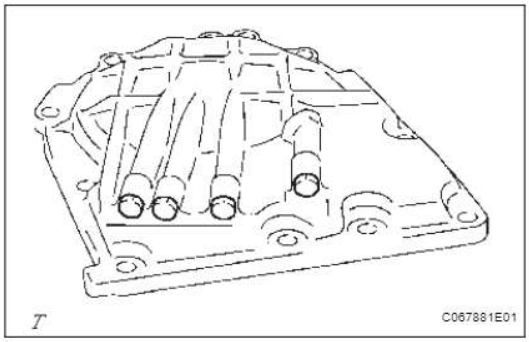
TRANSAXLE REAR COVER

COMPONENTS



AX

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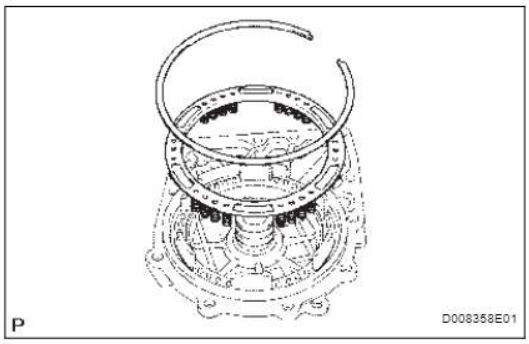


DISASSEMBLY

1. REMOVE TRANSAXLE REAR COVER PLUG

(a) Remove the 4 transaxle rear cover plugs from the transaxle rear cover.

(b) Using a screwdriver, remove the O-ring from the transaxle rear cover plug.



2. REMOVE OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using SST, a press and screwdriver, remove the snap ring.

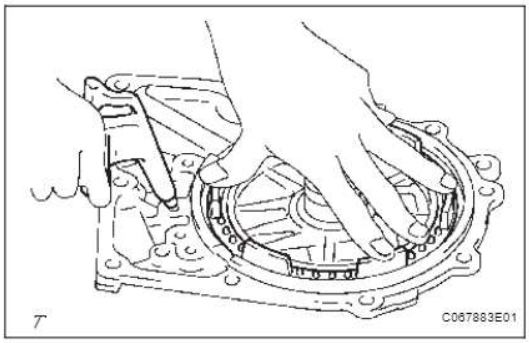
SST 09387-00070

NOTICE:

Stop the press when the overdrive brake piston is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, preventing the overdrive brake piston from being deformed.

(b) Remove the overdrive brake return spring.

3. INSPECT OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY (See page AX-222)

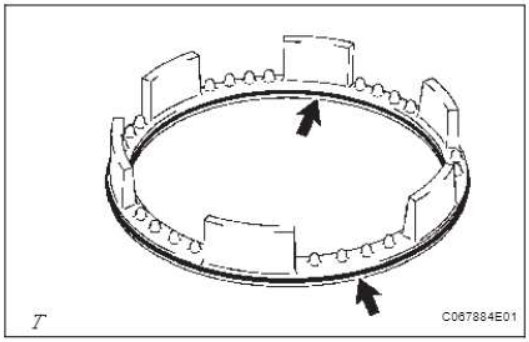


4. REMOVE 2ND COAST AND OVERDRIVE BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle rear cover to remove the overdrive brake piston.

NOTICE:

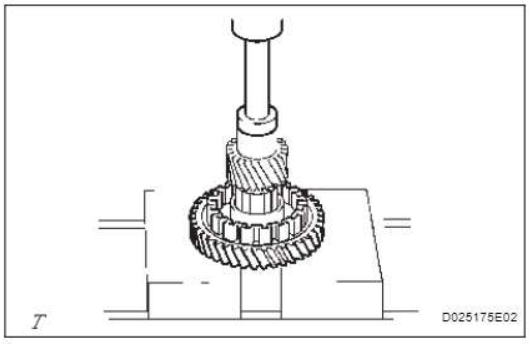
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**



5. REMOVE 2ND COAST AND OVERDRIVE O-RING

(a) Using a screwdriver, remove the 2 O-ring from the 2nd coast and overdrive brake piston.

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REASSEMBLY

1. INSTALL COUNTER DRIVEN GEAR

(a) Using SST and a press, press in the counter driven gear to the differential drive pinion.

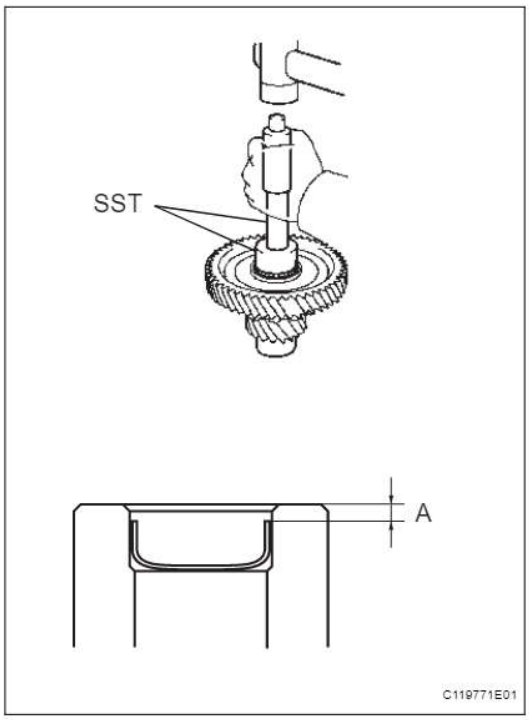
SST 09950-60010 (09951-00350), 09950-70010 (09951-07150)

NOTICE:

When replacing the counter driven gear, replace the counter drive gear in the transaxle case, too.

HINT:

The differential drive pinion should be pressed in until it comes in contact with the counter driven gear.



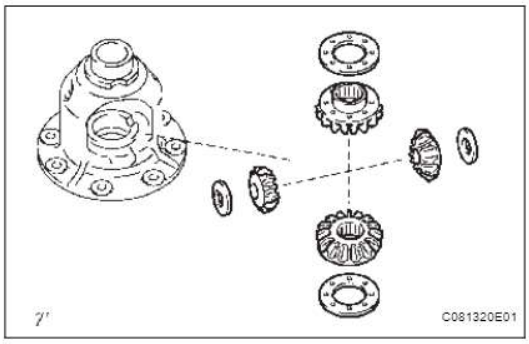
2. INSTALL DIFFERENTIAL DRIVE PINION PLUG

(a) Using SST and a plastic-faced hammer, tap in a new differential drive pinion plug to the differential drive pinion.

SST 09221-25026 (09221-00071)

Standard clearance A:

2.5 to 2.6 mm (0.0984 to 0.1023 in.)



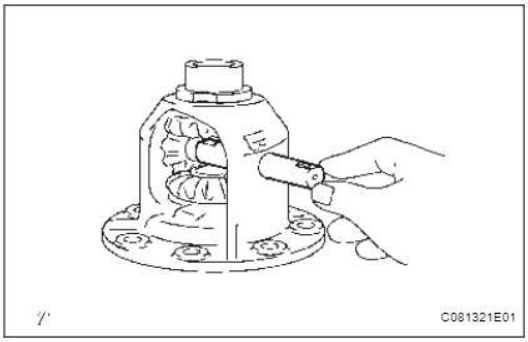
3. INSTALL FRONT DIFFERENTIAL SIDE GEAR

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

HINT:

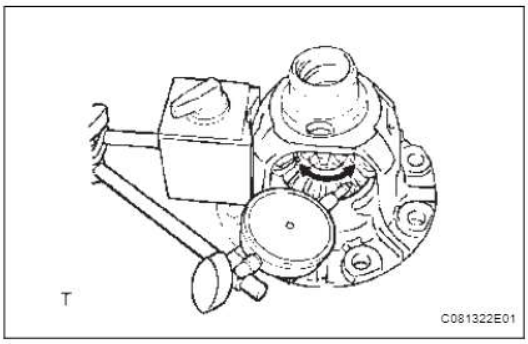
At the time of installation, set the alignment of the front differential pinions perpendicular to that of the side gear and rotate them so that their holes will be aligned with the holes in the differential case.

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4. INSTALL FRONT DIFFERENTIAL NO. 1 PINION SHAFT

(a) Install the pinion shaft to align the lock pin holes on the pinion shaft and differential case.



5. INSPECT BACKLASH

(a) Measure the side gear backlash while holding 1 pinion gear toward the case.

Standard backlash:

0.05 to 0.20 mm (0.0020 to 0.0079 in.)

If the backlash is not within the specification, install the correct thrust washer to the side gear.

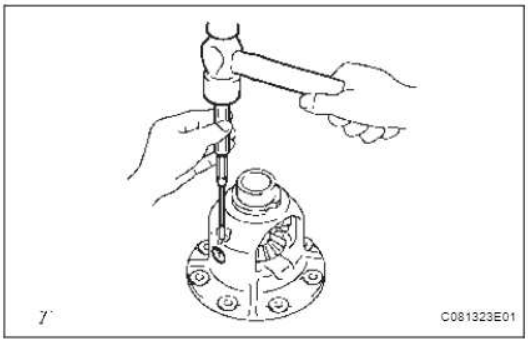
(b) Referring to the table below, select thrust washers which will ensure that the backlash is within the specification for both sides.

Standard thrust washer thickness

Thickness	Thickness
0.95 mm (0.0374 in.)	1.10 mm (0.0433 in.)
1.00 mm (0.0394 in.)	1.15 mm (0.0453 in.)
1.05 mm (0.0413 in.)	1.20 mm (0.0472 in.)

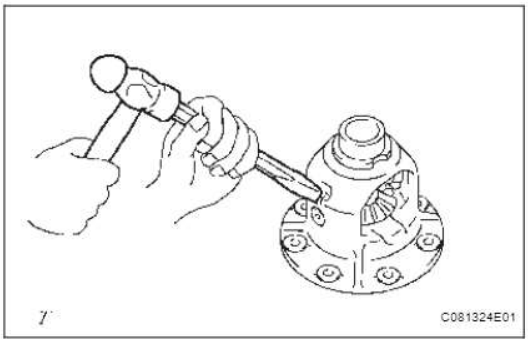
If the backlash is not within the specification, install a thrust washer of a different thickness.

AX



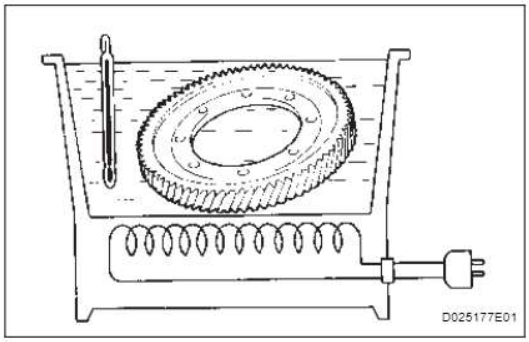
6. INSTALL FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

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



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

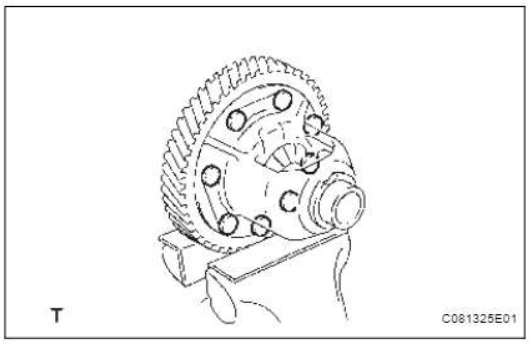
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7. INSTALL FRONT DIFFERENTIAL RING GEAR

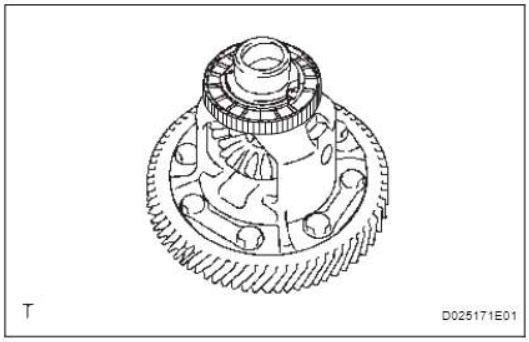
(a) Using ATF and a heater, heat the front differential ring gear to 90 to 110°C (194.0 to 230.0°F).

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



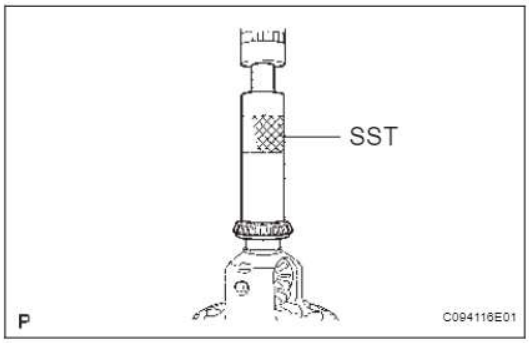
(c) Install the 4 lock plates and 8 bolts.
Torque: 88.2 N*m (899 kgf*cm, 65 ft.*lbf)

(d) Stake the ring gear lock plate.



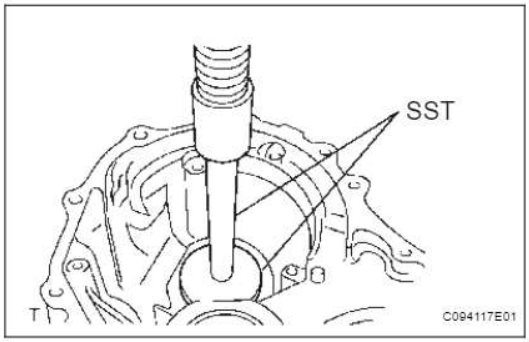
8. INSTALL SPEEDOMETER DRIVE GEAR

(a) Install the speedometer drive gear to the differential case.



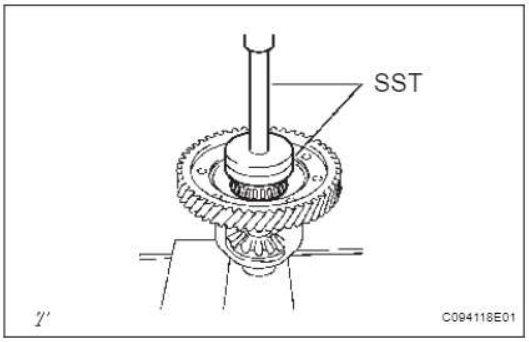
9. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, press in the front differential case front tapered roller bearing to the differential case.
SST 09316-60011 (09316-00011)



(b) Using SST and a press, press in the front differential case front tapered roller bearing to the transaxle housing.
SST 09950-60020 (09951-00750), 09950-70010 (09951-07150)

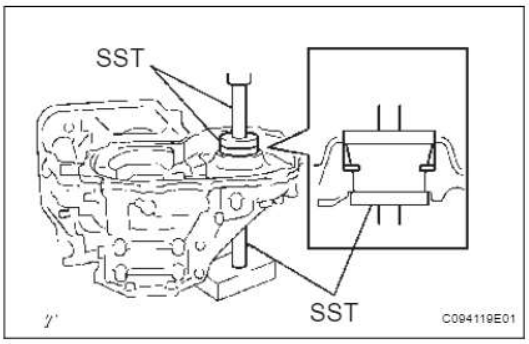
cardiagn.com



10. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

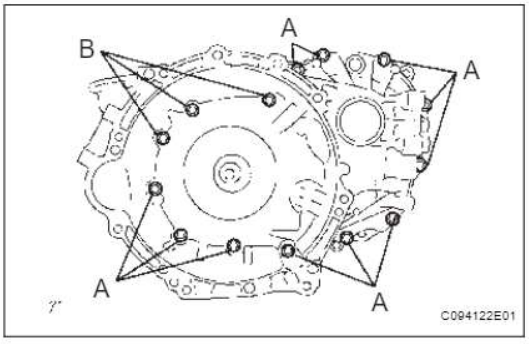
(a) Using SST and a press, press in the front differential case rear tapered roller bearing to the differential case.

SST 09726-40010, 09950-60020 (09951-00790)



(b) Using SST and a press, press in the shim and front differential case rear tapered roller bearing outer race to the transaxle case.

SST 09950-60010 (09951-00650, 09950-60020 (09951-00720), 09950-70010 (09951-07100, 09951-07200)

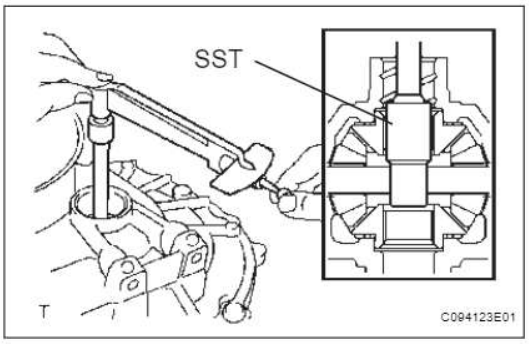


11. ADJUST TAPERED ROLLER BEARING PRELOAD

(a) Coat the front differential case and bearing with ATF, and install them to the transaxle case.

(b) Install the 14 bolts and transaxle housing.

Torque: 29.4 N*m (300 kgf*cm, 22 ft.*lbf) for bolt A
22.1 N*m (225 kgf*cm, 16 ft.*lbf) for bolt B



(c) Using SST and a small torque wrench, measure the preload of the differential gear.

SST 09564-32011

New bearing preload:
0.98 to 1.57 N/m (10.0 to 16.0 kgf*cm, 8.7 to 13.9 in.*lbf)

Used bearing preload:
0.49 to 0.78 N/m (5.0 to 8.0 kgf*cm, 4.3 to 6.9 in.*lbf)

If the preload is not within the specification, remove the differential from the transaxle case. Reselect the transaxle case side adjusting shim according to the following table.

Standard adjusting shim thickness

Mark	Thickness	Mark	Thickness
01	1.90 mm (0.0748 in.)	11	2.40 mm (0.0945 in.)
02	1.95 mm (0.0768 in.)	12	2.45 mm (0.0965 in.)
03	2.00 mm (0.0787 in.)	13	2.50 mm (0.0984 in.)

AX

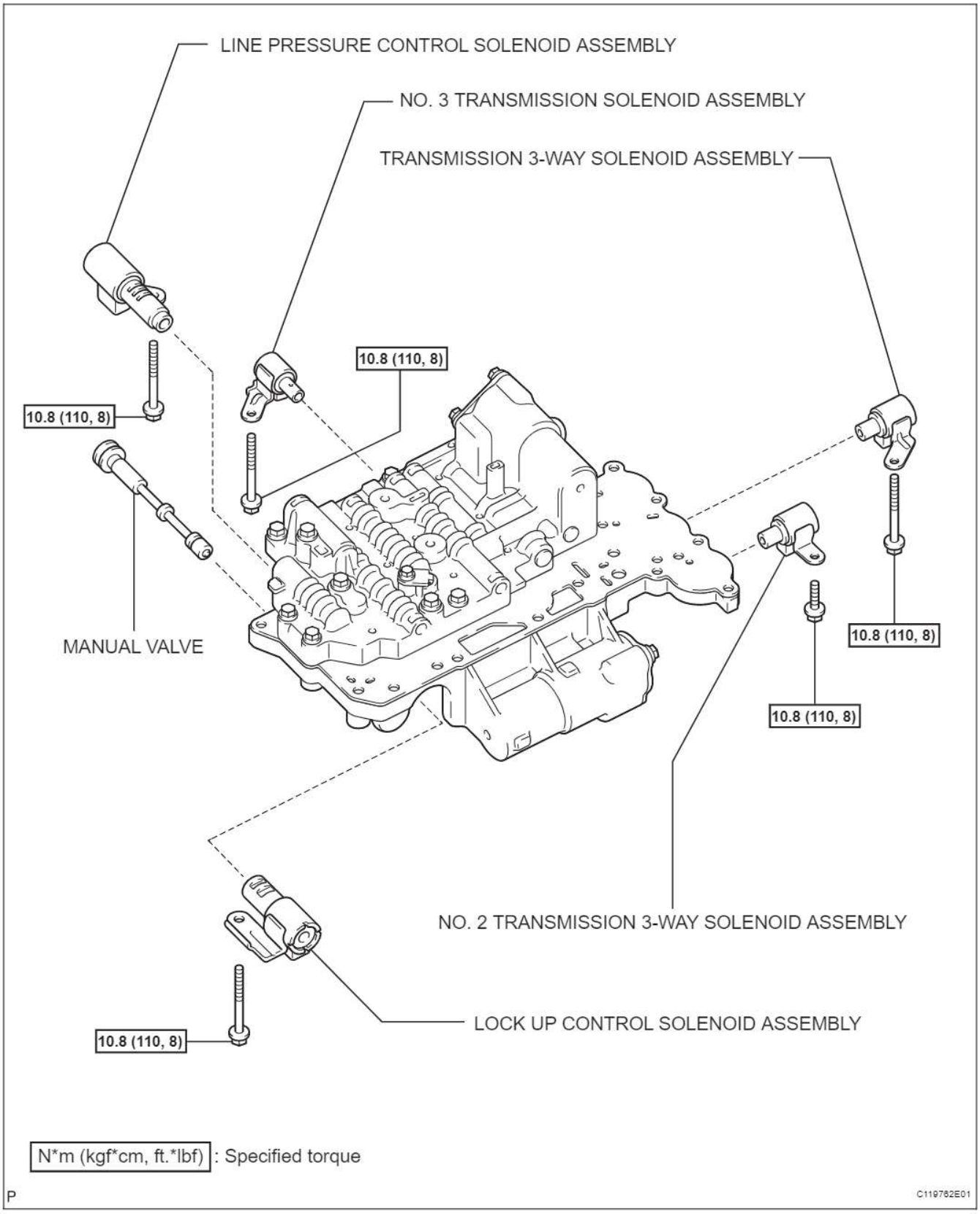
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Mark	Thickness	Mark	Thickness
04	2.05 mm (0.0807 in.)	14	2.55 mm (0.1004 in.)
05	2.10 mm (0.0827 in.)	15	2.60 mm (0.1024 in.)
06	2.15 mm (0.0846 in.)	16	2.65 mm (0.1043 in.)
07	2.20 mm (0.0866 in.)	17	2.70 mm (0.1063 in.)
08	2.25 mm (0.0886 in.)	18	2.75 mm (0.1083 in.)
09	2.30 mm (0.0906 in.)	19	2.80 mm (0.1102 in.)
10	2.35 mm (0.0925 in.)	-	-

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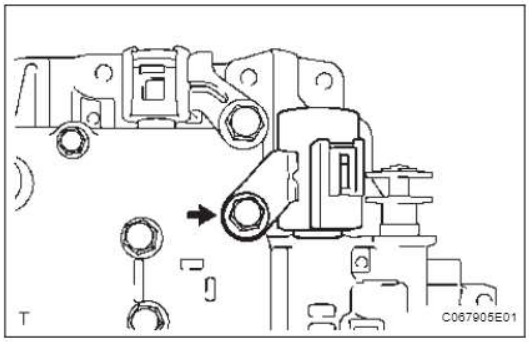
VALVE BODY

COMPONENTS



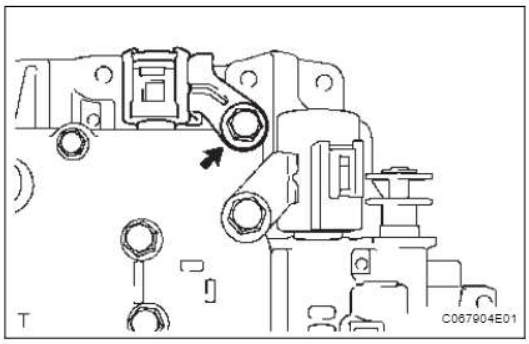
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DISASSEMBLY



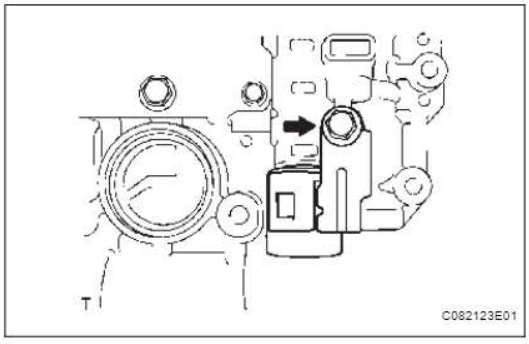
1. REMOVE SHIFT SOLENOID VALVE SLT

(a) Remove the bolt, and pull out the solenoid.



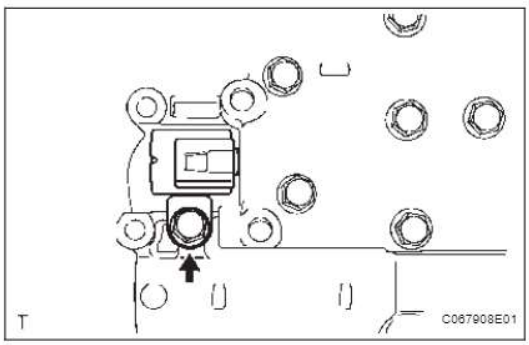
2. REMOVE SHIFT SOLENOID VALVE ST

(a) Remove the bolt, and pull out the solenoid.



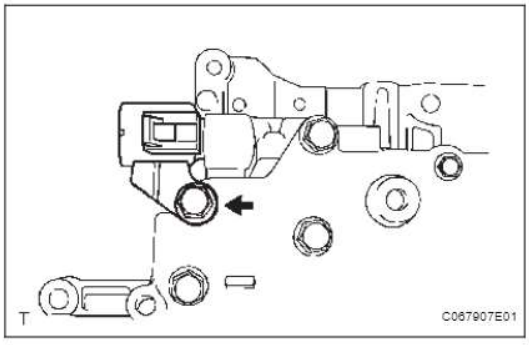
3. REMOVE SHIFT SOLENOID VALVE SL

(a) Remove the bolt, and pull out the solenoid.



4. REMOVE SHIFT SOLENOID VALVE S2

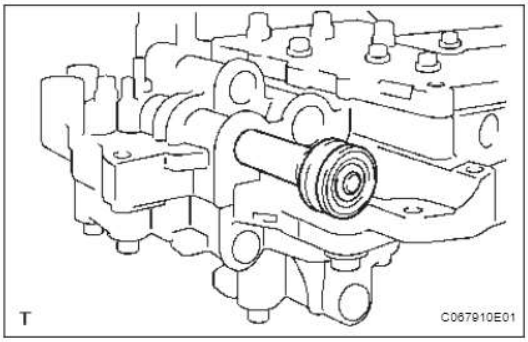
(a) Remove the bolt, and pull out the 3-way solenoid.



5. REMOVE SHIFT SOLENOID VALVE S1

(a) Remove the bolt, and pull out the 3-way solenoid.

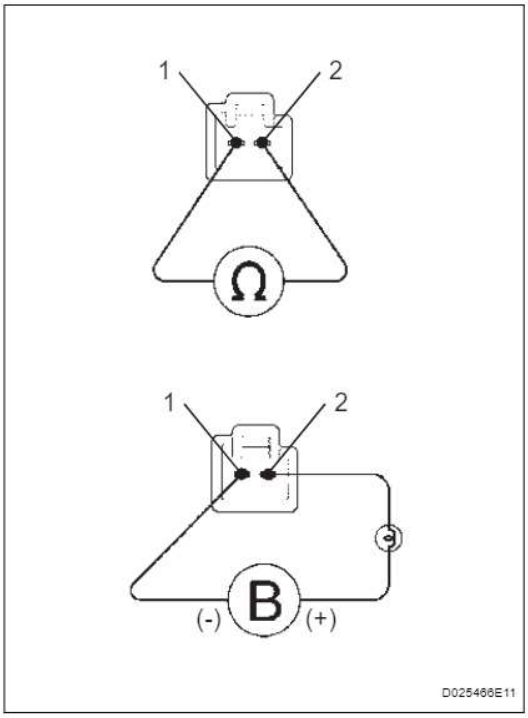
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6. REMOVE MANUAL VALVE

(a) Remove the manual valve from the valve body.

INSPECTION

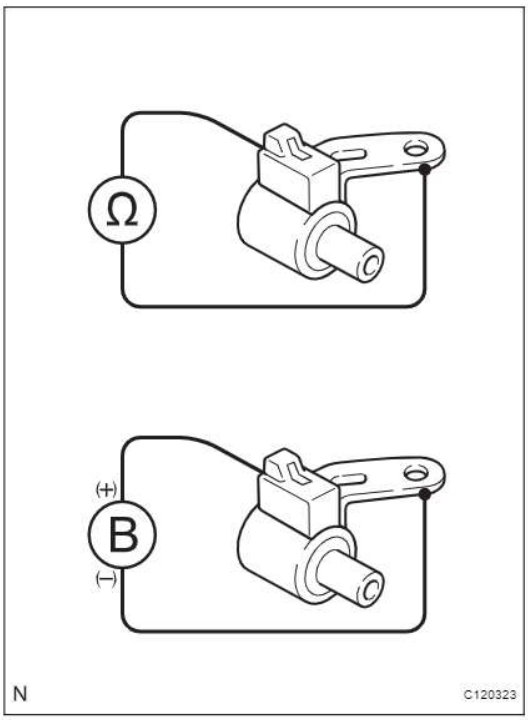


1. INSPECT SHIFT SOLENOID VALVE SLT

(a) Measure the resistance of the solenoid valve.
Standard resistance:
5.0 to 5.6 Ω at 20°C (68°F)

(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, and then check the movement of the valve.

(c) Check the operating noise of terminal 1 of the solenoid valve.



2. INSPECT SHIFT SOLENOID VALVE ST

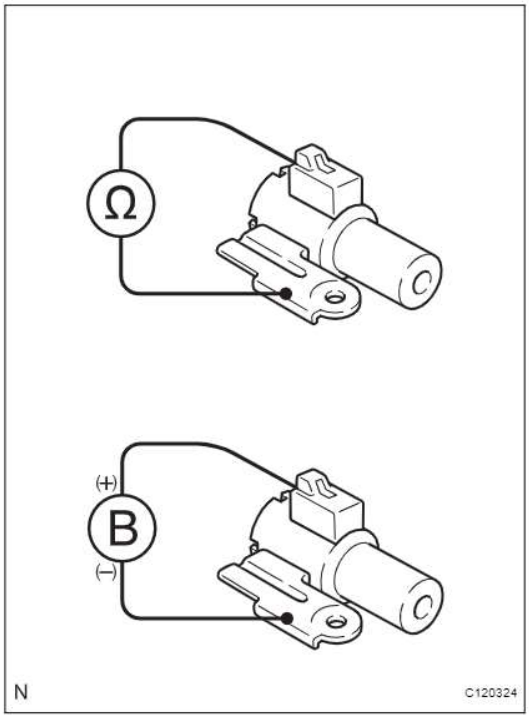
(a) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ω at 20°C (68°F)

(b) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

(c) Check the operating noise of the solenoid valve.

AX

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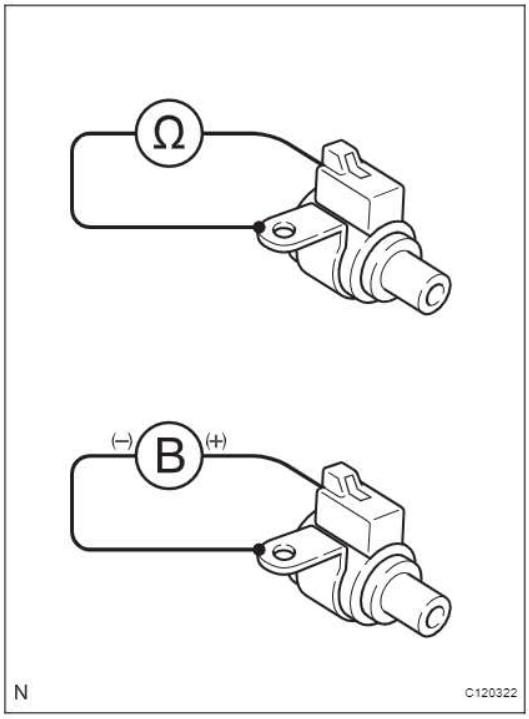


3. INSPECT SHIFT SOLENOID VALVE SL

(a) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ω at 20°C (68°F)

(b) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

(c) Check the operating noise of the solenoid valve.



4. INSPECT SHIFT SOLENOID VALVE S2

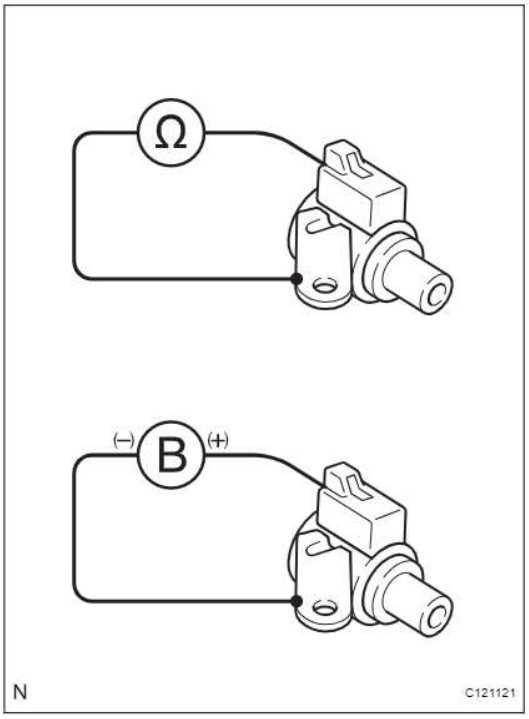
(a) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)

(b) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

(c) Check the operating noise of the solenoid valve.

AX

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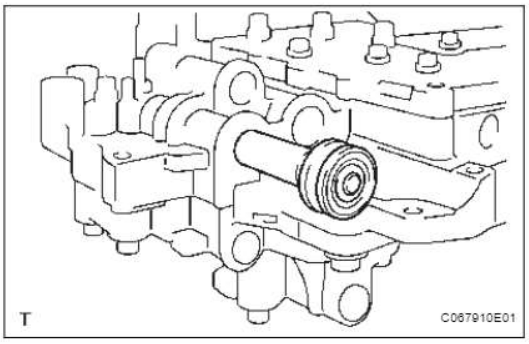
5. INSPECT SHIFT SOLENOID VALVE S1

(a) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ω at 20°C (68°F)

(b) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

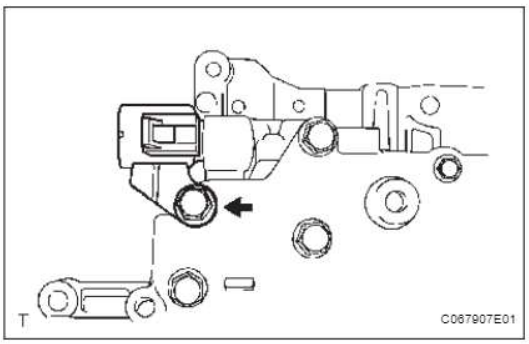
(c) Check the operating noise of the solenoid valve.

REASSEMBLY



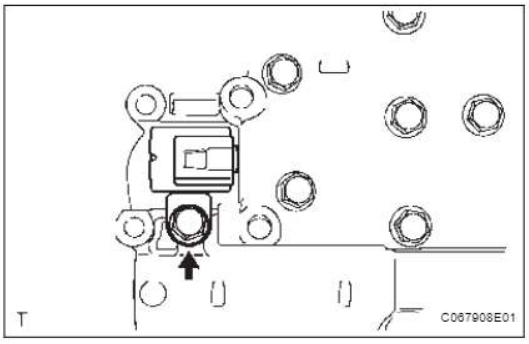
1. INSTALL MANUAL VALVE

(a) Coat the manual valve with ATF and install it to the valve body.



2. INSTALL SHIFT SOLENOID VALVE S1

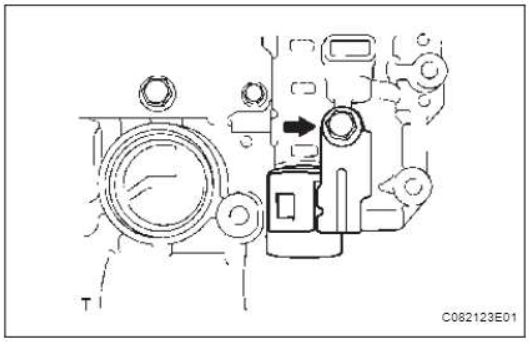
(a) Install the 3-way solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



3. INSTALL SHIFT SOLENOID VALVE S2

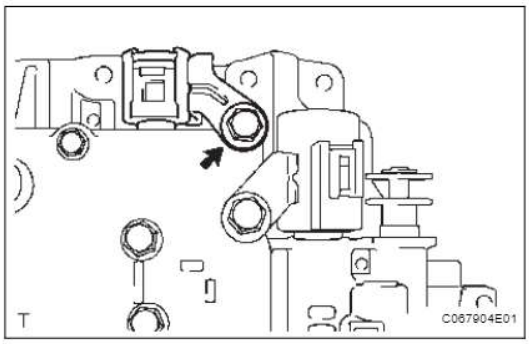
(a) Install the 3-way solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

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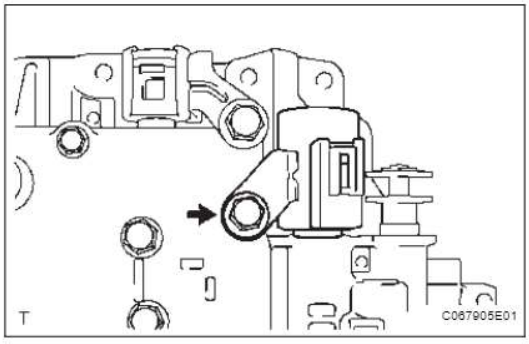
4. INSTALL SHIFT SOLENOID VALVE SL

(a) Install the solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



5. INSTALL SHIFT SOLENOID VALVE ST

(a) Install the 3-way solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



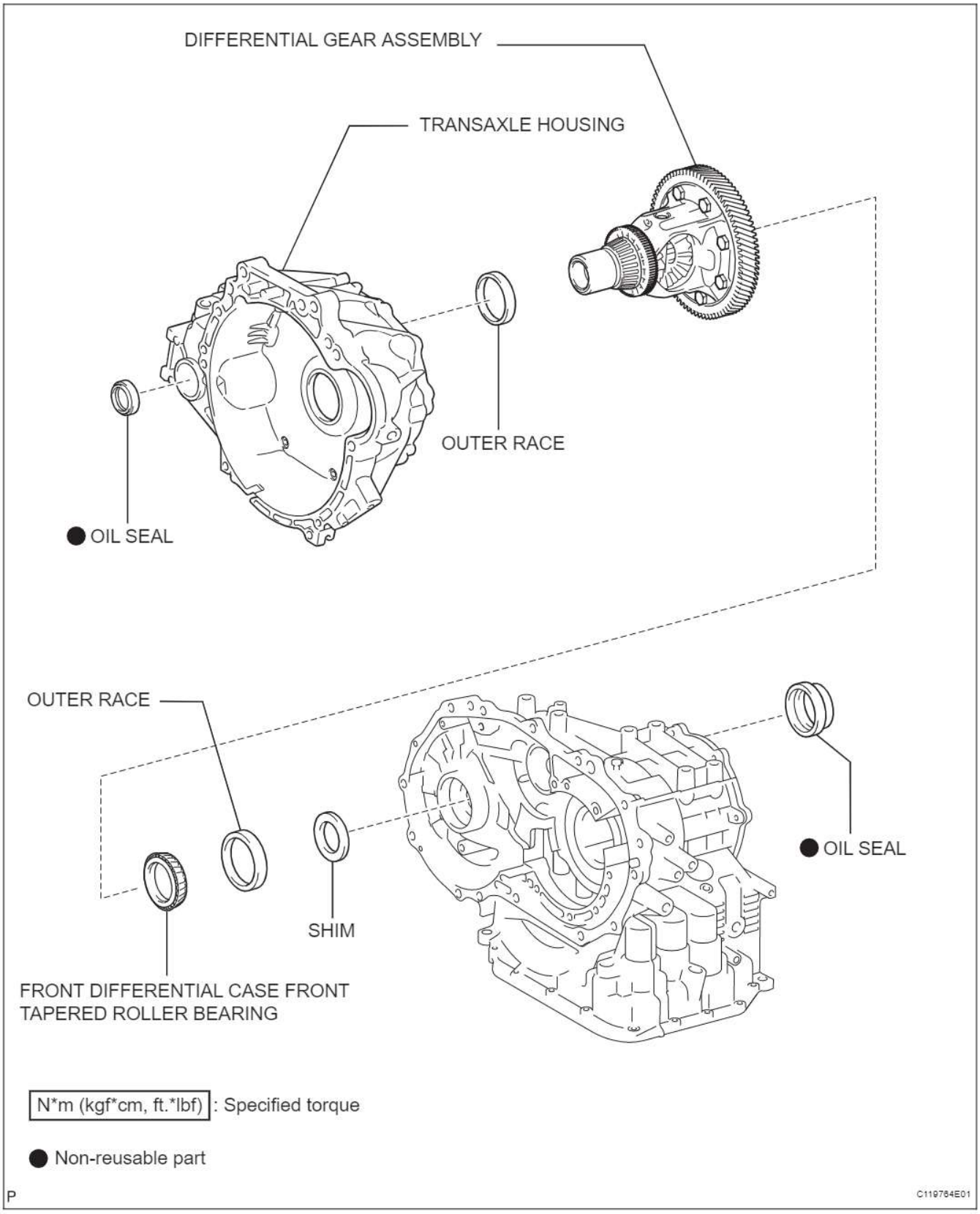
6. INSTALL SHIFT SOLENOID VALVE SLT

(a) Install the solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

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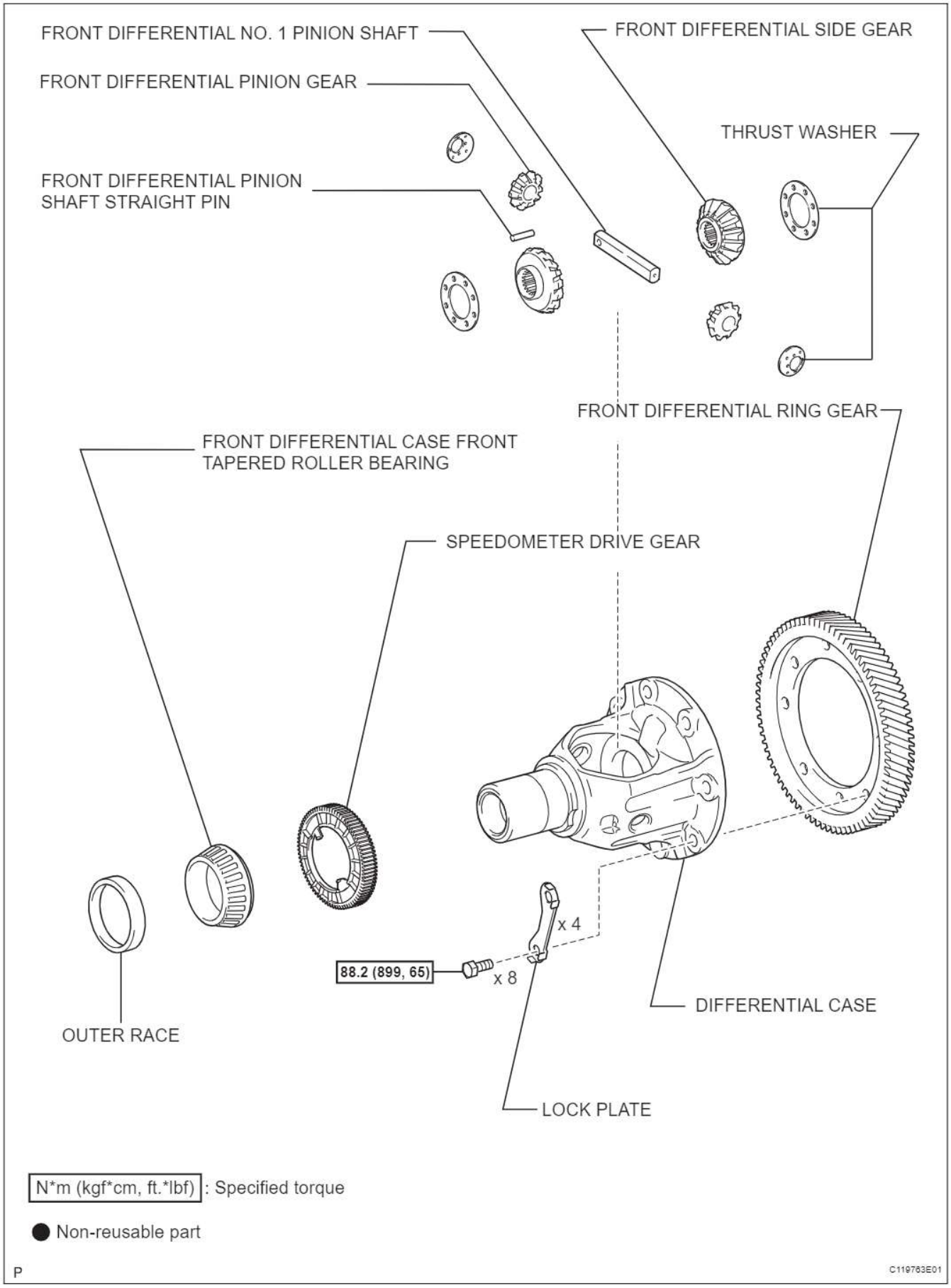
DIFFERENTIAL CASE

COMPONENTS

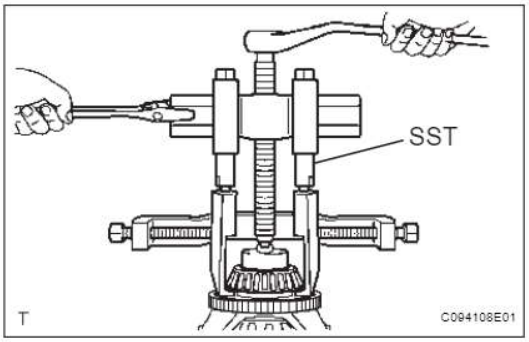


AX

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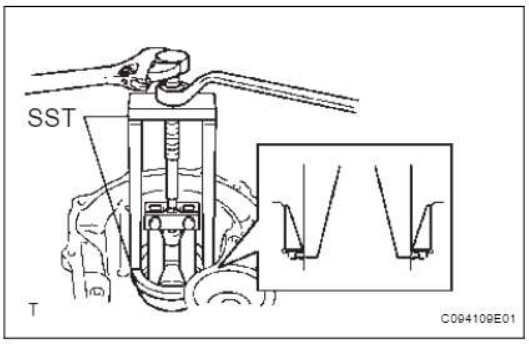


DISASSEMBLY

1. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

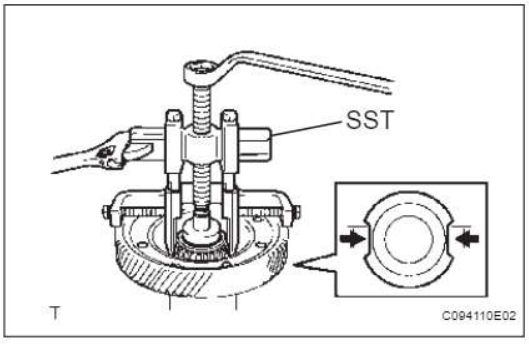
(a) Using SST, remove the front differential case front tapered roller bearing from the differential case.

SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00390)



(b) Using SST, remove the front differential case front tapered roller bearing outer race from the transaxle housing.

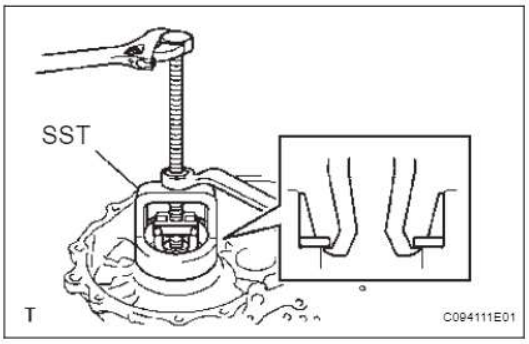
SST 09387-00041 (09387-02010, 09387-02020)



2. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

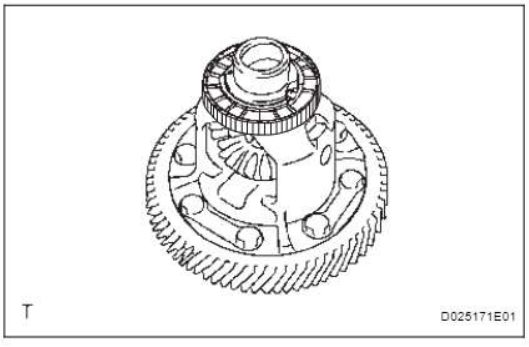
(a) Using SST, remove the front differential case rear tapered roller bearing from the differential case.

SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00430)



(b) Using SST, remove the outer race and shim.

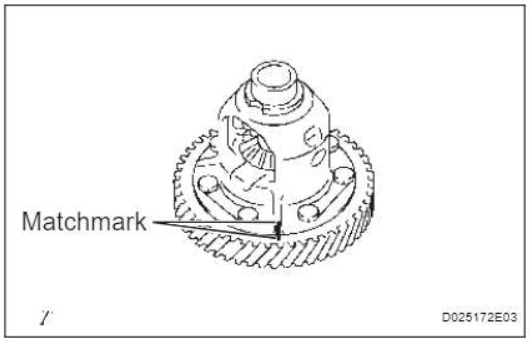
SST 09612-65014 (09612-01010)



3. REMOVE SPEEDOMETER DRIVE GEAR

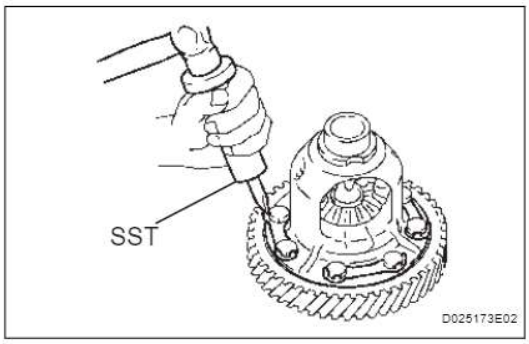
(a) Remove the speedometer drive gear from the differential case.

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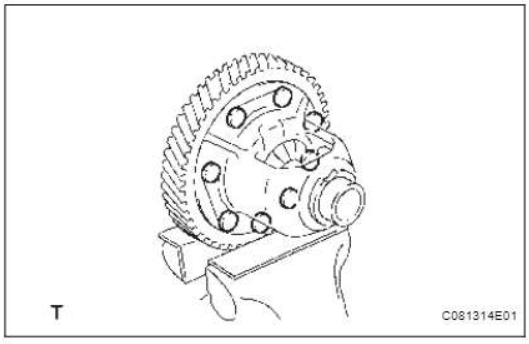


4. REMOVE FRONT DIFFERENTIAL RING GEAR

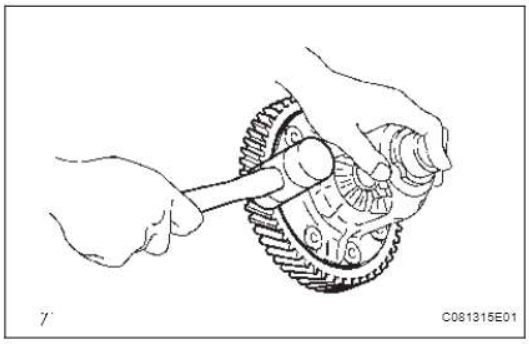
(a) Place matchmarks on the front differential ring gear and differential case.



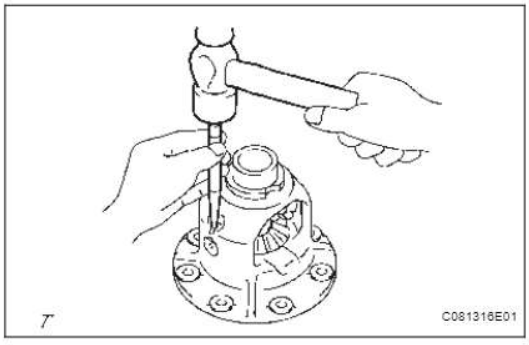
(b) Using SST and a hammer, unstake the lock plate.
SST 09930-00010



(c) Remove the 8 bolts and lock plate.



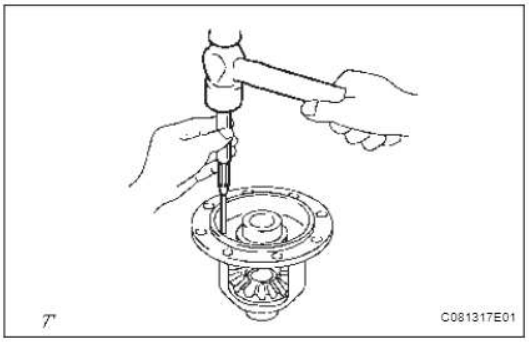
(d) Using a plastic-faced hammer, tap out the front differential ring gear from the differential case.



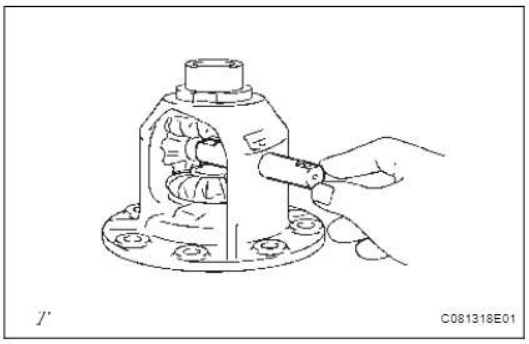
5. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a pin punch and hammer, unstake the differential case.

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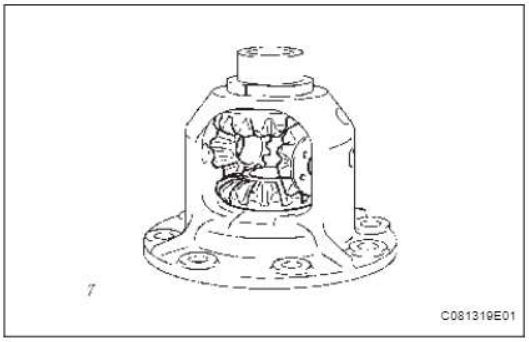


(b) Using a pin punch and hammer, tap out the straight pin.



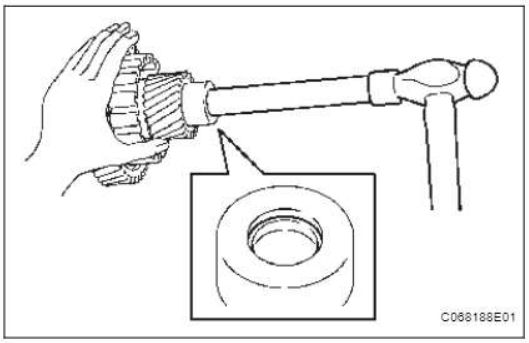
6. REMOVE FRONT DIFFERENTIAL NO. 1 PINION SHAFT

(a) Remove the pinion shaft from the front differential case.



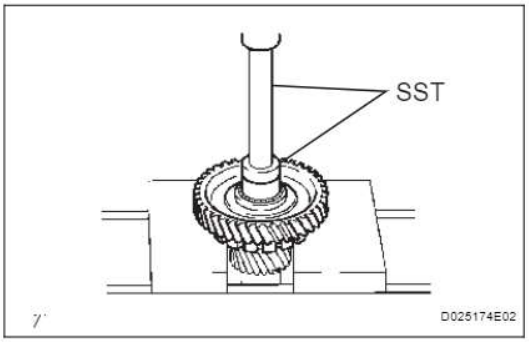
7. REMOVE FRONT DIFFERENTIAL SIDE GEAR

(a) Remove the 2 pinions, 2 thrust washers, 2 side gears and 2 thrust washers from the front differential case.



8. REMOVE DIFFERENTIAL DRIVE PINION PLUG

(a) Using a brass bar and plastic-faced hammer, tap out the differential drive pinion plug.



9. REMOVE COUNTER DRIVEN GEAR

(a) Using SST and a press, press out the counter driven gear from the differential drive pinion.

SST 09950-60010 (09951-00350), 09950-70010 (09951-07150)

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