TRANSAXLE & TRANSFER CASE

08

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GENERAL INFORMATION

Description

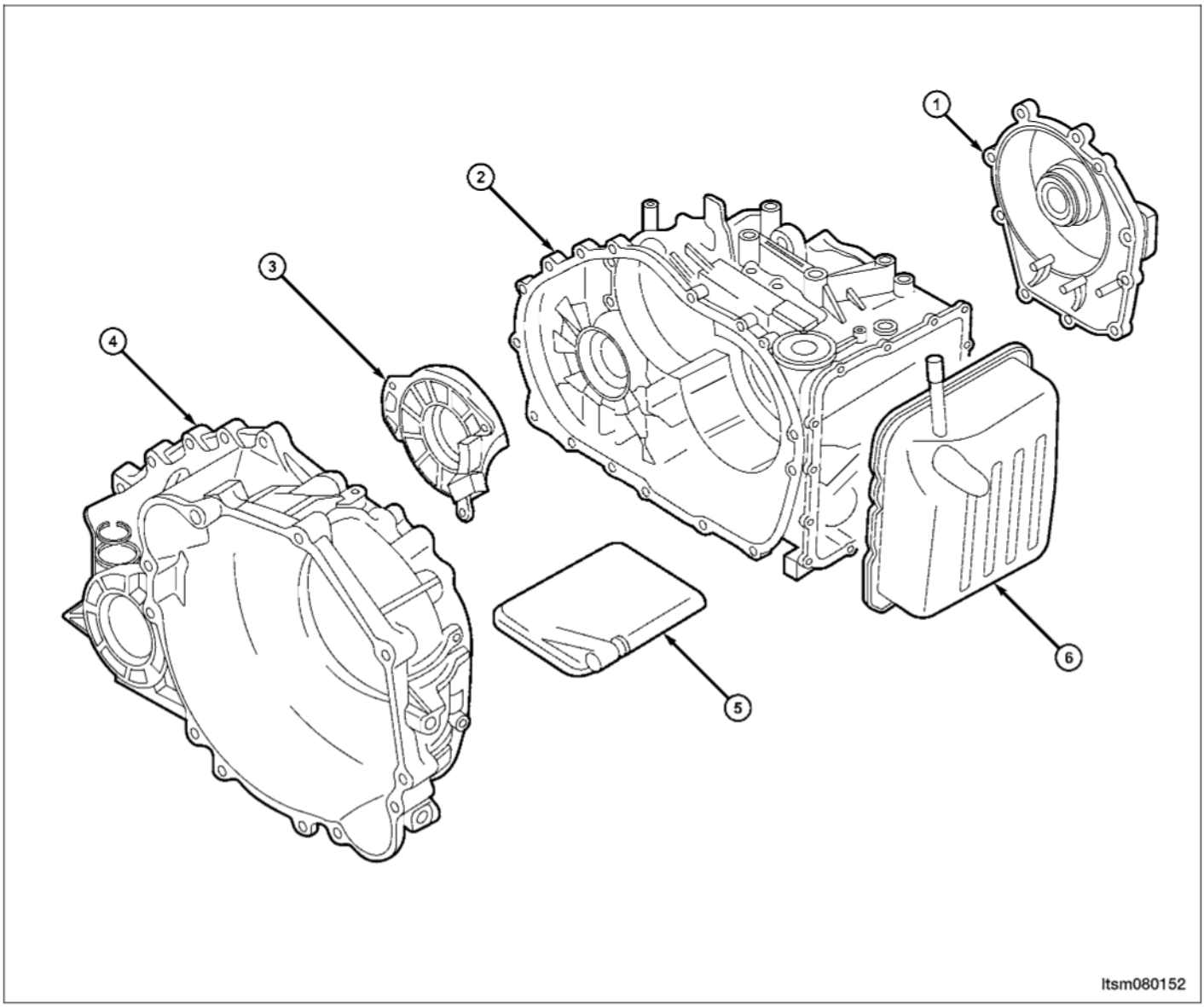
The DP0 automatic transaxle is a four-speed transaxle that is a conventional hydraulic/mechanical transaxle assembly with an integral differential, and is controlled with adaptive electronic controls and monitors. The hydraulic system of the transaxle consists of the transaxle fluid, fluid passages, hydraulic valves, fluid pump, and various line pressure control components.

The Transaxle Control Module (TCM) is the heart of the electronic control system and relies on information from various direct and indirect inputs (sensors, switches, etc.) to determine driver demand and vehicle operating conditions. With this information, the ECM/TCM can calculate and perform timely and quality shifts through various output or control devices.

The TCM also performs certain self-diagnostic functions and provides comprehensive information (sensor data, DTCs, etc.) which is helpful in proper diagnosis and repair. This information can be viewed with the X-431 scan tool.

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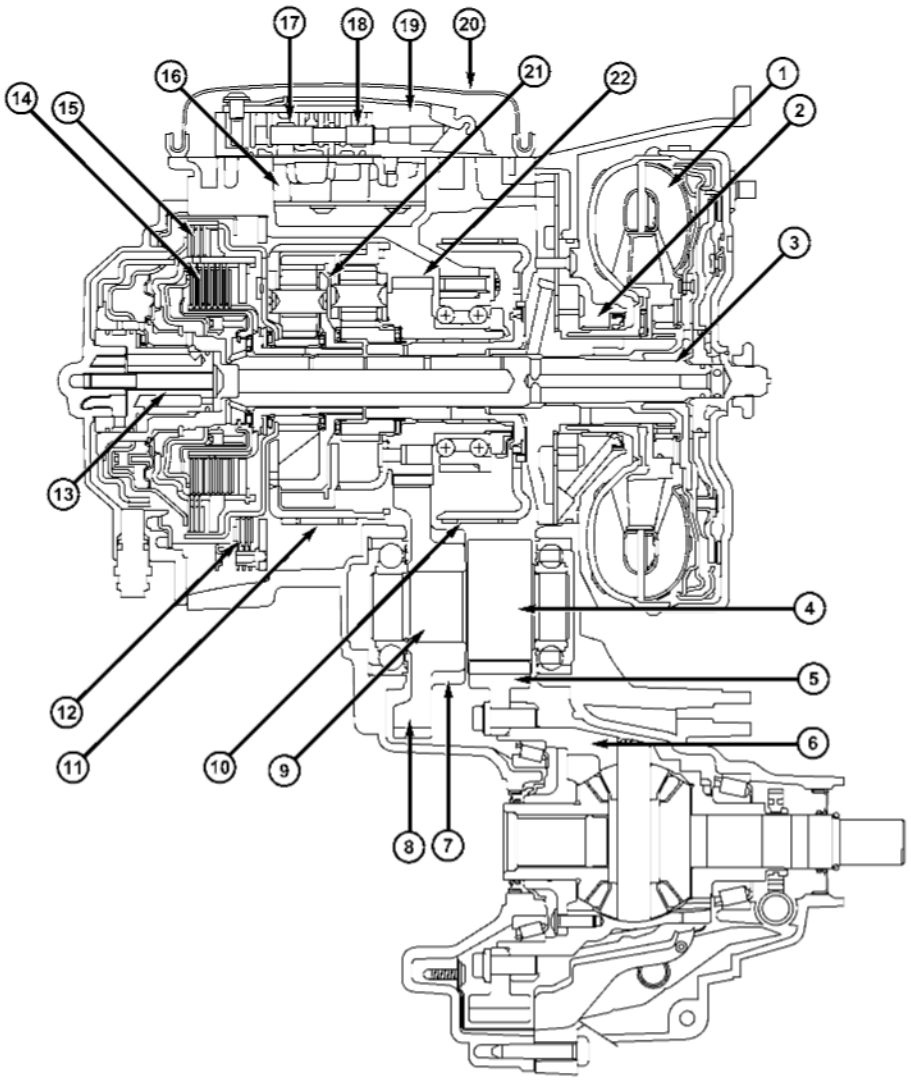
DP0 Transaxle External View



1 - Rear Cover	4 - Torque Converter Housing
2 - Transaxle Housing	5 - Fluid Filter
3 - Bearing Retainer	6 - Valve Body Cover

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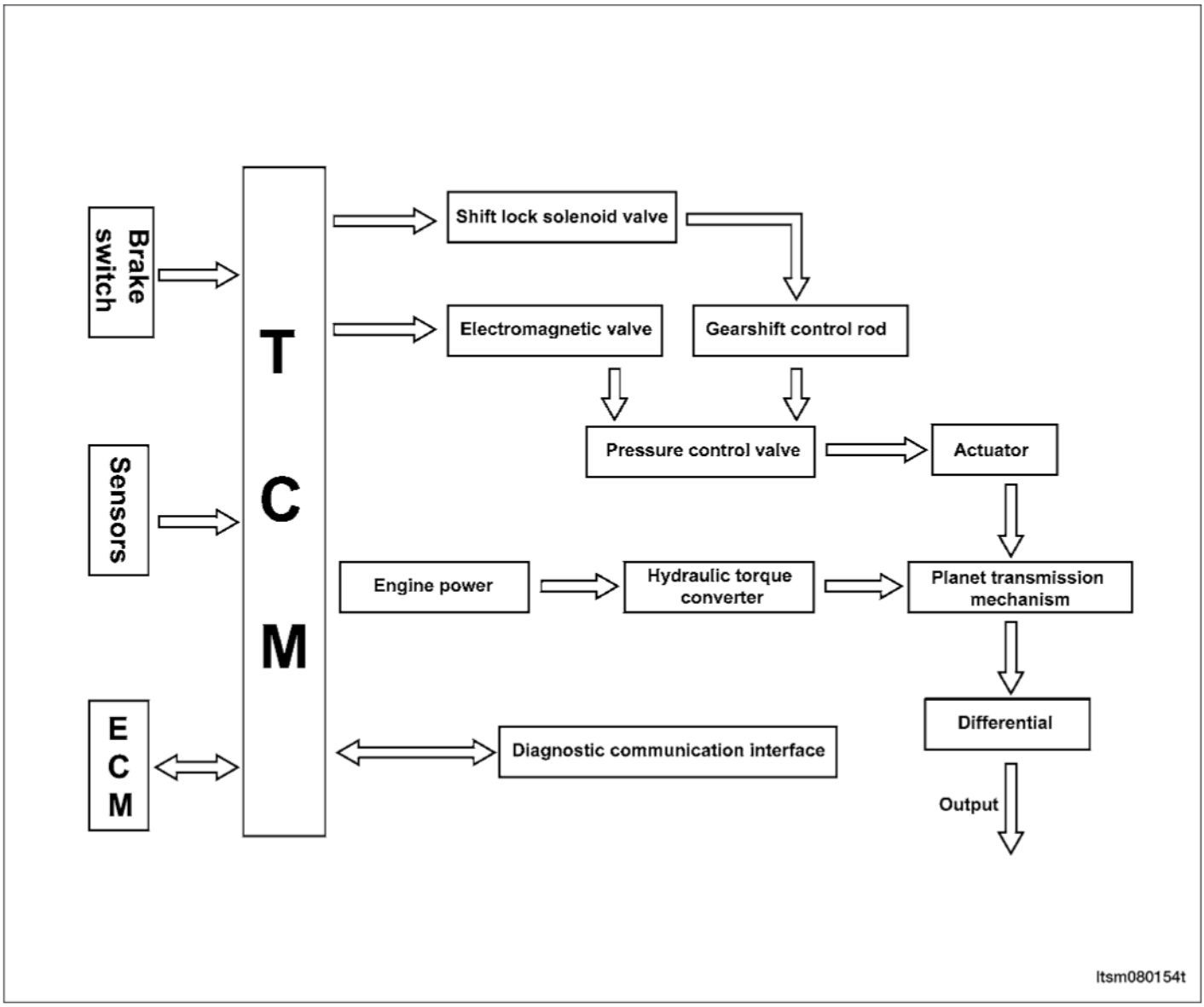
DP0 Transaxle Internal View



1 - Torque Converter	12 - Brake F1 (4th Gear)
2 - Fluid Pump Assembly	13 - Fluid Line
3 - Input Shaft	14 - Clutch E2 (2nd, 3rd and 4th Gear)
4 - Secondary Differential Driven Gear	15 - Clutch E1 (Reverse and 1st Gear)
5 - Differential Ring Gear	16 - Accumulator
6 - Differential Case	17 - Manual Valve
7 - Parking Gear	18 - Accumulator
8 - Primary Differential Driven Gear	19 - Ratchet Gear Plate
9 - Transfer Shaft	20 - Accumulator Cover
10 - Brake F3 (1st and 2nd Gear)	21 - Planet Gear
11 - Brake F2 (Reverse Gear)	22 - Primary Differential Drive Gear

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Operation



Automatic transaxle control is divided into the electronic and hydraulic transaxle control functions. While the electronic transaxle control is responsible for gear selection and for matching the pressures to the torque to be transmitted, the transaxle's power supply control occurs via hydraulic elements in the electro-hydraulic control module. The fluid supply to the hydraulic elements, such as the torque converter, the shift elements and the hydraulic transaxle control, is provided by way of a fluid pump connected to the torque converter.

The Transaxle Control Module (TCM) allows for the precise adaptation of pressures to the corresponding operating conditions and to the engine output during the gearshift phase, resulting in a noticeable improvement in shift quality. The engine speed limit can be reached in the individual gears at full throttle and kickdown. The shift range can be changed in the forward gears while driving, but the TCM employs a downshift safeguard to prevent engine over speed. The system offers the additional advantage of flexible adaptation to different vehicle and engine variants.

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Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
Drain Plug	33
Engine To Transaxle Bolts	80
Side Sill To Vehicle Body Bolts	120
Front Mount Bolts	60
Rear Mount Bolts	40
Fluid Pan Bolts	50
Transaxle Mount Nuts	120
Transaxle Mount Bolts	40
Drive Plate Bolts (automatic transaxle)	75

Gear Ratio Specifications

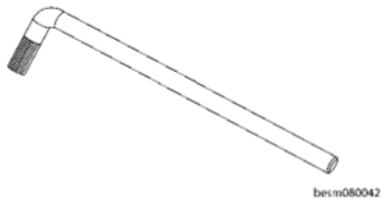
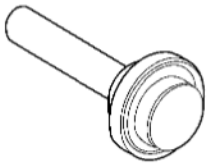
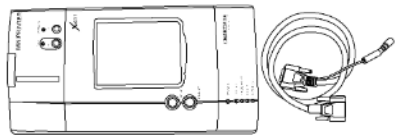
GEAR SELECTOR POSITION	RATIO
First	2.75
Second	1.5
Third	1
Overdrive	0.71
Reverse	2.45

Lubrication Specifications

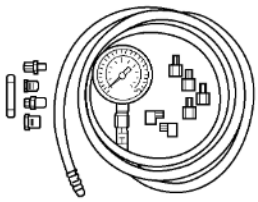
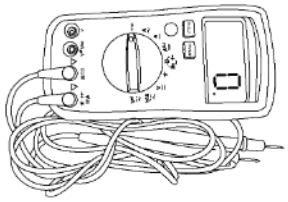
DESCRIPTION	ITEM
Transaxle Fluid Quantity	6.0L
Transaxle Fluid Change Quantity	3.0L
Fluid Type	DEXTRON III
Fluid Change Cycle	40000 Km

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Special Tools

Spline Spanner CH-30001	 besm080042
Differential Seal Installer CH-30002	 besm080043
Diagnostic Scan Tool X-431	 besm030001

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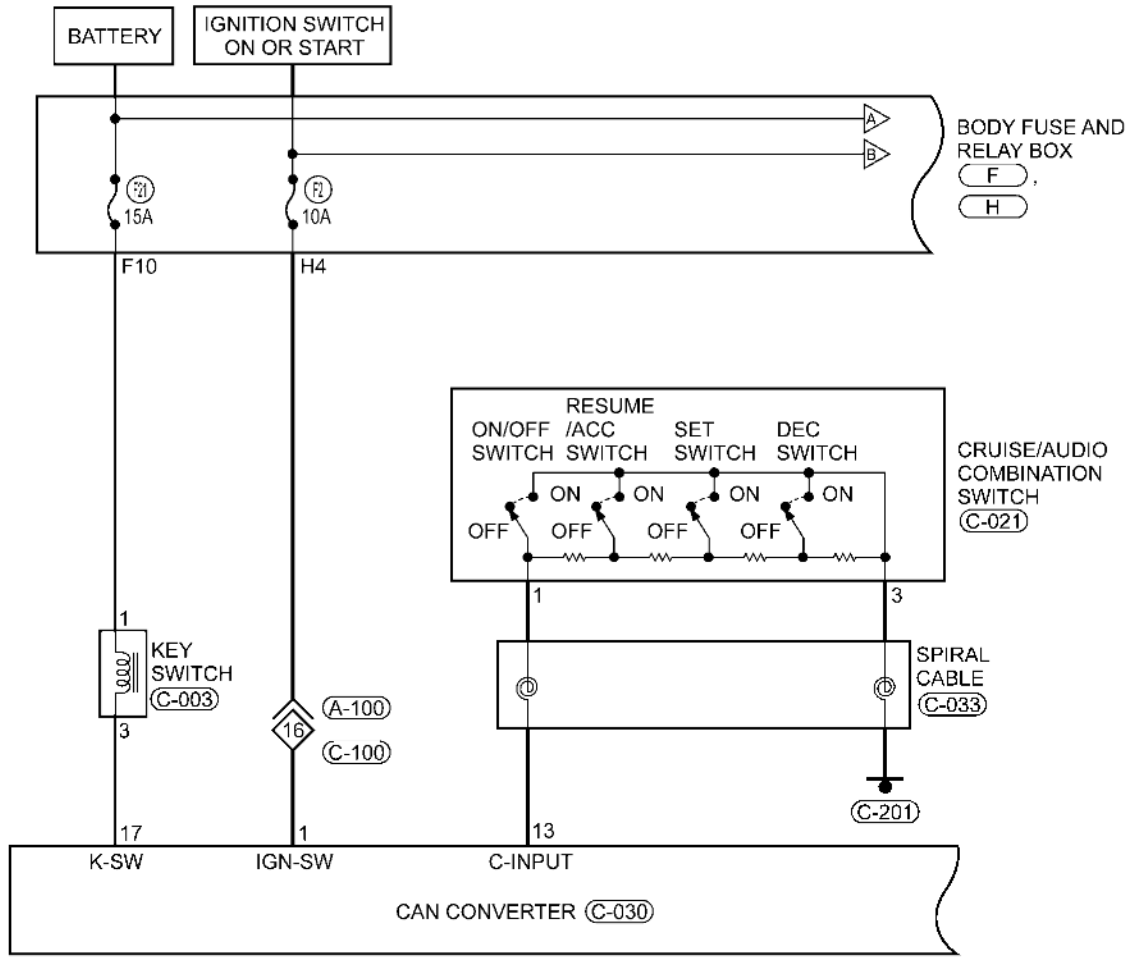
Automatic Transaxle Fluid Pressure Gauge	 besm080059
Digital Multimeter Fluke 15B & 17B	 besm030002

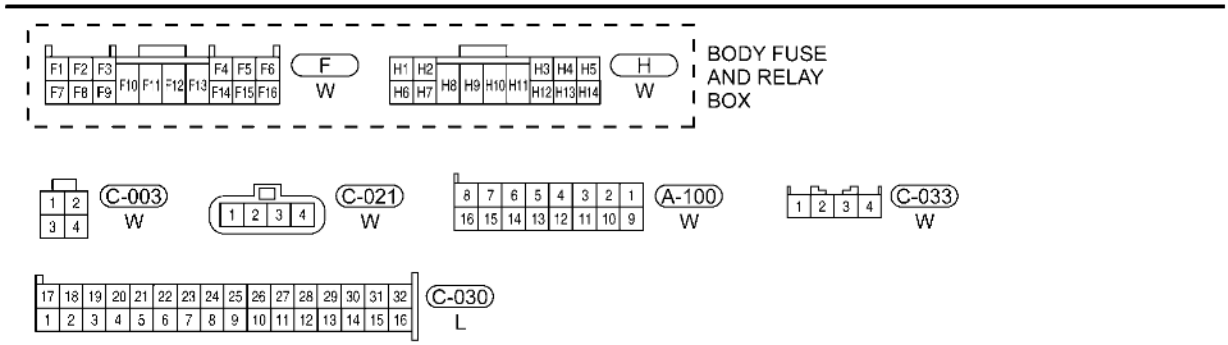
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Electrical Schematics

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A/T CONTROL SYSTEM - WITH DP0 SYSTEM

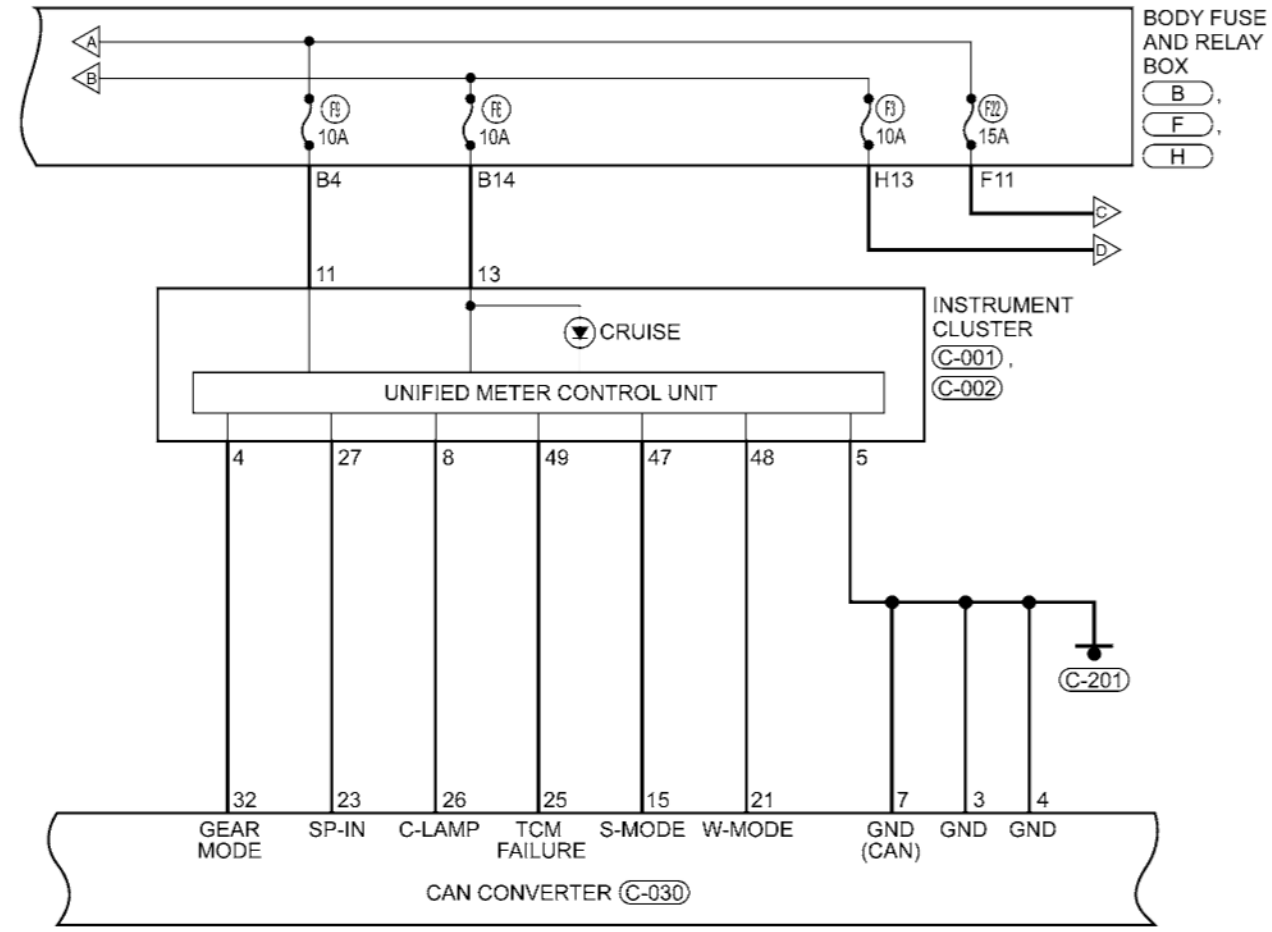


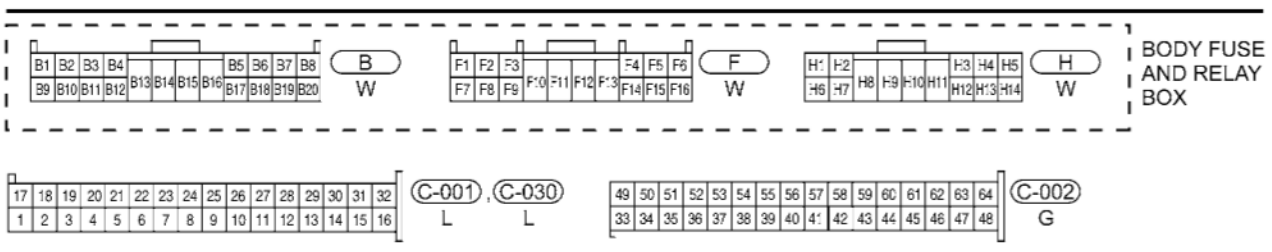


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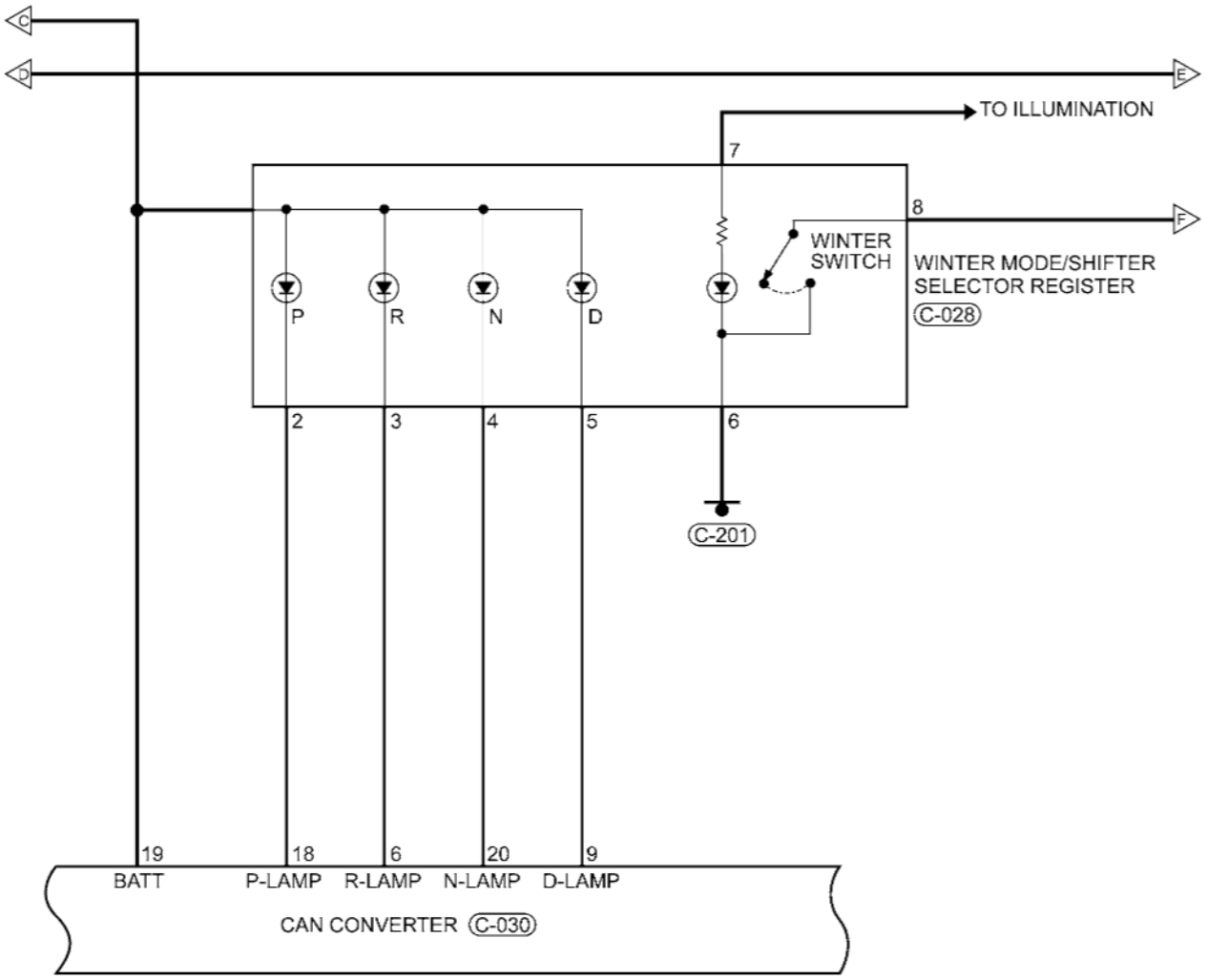


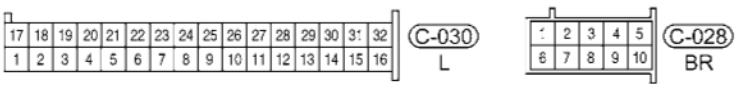


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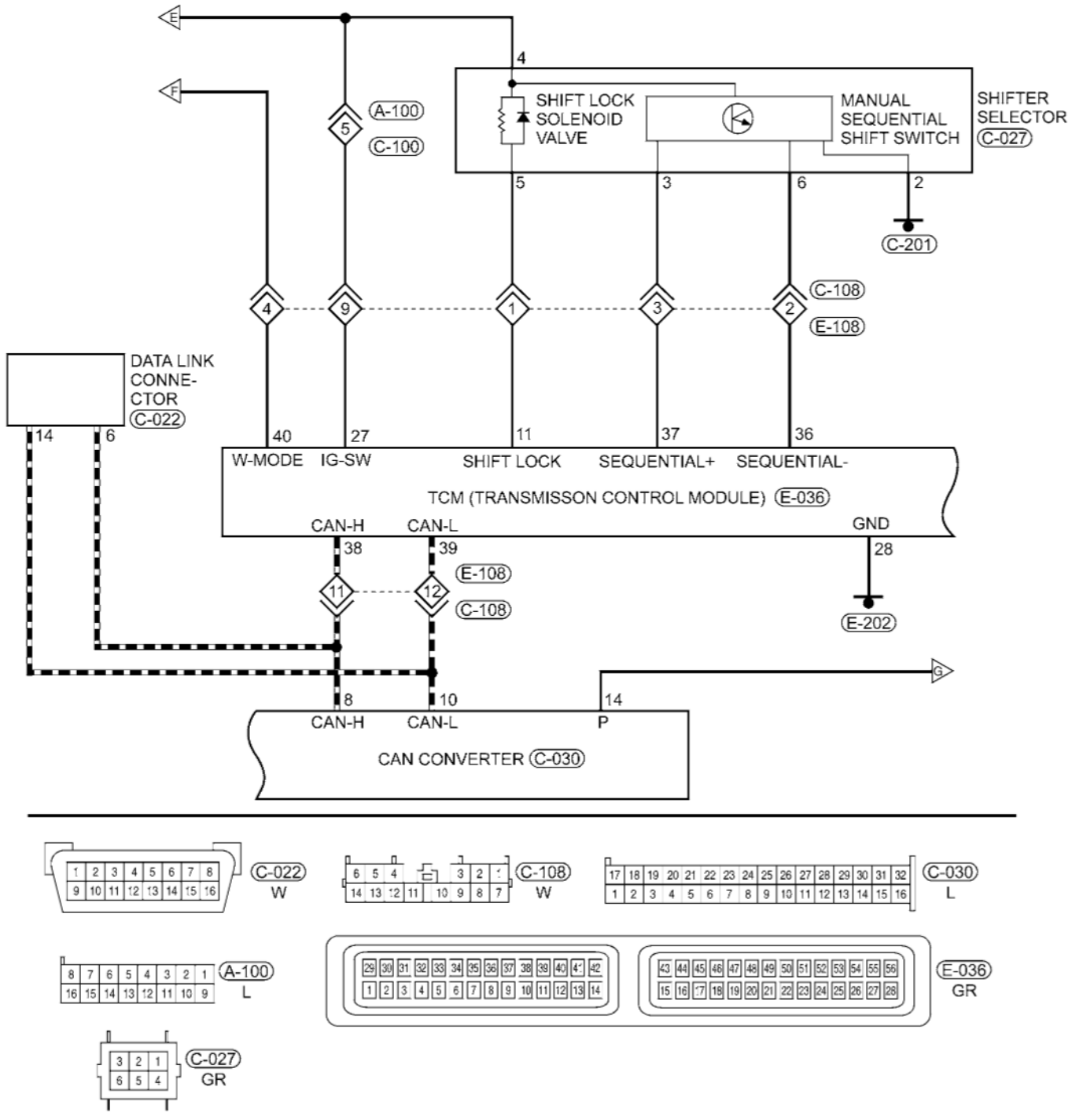




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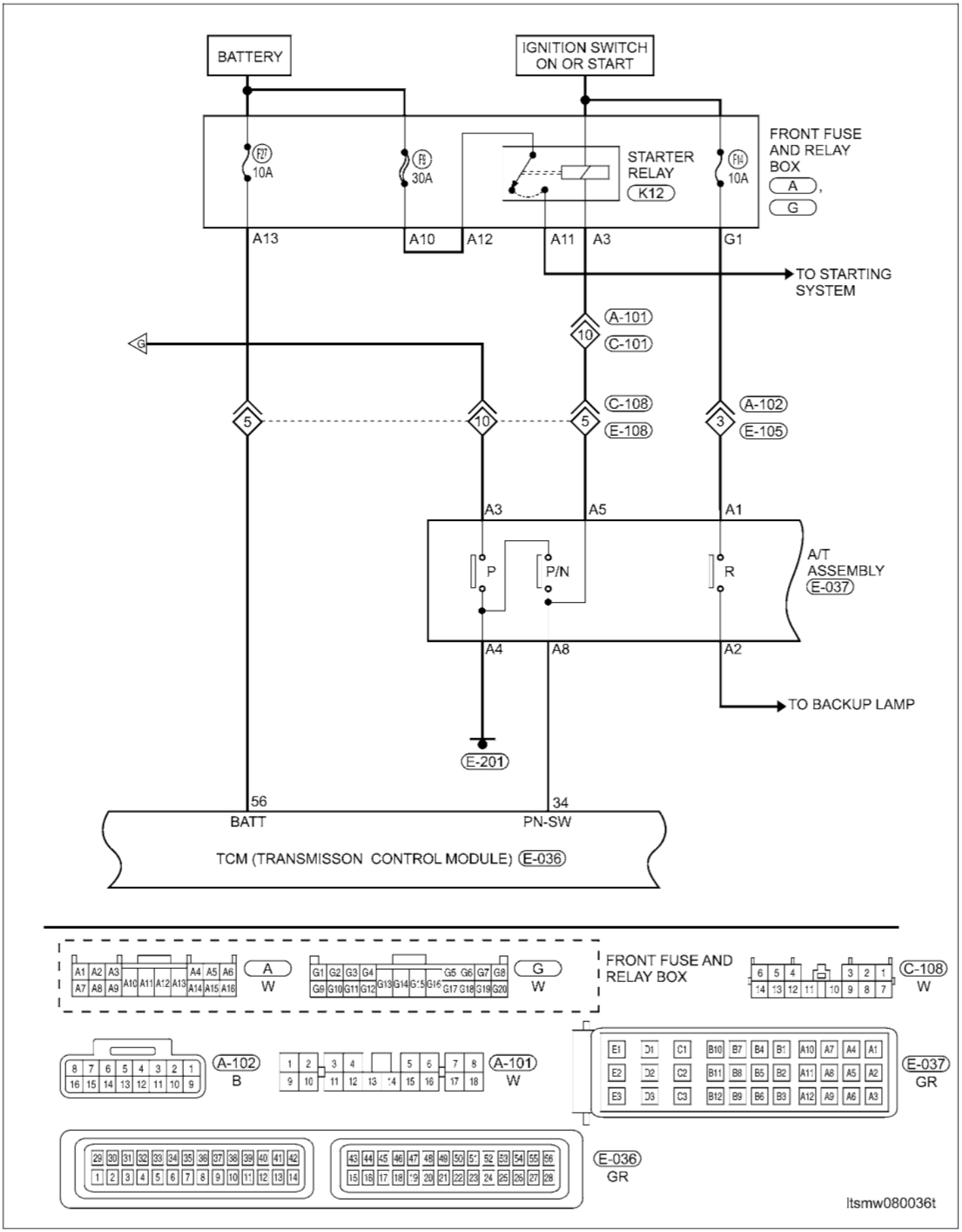
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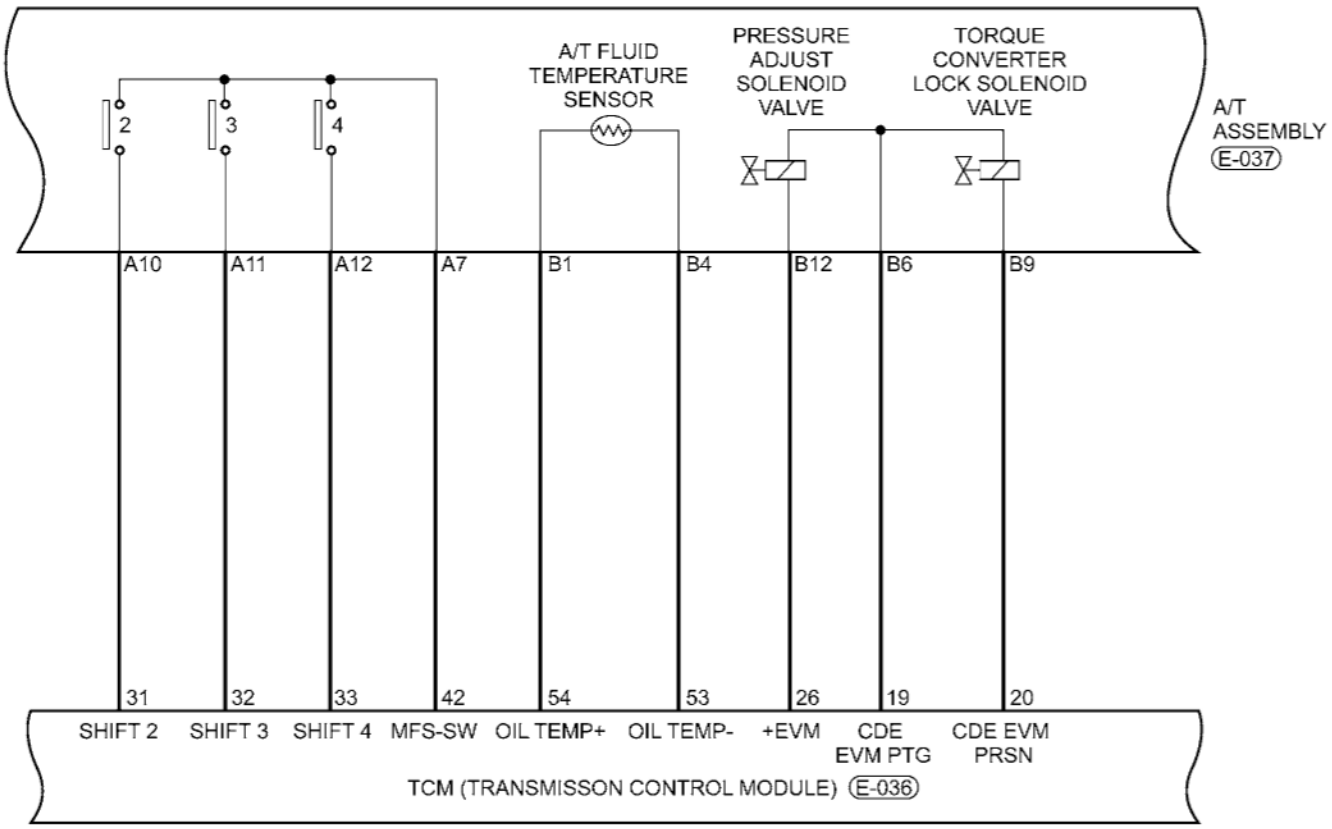
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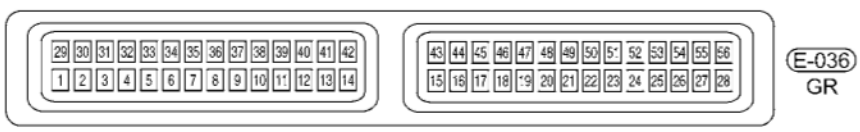
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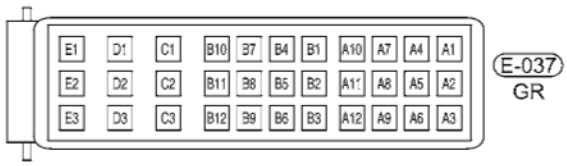


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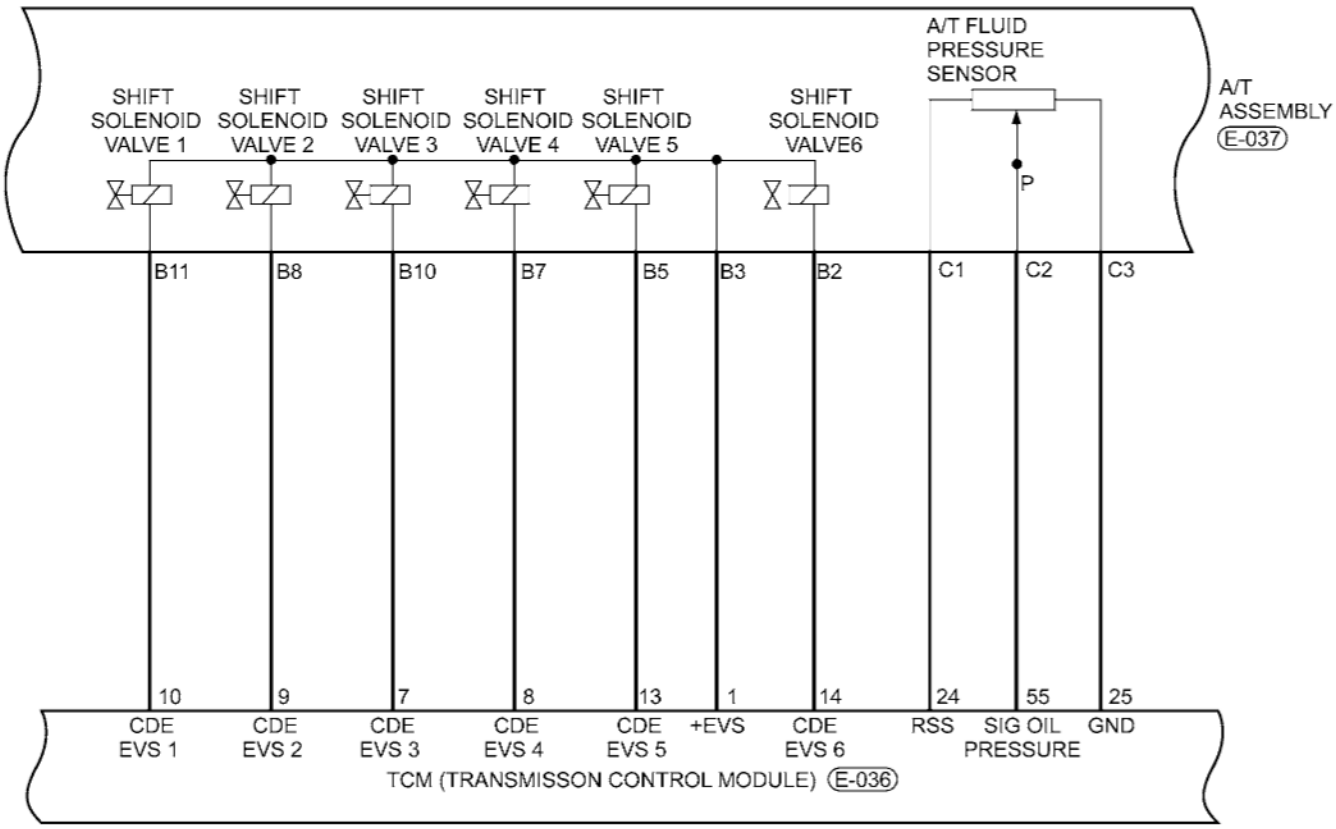


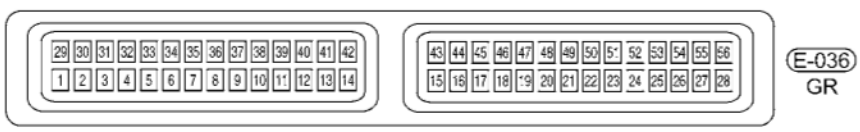


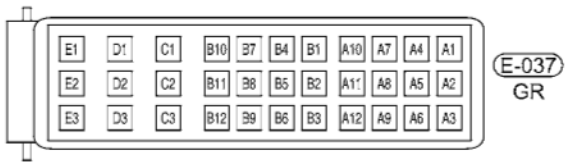
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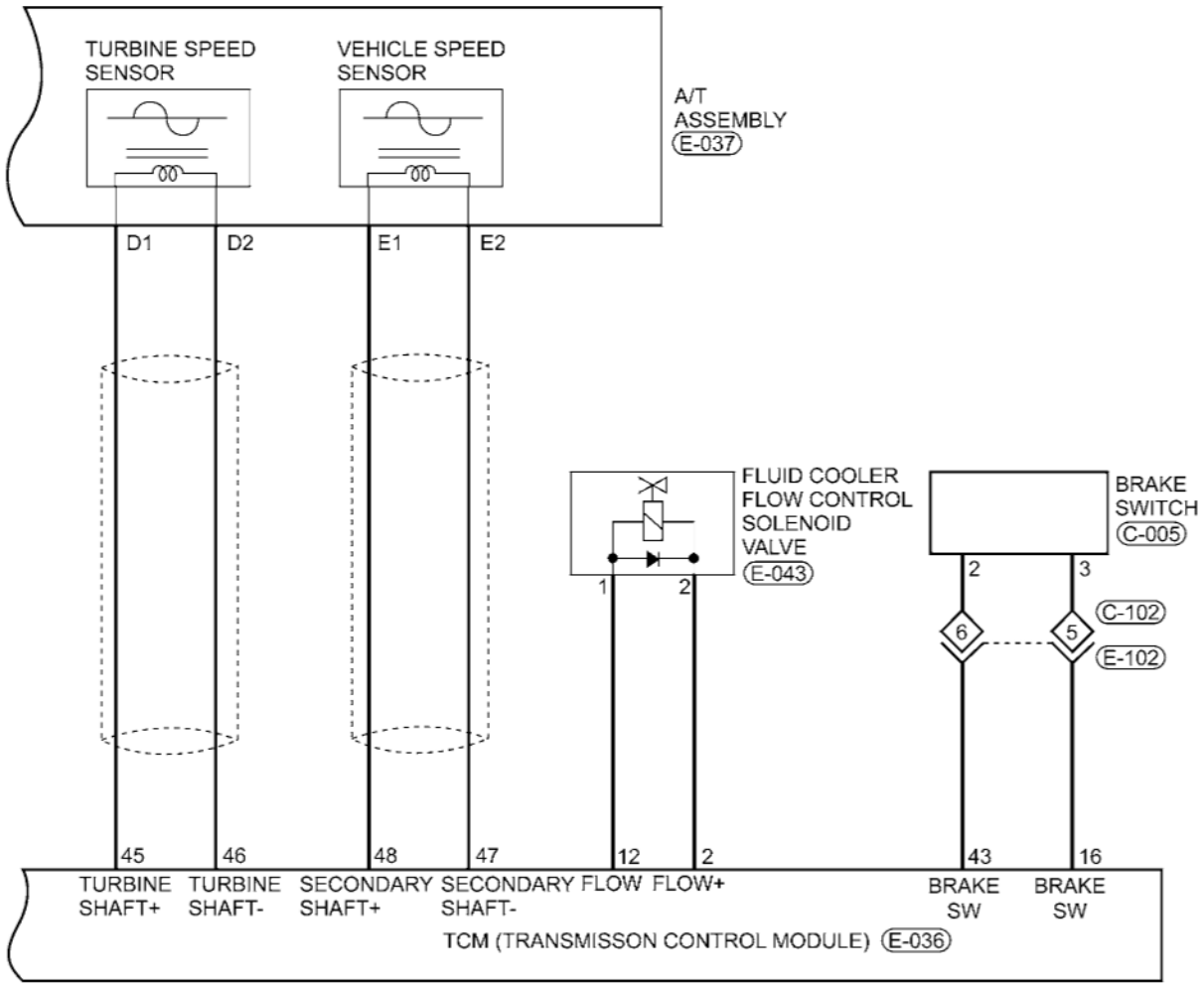


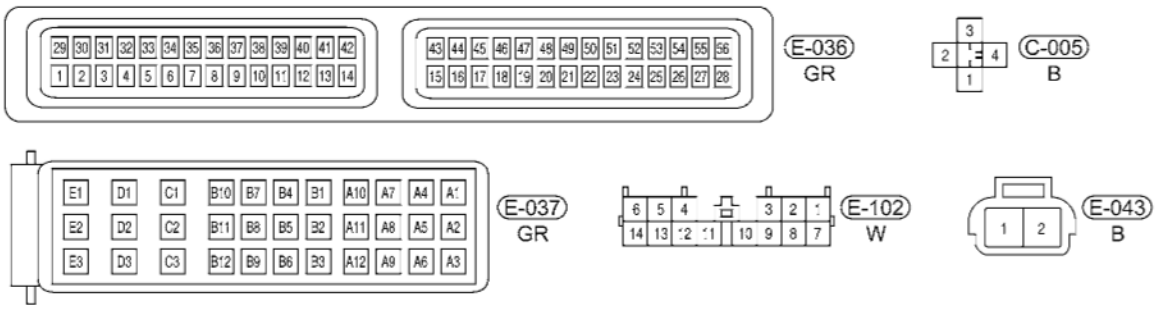


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DP0 Transaxle Control Module (TCM) Connector Pin-Out Table

TCM Pin-Out Table

PIN	CIRCUIT IDENTIFICATION	PIN	CIRCUIT IDENTIFICATION
1	+ EVS	29	-
2	Flow Control Solenoid Valve (+)	30	-
3	-	31	Shift 2
4	-	32	Shift 3
5	-	33	Shift 4
6	-	34	P/N Switch
7	Shift Solenoid Valve 3	35	-
8	Shift Solenoid Valve 4	36	Sequential (-)
9	Shift Solenoid Valve 2	37	Sequential (+)
10	Shift Solenoid Valve 1	38	CAN-H
11	Shift Lock	39	CAN-L
12	Fluid Cooler Flow Control	40	Winter Mode
13	Shift Solenoid Valve 5	41	-
14	Shift Solenoid Valve 6	42	MFS Switch
15	-	43	Brake Switch
16	Brake Switch	44	-
17	-	45	Turbine Shaft (+)
18	-	46	Turbine Shaft (-)
19	CDE EVM PTG	47	Secondary Shaft (-)
20	Torque Converter Lock Solenoid Valve (CDE EVM PRSN)	48	Secondary Shaft (+)
21	-	49	-
22	-	50	-
23	-	51	-
24	Regulated Sensor Supply	52	-
25	Sensor (GND)	53	Fluid Temperature Sensor (-)
26	Pressure Adjust Solenoid Valve (+EVM)	54	Fluid Temperature Sensor (+)
27	Ignition Switch	55	Fluid Pressure Sensor
28	GND	56	BATT

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DIAGNOSIS & TESTING

Diagnostic Help

1. The X-431 scan tool connects to the Data Link Connector (DLC) and communicates with the vehicle electronic modules through the data network.
2. Confirm that the malfunction is current and carry-out the diagnostic tests and repair procedures.
3. If the Diagnostic Trouble Code (DTC) cannot be deleted, it is a current fault.
4. Use only a digital multimeter to perform voltage readings on electronic systems.
5. Refer to any Technical Bulletins that may apply to the failure.
6. Visually inspect the related wiring harness.
7. Inspect and clean all Engine Control Module (ECM) grounds that are related to the most current DTC.
8. If numerous trouble codes were set, use a wiring schematic and look for any common ground circuits or voltage supply circuits that may apply to the DTC.

Intermittent DTC Troubleshooting

If the failure is intermittent perform the following:

- Check for loose connectors.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Monitor the scan tool data relative to this circuit.
- Wiggle the related wiring harness and connectors while looking for an interrupted signal on the affected circuit.
- If possible, try to duplicate the conditions under which the DTC set.
- Look for the data to change or for the DTC to reset during the wiggle test.
- Look for broken, bent, pushed out or corroded terminals.
- Inspect the sensor and mounting area for any condition that would result in an incorrect signal, such as damage, or foreign material.
- A data recorder, and/or oscilloscope should be used to help diagnose intermittent conditions.
- Remove the Engine Control Module (ECM) from the troubled vehicle and install in a new vehicle and test. If the DTC cannot be deleted, the ECM is malfunctioning. If the DTC can be deleted, return the ECM to the original vehicle.

Ground Inspection

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This added resistance can alter the way a circuit works.

Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can effect the circuit. Perform the following when inspecting a ground connection:

1. Remove the ground bolt or screw.
2. Inspect all mating surface for tarnish, dirt, rust, etc.
3. Clean as required to assure good contact.
4. Reinstall bolt or screw securely.
5. Inspect for ″add-on″ accessories which may be interfering with the ground circuit.
6. If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are crimped to one eyelet, make sure no excess wire insulation has been crimped creating a bad ground.

Diagnostic Tools

1. Diagnostic Scan Tool X-431
2. Digital Multimeter
3. Jumper Wire

Transaxle Control Module (TCM) Electrical Harness Test Tool

If using a TCM electrical harness test tool, you can diagnose the TCM harness while the TCM is still connected.

- Measure sensor and solenoid resistance (always measure resistance with the power off).
- Measure the signal voltage of the TCM (always measure voltage with the power on).

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NOTE :
Using the TCM electrical harness test tool will help prevent electrical connector terminal damage.

Diagnostic Trouble Code (DTC) List

DP0 Automatic Transaxle DTC List

DTC	DTC DEFINITION
P0218	Automatic Transaxle Overheating
P0603	Internal Control Module Memory
P0604	RAM
P0605	Checksum Error
P0641	Sensor Feed
P0657	Solenoid Power Supply Circuit Shorted To Voltage
P0657	SSV Feed Circuit Open
P0705	Multi-function Switch: Prohibited Position
P0706	Multi-function Switch: Intermediate Position
P0709	Multi-function Switch: Affected by Interference
P0710	Fluid Temperature Sensor
P0715	No Turbine Speed Sensor Signal
P0715	Turbine Speed Sensor Affected by Interference
P0720	No Vehicle Speed Sensor Signal
P0720	Vehicle Speed Sensor Affected by Interference
P0720	Vehicle Speed Sensor Signal Consistency
P0730	Cylinder Slip
P0740	Lock-up
P0753	EVS1 Circuit Open
P0753	EVS1 Circuit Shorted To Ground
P0753	EVS1 Circuit Shorted To Voltage
P0758	EVS2 Circuit Open
P0758	EVS2 Circuit Shorted To Voltage
P0763	EVS3 Circuit Open
P0763	EVS3 Circuit Shorted To Voltage
P0768	EVS4 Circuit Open
P0768	EVS4 Circuit Shorted To Ground
P0768	EVS4 Circuit Shorted To Voltage
P0773	EVS5 Circuit Open
P0773	EVS5 Circuit Shorted To Voltage
P0775	EVM (Electronic Valve Modulation) Circuit Open
P0775	EVM (Electronic Valve Modulation) Circuit Shorted To Voltage
P0795	EVLU Circuit Open
P0795	EVLU Shorted To Voltage
P0819	Flick Shift Contact Duration
P0819	Flick Shift Contacts
P0840	Pressure Sensor
P0850	P/N Contact

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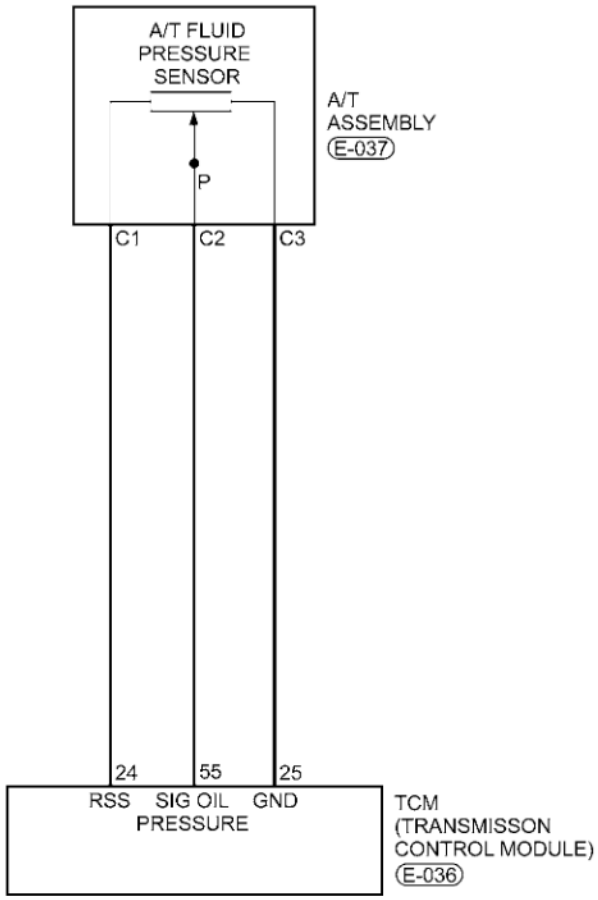
DTC	DTC DEFINITION
P1928	Shift Lock Solenoid Valve Circuit Open
P1928	Shift Lock Solenoid Valve Shorted To Voltage
P2709	EVS6 Circuit Open
P2709	EVS6 Circuit Shorted To Voltage
P2753	EPDE Circuit Open
P2753	EPDE Circuit Shorted To Ground
U0001	CAN Communication Error
U0100	Link to EMS
U1100	Coolant Temperature Not Sent By EMS
U111F	Engine Speed Not Sent By EMS
U1120	Actual Torque Not Sent By EMS
U1121	Pedal Position Not Sent By EMS
U1122	Expected Torque Not Sent By EMS
U112B	Torque Without Reduction Consistency
U112B	Torque Without Reduction Not Sent By EMS

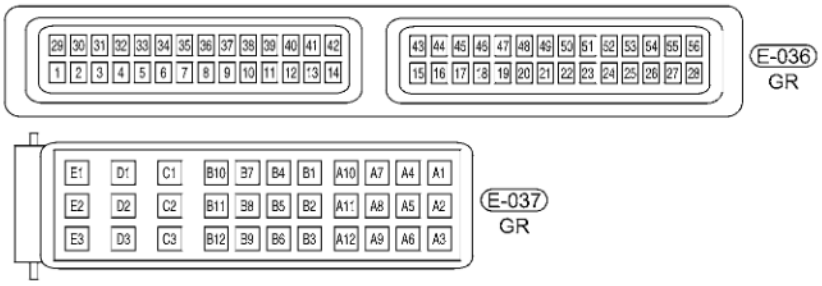
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Diagnostic Trouble Code (DTC) Tests

P0641 - Sensor Feed

TM - DP0 - OPS - 01



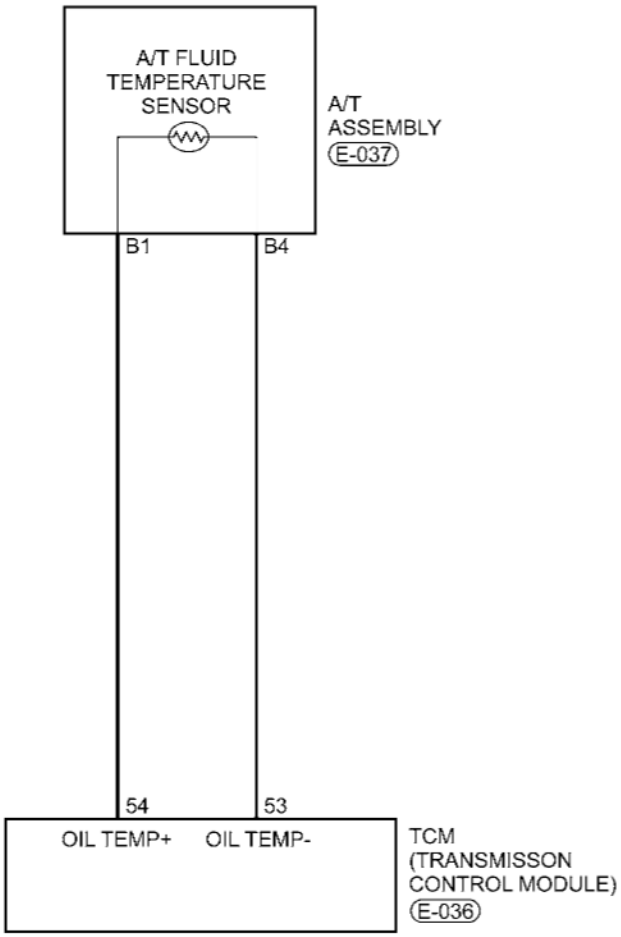


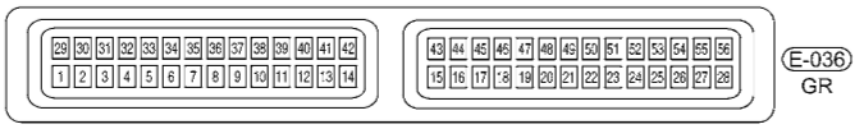
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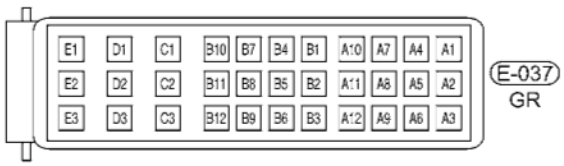
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A/T Fluid Temperature Sensor

TM - DP0 - FTS - 01







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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0641	Sensor feed	Engine is running	The Transaxle Control Module (TCM) detects that the voltage is out of the acceptable range.	• TFT sensor • A/T fluid pressure sensor • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

- If DTCs P0840 and P0710 are present, diagnose and repair them before continuing with this test.
- Using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected. This will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

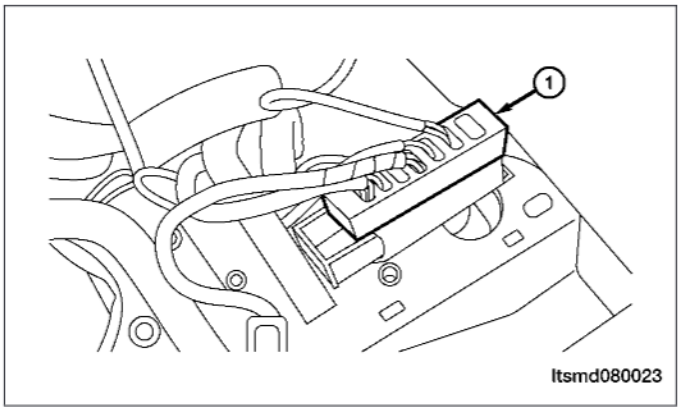
1. CHECK TRANSAXLE FLUID PRESSURE AND TEMPERATURE SENSOR ELECTRICAL CONNECTOR

- Turn the ignition switch off.
- Disconnect the A/T assembly electrical connector E-037 (1).
- Inspect the electrical connector for damage.

Is the electrical connector OK?

Yes >> Go to the next step.

No >> Repair or replace the electrical connector as necessary.



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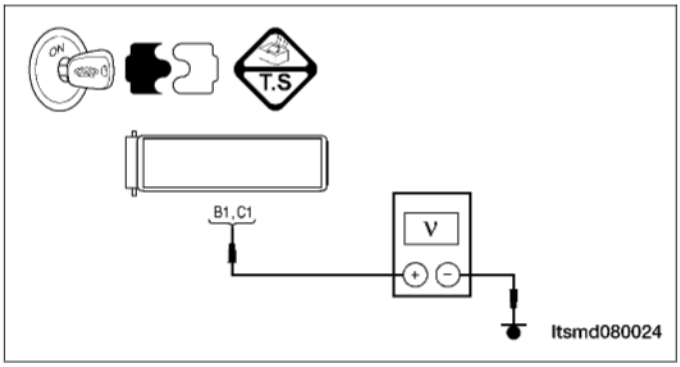
2. CHECK TRANSAXLE FLUID PRESSURE AND TEMPERATURE (TFT) SENSOR POWER SUPPLY

- Turn the ignition switch on.
- Check the A/T fluid pressure sensor voltage supply circuit for 5 V between connector E-037, terminal C1 and ground.
- Check the Transaxle Fluid Temperature (TFT) sensor voltage supply circuit for 5 V between connector E-037, terminal B1 and ground.

Is 5 V present at each terminal?

Yes >> • Go to the next step.

No >> • Repair or replace open circuit or short to ground or short to power in harness or connectors.



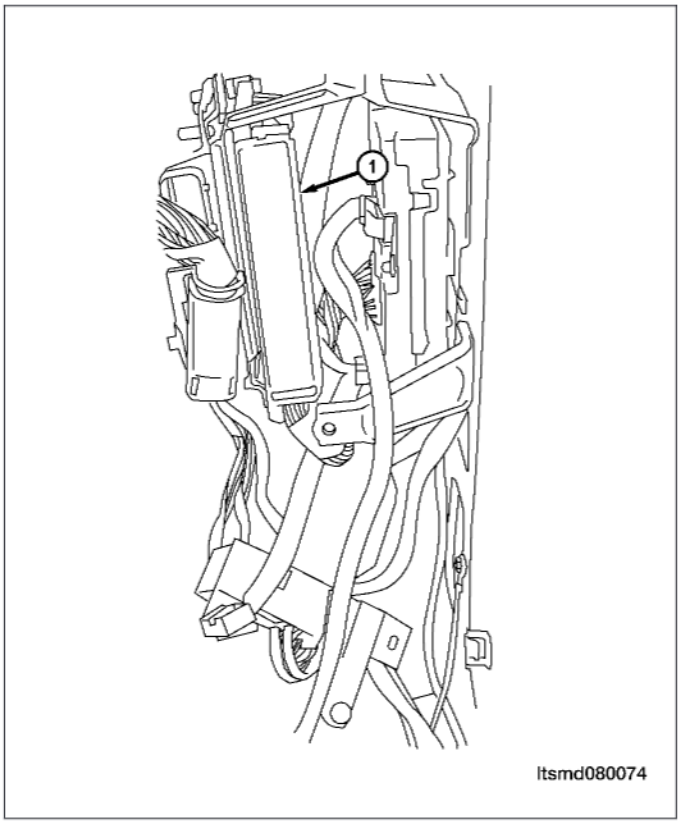
3. CHECK A/T FLUID PRESSURE SENSOR AND TFT SENSOR GROUND CIRCUIT

- Disconnect the Transaxle Control Module (TCM) electrical connector E-036 (1).
- Check the A/T fluid pressure sensor ground circuit between the A/T connector E-037, terminal C3 and TCM connector E-036 terminal 25 for an open, short to ground or short to voltage.
- Check the A/T TFT sensor ground circuit between the A/T connector E-037, terminal B4 and TCM connector E-036 terminal 53 for an open, short to ground or short to voltage.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair the circuit for an open or short to ground or short to voltage in the harness or connectors.

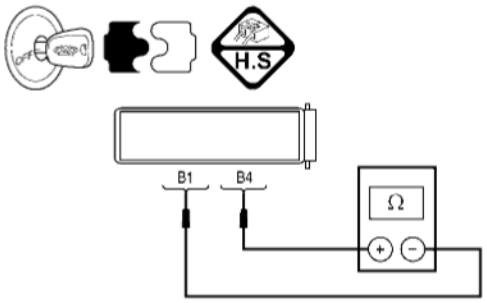


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4. CHECK TFT SENSOR

- Check TFT sensor as follows:

TFT SENSOR RESISTANCE	
TEMPERATURE °C	RESISTANCE Ω
-50	93917
-30	28237.4
-10	9826
0	6079
20	2528.5
25	2063
40	1159.2
50	810.4
70	419.1
80	309.2
100	176.2
120	105.9
140	66.7



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Is the check result normal?

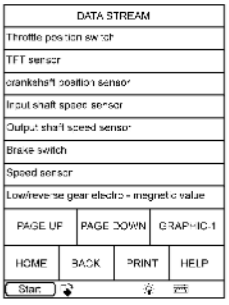
Yes >> Go to the next step.

No >> Replace the TFT sensor.

5. CHECK A/T FLUID PRESSURE SENSOR

- Turn ignition switch on.
- With X-431 scan tool, select view TCM data stream and compare to the following table.

ITEM	CONDITION	DISPLAY VALUE
Fluid Pressure	• Ignition switch: ON • Engine: Not running	Below 0.2 bar
	• Engine: Idle • TFT: 31°C • ECT: 30°C	Approximately 0.05 bar



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Is the check result normal?

Yes >> Go to the next step.

No >> Replace the TCM.

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6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is the check result normal?

Yes >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

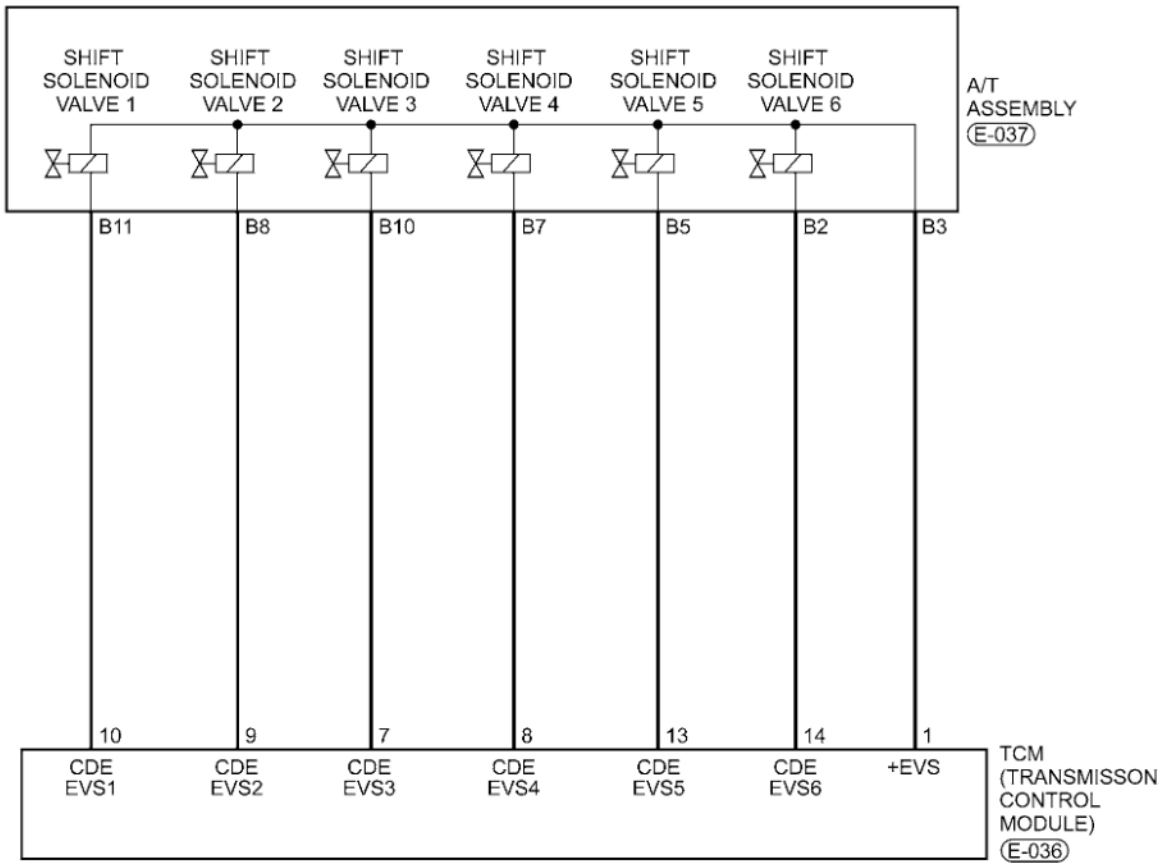
No >> Replace the TCM.

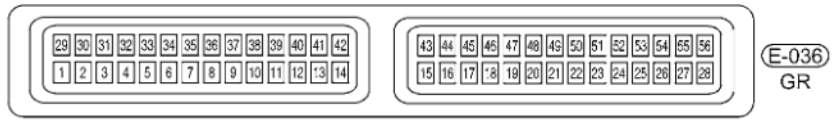
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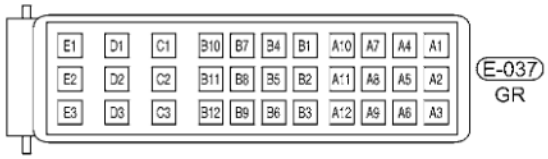
P0657 - Solenoid Power Supply Circuit Shorted To Voltage

Electronic Valve Solenoid

TM - DP0 - EVS - 01







ltsmw080022t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSE
P0657	Solenoid power supply circuit shorted to voltage	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detects an improper voltage drop (short to voltage) when it tries to operate the solenoid valve.	• Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

Using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected. This will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the gear position while driving, and compare to the following table.

TRANSAXLE GEAR POSITION/SOLENOID ACTIVATION						
SELECTOR POSITION	RANGE	SHIFT SOLENOID VALVE 1	SHIFT SOLENOID VALVE 2	SHIFT SOLENOID VALVE 3	SHIFT SOLENOID VALVE 4	
P	0	-	-	#	-	
R	R	-	-	-	-	
N	0	-	-	#	-	
D	1	-	-	#	#	
	2	-	#	-	#	
	3	-	-	-	-	
	4	#	#	-	-	



ltsmd080001t

- #: Operating component

Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- Stop the engine.
- Turn ignition switch on.
- With X-431 scan tool, perform the solenoid actuate test.
- The solenoid actuation should be heard.

Is the check result normal?

Yes >> Go to step 4.

No >> Go to the next step.

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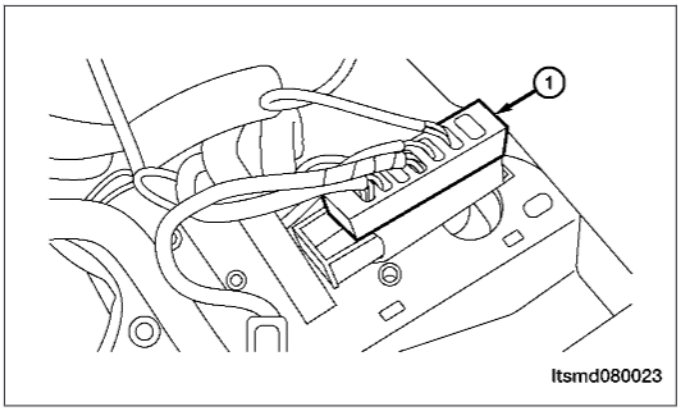
3. CHECK A/T ASSEMBLY AND TCM ELECTRICAL CONNECTOR

- Turn ignition switch off.
- Disconnect the A/T assembly electrical connector E-037 (1).
- Disconnect the TCM electrical connector E-036.
- Inspect the electrical connectors for damage.

Is the electrical connector OK?

Yes >> Go to the next step.

No >> Repair or replace the electrical connector as necessary.



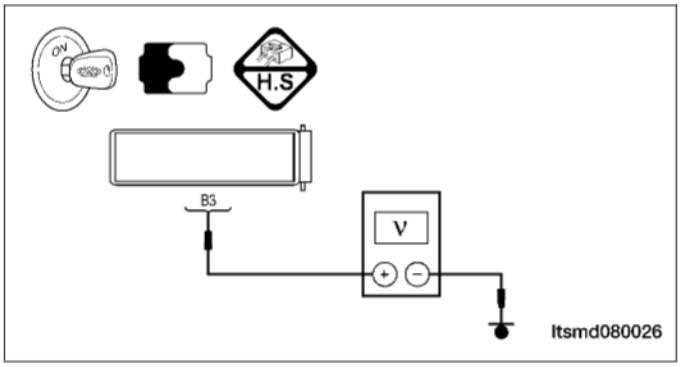
4. CHECK SOLENOID POWER SUPPLY

- Check the solenoid power circuit for battery voltage between the A/T assembly electrical connector E-037 terminal B3 and ground.

Is battery voltage present?

Yes >> Repair the circuit for a short to voltage in the harness or connectors.

No >> Go to the next step.



5. CHECK DTC

- Reconnect all previously disconnected electrical connectors.
- Start and operate the vehicle.
- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Did DTC P0657 reset?

Yes >> Replace the TCM.

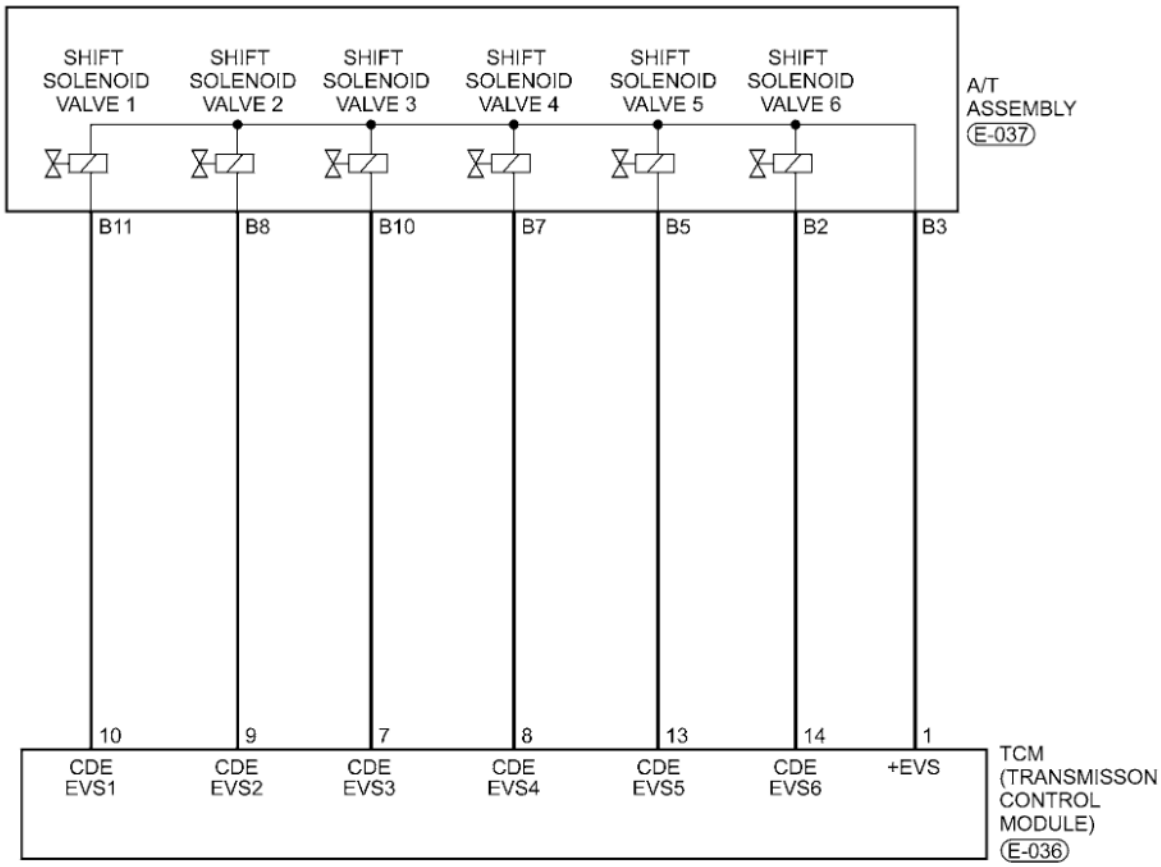
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

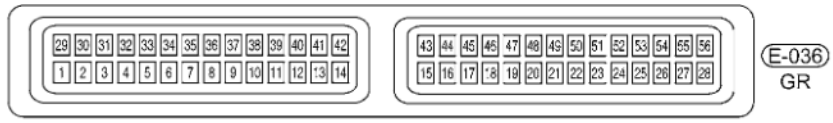
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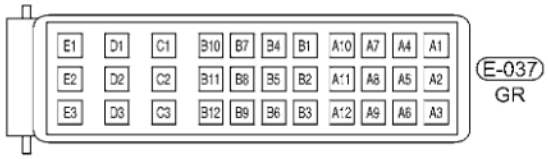
P0657 - Solenoid Power Supply Circuit Open

Electronic Valve Solenoid

TM - DP0 - EVS - 01







ltsmw080022t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSE
P0657	Solenoid power supply circuit open	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detects an improper voltage drop (open) when it tries to operate the solenoid valve.	• Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

Using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected. This will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the gear position while driving, and compare to the following table.

TRANSAXLE GEAR POSITION/SOLENOID ACTIVATION						
SELECT POSITION	RANGE	SHIFT SOLENOID VALVE 1	SHIFT SOLENOID VALVE 2	SHIFT SOLENOID VALVE 3	SHIFT SOLENOID VALVE 4	
P	0	-	-	#	-	
R	R	-	-	-	-	
N	0	-	-	#	-	
D	1	-	-	#	#	
	2	-	#	-	#	
	3	-	-	-	-	
	4	#	#	-	-	



ltsmd080001t

- #: Operating component

Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- Stop the engine.
- Turn ignition switch on.
- With X-431 scan tool, perform the solenoid actuate test.
- The solenoid actuation should be heard.

Is the check result normal?

Yes >> Go to step 5.

No >> Go to the next step.

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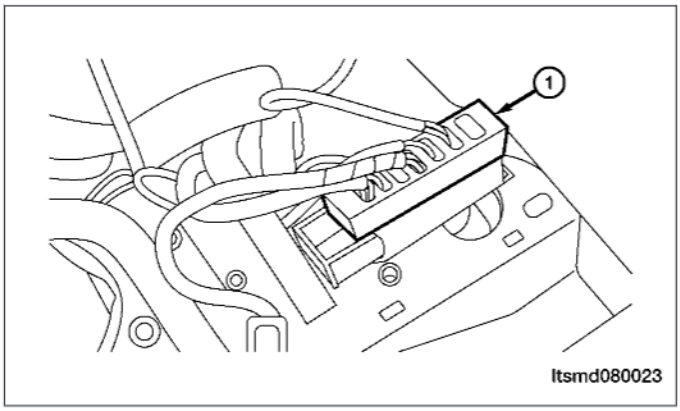
3. CHECK A/T ASSEMBLY ELECTRICAL CONNECTOR

- Turn ignition switch off.
- Disconnect the A/T assembly electrical connector E-037 (1).
- Inspect the electrical connector for damage.

Is the electrical connector OK?

Yes >> Go to the next step.

No >> Repair or replace the electrical connector as necessary.



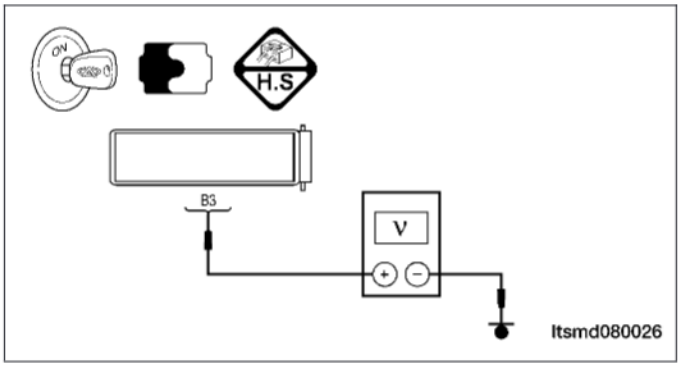
4. CHECK SOLENOID POWER SUPPLY

- Turn ignition switch on.
- Check the solenoid power circuit for battery voltage between the A/T connector E-037 terminal B3 and ground.

Is battery voltage present?

Yes >> Go to the next step.

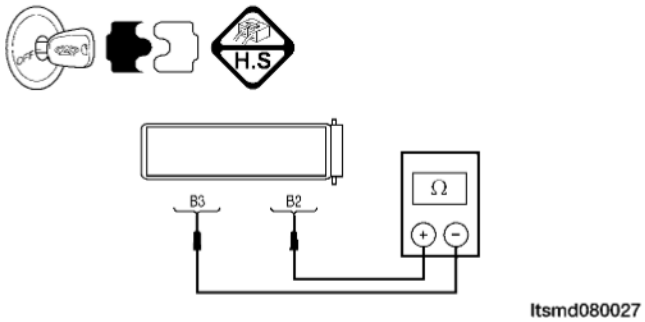
No >> Repair or replace circuit for an open in harness or connectors.



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5. CHECK SHIFT SOLENOID VALVE 6 RESISTANCE

- Turn ignition switch off.
- Check the harness continuity between the following terminals:

SOLENOID VALVE 6 RESISTANCE BASED ON TRANSAXLE TEMPERATURE				
A/T ASSEMBLY TERMINAL	A/T ASSEMBLY TERMINAL	TEMPERATURE	CONTINUITY	
B3	B2	23°C	Yes	

Is the check result normal?

Yes >> Go to the next step.

No >> Replace solenoid valve 6.

6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0657 still present?

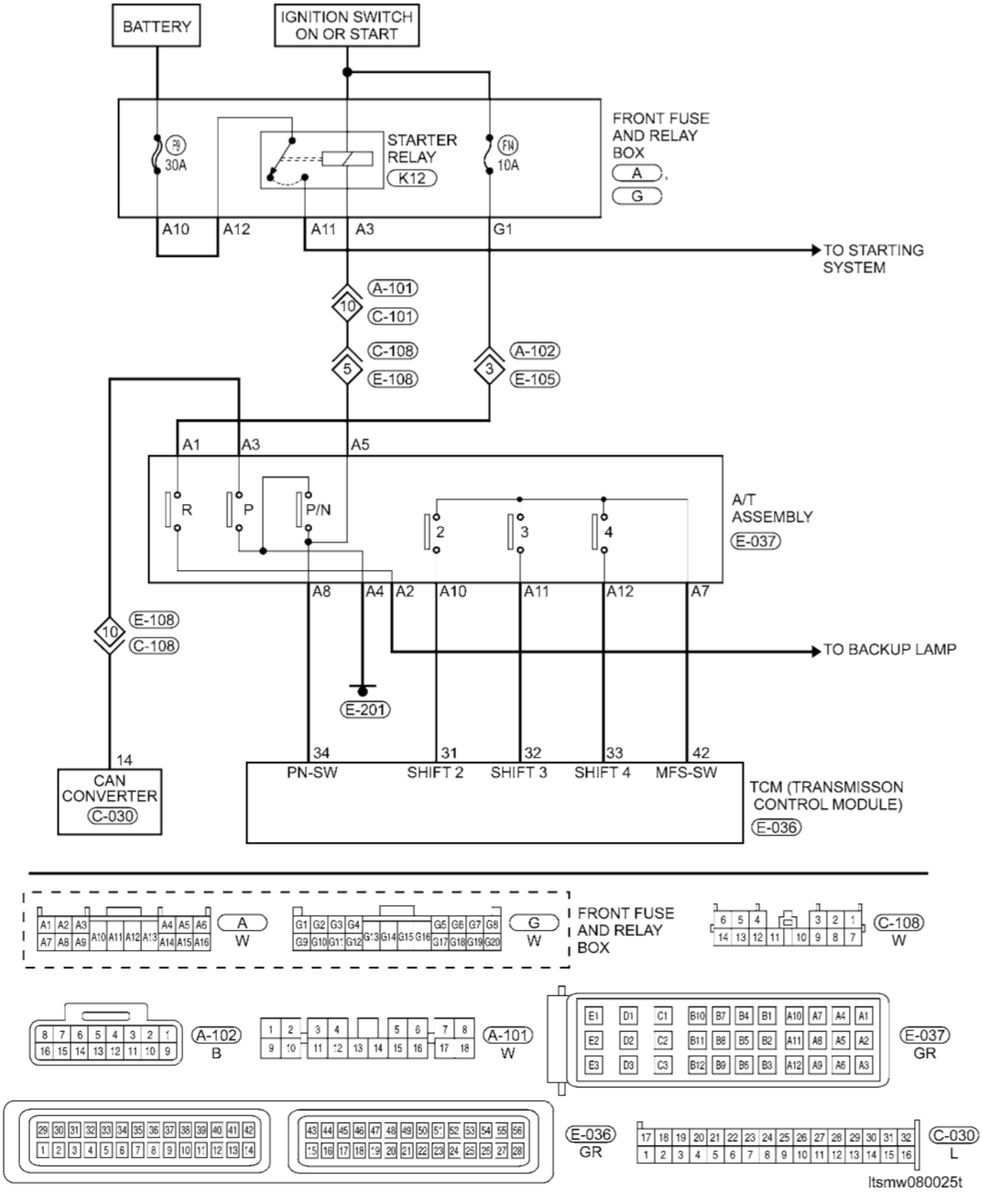
Yes >> Replace the TCM.

No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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P0705 - Multi-Function Switch: Prohibited Position

TM - DP0 - GSL - 01



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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0705	Multi-Function switch: prohibited position	Vehicle is driving	The Transaxle Control Module (TCM) detects the voltage is out of range when moving the shift lever from the ″P″ position to the ″N″ position.	• Multi-Function Switch • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected. Troubleshoot any Engine Control Module (ECM) charging/cranking DTCs before proceeding.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- Turn ignition switch on.
- With the scan tool, select view DTC and data stream for A/T.
- Monitor the value of the multi-function switch and compare to the following table.

TRANSAXLE RANGE SWITCH (CMF) CONDITION					
SHIFT LEVER POSITION	P/N	S2	S3	S4	
P	Close	Close	Open	Open	
R	Open	Close	Close	Close	
N	Close	Open	Close	Open	
D	Open	Open	Open	Close	
M	Close	Close	Close	Open	
+	Close	Close	Close	Open	
-	Close	Close	Close	Open	

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SEQUENCE SHIFT SWITCH CONDITION		
SHIFT LEVER POSITION	SEQUENCE SHIFT UP	SEQUENCE SHIFT DOWN
R	Active	Active
P	Active	Active
N	Active	Active
D	Active	Active
M	Not Active	Not Active
+	Not Active	Active
-	Active	Not Active

Is DTC P0705 present and the status active for this DTC?

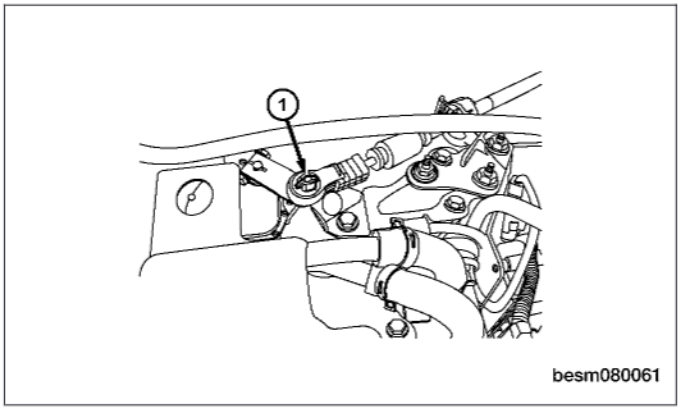
Yes >> Go to the next step.

No >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

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2. CHECK SHIFT SWITCH VALUE

- Move the shift lever (1) to every shift position.
- Measure the voltage as follows:



SHIFT POSITION VALUE				
TERMINAL	**S2**	**S3**	**S4**	**P/N**
POSITION	**31 - 42**	**32 - 42**	**33 - 42**	**34 - 42**
P	0	B+	B+	0
R	0	0	0	B+
N	B+	0	B+	0
D	B+	B+	0	B+
3	B+	0	0	B+
2	0	0	B+	B+

Do the circuits check OK, and do the reverse lamps also illuminate?

Yes >> The transaxle range switch is normal.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

No >> Go to the next step.

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3. CHECK RANGE SWITCH RESISTANCE

- Turn ignition switch off.
- Disconnect the TCM electrical connector.
- Measure the resistance as follows:

CHECK TCM CONNECTOR SHIFT RANGE SWITCH ON OR OFF CONDITION				
TERMINAL	**S2**	**S3**	**S4**	**P/N**
POSITION	**31 - 42**	**32 - 42**	**33 - 42**	**34 - 42**
P	0	∞	∞	0
R	0	0	0	∞
N	∞	0	∞	0
D	∞	∞	0	∞
3	∞	0	0	∞
2	0	0	∞	∞

CHECK TRANSAXLE ASSEMBLY CONNECTOR SHIFT RANGE SWITCH ON OR OFF CONDITION					
TERMINAL	**S2**	**S3**	**S4**	**R**	**P/N**
POSITION	A10 - A7	A11 - A7	A12 - A7	A1 - A2	A8 - A4
P	0	∞	∞	∞	0
R	0	0	0	0	∞
N	∞	0	∞	∞	0
D	∞	∞	0	∞	∞
3	∞	0	0	∞	∞
2	0	0	∞	∞	∞

Does the switch check OK?

Yes >> If the test results for the TCM electrical connector is normal, and the test results for the transaxle assembly is not normal, repair the circuits between the TCM electrical connector and transaxle shift range switch.

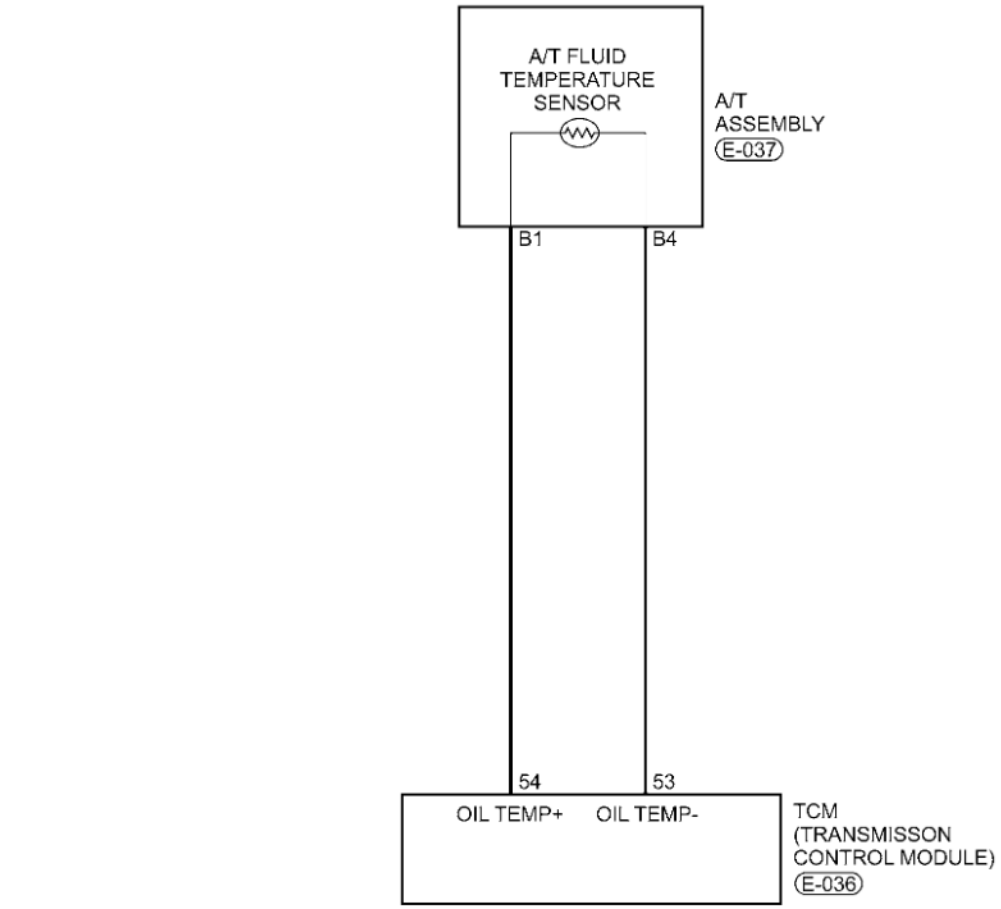
No >> If the test results for the TCM electrical connector pin 34 and pin 42 are normal, and the test results for the transaxle range switch pin A8 and A4 are normal, repair the circuit between the TCM electrical connector pin 34 and transaxle range switch electrical connector pin A8.
If the test results are not normal in one switch position, replace the transaxle range switch. If the test results are not normal at two or more switch positions, adjust the transaxle range switch before replacing it. After adjusting the transaxle range switch, verify the adjustment with the table. If the test results are still not normal, replace the transaxle range switch.

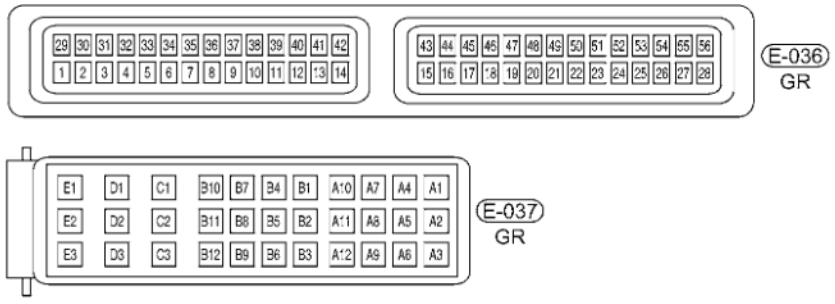
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P0710 - Fluid Temperature Sensor

FTS

TM - DP0 - FTS - 01





ltsmw080018t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSE
P0710	Transaxle Fluid Temperature (TFT) sensor	Engine is running	The Transaxle Control Module (TCM) will set this DTC when the transaxle temperature does not reach a normal operating temperature within a given time frame.	• TFT sensor • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

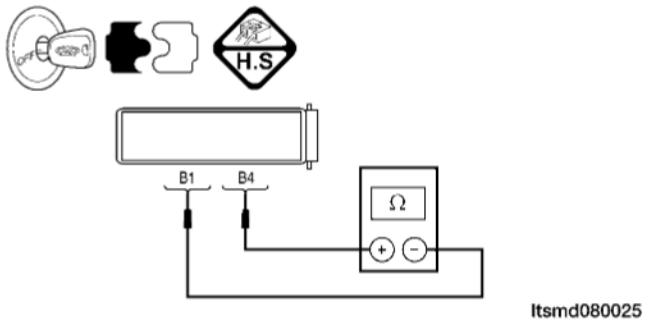
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Diagnostic Procedure

1. CHECK A/T FLUID TEMPERATURE SENSOR RESISTANCE

- Turn the ignition switch off.
- Disconnect A/T assembly connector E-037.
- Check TFT sensor resistance between sensor terminals, component side.

TFT SENSOR RESISTANCE	
TEMPERATURE (°C)	**RESISTANCE Ω**
-50	93917
-30	28237.4
-10	9826
0	6079
20	2528.5
25	2063
40	1159.2
50	810.4
70	419.1
80	309.2
100	176.2
120	105.9
140	66.7



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Is the check result normal?

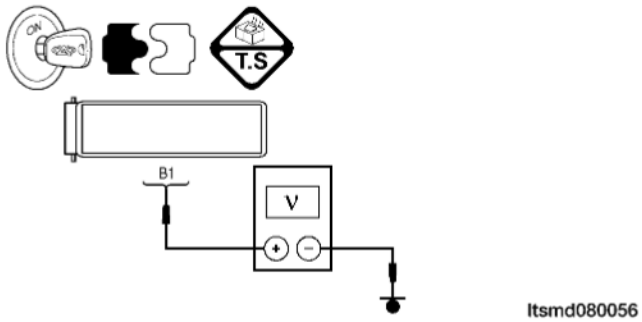
Yes >> Go to the next step.

No >> Replace the TFT sensor.

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2. CHECK TFT SENSOR POWER SUPPLY

- Turn ignition switch on.
- Check power supply between A/T assembly terminal B1 and ground.

TFT SENSOR VOLTAGE			
A/T ASSEMBLY CONNECTOR TERMINAL	TERMINAL	VOLTAGE	
B1	Ground	5 V	

- 5 V should exist.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to power or short to ground in harness or connectors. If circuit is normal, replace TCM.

3. CHECK TFT SENSOR GROUND CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Check continuity between TFT sensor connector E-037 and TCM connector E-036.
- Check TFT sensor ground circuit for a short to ground and short to power supply.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power supply in harness or connectors.

4. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0710 still present?

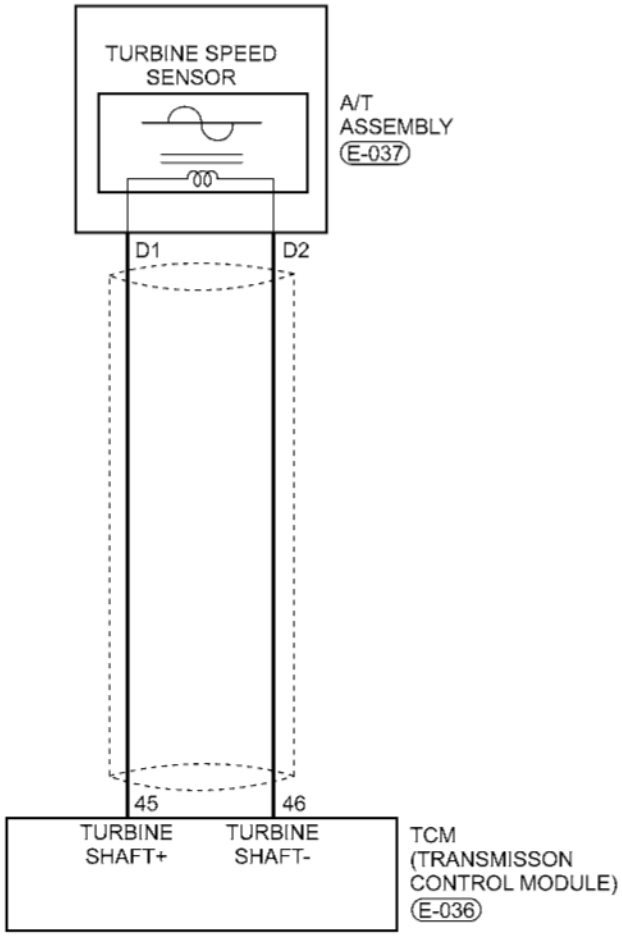
Yes >> Replace the TCM.

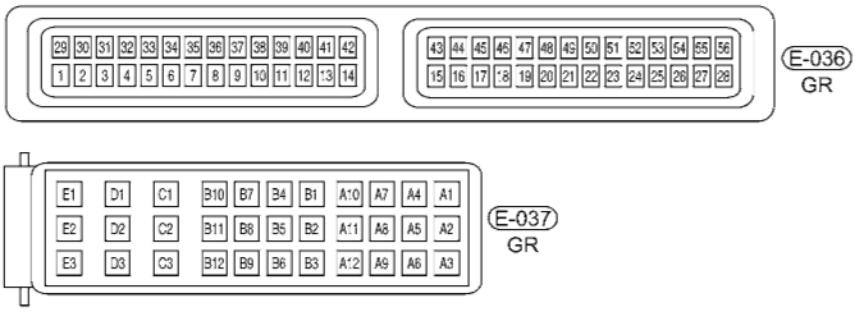
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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P0715 - Turbine Speed Sensor Affected By Interference

TM - DP0 - TSS - 01





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0715	Turbine speed sensor affected by interference	Engine is running	The Transaxle Control Module (TCM) will set this DTC when the turbine speed signal is not present.	• Turbine speed sensor • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on.
- With the scan tool, record and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK DTC AND TURBINE SPEED SENSOR DATA STREAM

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of turbine speed sensor while driving.

Is the check result normal and DTC not present?

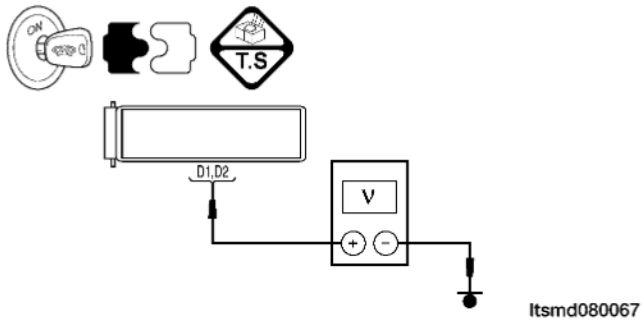
Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

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2. CHECK TURBINE SPEED SENSOR REFERENCE VOLTAGE

- Turn ignition switch on.
- Check reference voltage between A/T assembly terminal D1, D2 and ground.

TURBINE SPEED SENSOR VOLTAGE			
A/T ASSEMBLY CONNECTOR TERMINAL	GROUND	VOLTAGE	
D1	Ground	2 V	
D2			

- 2 V should exist.

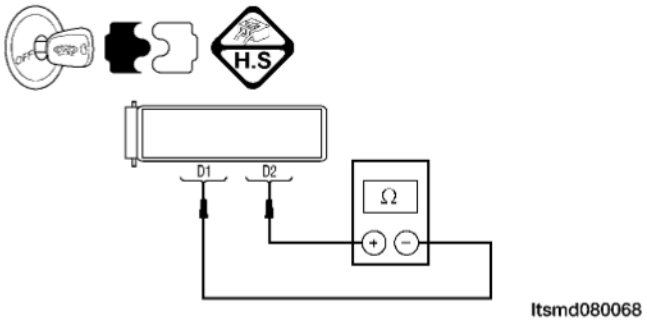
Is 2 V present at each electrical connector pin?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to power or short to ground in harness or connectors. If circuit is normal, replace the TCM.

3. CHECK TURBINE SPEED SENSOR RESISTANCE

- Check the resistance of the turbine speed sensor between the turbine speed sensor electrical connector pin D1 and D2, component side.

TURBINE SPEED SENSOR RESISTANCE		
TURBINE SPEED SENSOR RESISTANCE BASED ON TRANSAXLE TEMPERATURE		
TERMINAL	RESISTANCE 23°C	
D1 - D2	260 - 340 Ω	

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the turbine speed sensor.

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4. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0715 present?

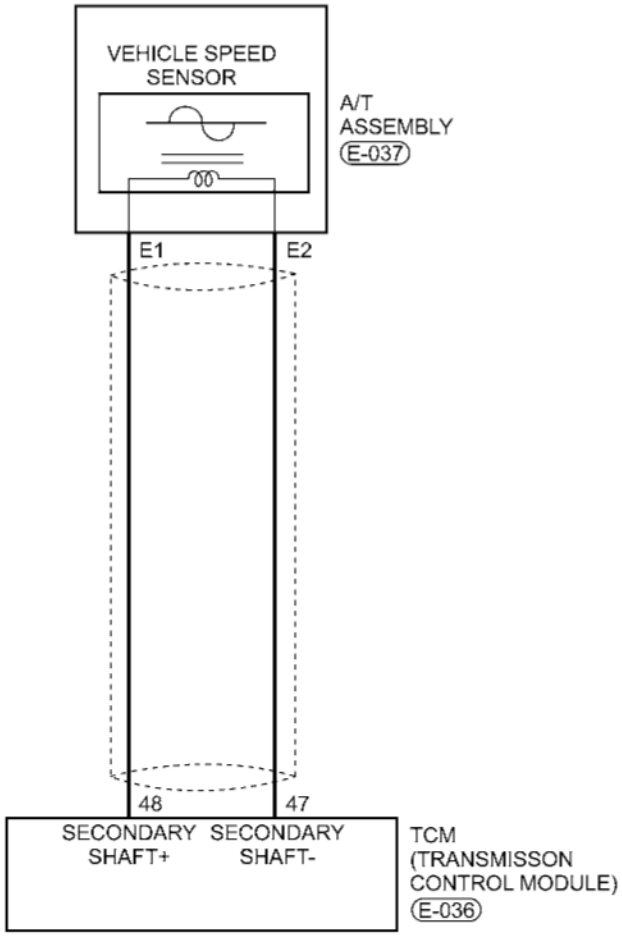
Yes >> Replace the TCM.

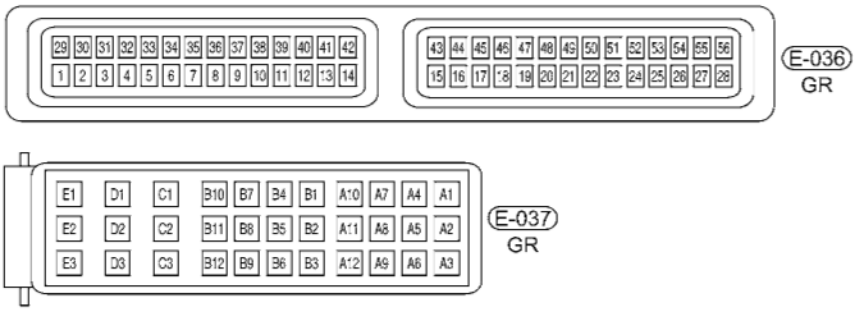
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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P0730 - Ratio Of Transaxle Error

TM - DP0 - VSS - 01





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Operating Components Condition

- Related Operating Components

RELATED OPERATING COMPONENT									
GEARSHIFT LEVER POSITION		GEAR RATIO	ENGINE START	PARKING MECHANISM	DRIVE		LOCK		
					2, 3, 4 GEAR CLUTCH (E2)	REVERSE AND 1-3 GEAR CLUTCH (E1)	4 GEAR BRAKE (F1)	REVERSE GEAR BRAKE (F2)	1, 2 GEAR BRAKE (F3)
P	Parking	-	Enabled	√	-	√	-	-	-
R	Reverse Gear	-2.45	-	-	-	√	-	√	-
N	Neutral Gear	-	Enabled	-	-	√	-	-	-
D	Gear 1	2.75	-	-	-	√	-	-	√
	Gear 2	1.5	-	-	-	-	-	-	√
	Gear 3	1.000	-	-	-	√	-	-	-
	Gear 4	0.71	-	-	-	-	√	-	-

√ Operating components

On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSE
P0730	Ratio of transaxle error	Vehicle is driving	The Transaxle Control Module (TCM) detects that a Gear Ratio Error is already present. The DTC is set if the fault happened within seconds of a shift.	• Input shaft speed sensor • Output shaft speed sensor • The retainer of deceleration clutch • Transfer case driven and drive gear • 2, 3, 4 gear clutch (E2) • Reverse and 1 - 3 gear clutch (E1) • 4 gear brake (F1) • Reverse gear brake (F2) • 1, 2 gear brake (F3) • Noise interference

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

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NOTE :
Checking the automatic transaxle fluid quality and fluid level is the most basic check of the automatic transaxle. The fluid check is also an important inspection to determine if the transaxle will need to be disassembled.

CAUTION:
The burnt scent of ATF fluid indicates that the transaxle fluid is contaminated. The tiny particles in the fluid pan indicate that the transaxle is worn and it will be necessary to overhaul the transaxle.

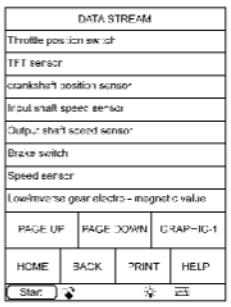
NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK FLUID QUALITY, FLUID LEVEL AND DTC

- Drive the vehicle until the TFT reaches working temperature (70° - 80°C).
- Park the vehicle on level ground.
- Shift the gear selector lever to all gear positions once, stay in one gear about 5 seconds, then shift to gear "N".
- Clean and check the outside of dipstick and remove the dipstick to check the fluid level.
- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	EVS					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
R	Not active	Not active	Not active	Not active	Not active	Not active
N/P	Not active	Not active	Active	Not active	Not active	Not active
1	Not active	Not active	Active	Active	Not active	Not active
2	Not active	Active	Not active	Active	Not active	Not active
3	Not active	Not active	Not active	Not active	Not active	Not active
4	Active	Active	Not active	Not active	Not active	Not active



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Is the check result not normal and DTC P0730, DTC P0715 or DTC P0720 present?

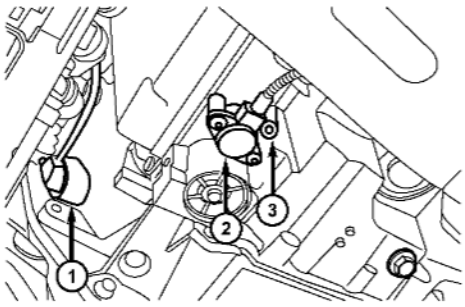
Yes >> If DTC P0715 is present, see DTC P0715 diagnostic procedure.
If DTC P0720 is present, see DTC P0720 diagnostic procedure.

No >> Go to the next step.

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2. HYDRAULIC TEST

- Preheat the transaxle fluid to 80° - 100°C.
- Lift the vehicle until the wheels can rotate freely.
- Connect the special fluid pressure gage onto the fluid pressure measurement port as (3).



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CONNECTOR AND TEST CAVITY			
CONNECTOR AND CAVITY	1	2	3
Figure name	Output speed sensor	Fluid pressure sensor	Fluid pressure test port

STANDARD FLUID PRESSURE TEST		
MEASURE STATUS	ENGINE SPEED (RPM)	STANDARD FLUID PRESSURE (BAR)
Gear lever position	Not running	Below 0.2
D/R	820 RPM	2.6
D/R	1400 RPM	8.7

- In accordance with the shown status of standard fluid pressure measurement table, measure the fluid pressure of measurement port. The measurement of port should be within the standard range.
- If some measurement values is beyond the standard range, please refer to the fluid pressure measurement and diagnosis table for causes.

Is the check result normal?

Yes >> Go to step 5 for disc or plate abrasion.

No >> Go to the next step.

3. CHECK VALVE BODY ASSEMBLY AND FLUID PUMP AND PIPELINE

- Turn the ignition switch off.
- Remove and disassemble the DP0 Automatic Transaxle Assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Check valve body and fluid pump and pipeline.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components as needed.

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4. COMPRESSED AIR TEST

- Check low speed clutch system: Low speed clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.
- Check reverse/low brake clutch system: Low speed clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.

Is the check result normal?

Yes >> Go to the next step for disc or plate abrasion.

No >> Replace the damaged components as needed.

5. CHECK CLUTCH SYSTEM

- Check low speed clutch system:
  - 2, 3, 4 gear clutch (E2)
  - Reverse and 1 - 3 gear clutch (E1)
  - Check clutch plate
  - Check clutch disc
  - Snap ring
  - Clutch reaction disc
  - D-Ring
  - Spring retainer

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

6. CHECK BRAKE SYSTEM

- Check reverse/low brake system:
  - 4 gear brake (F1)
  - Reverse gear brake (F2)
  - 1, 2 gear brake (F3)
  - Check brake plate
  - Check brake disc
  - Central support
  - Snap ring
  - Spring retainer
  - Brake piston

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

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7. CHECK DTC

- Assemble all the disassembled components.
- Install the Automatic Transaxle Assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Fill with new ATF.
- Fill the ATF from the refilling tube.
- Refit the hose connector disassembled in step 1 and refit the dipstick (clean the dipstick before refit).
- Shift the gear selector lever to each gear position and then shift to gear “N”.
- Drive the vehicle until the ATF reached working temperature (70° - 80°C) and re-check the fluid level. The fluid level must be within the HOT range of dipstick.
- Refit the checking dipstick of transaxle.
- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0730 still present?

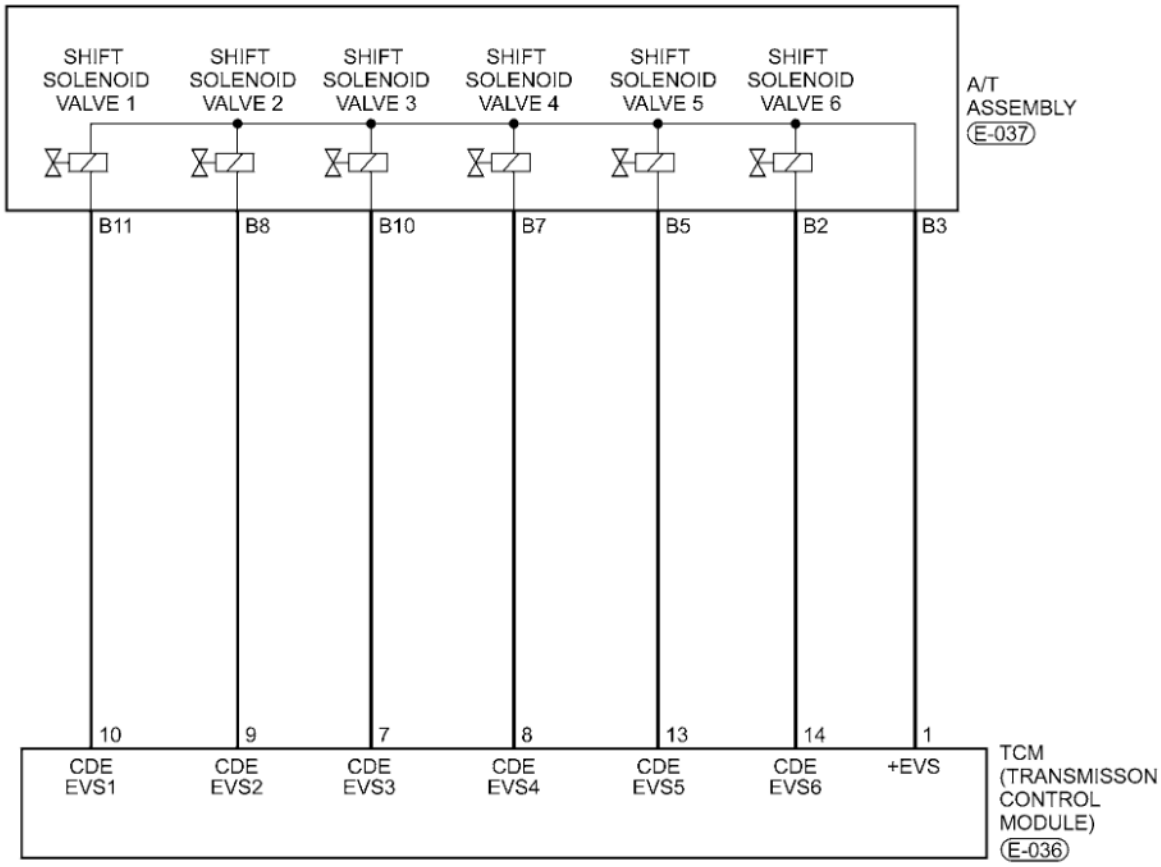
Yes >> Replace the TCM.

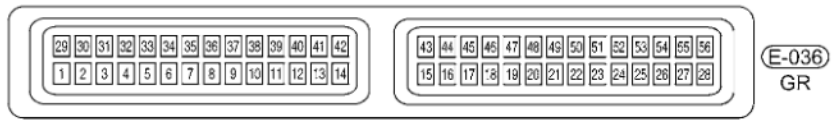
No >> The system is now operating properly.

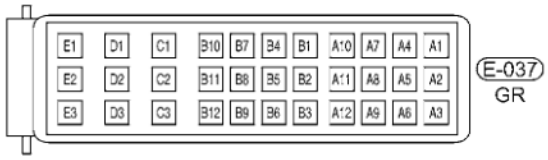
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P0753 - Shift Solenoid Valve 1 (SSV1) Open Circuit Or Short To Power Supply Or Short To Ground

TM - DP0 - EVS - 01







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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0753	Shift Solenoid Valve 1 (SSV1) short to power supply	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 1 (SSV1) • Harness or connectors (The sensor circuit short to power supply) • Transaxle Control Module (TCM)
P0753	Shift Solenoid Valve 1 (SSV1) open or short to ground circuit	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 1 (SSV1) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on.
- With the scan tool, record and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

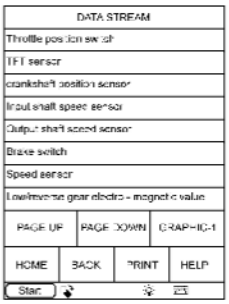
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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	EVS					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
R	Not active	Not active	Not active	Not active	Not active	Not active
N/P	Not active	Not active	Active	Not active	Not active	Not active
1	Not active	Not active	Active	Active	Not active	Not active
2	Not active	Active	Not active	Active	Not active	Not active
3	Not active	Not active	Not active	Not active	Not active	Not active
4	Active	Active	Not active	Not active	Not active	Not active



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 6.

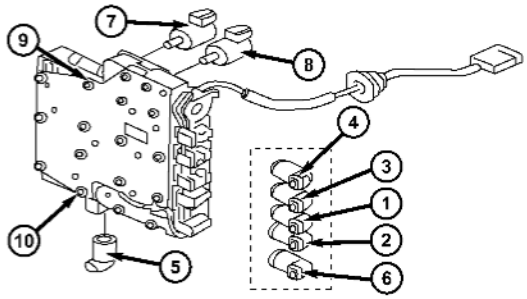
No >> Go to the next step.

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3. CHECK SHIFT SOLENOID VALVE 1 (SSV1) RESISTANCE

- Check SSV1 resistance as follows:

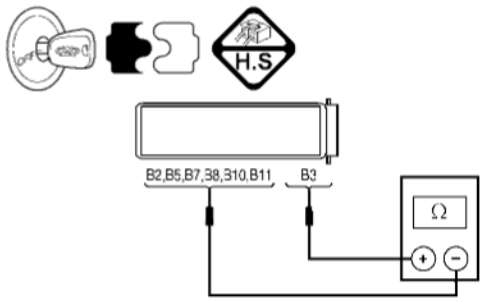
SHIFT SOLENOID COMPONENTS	
NUMBER	**SOLENOID**
1	Shift Solenoid Valve 1
2	Shift Solenoid Valve 2
3	Shift Solenoid Valve 3
4	Shift Solenoid Valve 4
5	Shift Solenoid Valve 5
6	Shift Solenoid Valve 6
7	Pressure Adjust Solenoid Valve
8	Torque Converter Lock Solenoid Valve
9	Manual Valve
10	Valve Body



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- Check SSV1 resistance as shown in the following table:

SHIFT SOLENOID VALVE	A/T ASSEMBLY TERMINAL
VALVE 1 (SSV1)	B11 - B3
VALVE 2 (SSV2)	B8 - B3
VALVE 3 (SSV3)	B10 - B3
VALVE 4 (SSV4)	B7 - B3
VALVE 5 (SSV5)	B5 - B3
VALVE 6 (SSV6)	B2 - B3
RESISTANCE (23°C)	38 - 42 (Ω)



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Is the check result normal?

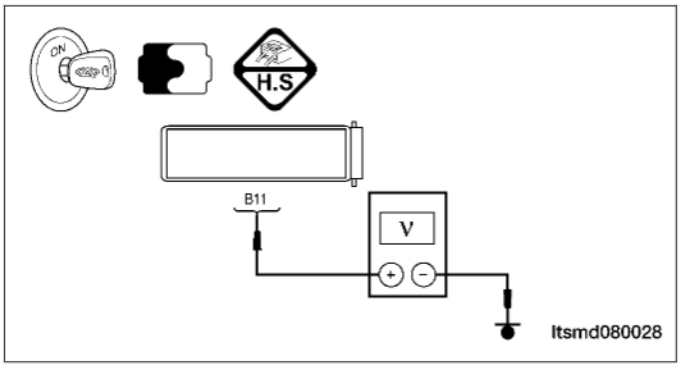
Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, Go to step 6.
- If the solenoid can't be heard, Go to the next step.

No >> Replace the damaged solenoid valve.

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4. CHECK SHIFT SOLENOID VALVE 1 (SSV1) POWER SUPPLY

- Turn the ignition switch on.
- Check power supply between shift solenoid valve 1 (SSV1) E-037, terminal B11 and ground in the A/T assembly connector E-037.
- Voltage should be more than 12 V.



- Or using the appropriate diagnostic test tool and a digital multimeter perform the following:
- Check the EVS1 solenoid supply voltage between TCM pin 1 and TCM pin 10 when activating the EVS1 solenoid and deactivating the EVS1 solenoid.
- Check the shift solenoid control signal. Check the voltage of the shift solenoid in each shift position.
- Check the voltage of the EVS1 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B11.

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	TCM TERMINAL					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
	1 - 10	1 - 9	1 - 7	1 - 8	1 - 13	1 - 14
R	0 V	0 V	0 V	0 V	0 V	0 V
N/P	0 V	0 V	+12 V	0 V	0 V	0 V
1	0 V	0 V	+12 V	+12 V	0 V	0 V
2	0 V	+12 V	0 V	+12 V	0 V	0 V
3	0 V	0 V	0 V	0 V	0 V	0 V
4	+12 V	+12 V	0 V	0 V	0 V	0 V

Is the check result normal?

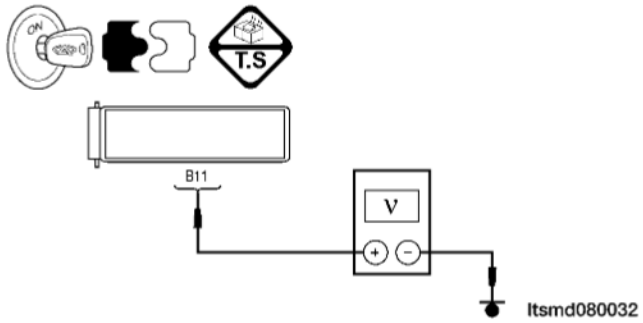
Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.

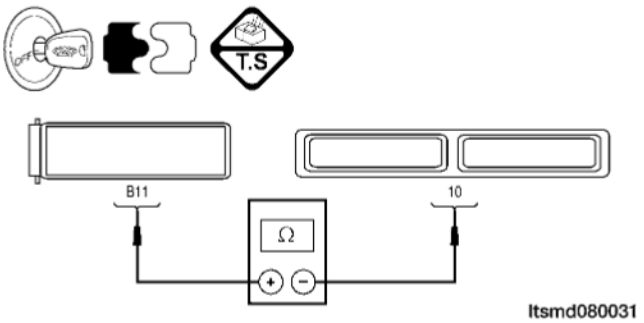
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5. CHECK SHIFT SOLENOID VALVE 1 (SSV1) CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Disconnect A/T assembly connector.
- Turn the ignition switch on.
- Check harness for short to power supply.

A/T ASSEMBLY CONNECTOR E-037 TERMINAL	TCM CONNECTOR E-036 TERMINAL	VOLTAGE	
B11	10	Should not exist	

- Check the harness for an open or short to ground in harness or connectors.

A/T ASSEMBLY CONNECTOR E-037 TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
B11	10	Yes	

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power supply in harness or connectors.

6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to "DTC Confirmation Procedure".

Is DTC P0753 still present?

Yes >> Replace the TCM.

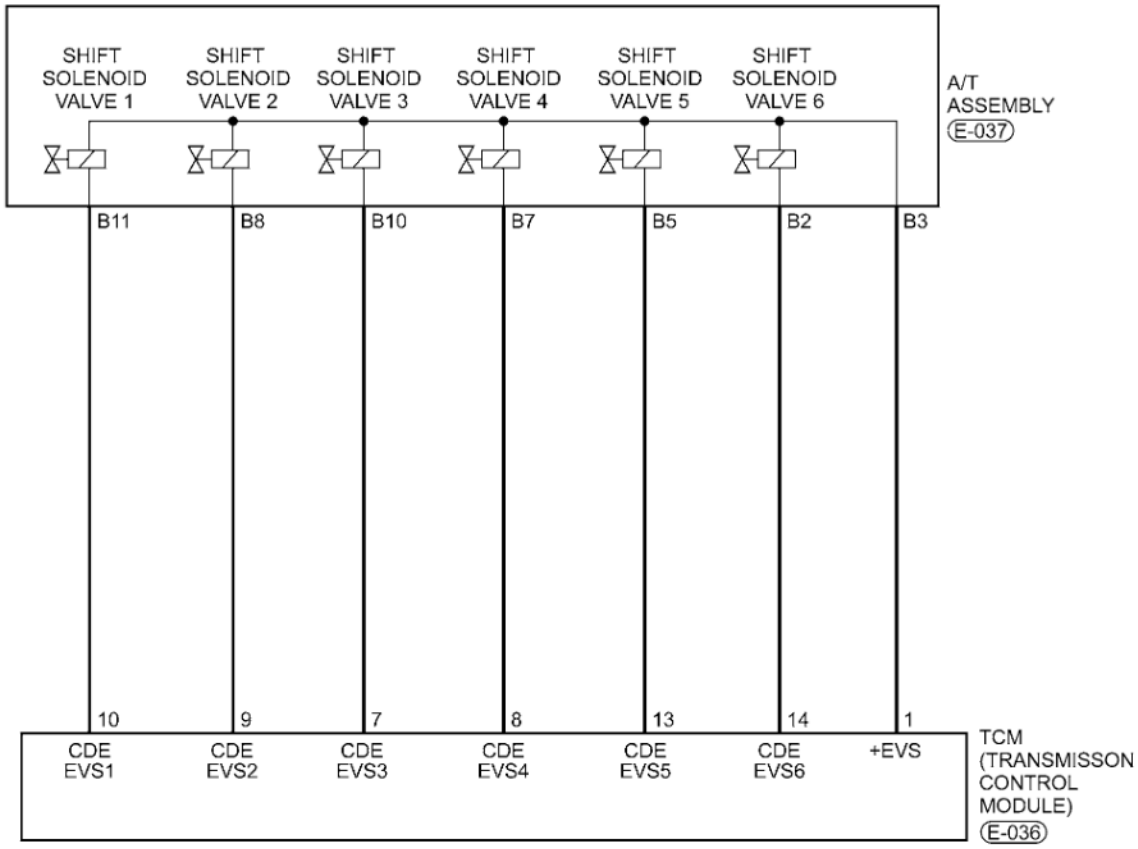
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

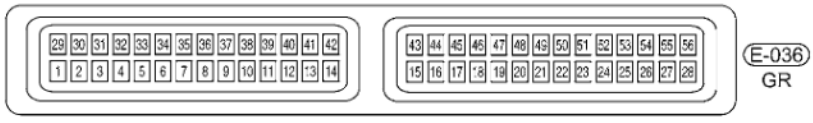
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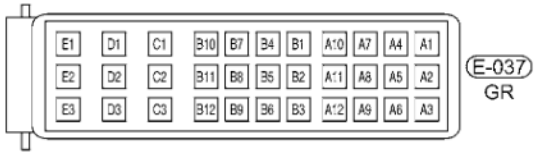
P0758 - Shift Solenoid Valve 2 (SSV2) Open Circuit Or Short To Power Supply Or Short To Ground

EVS

TM - DP0 - EVS - 01







ltsmw080022t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0758	Shift Solenoid Valve 2 (SSV2) short to power supply	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 2 (SSV2) • Harness or connectors (The sensor circuit short to power supply) • Transaxle Control Module (TCM)
P0758	Shift Solenoid Valve 2 (SSV2) open or short to ground circuit	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 2 (SSV2) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on.
- With the scan tool, record and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SELECT POSITION	RANGE	SHIFT SOLENOID VALVE 1	SHIFT SOLENOID VALVE 2	SHIFT SOLENOID VALVE 3	SHIFT SOLENOID VALVE 4
P	0	-	-	#	-
R	R	-	-	-	-
N	0	-	-	#	-
D	1	-	-	#	#
	2	-	#	-	#
	3	-	-	-	-
	4	#	#	-	-



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 6.

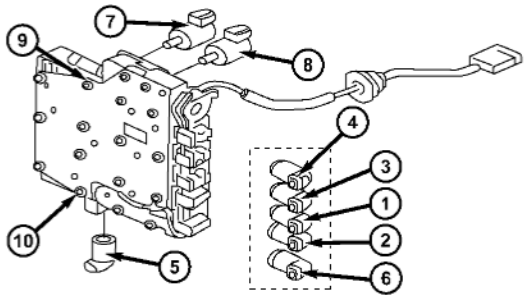
No >> Go to the next step.

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3. CHECK SHIFT SOLENOID VALVE 2 (SSV2) RESISTANCE

- Check SSV2 resistance as follows:

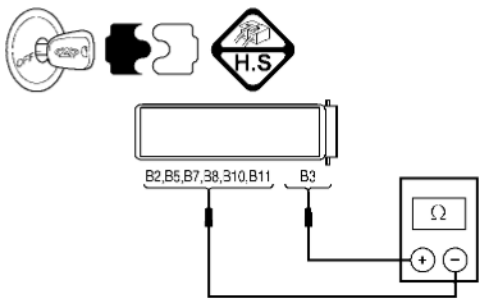
NUMBER	SOLENOID
1	Shift Solenoid Valve 1
2	Shift Solenoid Valve 2
3	Shift Solenoid Valve 3
4	Shift Solenoid Valve 4
5	Shift Solenoid Valve 5
6	Shift Solenoid Valve 6
7	Pressure adjust solenoid valve
8	Torque converter lock solenoid valve
9	Manual valve
10	Valve body



ltsmd080029

- Check SSV2 resistance as shown in the following table:

SHIFT SOLENOID VALVE	A/T ASSEMBLY TERMINAL
VALVE 1 (SSV1)	B11 - B3
VALVE 2 (SSV2)	B8 - B3
VALVE 3 (SSV3)	B10 - B3
VALVE 4 (SSV4)	B7 - B3
VALVE 5 (SSV5)	B5 - B3
VALVE 6 (SSV6)	B2 - B3
RESISTANCE (23°C)	38 - 42 (Ω)



ltsmd080030

Is the check result normal?

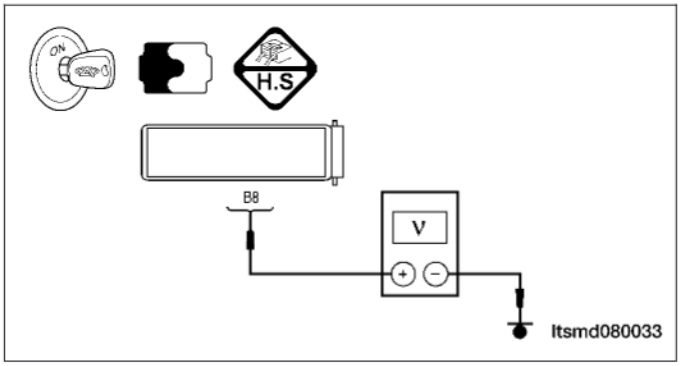
Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 6.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged solenoid valve.

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4. CHECK SHIFT SOLENOID VALVE 2 (SSV2) POWER SUPPLY

- Turn the ignition switch on.
- Check power supply between shift solenoid valve 2 (SSV2) E-037 terminal B8 and ground in the A/T assembly connector E-037.



- Voltage should be more than 12 V.
- Or using the appropriate diagnostic test tool and a digital multimeter perform the following:
- Check the EVS2 solenoid supply voltage between TCM pin 1 and TCM pin 9 when activating the EVS2 solenoid and deactivating the EVS2 solenoid.
- Check the shift solenoid control signal. Check the voltage of the shift solenoid in each shift position.
- Check the voltage of the EVS2 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B8.

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	TCM TERMINAL					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
	1 - 10	1 - 9	1 - 7	1 - 8	1 - 13	1 - 14
R	0 V	0 V	0 V	0 V	0 V	0 V
N/P	0 V	0 V	+12 V	0 V	0 V	0 V
1	0 V	0 V	+12 V	+12 V	0 V	0 V
2	0 V	+12 V	0 V	+12 V	0 V	0 V
3	0 V	0 V	0 V	0 V	0 V	0 V
4	+12 V	+12 V	0 V	0 V	0 V	0 V

Is the check result normal?

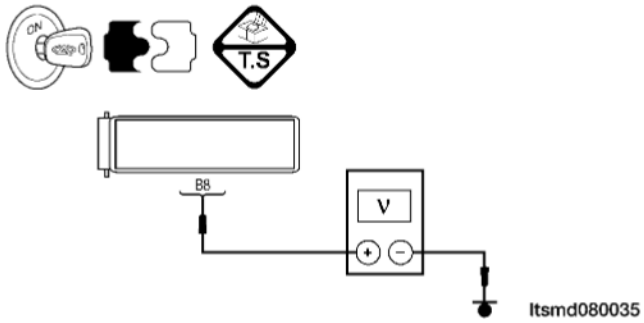
Yes >> Go to the next step.

No >> Repair or replace open circuit or short to ground in harness or connectors.

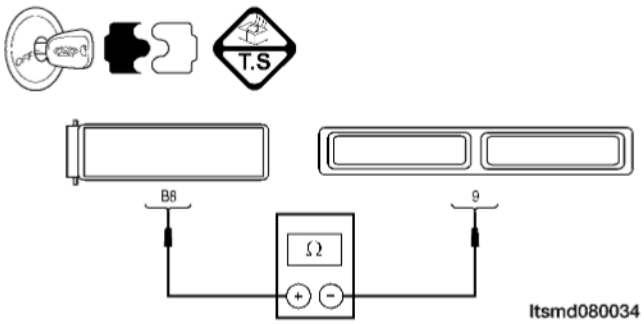
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5. CHECK SHIFT SOLENOID VALVE 2 (SSV2) CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Disconnect A/T assembly connector.
- Turn the ignition switch on.
- Check harness for short to power supply.

A/T ASSEMBLY CONNECTOR E-037 TERMINAL	GROUND	VOLTAGE	
B8	Ground	Should not exist	

- Check the harness for an open or short to ground in harness or connectors.

A/T ASSEMBLY CONNECTOR E-037 TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
B8	9	Yes	

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power supply in harness or connectors.

6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to "DTC Confirmation Procedure".

Is DTC P0758 present?

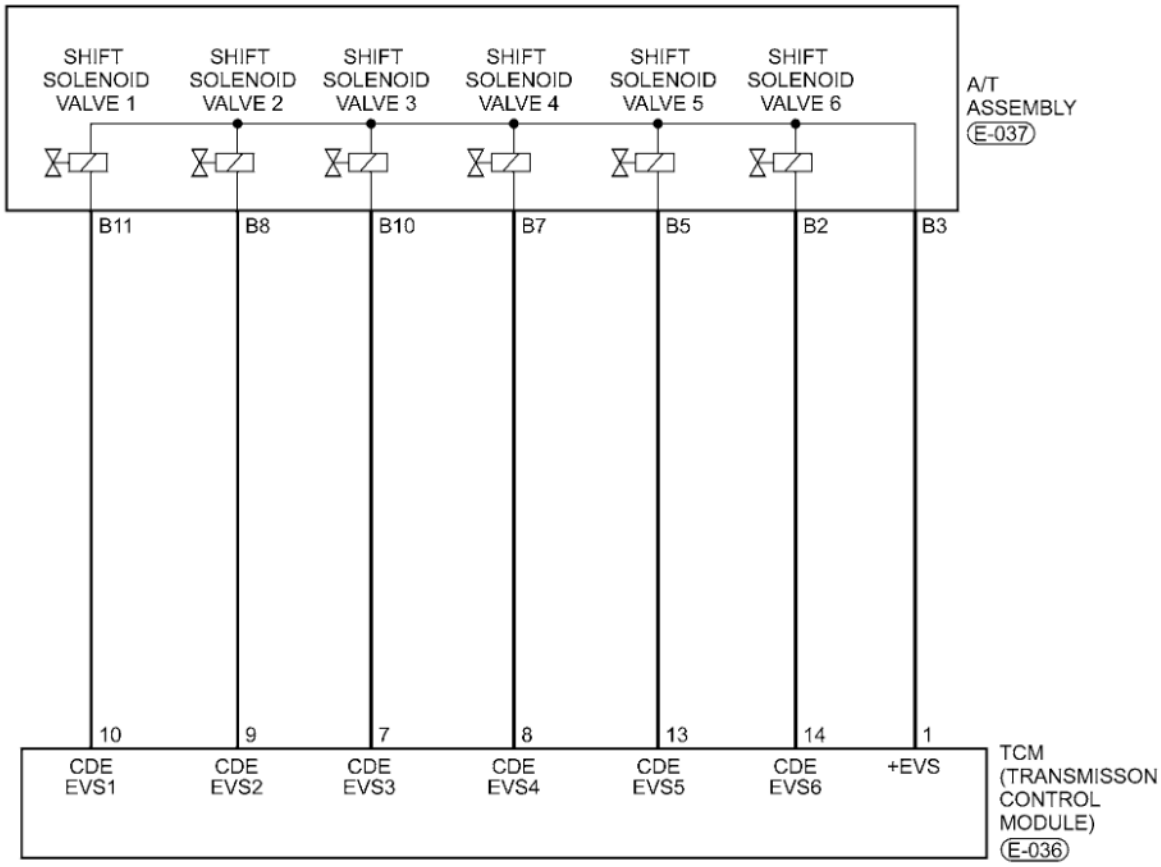
Yes >> Replace the TCM.

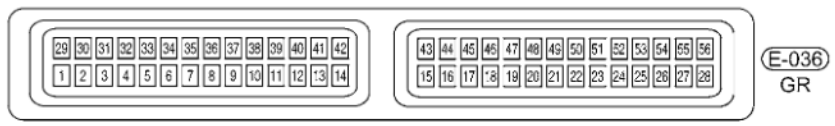
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

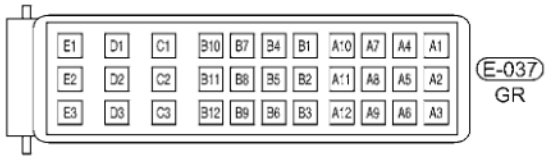
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P0763 - Shift Solenoid Valve 3 (SSV3) Short To Power Supply
P0763 - Shift Solenoid Valve 3 (SSV3) Open Or Short To Ground Circuit

TM - DP0 - EVS - 01







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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0763	Shift Solenoid Valve 3 (SSV3) short to power supply	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 3 (SSV3) • Harness or connectors (The sensor circuit short to power supply) • Transaxle Control Module (TCM)
P0763	Shift Solenoid Valve 3 (SSV3) open or short to ground circuit	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 3 (SSV3) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on.
- With the scan tool, record and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

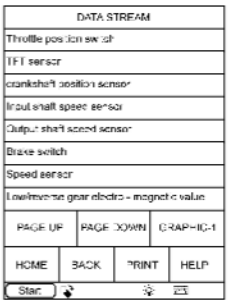
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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	EVS					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
R	Not active	Not active	Not active	Not active	Not active	Not active
N/P	Not active	Not active	Active	Not active	Not active	Not active
1	Not active	Not active	Active	Active	Not active	Not active
2	Not active	Active	Not active	Active	Not active	Not active
3	Not active	Not active	Not active	Not active	Not active	Not active
4	Active	Active	Not active	Not active	Not active	Not active



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 6.

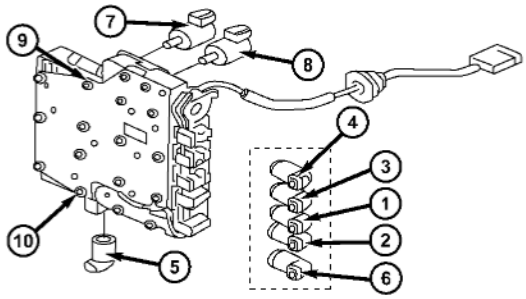
No >> Go to the next step.

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3. CHECK SHIFT SOLENOID VALVE 3 (SSV3) RESISTANCE

- Check SSV3 resistance as follows:

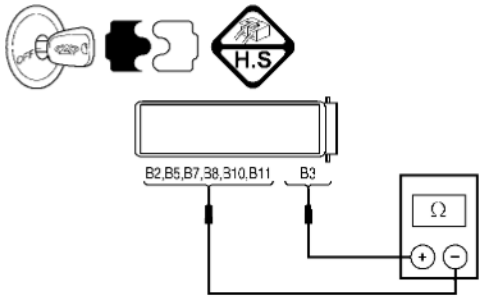
NUMBER	SOLENOID
1	Shift Solenoid Valve 1
2	Shift Solenoid Valve 2
3	Shift Solenoid Valve 3
4	Shift Solenoid Valve 4
5	Shift Solenoid Valve 5
6	Shift Solenoid Valve 6
7	Pressure adjust solenoid valve
8	Torque converter lock solenoid valve
9	Manual valve
10	Valve body



ltsmd080029

- Check SSV3 resistance as shown in the following table:

SHIFT SOLENOID VALVE	A/T ASSEMBLY TERMINAL
VALVE 1 (SSV1)	B11 - B3
VALVE 2 (SSV2)	B8 - B3
VALVE 3 (SSV3)	B10 - B3
VALVE 4 (SSV4)	B7 - B3
VALVE 5 (SSV5)	B5 - B3
VALVE 6 (SSV6)	B2 - B3
RESISTANCE (23°C)	38 - 42 (Ω)



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Is the check result normal?

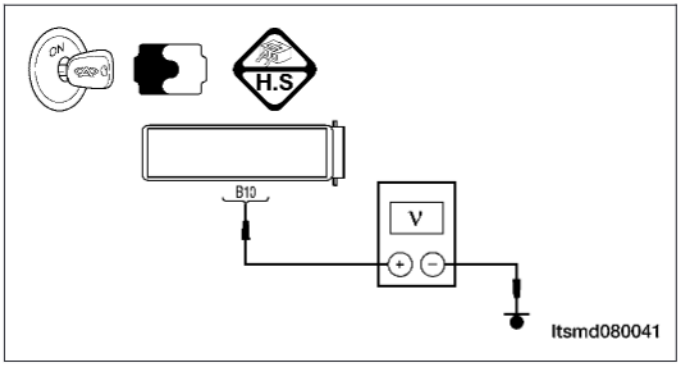
Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 6.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged solenoid valve.

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4. CHECK SHIFT SOLENOID VALVE 3 (SSV3) POWER SUPPLY

- Turn the ignition switch on.
- Check power supply between SSV3 E-037 terminal B10 and ground in the A/T assembly connector E-037.
- Battery voltage should exist.



- Or using the appropriate diagnostic test tool and a digital multimeter perform the following:
- Check the EVS3 solenoid supply voltage between TCM pin 1 and TCM pin 7 when activating the EVS3 solenoid and deactivating the EVS3 solenoid.
- Check the shift solenoid control signal. Check the voltage of the shift solenoid in each shift position.
- Check the voltage of the EVS3 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B10.

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	TCM TERMINAL					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
	1 - 10	1 - 9	1 - 7	1 - 8	1 - 13	1 - 14
R	0 V	0 V	0 V	0 V	0 V	0 V
N/P	0 V	0 V	+12 V	0 V	0 V	0 V
1	0 V	0 V	+12 V	+12 V	0 V	0 V
2	0 V	+12 V	0 V	+12 V	0 V	0 V
3	0 V	0 V	0 V	0 V	0 V	0 V
4	+12 V	+12 V	0 V	0 V	0 V	0 V

Is the check result normal?

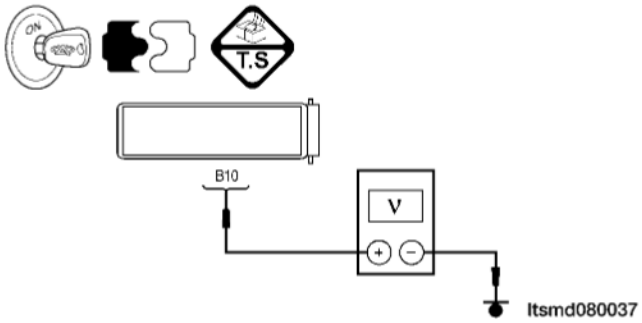
Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.

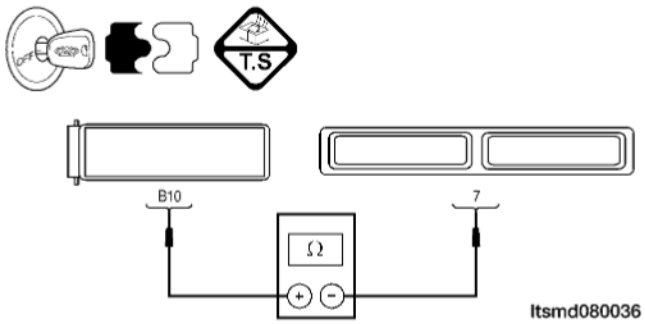
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5. CHECK SHIFT SOLENOID VALVE 3 (SSV3) CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Disconnect A/T assembly connector.
- Turn the ignition switch on.
- Check harness for short to power supply.

A/T ASSEMBLY CONNECTOR E-037 TERMINAL	GROUND	VOLTAGE	
B10	Ground	Should not exist	

- Check the harness for an open or short to ground in harness or connectors.

A/T ASSEMBLY CONNECTOR E-037 TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
B10	7	Yes	

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to power supply or short to ground in harness or connectors.

6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to "DTC Confirmation Procedure".

Is DTC P0763 present?

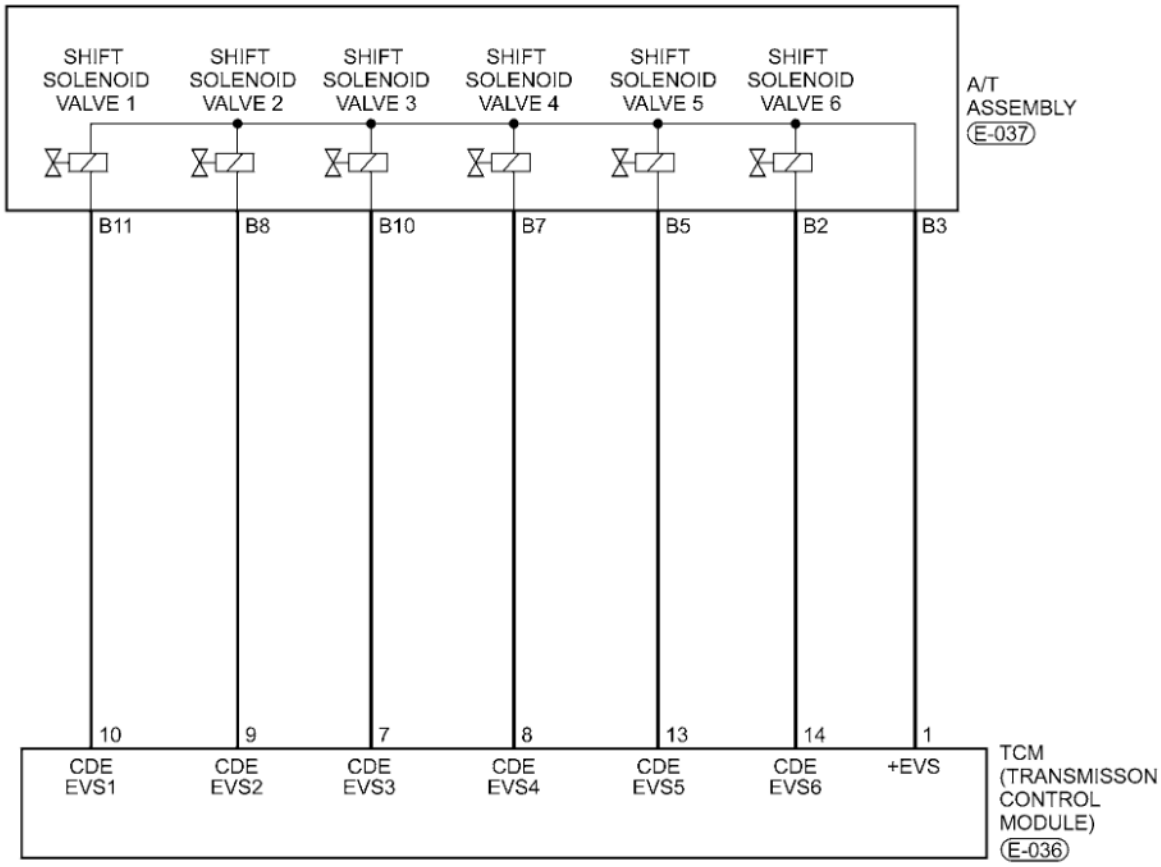
Yes >> Replace the TCM.

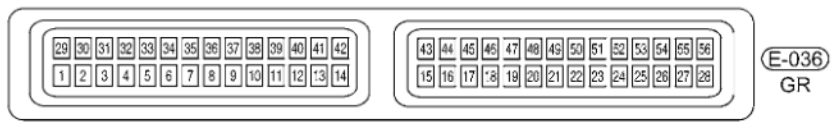
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

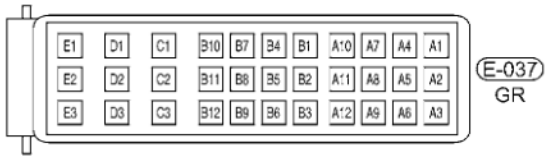
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P0768 - Shift Solenoid Valve 4 (SSV4) Short To Power Supply
P0768 - Shift Solenoid Valve 4 (SSV4) Open Or Short To Ground Circuit

TM - DP0 - EVS - 01







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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0768	Shift Solenoid Valve 4 (SSV4) short to power supply	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 4 (SSV4) • Harness or connectors (The sensor circuit short to power supply) • Transaxle Control Module (TCM)
P0768	Shift Solenoid Valve 4 (SSV4) open or short to ground circuit	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 4 (SSV4) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on.
- With the scan tool, record and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

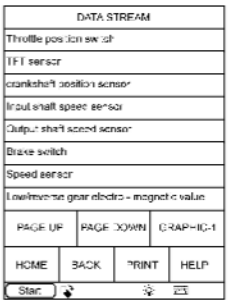
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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	EVS					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
R	Not active	Not active	Not active	Not active	Not active	Not active
N/P	Not active	Not active	Active	Not active	Not active	Not active
1	Not active	Not active	Active	Active	Not active	Not active
2	Not active	Active	Not active	Active	Not active	Not active
3	Not active	Not active	Not active	Not active	Not active	Not active
4	Active	Active	Not active	Not active	Not active	Not active



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 6.

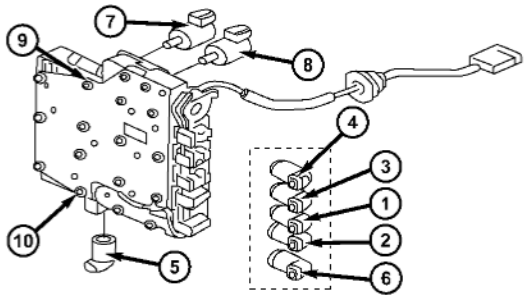
No >> Go to the next step.

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3. CHECK SHIFT SOLENOID VALVE 4 (SSV4) RESISTANCE

- Check SSV4 resistance as follows:

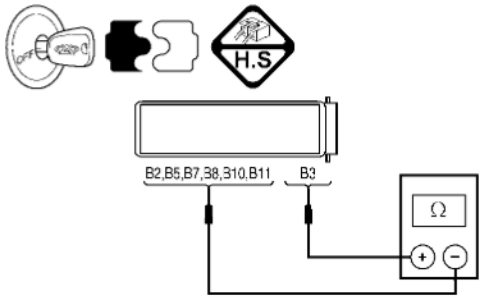
NUMBER	SOLENOID
1	Shift Solenoid Valve 1
2	Shift Solenoid Valve 2
3	Shift Solenoid Valve 3
4	Shift Solenoid Valve 4
5	Shift Solenoid Valve 5
6	Shift Solenoid Valve 6
7	Pressure adjust solenoid valve
8	Torque converter lock solenoid valve
9	Manual valve
10	Valve body



ltsmd080029

- Check SSV4 resistance as shown in the following table:

SHIFT SOLENOID VALVE	A/T ASSEMBLY TERMINAL
VALVE 1 (SSV1)	B11 - B3
VALVE 2 (SSV2)	B8 - B3
VALVE 3 (SSV3)	B10 - B3
VALVE 4 (SSV4)	B7 - B3
VALVE 5 (SSV5)	B5 - B3
VALVE 6 (SSV6)	B2 - B3
RESISTANCE (23°C)	38 - 42 (Ω)



ltsmd080030

Is the check result normal?

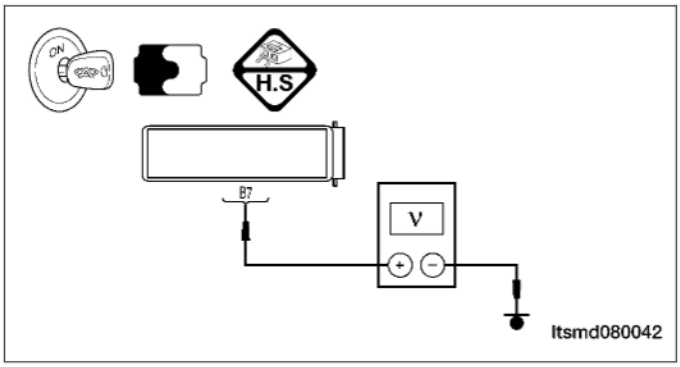
Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 6.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged solenoid valve.

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4. CHECK SHIFT SOLENOID VALVE 4 (SSV4) POWER SUPPLY

- Turn the ignition switch on.
- Check power supply between SSV4 E-037 terminal B7 and ground in the A/T assembly connector E-037.
- 12 V voltage should exist.



- Or using the appropriate diagnostic test tool and a digital multimeter perform the following:
- Check the EVS4 solenoid supply voltage between TCM pin 1 and TCM pin 8 when activating the EVS4 solenoid and deactivating the EVS4 solenoid.
- Check the shift solenoid control signal. Check the voltage of the shift solenoid in each shift position.
- Check the voltage of the EVS4 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B7.

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	TCM TERMINAL					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
	1 - 10	1 - 9	1 - 7	1 - 8	1 - 13	1 - 14
R	0 V	0 V	0 V	0 V	0 V	0 V
N/P	0 V	0 V	+12 V	0 V	0 V	0 V
1	0 V	0 V	+12 V	+12 V	0 V	0 V
2	0 V	+12 V	0 V	+12 V	0 V	0
3	0 V	0 V	0 V	0 V	0 V	0 V
4	+12 V	+12 V	0 V	0 V	0 V	0 V

Is the check result normal?

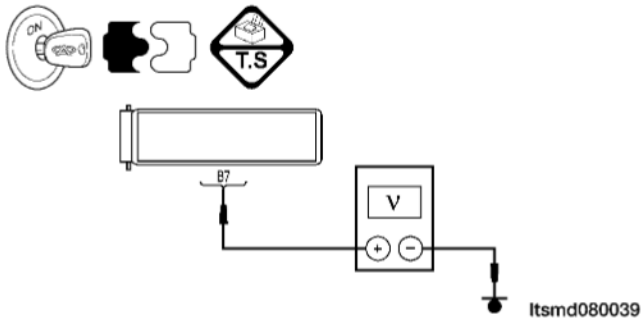
Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.

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5. CHECK SHIFT SOLENOID VALVE 4 (SSV4) CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Disconnect A/T assembly connector.
- Turn the ignition switch on.
- Check harness for short to power supply.

A/T Assembly connector E-037 terminal B7	**Ground**	**Voltage should not exist**	

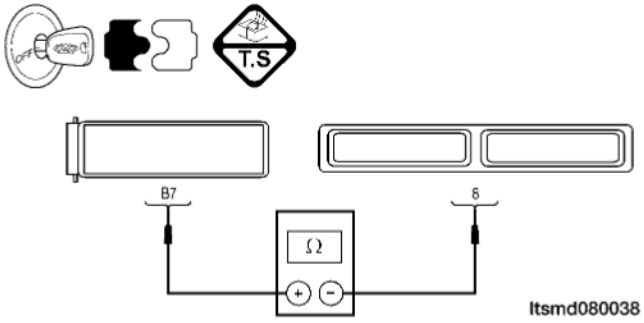
Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit short to power supply in harness or connectors.

6. CHECK SHIFT SOLENOID VALVE 4 (SSV4) CONTROL CIRCUIT

- Check for harness continuity between the following terminals:

A/T ASSEMBLY CONNECTOR E-037 TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
B7	8	Yes	

- Check the harness for short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.

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7. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0768 present?

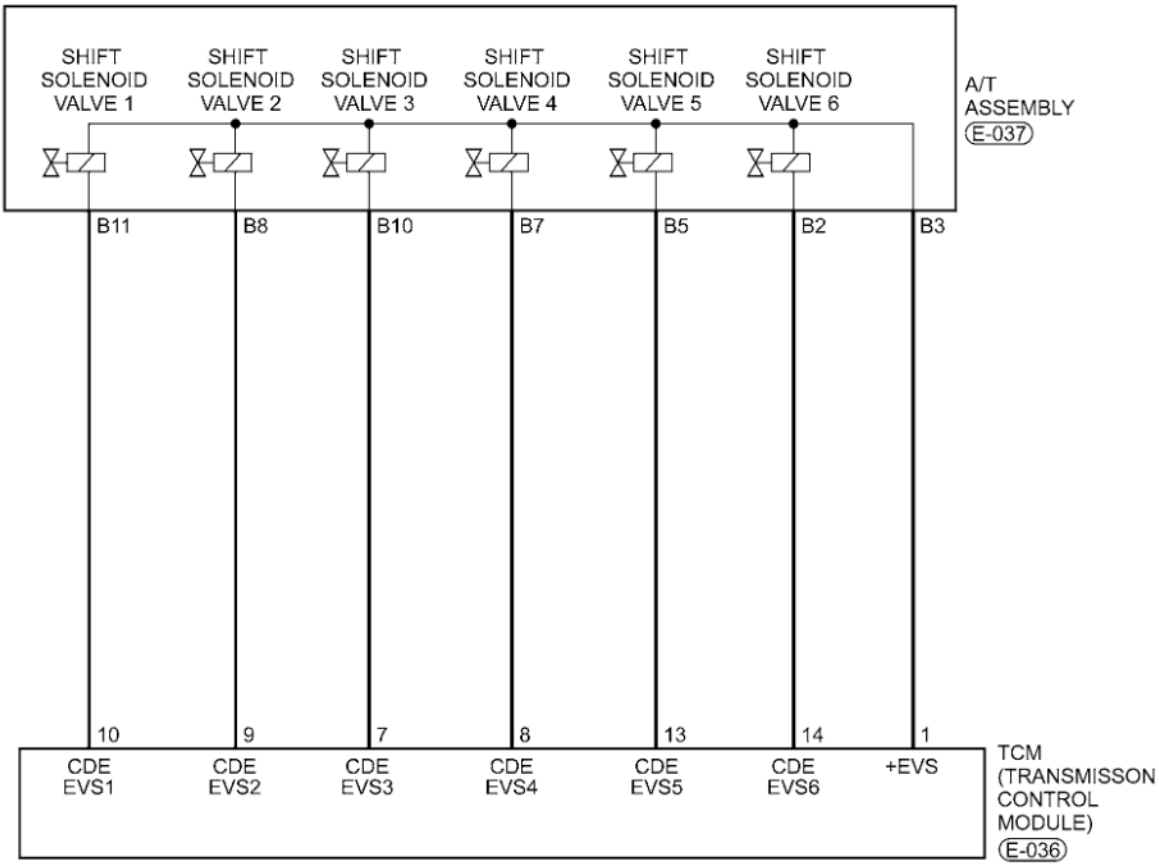
Yes >> Replace the TCM.

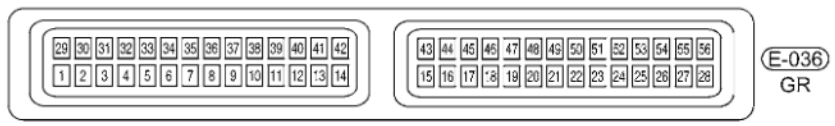
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

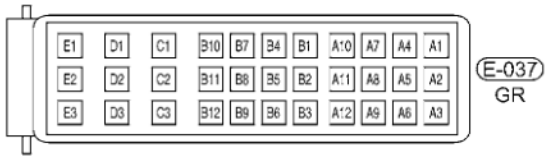
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P0773 - Shift Solenoid Valve 5 (SSV5) Short To Power Supply
P0773 - Shift Solenoid Valve 5 (SSV5) Open Or Short To Ground Circuit

TM - DP0 - EVS - 01







ltsmw080022t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0773	Shift Solenoid Valve 5 (SSV5) short to power supply	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Solenoid (SSV5) • Harness or connectors (The sensor circuit short to power supply) • Transaxle Control Module (TCM)
P0773	Shift Solenoid Valve 5 (SSV5) open or short to ground circuit			• Solenoid (SSV5) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on.
- With the scan tool, record and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

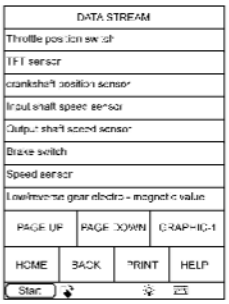
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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	EVS					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
R	Not active	Not active	Not active	Not active	Not active	Not active
N/P	Not active	Not active	Active	Not active	Not active	Not active
1	Not active	Not active	Active	Active	Not active	Not active
2	Not active	Active	Not active	Active	Not active	Not active
3	Not active	Not active	Not active	Not active	Not active	Not active
4	Active	Active	Not active	Not active	Not active	Not active



ltsmd080001t

Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 6.

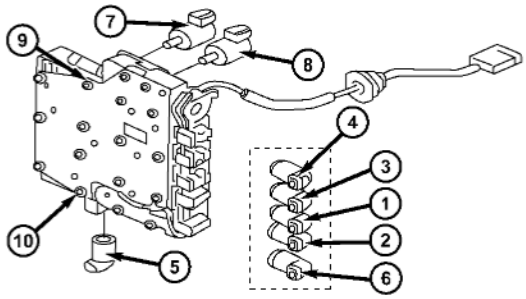
No >> Go to the next step.

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3. CHECK SHIFT SOLENOID VALVE 5 (SSV5) RESISTANCE

- Check SSV5 resistance as follows:

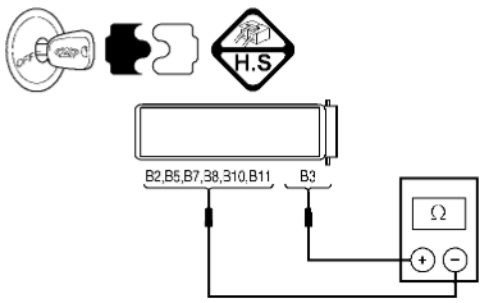
NUMBER	SOLENOID
1	Shift Solenoid Valve 1
2	Shift Solenoid Valve 2
3	Shift Solenoid Valve 3
4	Shift Solenoid Valve 4
5	Shift Solenoid Valve 5
6	Shift Solenoid Valve 6
7	Pressure adjust solenoid valve
8	Torque converter lock solenoid valve
9	Manual valve
10	Valve body



Itsmd080029

- Check SSV5 resistance as shown in the following table:

SHIFT SOLENOID VALVE	A/T ASSEMBLY TERMINAL
VALVE 1 (SSV1)	B11 - B3
VALVE 2 (SSV2)	B8 - B3
VALVE 3 (SSV3)	B10 - B3
VALVE 4 (SSV4)	B7 - B3
VALVE 5 (SSV5)	B5 - B3
VALVE 6 (SSV6)	B2 - B3
RESISTANCE (23°C)	38 - 42 (Ω)



Itsmd080030

Is the check result normal?

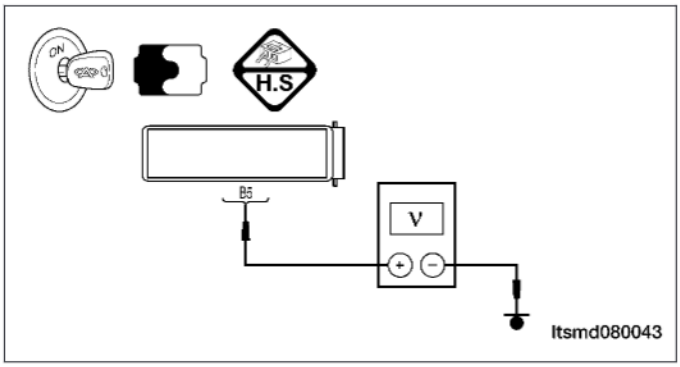
Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 6.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged solenoid valve.

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4. CHECK SHIFT SOLENOID VALVE 5 (SSV5) POWER SUPPLY

- Turn the ignition switch on.
- Check power supply between SSV5 E-037 terminal B5 and ground in the A/T assembly connector E-037.
- Battery voltage should exist.



- Or using the appropriate diagnostic test tool and a digital multimeter perform the following:
- Check the EVS5 solenoid supply voltage between TCM pin 1 and TCM pin 13 when activating the EVS5 solenoid and deactivating the EVS5 solenoid.
- Check the shift solenoid control signal. Check the voltage of the shift solenoid in each shift position.
- Check the voltage of the EVS5 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B5.

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	TCM TERMINAL					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
	1 - 10	1 - 9	1 - 7	1 - 8	1 - 13	1 - 14
R	0 V	0 V	0 V	0 V	0 V	0 V
N/P	0 V	0 V	+12 V	0 V	0 V	0 V
1	0 V	0 V	+12 V	+12 V	0 V	0 V
2	0 V	+12 V	0 V	+12 V	0 V	0
3	0 V	0 V	0 V	0 V	0 V	0 V
4	+12 V	+12 V	0 V	0 V	0 V	0 V

Is the check result normal?

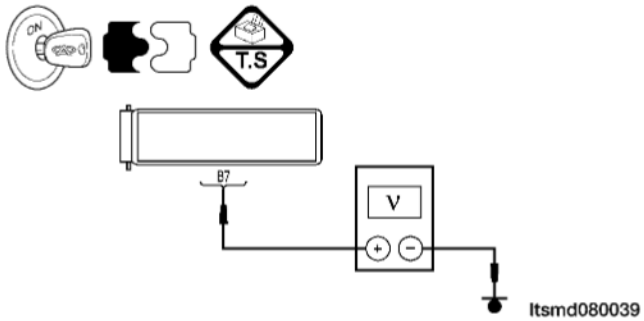
Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.

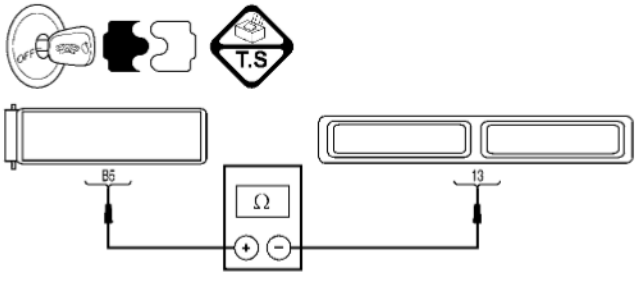
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5. CHECK SHIFT SOLENOID VALVE 5 (SSV5) CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Disconnect A/T assembly connector.
- Turn the ignition switch on.
- Check harness for short to power supply.

A/T assembly connector E-037 terminal B5	**Ground**	**Voltage should not exist**	

- Check the harness for an open or short to ground.

A/T ASSEMBLY CONNECTOR E-037 TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
B5	13	Yes	

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to power supply or short to ground in harness or connectors.

6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to "DTC Confirmation Procedure".

Is DTC P0773 still present?

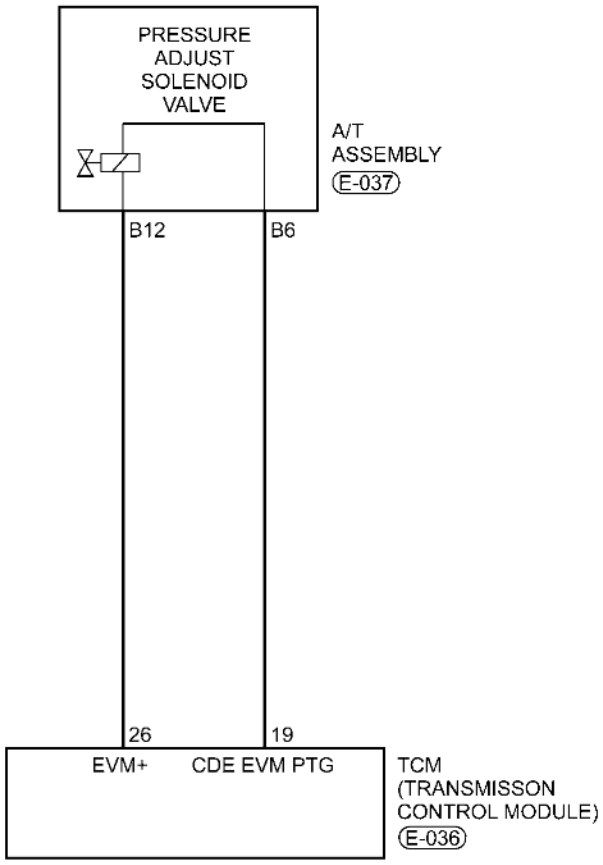
Yes >> Replace the TCM.

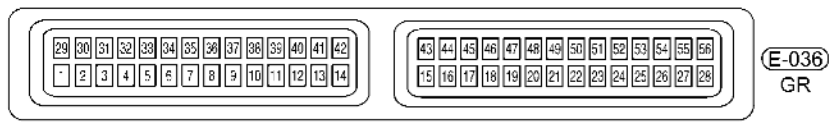
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

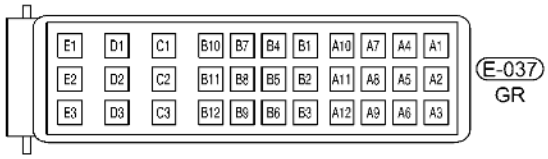
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P0775 - EVM (Modulation Solenoid Valve) Open Circuit Or Short To Ground
P0775 - EVM (Modulation Solenoid Valve) Shorted To Voltage

TM - DP0 - EVM - 01







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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0775	Modulation solenoid valve (EVM) short to power supply	Vehicle is driving	The EVM is modulated by controlling the duty cycle of the Solenoid. The DTC is set after the TCM detects that the duty cycle of the control current is out of the acceptable range for specified seconds.	• Modulation solenoid valve (EVM) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)
P0775	Modulation solenoid valve (EVM) open circuit or short to ground	Vehicle is driving	The EVM is modulated by controlling the duty cycle of the Solenoid. The DTC is set after the TCM detects that the duty cycle of the control current is out of the acceptable range for specified seconds.	• Modulation solenoid valve (EVM) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on.
- With the scan tool, record and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

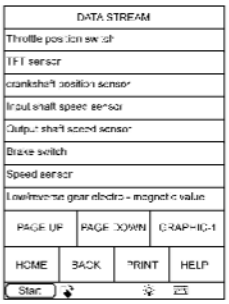
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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	EVS					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
R	Not active	Not active	Not active	Not active	Not active	Not active
N/P	Not active	Not active	Active	Not active	Not active	Not active
1	Not active	Not active	Active	Active	Not active	Not active
2	Not active	Active	Not active	Active	Not active	Not active
3	Not active	Not active	Not active	Not active	Not active	Not active
4	Active	Active	Not active	Not active	Not active	Not active



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Is the check result normal and DTC not present?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

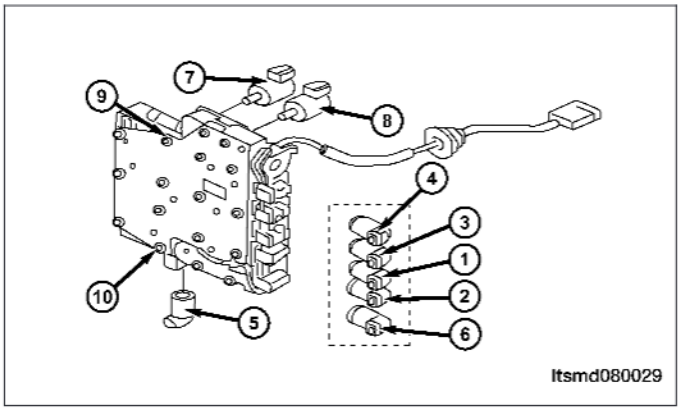
Yes >> Go to step 7.

No >> Go to the next step.

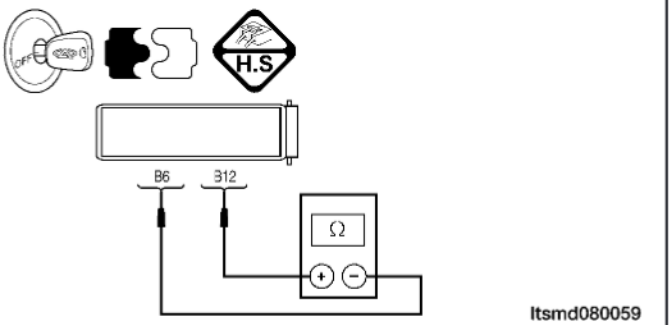
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3. CHECK EVM SOLENOID VALVE RESISTANCE

- Turn ignition switch off.
- Disconnect pressure adjust solenoid valve (7) connector.
- Check EVM solenoid valve resistance as shown in the following table:



EVM SOLENOID (7) RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
TEMPERATURE	**RESISTANCE**
23°C	36 - 44 Ω



Is the check result normal?

Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, Go to step 7.
- If the solenoid can't be heard, Go to the next step.

No >> Replace the damaged solenoid valve.

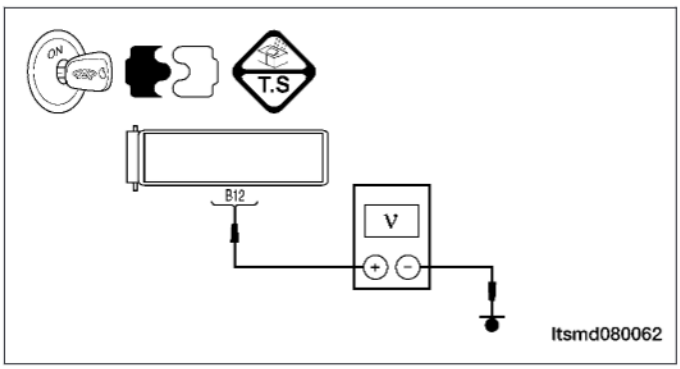
4. CHECK EVM SOLENOID VALVE POWER SUPPLY

- Turn ignition switch on.
- Check power supply between EVM control solenoid valve E-037 terminal B12 and ground in the A/T assembly connector E-037.
- 12 V should exist.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.



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5. CHECK EVM SOLENOID VALVE CONTROL CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Turn ignition switch on.
- Check if voltage is present between E-037, terminal B8 and ground.
- Check the harness for short to power supply circuits.

Is the check results normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power supply in harness or connectors.

6. CHECK EVM SIGNAL

- Connect TCM and EVM connector.
- With the engine running, move the shifter to "N" position, check the voltage of the EVM valve between the TCM pin 26 and pin 19.

Is the voltage approximately 2.5 V with the engine running and the transaxle in the "N" position?

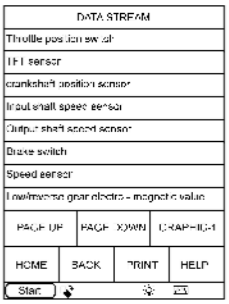
Yes >> Go to the next step.

No >> Go to step 8.

7. CHECK FLUID PRESSURE

- Connect the ATF pressure gauge.
- Drive the vehicle and monitor the transaxle main ATF distributing passage pressure.

GROUND TIME (%)	MODULATION FLUID PRESSURE (×100000 PA)
0	0
10	0.32
12	0.48
15	0.67
20	0.88
30	1.17
40	1.41
50	1.69
60	1.97
70	2.26
80	2.60
88	2.87
90	2.91
92	2.95
95	3
100	3



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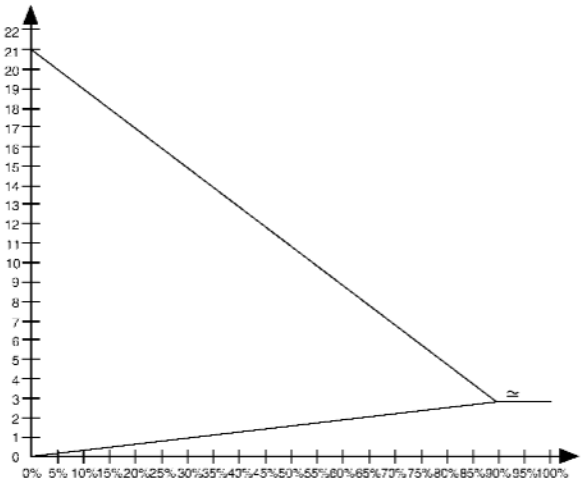
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- Verify if the EVM valve duty cycle and ATF pressure ratio matches.

Does the EVM valve duty cycle and ATF pressure ratio match?

Yes >> Go to the next step.

No >> Replace the EVM valve for a mechanical problem or repair the transaxle internal main ATF distributing passage pressure control device.



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8. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0775 present?

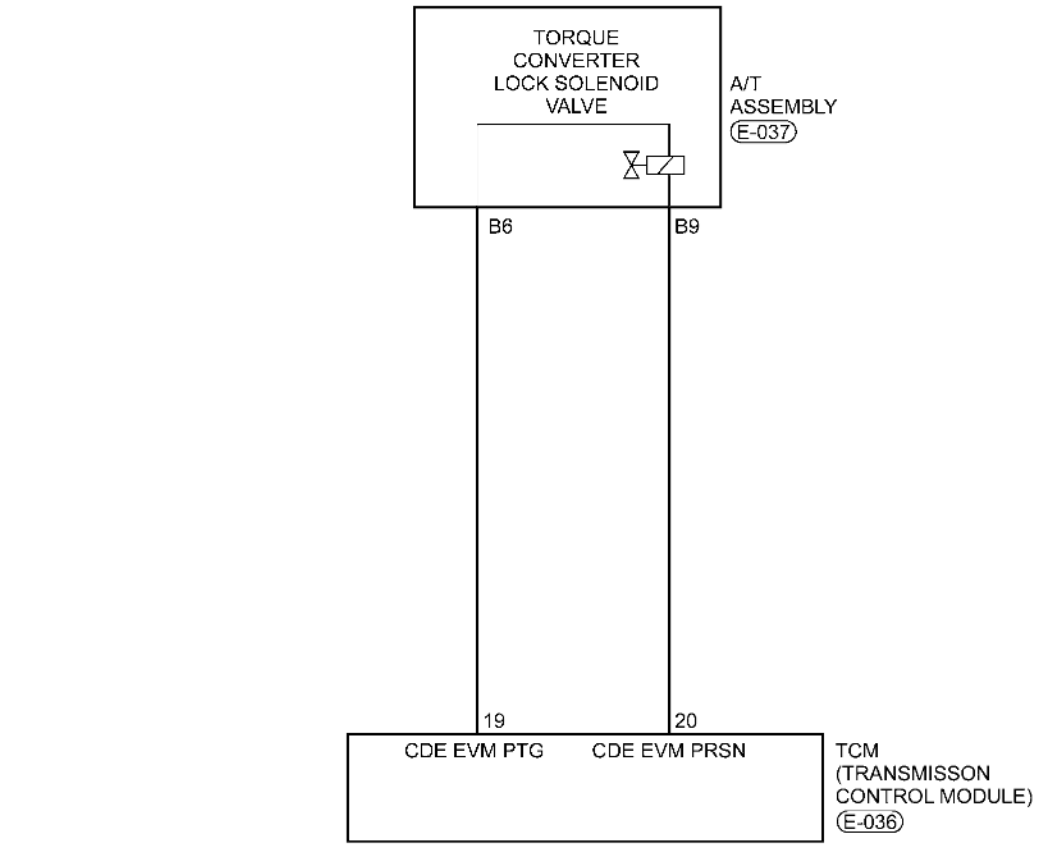
Yes >> Replace the TCM.

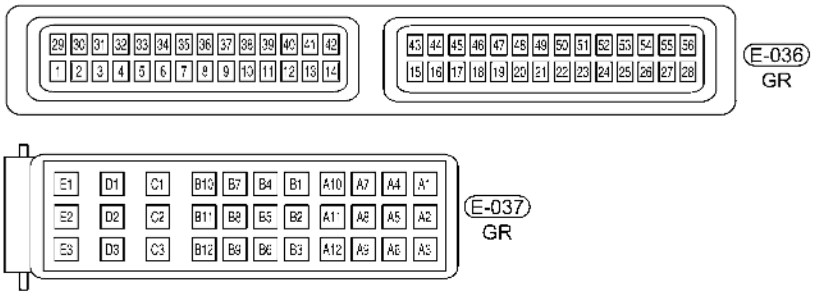
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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P0795 - Torque Converter Lock Solenoid Valve (EVLU) Open Circuit Or Short To Ground
P0795 - Torque Converter Lock Solenoid Valve (EVLU) Short To Voltage

TM - DP0 - CDE - 01





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0795	Torque converter lock solenoid valve (EVLU) open circuit or short to ground	Vehicle is driving	The Transaxle Control Module (TCM) detects that the torque converter lock solenoid valve (EVLU) circuit shorted to ground or open.	• Torque converter lock solenoid valve (EVLU) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)
P0795	Torque converter lock solenoid valve (EVLU) short to voltage	Vehicle is driving	The Transaxle Control Module (TCM) detects that the torque converter lock solenoid valve (EVLU) circuit is shorted to voltage.	• Torque converter lock solenoid valve (EVLU) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the diagnostic connector, press the POWER key to start the X-431.
- Start the engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

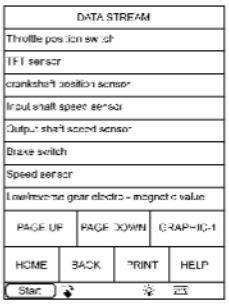
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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	EVS					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
R	Not active	Not active	Not active	Not active	Not active	Not active
N/P	Not active	Not active	Active	Not active	Not active	Not active
1	Not active	Not active	Active	Active	Not active	Not active
2	Not active	Active	Not active	Active	Not active	Not active
3	Not active	Not active	Not active	Not active	Not active	Not active
4	Active	Active	Not active	Not active	Not active	Not active



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Is the check result normal and DTC not present?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

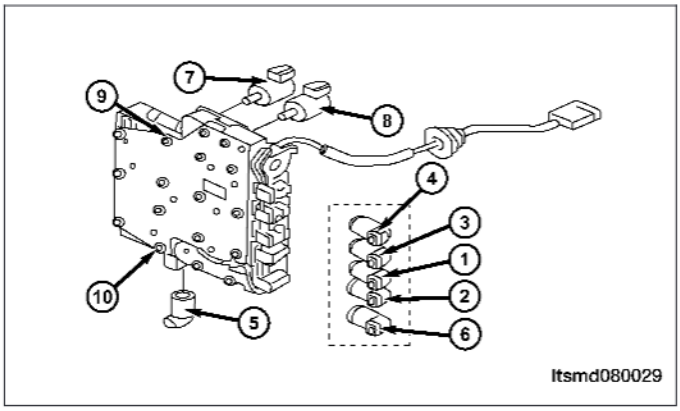
Yes >> Go to step 7.

No >> Go to the next step.

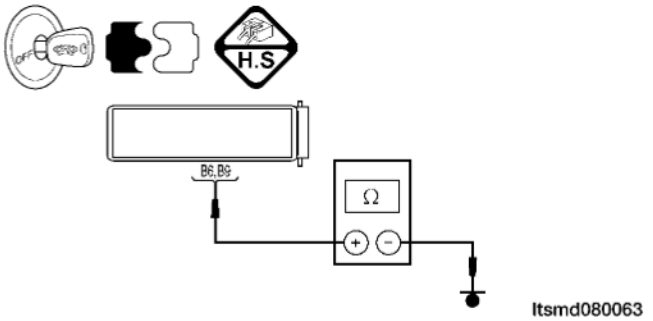
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3. CHECK TORQUE CONVERTER LOCK SOLENOID VALVE RESISTANCE

- Turn the ignition switch off.
- Disconnect torque converter lock solenoid valve 8 connector E-037.
- Check solenoid valve resistance as shown in the following table:



TORQUE CONVERTER LOCK SOLENOID (8) RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38 - 42 Ω



Is the check result normal?

Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 7.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged solenoid valve.

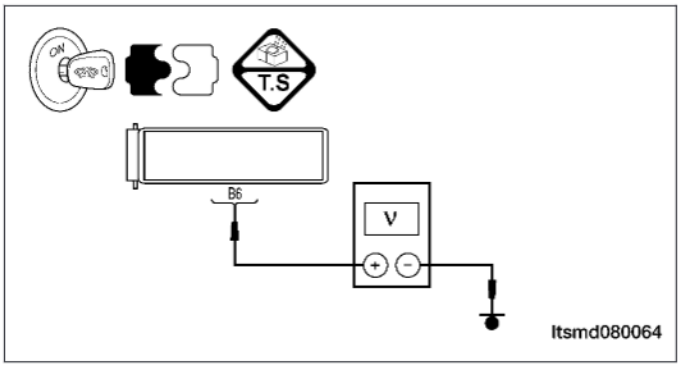
4. CHECK TORQUE CONVERTER LOCK SOLENOID VALVE POWER SUPPLY

- Turn the ignition switch on.
- Check power supply between torque converter lock solenoid valve E-037 terminal B6 and ground in the A/T assembly connector E-037.
- 12 V should exist.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.

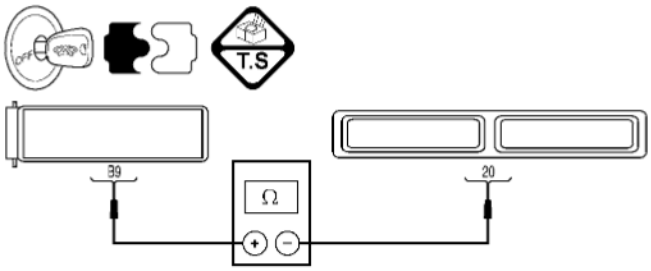


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5. CHECK TORQUE CONVERTER LOCK SOLENOID VALVE CONTROL CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

Check Resistance

TORQUE CONVERTER LOCK SOLENOID VALVE TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
B9	20	Yes	 ltsmd080065

- Check the harness for short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.

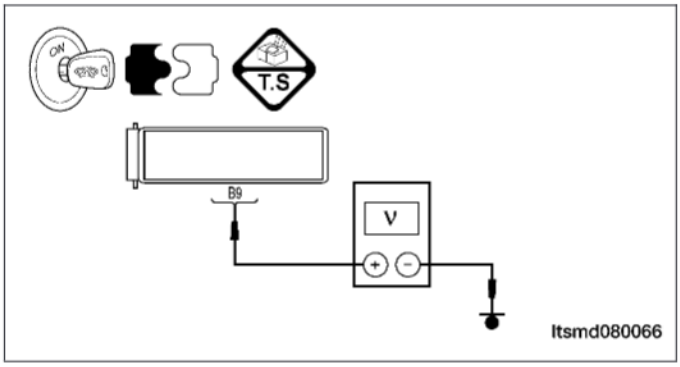
6. CHECK TORQUE CONVERTER LOCK SOLENOID VALVE CONTROL CIRCUIT

- Turn the ignition switch on.
- Check if voltage is present between E-037, terminal B9 and ground.
- Check the harness for short to power supply circuits.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for a short to power supply in harness or connectors.



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7. CHECK TORQUE CONVERTER LOCK SOLENOID VALVE SIGNAL

- Connect TCM and torque converter lock solenoid valve connector.
- With the engine running, move the shifter to ″N″ position, check the voltage of the solenoid valve between the TCM pin 19 and pin 20.

Is the voltage approximately 4.5 V with the engine running and the transaxle in the "N" position?

Yes >> Go to the next step.

No >> Go to step 9.

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8. CHECK EVLU VALVE

- With the scan tool X-431, drive the vehicle, monitor the EVLU valve condition.
- Drive the vehicle until it is fully warmed up to at least 50°C. Perform the following step 3 times:
- Drive the vehicle at 80 km/h (50 mph) and allow 4th gear to engage for at least 10 seconds.
- Close the throttle, then tip back in until the throttle angle is between 20 and 30 degrees.

NOTE :
If you go over 30 degrees, you must release the throttle and retry.

Does the TCC engage during any of the attempts?

Yes >> The system is normal.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

No >> Replace the torque converter lock solenoid valve for a mechanical problem.

9. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0795 still present?

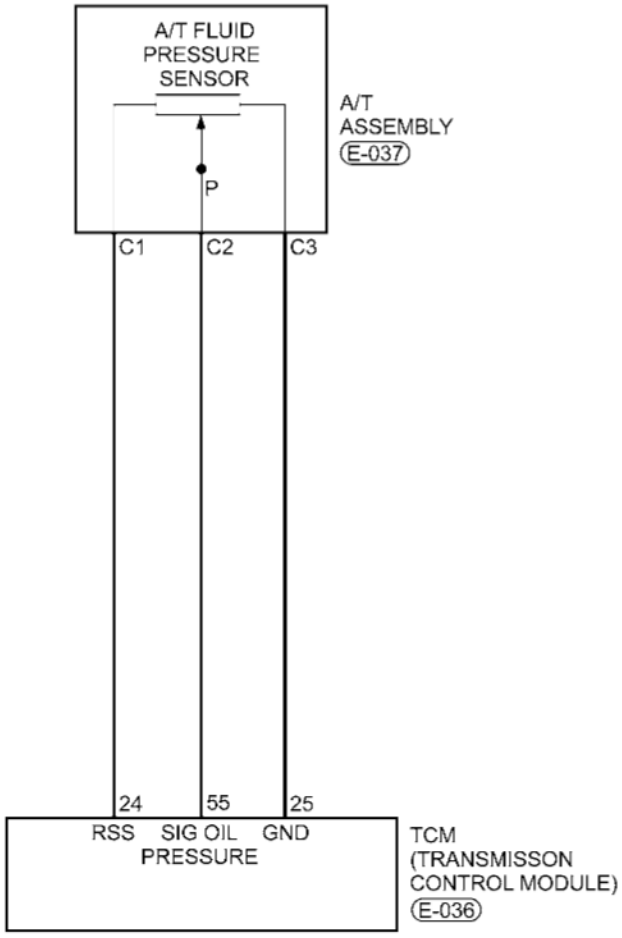
Yes >> Replace the TCM.

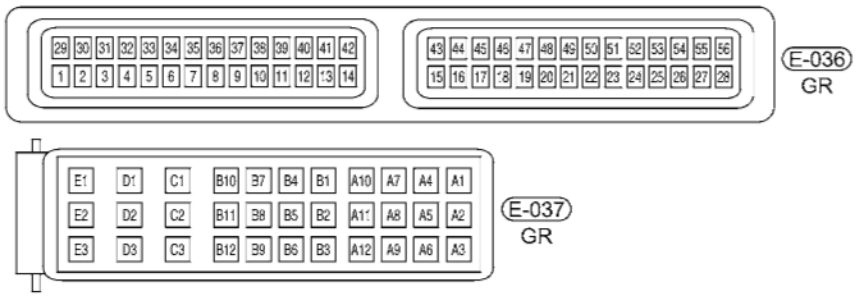
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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P0840 - Pressure Sensor

TM - DP0 - OPS - 01





ltsmw080015t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P0840	Pressure sensor	Vehicle is driving	The Transaxle Control Module (TCM) detects this DTC after the engine speed is up to 2000 RPM for 10 seconds and there is a fault with the pressure sensor circuit.	• A/T fluid pressure sensor • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- Drive the vehicle uphill to maintain the driving conditions required for this test.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

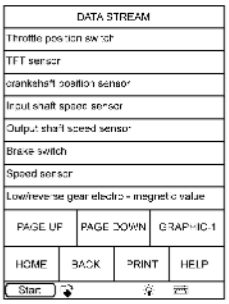
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Diagnostic Procedure

1. CHECK A/T FLUID PRESSURE SENSOR SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start vehicle and monitor the value of "INPUT SPEED SENSOR".

ITEM	CONDITION	DISPLAY VALUE
Fluid Pressure	Ignition switch on, not running	Below 0.2 bar
	• Engine: Idle • TFT: 31°C • ECT: 30°C	Approximately 0.05 bar



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

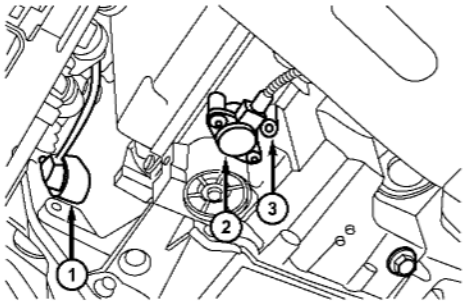
2. CHECK FLUID PRESSURE SENSOR ELECTRICAL CONNECTOR

- Stop vehicle and turn ignition switch off.
- Disconnect fluid pressure sensor 2 connector.
- Inspect the electrical connector for damage.

Is the electrical connector OK?

Yes >> Go to the next step.

No >> Repair or replace the electrical connector as necessary.

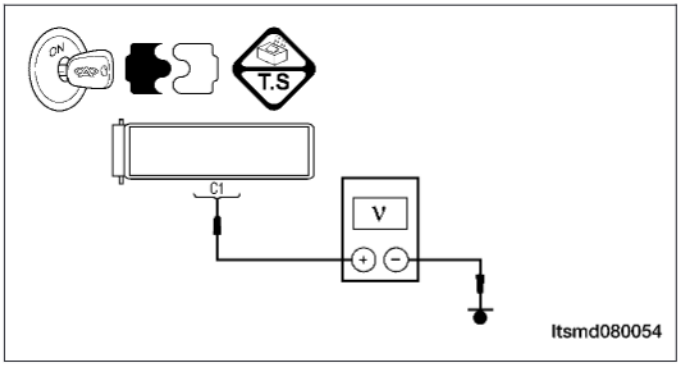


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3. CHECK FLUID PRESSURE SENSOR POWER SUPPLY

- Stop vehicle and turn ignition switch off.
- Turn the ignition switch on.
- Check sensor power supply between sensor terminal C1 and ground in the sensor electrical connector E-037.
- 5 V should exist.



Is the check result normal?

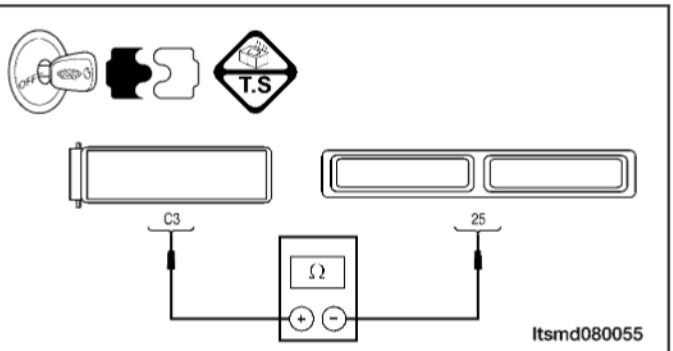
Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power in harness or connectors.
If circuit is normal, replace TCM.

4. CHECK FLUID PRESSURE SENSOR GROUND CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

A/T ASSEMBLY TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY
C3	25	Yes



- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to power or short to ground in harness connectors.

5. CHECK FLUID PRESSURE SENSOR SIGNAL

- Connect fluid pressure sensor connector.
- Connect TCM connector.
- Turn the ignition switch on.
- Check sensor signal voltage between sensor terminal 55 and 25 in the sensor electrical connector E-037.
- 1.4 V should exist.

Is the check result normal?

Yes >> Go to step 8.

No >> Go to the next step.

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6. CHECK FLUID PRESSURE SENSOR SIGNAL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM and sensor connector.
- Check harness continuity between fluid pressure sensor terminal C2 and TCM terminal 55.
- Check short to ground and short to power supply.

Is the check result normal?

Yes >> Go to the next step.

No >> Check harness for an open or short to ground or short to power supply in harness or connectors.

7. CHECK THE FLUID PRESSURE SENSOR

- Check fluid pressure sensor resistance between sensor terminal C2 and C3 in A/T assembly connector E-037.
- Approximately 20 KΩ should exist.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the fluid pressure sensor.

8. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0840 present?

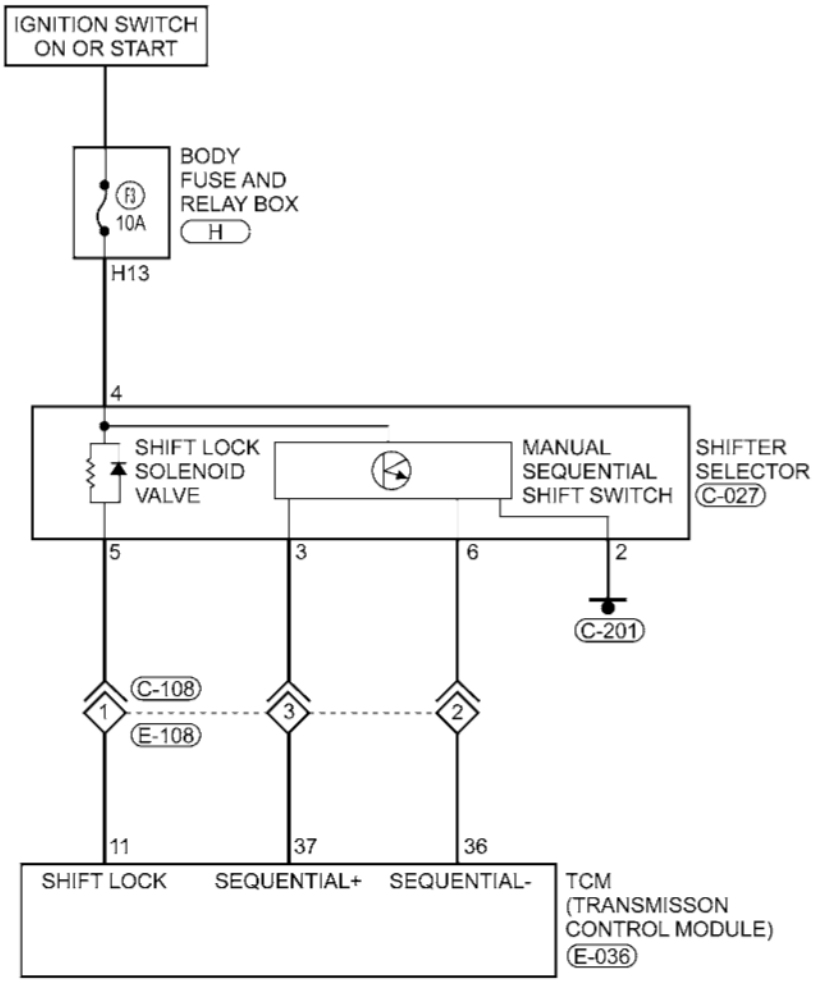
Yes >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

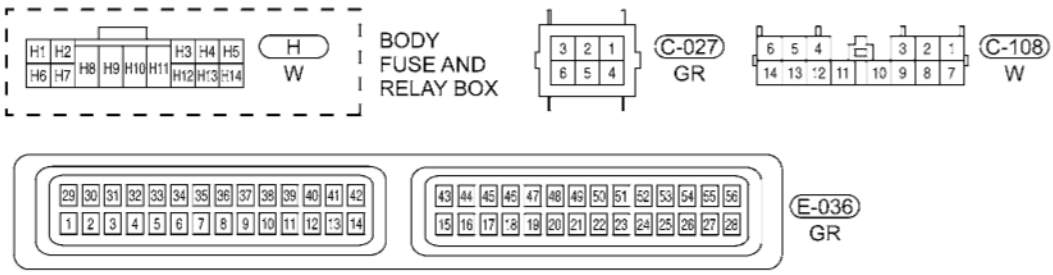
No >> Replace the TCM.

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P1928 - Shift Lock Solenoid Valve Circuit Shorted To Voltage

TM - DP0 - SHIFT - 01





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P1928	Shift lock solenoid circuit short to power supply	Ignition on or vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detects that the shift lever lock solenoid circuit shorted to power supply.	• Shift lock solenoid valve • Harness or connectors (The sensor circuit is shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- Try to operate the shifter selector.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK SHIFT LOCK SOLENOID VALVE SIGNAL

- With the scan tool, select view DTC and data stream.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SELECT POSITION	RANGE	SHIFT SOLENOID VALVE 1	SHIFT SOLENOID VALVE 2	SHIFT SOLENOID VALVE 3	SHIFT SOLENOID VALVE 4
P	0	-	-	#	-
R	R	-	-	-	-
N	0	-	-	#	-
D	1	-	-	#	#
	2	-	#	-	#
	3	-	-	-	-
	4	#	#	-	-



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- #: Operating solenoid

Is the check result normal and DTC not present?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- Watch, listen and monitor the shift lock solenoid condition and verify the shift lock solenoid works correctly and the solenoid should be heard when actuate shift lock solenoid valve.

Is the check result normal?

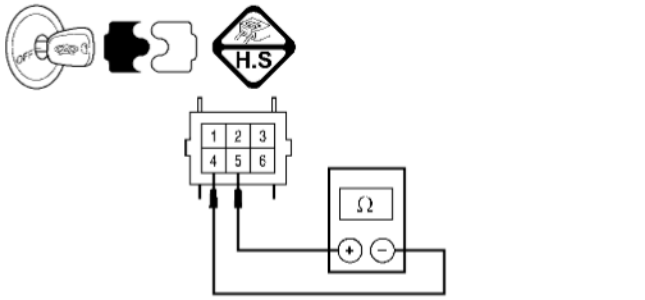
Yes >> Go to step 7.

No >> Go to the next step.

3. CHECK SHIFT LOCK SOLENOID VALVE RESISTANCE

- Turn the ignition switch off.
- Disconnect shift lock solenoid valve connector C-027.
- Check shift lock solenoid valve resistance as shown in the following table:

SHIFT LOCK SOLENOID VALVE RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	**Resistance**
23°C	36 - 44 Ω



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Is the check result normal?

Yes >> Replace the shift lock solenoid valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 7.
- If the solenoid can't be heard, go to the next step.

No >> Replace the shift lock solenoid for a mechanical problem.

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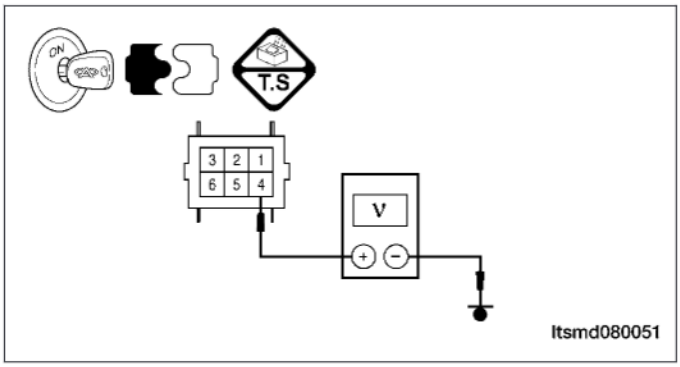
4. CHECK SHIFT LOCK SOLENOID VALVE POWER SUPPLY

- Turn ignition switch on.
- Check the shift lock solenoid valve power supply.
- Battery voltage should exist.

Is the check result normal?

Yes >> Go to the next step.

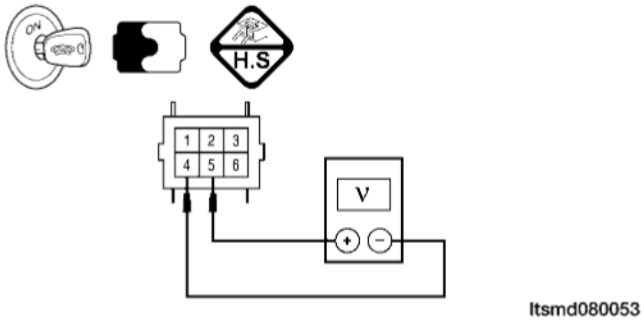
No >> Repair or replace open circuit or short to ground in harness or connectors.



5. CHECK SHIFT LOCK SOLENOID VALVE CONTROL CIRCUIT

- Turn the ignition switch on.
- Check the shift lock solenoid control signal voltage of the shift lock solenoid when pressing the brake pedal.
- Check power supply between shift lock solenoid valve terminal 4 and 5 in the shifter selector connector C-027.

SHIFT SOLENOID CONDITION	
Condition	**Shift Lock Solenoid**
Terminal	Pins 4 - 5
Brake Pedal ON	0 (V)
Brake Pedal OFF	12 (V)



Does the voltage change as the brake pedal is ON and OFF?

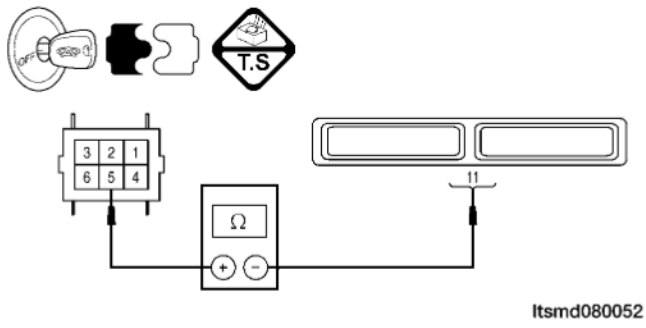
Yes >> Go to step 7.

No >> Go to the next step.

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6. CHECK SHIFT LOCK SOLENOID VALVE CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

SHIFT LOCK SOLENOID VALVE CONNECTOR TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
5	11	Yes	

- Check the harness for short to power supply.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for short to power supply in harness or connectors.

7. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P1928 present?

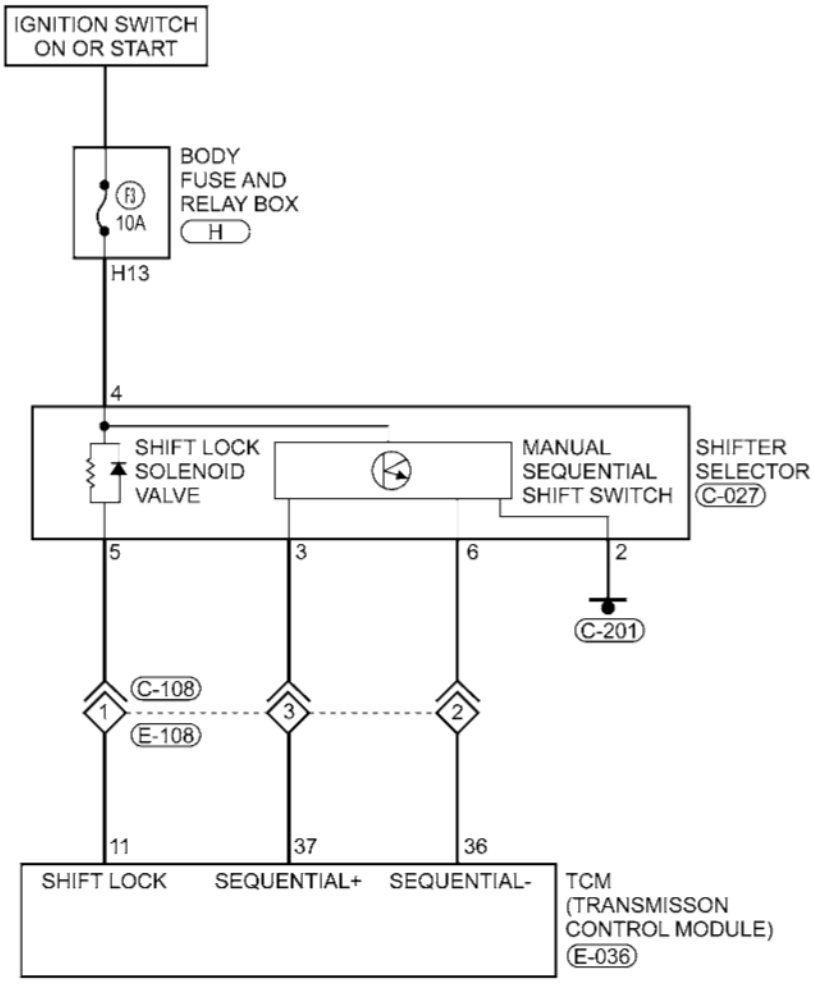
Yes >> Replace the TCM.

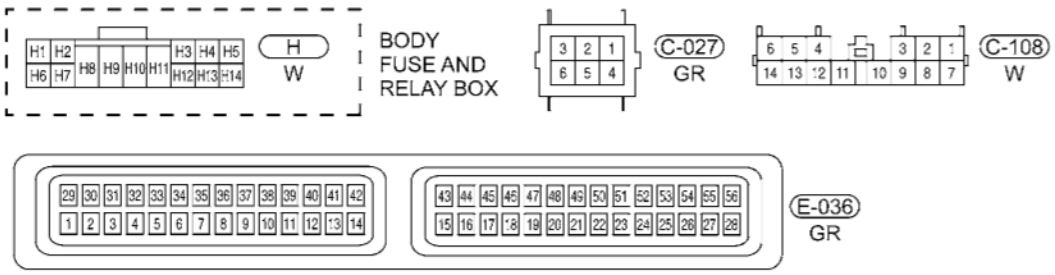
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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P1928 - Shift Lock Solenoid Valve Open Circuit Or Short To Ground

TM - DP0 - SHIFT - 01





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P1928	Shift lock solenoid valve open circuit or short to ground	Ignition switch on or vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detects that the shift lever lock solenoid circuit shorted to ground or open.	• Shift lock solenoid valve • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- Try to operate the shifter selector.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK SHIFT LOCK SOLENOID VALVE SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

SELECT POSITION	RANGE	SHIFT SOLENOID VALVE 1	SHIFT SOLENOID VALVE 2	SHIFT SOLENOID VALVE 3	SHIFT SOLENOID VALVE 4
P	0	-	-	#	-
R	R	-	-	-	-
N	0	-	-	#	-
D	1	-	-	#	#
	2	-	#	-	#
	3	-	-	-	-
	4	#	#	-	-



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- #: Operating solenoid

Is the check result normal and DTC not present?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- Watch, listen and monitor the shift lock solenoid condition and verify the shift lock solenoid works correctly and the solenoid should be heard when actuate shift lock solenoid valve.

Is the check result normal?

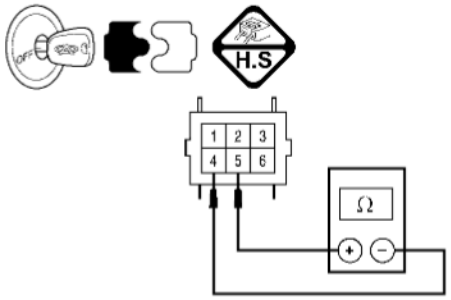
Yes >> Go to step 7.

No >> Go to the next step.

3. CHECK SHIFT LOCK SOLENOID VALVE RESISTANCE

- Turn the ignition switch off.
- Disconnect shift lock solenoid valve connector C-027.
- Check shift lock solenoid valve resistance as shown in the following table:

SHIFT LOCK SOLENOID VALVE RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	**Resistance**
23°C	36 - 44 Ω



ltsmd080050

Is the check result normal?

Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 7.
- If the solenoid can't be heard, go to the next step.

No >> Replace the shift lock solenoid for a mechanical problem.

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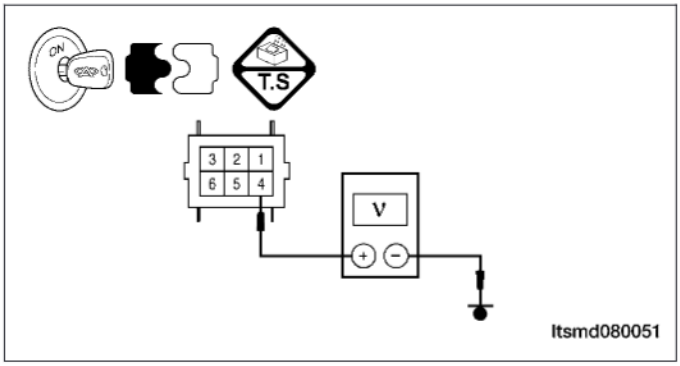
4. CHECK SHIFT LOCK SOLENOID VALVE POWER SUPPLY

- Turn the ignition switch on.
- Check the shift lock solenoid valve power supply.
- Battery voltage should exist.

Is the check result normal?

Yes >> Go to the next step.

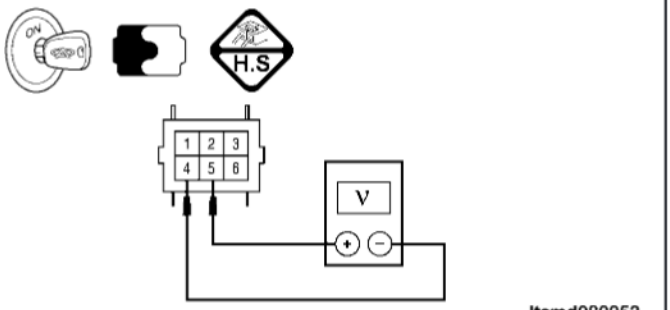
No >> Repair or replace the circuit for an open or short to ground in harness or connectors.



5. CHECK SHIFT LOCK SOLENOID VALVE CONTROL CIRCUIT

- Turn the ignition switch on.
- Check the shift lock solenoid control signal voltage of the shift lock solenoid when pressing the brake pedal.
- Check power supply between shift lock solenoid valve terminal 4 and 5 in the shifter selector connector C-027.

SHIFT SOLENOID CONDITION	
Condition	**Shift Lock Solenoid**
Terminal	Pins 4 - 5
Brake Pedal: ON	0 (V)
Brake Pedal: OFF	12 (V)



Does the voltage change as the brake pedal is ON and OFF?

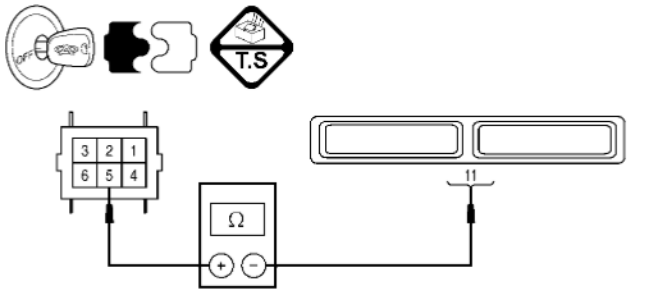
Yes >> Go to step 7.

No >> Go to the next step.

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6. CHECK SHIFT LOCK SOLENOID VALVE CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

SHIFT LOCK RESISTANCE			
SHIFT LOCK SOLENOID VALVE CONNECTOR TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
5	11	Yes	

- Check the harness for an open circuit or short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for an open or short to ground in harness or connectors.

7. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P1928 present?

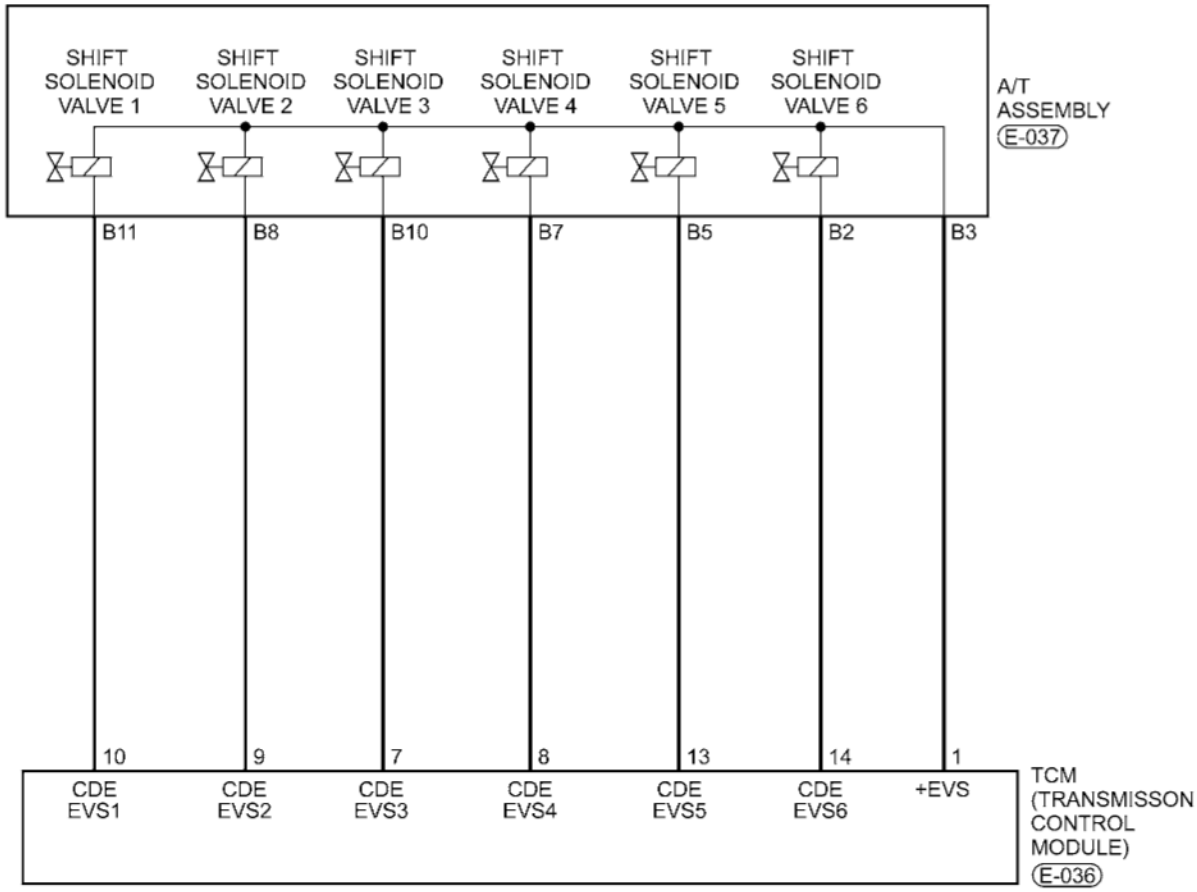
Yes >> Replace the TCM.

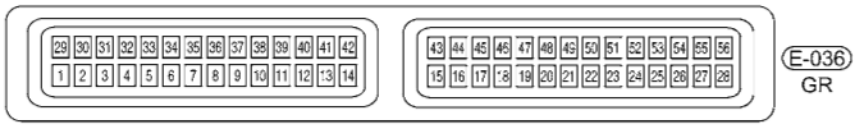
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

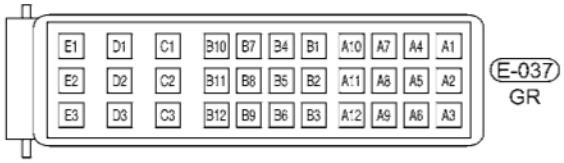
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P2709 - Shift Solenoid Valve 6 (SSV6) Short To Power Supply

TM - DP0 - EVS - 01







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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P2709	Shift Solenoid Valve 6 (SSV6) short to power supply	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 6 (SSV6) • Harness or connectors (The sensor circuit short to power supply) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the diagnostic connector, press the POWER key to start the X-431.
- Start the engine and warm it to normal operating temperature.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

X-431 REFERENCE VALUE					
SELECT POSITION	RANGE	SHIFT SOLENOID VALVE 1	SHIFT SOLENOID VALVE 2	SHIFT SOLENOID VALVE 3	SHIFT SOLENOID VALVE 4
P	0	-	-	#	-
R	R	-	-	-	-
N	0	-	-	#	-
D	1	-	-	#	#
	2	-	#	-	#
	3	-	-	-	-
	4	#	#	-	-



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

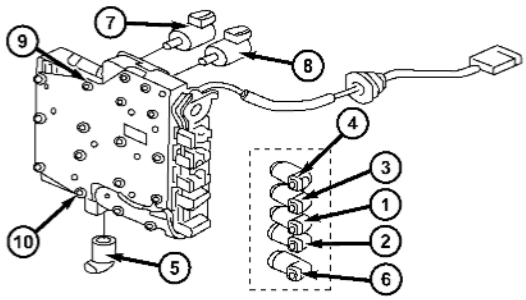
Is the check result normal?

Yes >> Go to step 6.

No >> Go to the next step.

3. CHECK SHIFT SOLENOID VALVE 6 (SSV6) RESISTANCE

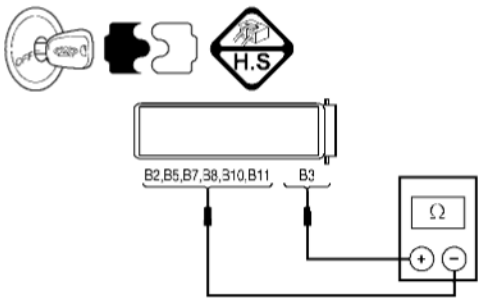
NUMBER	SOLENOID
1	Shift Solenoid Valve 1
2	Shift Solenoid Valve 2
3	Shift Solenoid Valve 3
4	Shift Solenoid Valve 4
5	Shift Solenoid Valve 5
6	Shift Solenoid Valve 6
7	Pressure adjust solenoid valve
8	Torque converter lock solenoid valve
9	Manual valve
10	Valve body



Itsmd080029

- Check SSV6 resistance as shown in the following table:

SHIFT SOLENOID VALVE	A/T ASSEMBLY TERMINAL
VALVE 1 (SSV1)	B11 - B3
VALVE 2 (SSV2)	B8 - B3
VALVE 3 (SSV3)	B10 - B3
VALVE 4 (SSV4)	B7 - B3
VALVE 5 (SSV5)	B5 - B3
VALVE 6 (SSV6)	B2 - B3
RESISTANCE (23°C)	38 - 42 (Ω)



Itsmd080030

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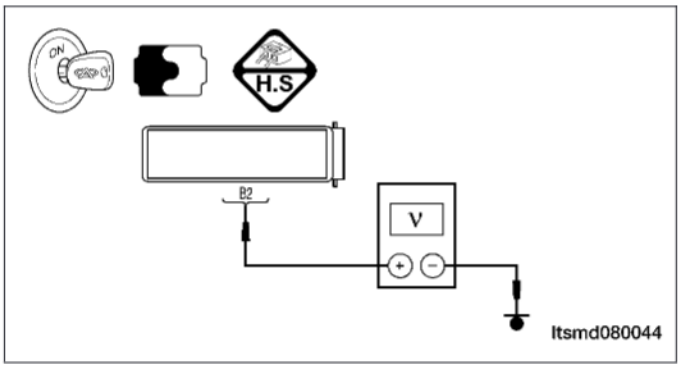
Is the check result normal?

Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 6.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged solenoid valve.

4. CHECK SHIFT SOLENOID VALVE 6 (SSV6) POWER SUPPLY

- Turn the ignition switch on.
- Check power supply between SSV6 E-037 terminal B2 and ground in the A/T assembly connector E-037.
- Battery voltage should exist.



- Or using the appropriate diagnostic test tool and a digital multimeter perform the following:
- Check the EVS6 solenoid supply voltage between TCM pin 1 and TCM pin 14 when activating the EVS6 solenoid and deactivating the EVS6 solenoid.
- Check the shift solenoid control signal. Check the voltage of the shift solenoid in each shift position.
- Check the voltage of the EVS6 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B2.

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	TCM TERMINAL					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
	1 - 10	1 - 9	1 - 7	1 - 8	1 - 13	1 - 14
R	0 V	0 V	0 V	0 V	0 V	0 V
N/P	0 V	0 V	+12 V	0 V	0 V	0 V
1	0 V	0 V	+12 V	+12 V	0 V	0 V
2	0 V	+12 V	0 V	+12 V	0 V	0
3	0 V	0 V	0 V	0 V	0 V	0 V
4	+12 V	+12 V	0 V	0 V	0 V	0 V

Is the check result normal?

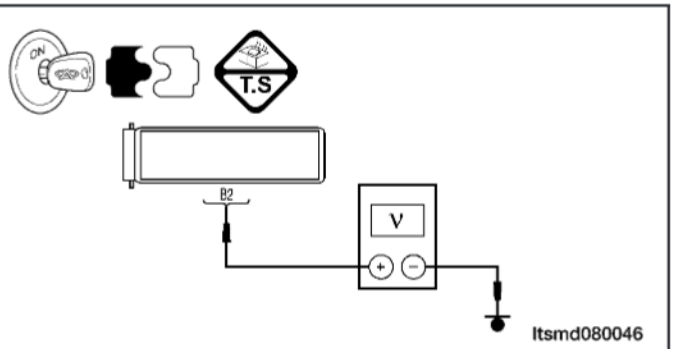
Yes >> Go to the next step.

No >> Repair or replace open circuit or short to ground in harness or connectors.

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5. CHECK SHIFT SOLENOID VALVE 6 (SSV6) CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Disconnect A/T assembly connector.
- Turn the ignition switch on.
- Check harness for short to power supply.

A/T Assembly Connector E-037 Terminal B2	Ground	

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace short to power supply in harness or connectors.

6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P0773 present?

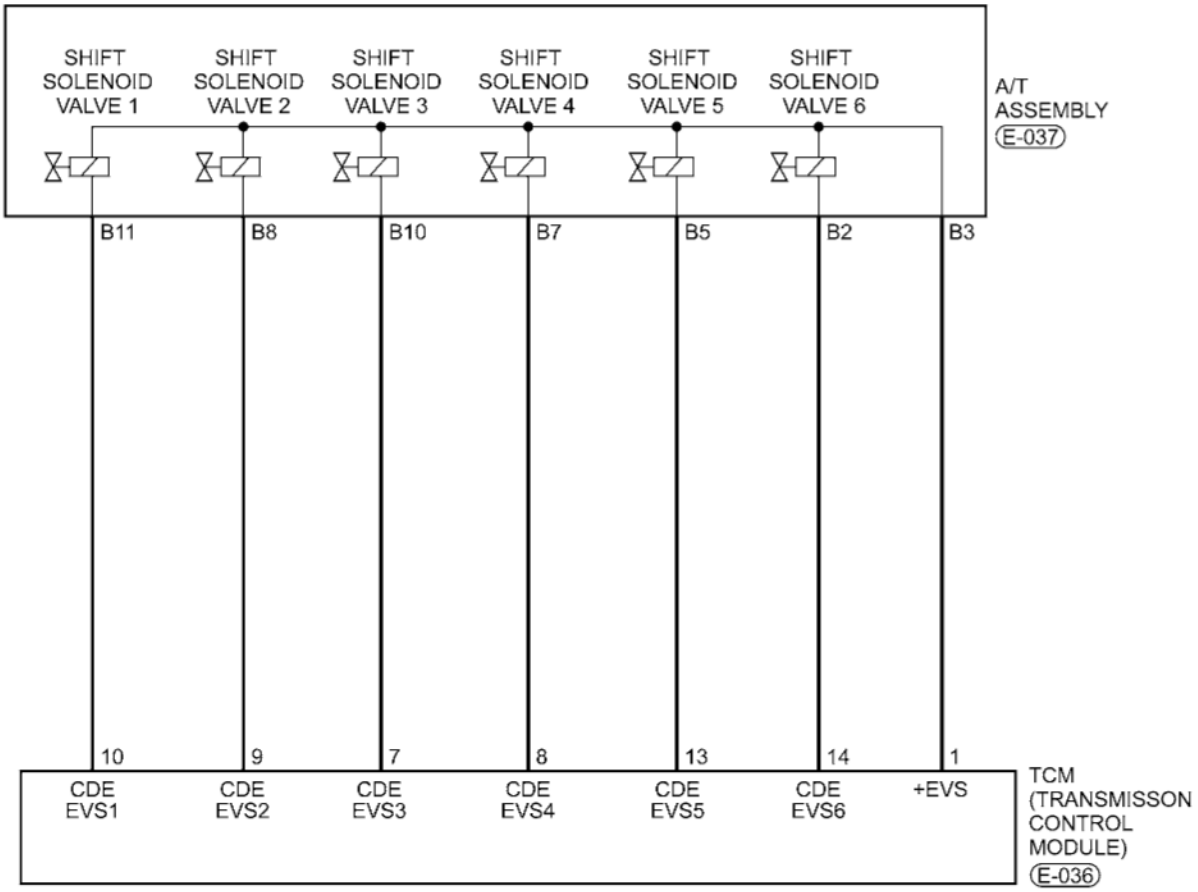
Yes >> Replace the TCM.

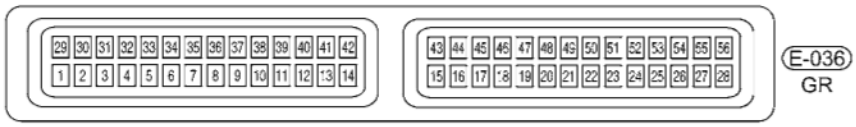
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

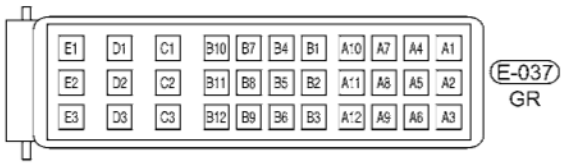
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P2709 - Shift Solenoid Valve 6 (SSV6) Open Circuit Or Short To Ground

TM - DP0 - EVS - 01







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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
P2709	Shift Solenoid Valve 6 (SSV6) open or short to ground circuit	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve.	• Shift Solenoid Valve 6 (SSV6) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press [POWER] key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

X-431 REFERENCE VALUE						
SELECT POSITION	RANGE	SHIFT SOLENOID VALVE 1	SHIFT SOLENOID VALVE 2	SHIFT SOLENOID VALVE 3	SHIFT SOLENOID VALVE 4	
P	0	-	-	#	-	
R	R	-	-	-	-	
N	0	-	-	#	-	
D	1	-	-	#	#	
	2	-	#	-	#	
	3	-	-	-	-	
	4	#	#	-	-	



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

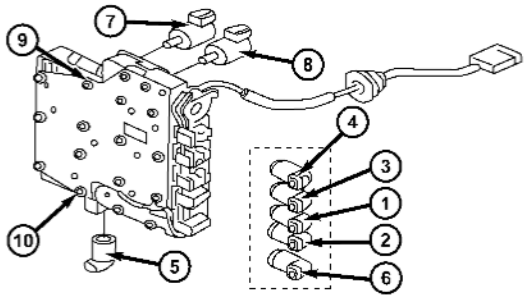
Yes >> Go to step 6.

No >> Go to the next step.

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3. CHECK SHIFT SOLENOID VALVE 6 (SSV6) RESISTANCE

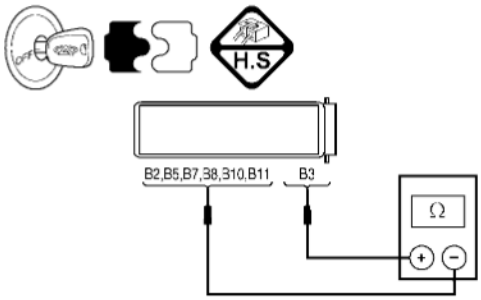
NUMBER	SOLENOID
1	Shift Solenoid Valve 1
2	Shift Solenoid Valve 2
3	Shift Solenoid Valve 3
4	Shift Solenoid Valve 4
5	Shift Solenoid Valve 5
6	Shift Solenoid Valve 6
7	Pressure adjust solenoid valve
8	Torque converter lock solenoid valve
9	Manual valve
10	Valve body



ltsmd080029

- Check SSV6 resistance as shown in the following table:

SHIFT SOLENOID VALVE	A/T ASSEMBLY TERMINAL
VALVE 1 (SSV1)	B11 - B3
VALVE 2 (SSV2)	B8 - B3
VALVE 3 (SSV3)	B10 - B3
VALVE 4 (SSV4)	B7 - B3
VALVE 5 (SSV5)	B5 - B3
VALVE 6 (SSV6)	B2 - B3
RESISTANCE (23°C)	38 - 42 (Ω)



ltsmd080030

Is the check result normal?

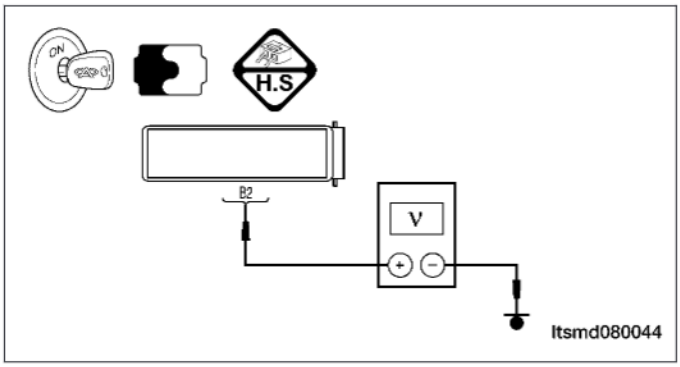
Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 6.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged solenoid valve.

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4. CHECK SHIFT SOLENOID VALVE 6 (SSV6) POWER SUPPLY

- Turn the ignition switch on.
- Check power supply between SSV6 E-037 terminal B2 and ground in the A/T assembly connector E-037.
- Battery voltage should exist.



- Or using the appropriate diagnostic test tool and a digital multimeter perform the following:
- Check the EVS6 solenoid supply voltage between TCM pin 1 and TCM pin 14 when activating the EVS6 solenoid and deactivating the EVS6 solenoid.
- Check the shift solenoid control signal. Check the voltage of the shift solenoid in each shift position.
- Check the voltage of the EVS6 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B2.

SEQUENCE SOLENOID (EVS) CONDITION						
LEVER POSITION	TCM TERMINAL					
	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
	1 - 10	1 - 9	1 - 7	1 - 8	1 - 13	1 - 14
R	0 V	0 V	0 V	0 V	0 V	0 V
N/P	0 V	0 V	+12 V	0 V	0 V	0 V
1	0 V	0 V	+12 V	+12 V	0 V	0 V
2	0 V	+12 V	0 V	+12 V	0 V	0
3	0 V	0 V	0 V	0 V	0 V	0 V
4	+12 V	+12 V	0 V	0 V	0 V	0 V

Is the check result normal?

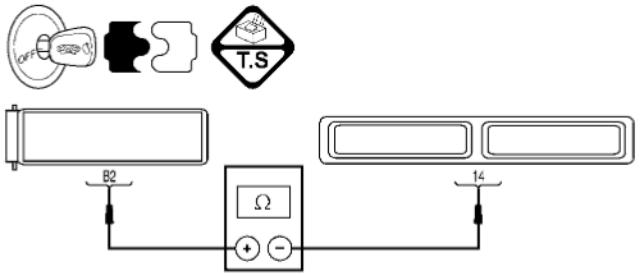
Yes >> Go to the next step.

No >> Repair or replace open circuit or short to ground in harness or connectors.

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5. CHECK SHIFT SOLENOID VALVE 6 (SSV6) CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Disconnect A/T assembly connector.
- Check for harness continuity between the following terminals:

TCM TERMINAL RESISTANCE			
A/T ASSEMBLY CONNECTOR E-037 TERMINAL	TCM CONNECTOR E-036 TERMINAL	CONTINUITY	
B2	14	Yes	

- Check the harness for short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace open circuit or short to ground in harness or connectors.

6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P2709 present?

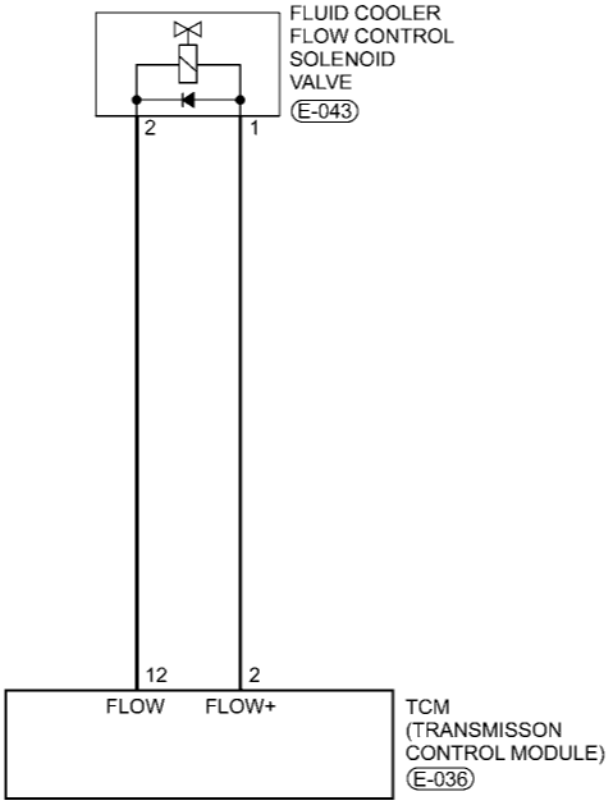
Yes >> Replace the TCM.

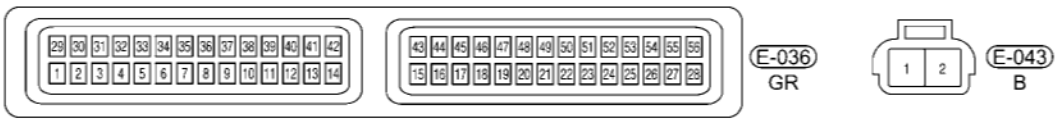
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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P2753 - EPDE Circuit Or Short To Power Supply
P2753 - EPDE Open Circuit Or Short To Ground

TM - DP0 - OFS - 01





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSE
P2753	Fluid cooler flow control solenoid (EPDE) short to power supply	Ignition switch on or vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM detected the EPDE solenoid circuit is short to power supply when the TFT is more than 108°C.	• Fluid cooler flow control solenoid valve (EPDE) • Harness or connectors (The sensor circuit is shorted) • Transaxle Control Module (TCM)
P2753	Fluid cooler flow control solenoid (EPDE) open circuit or short to ground		The Transaxle Control Module (TCM) will set this DTC when the TCM detected the EPDE solenoid circuit is short to ground, or open when the TFT is over 108°, and the engine speed is above 2000 RPM.	• Fluid cooler flow control solenoid valve (EPDE) • Harness or connectors (The sensor circuit is open or shorted) • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Start the engine and warm it to normal operating temperature.
- Drive the vehicle.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).
- If using the appropriate diagnostic test tool, you can diagnose the TCM harness while the TCM is still connected.
- Using the appropriate diagnostic test tool in this way will help prevent electrical connector terminal damage.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

X-431 REFERENCE VALUE						
SELECT POSITION	RANGE	SHIFT SOLENOID VALVE 1	SHIFT SOLENOID VALVE 2	SHIFT SOLENOID VALVE 3	SHIFT SOLENOID VALVE 4	
P	0	-	-	#	-	
R	R	-	-	-	-	
N	0	-	-	#	-	
D	1	-	-	#	#	
	2	-	#	-	#	
	3	-	-	-	-	
	4	#	#	-	-	



ltsmd080001t

- #: Operating solenoid

Is the check result normal and DTC not present?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

CHECK CONDITION		
SOLENOID	ACTUATE CONDITION	SOLENOID CONDITION
Fluid Cooler Flow Control Solenoid Valve	TFT ≥ 100°C	Open
	RPM ≥ 2000 RPM	

EPDE RANGE CONDITION		
EPDE PIN	12-2	12-2
CONDITION	TFT ≥ 100°C RPM ≥ 2000 RPM	TFT ≤ 60°C RPM ≤ 2000
VALUE (V)	12	0

Is the check result normal?

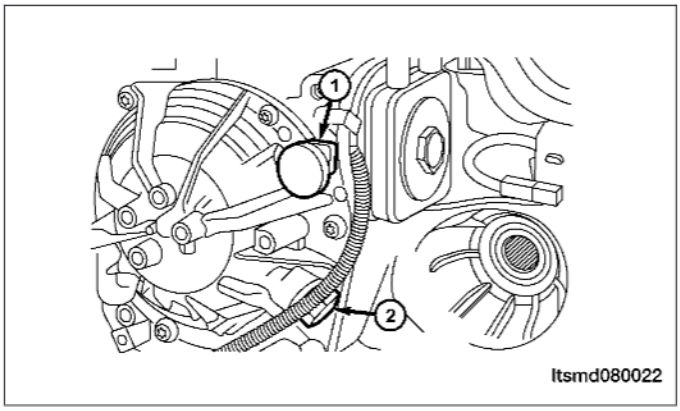
Yes >> Go to step 6.

No >> Go to the next step.

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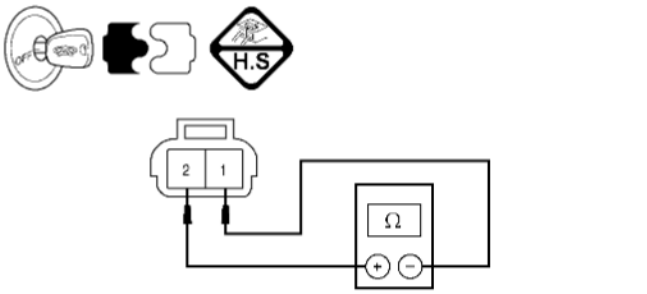
3. CHECK FLUID COOLER FLOW CONTROL SOLENOID VALVE RESISTANCE

- Turn ignition switch off.
- Disconnect fluid cooler flow control solenoid valve (1) connector E-043.
- Check fluid cooler flow control solenoid valve resistance as shown in the following table:



EPDE TERMINAL RESISTANCE

EPDE Solenoid (1) Resistance Based On Transaxle Temperature	
Temperature	**Resistance**
23°C	36 - 44 Ω



Is the check result normal?

Yes >> Replace the valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, go to step 6.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged solenoid valve.

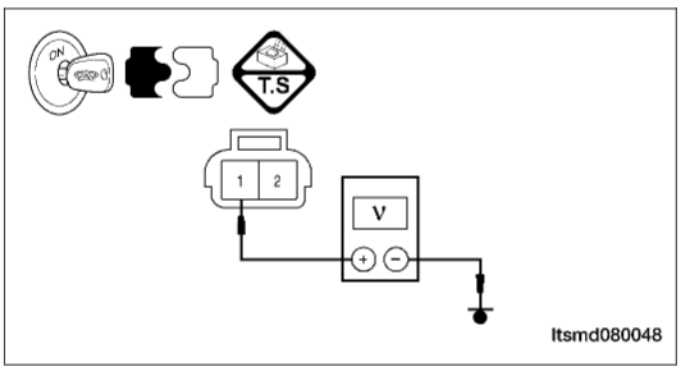
4. CHECK FLUID COOLER FLOW CONTROL SOLENOID VALVE POWER SUPPLY

- Turn ignition switch on.
- Check power supply between fluid cooler flow control solenoid valve E-043 terminal 1 and ground in the A/T assembly connector E-043.
- Battery voltage should exist.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground in harness or connectors.



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5. CHECK FLUID COOLER FLOW CONTROL SOLENOID VALVE CONTROL CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Check the harness for an open or short to ground.
- Check the harness for short to power.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for an open or short to power or short to ground in harness or connectors.

6. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC P2753 still present?

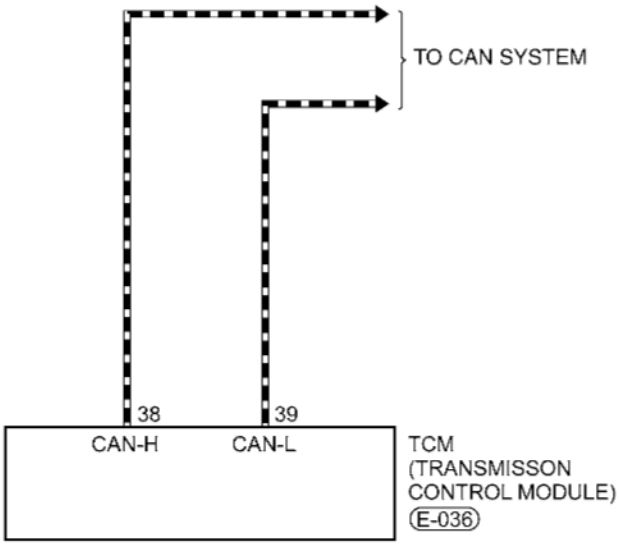
Yes >> Replace the TCM.

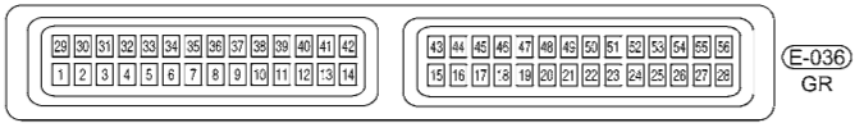
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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U0001 - CAN Communication Error

TM - DP0 - CAN - 01





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSE
U0001	CAN Communication Error	With the ignition switch on	The Transaxle Control Module (TCM) lost communication over the CAN-Bus circuit. The circuit is continuously monitored.	• CAN Converter • Harness or connectors (The sensor circuit is open or shorted) • ECM • Transaxle Control Module (TCM)

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Start the engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

- Ensure that the battery is fully charged.
- Before performing any DTC diagnostic procedures, verify the TCM power and ground circuits are properly connected.
- Before performing the diagnostic procedure, repair all other TCM DTCs first.

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch off.
- Loosen and retighten ground screws on the body (See Ground Inspection in Section 12 Brakes).
- Inspect the ground connection C-201 mounting position (See Vehicle Wiring Harness Layout - Main Harness in Section 16 Wiring).

Are the ground connections OK?

Yes >> Go to the next step.

No >> Repair or replace the ground connections.

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2. CHECK DTC

- Turn ignition switch on.
- With the scan tool, select view TCM DTC and data stream.

Is DTC U0001 present?

Yes >> Go to the next step.

No >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).
Erase all codes and test drive the vehicle to verify the repair is complete.

3. CHECK OTHER MODULE DTC

- With the scan tool X-431, attempt to enter all the other CAN communication modules such as ECM, CAN converter module.
- Read the CAN DTCs.

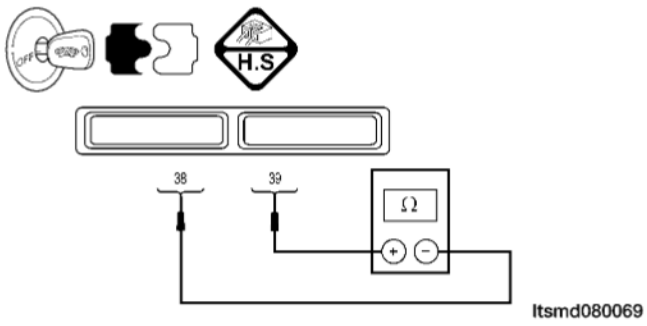
Were other modules DTCs found?

Yes >> If all of the other modules have the same DTC ″CAN Communication″, go to the next step.
If all of the other modules have the DTC ″Lost communication with TCM″, and do not have the ″CAN Communication″, replace and program the TCM module.

No >> Go to step 8.

4. CHECK CAN-BUS LINE TERMINAL RESISTANCE IN TCM

- Turn the ignition switch off.
- Disconnect the negative battery cable.
- Disconnect TCM connector.
- Check resistance between TCM connector 38 and 39.

CAN TERMINAL RESISTANCE			
CAN-H	CAN-L	RESISTANCE	
38	39	123 Ω	

Is the check result normal?

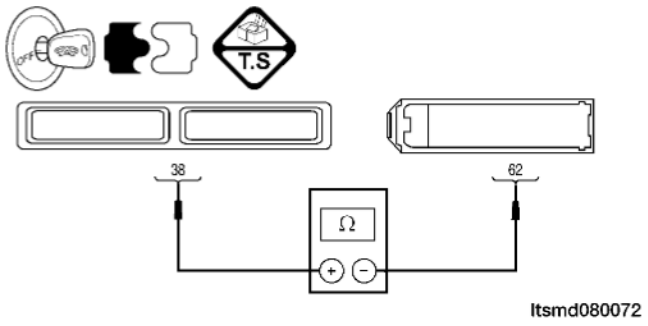
Yes >> Go to the next step.

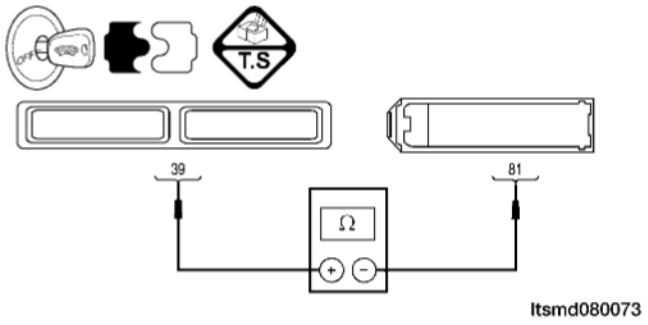
No >> Replace TCM.
The problem caused by TCM internal error.

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5. CHECK CAN-BUS LINE

- Disconnect ECM and CAN converter connectors.
- Check for harness continuity between the following terminals:

CHECK CAN-H CONTINUITY				
CAN	TCM TERMINAL	ECM TERMINAL	CONTINUITY	
CAN-H	38	62	Yes	

CHECK CAN-L CONTINUITY				
CAN	TCM TERMINAL	ECM TERMINAL	CONTINUITY	
CAN-L	39	81	Yes	

- Check the harness for short to ground and short to power.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace CAN-Bus line.

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6. CHECK CAN-BUS LINE

- Connect the negative battery cable.
- Connect TCM and ECM connectors.
- Turn the ignition switch on.
- Check CAN-Bus voltage between the following terminals:

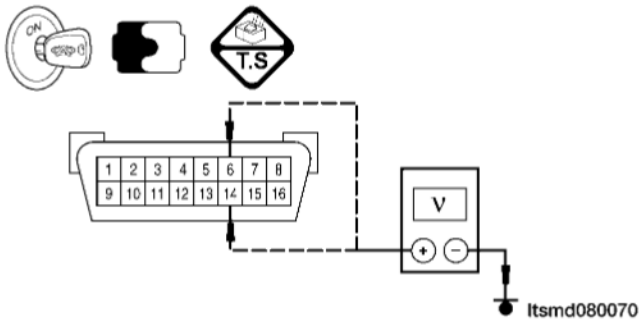
CAN-H

- 0.025 V should exist with bus communication inactive.
- 0.65 V should exist with bus communication active.

CAN-L

- 11 V should exist with bus communication inactive.
- 4.65 V should exist with bus communication active.

- Check CAN-Bus voltage between the following terminals:

CHECK CAN-BUS LINE VOLTAGE		
DLC TERMINAL	**GROUND**	
6 (CAN-H)	Ground	
14 (CAN-L)		

Is the check result normal and DTC U0001 not present?

Yes >> Replace CAN converter.
The problem caused by CAN converter internal error.

No >> Go to the next step.

7. CHECK CAN-BUS LINE

- Turn ignition switch off.
- Connect CAN converter.
- Disconnect ECM connectors.
- Turn ignition switch on.
- Check CAN-Bus voltage as the standard value.

Is the check result normal and DTC U0001 not present?

Yes >> Replace and program ECM.
The problem caused by ECM internal error.

No >> Go to the next step.

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8. CHECK THE TCM ELECTRICAL CONNECTOR

- Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.
- With the X-431 scan tool, read TCM DTCs.

Is the check result normal and DTC U0001 not present?

Yes >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

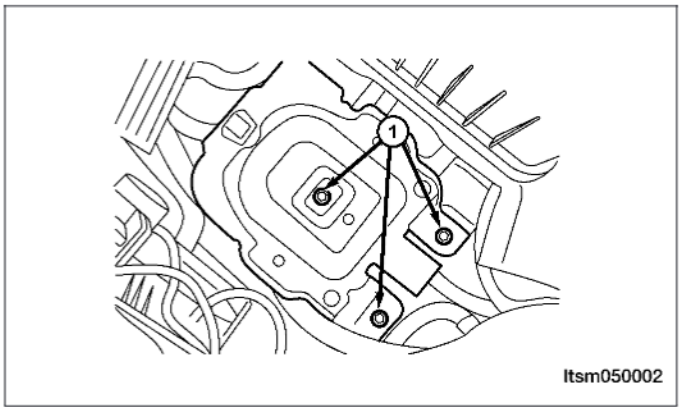
No >> Replace the TCM.
The problem caused by TCM internal error.

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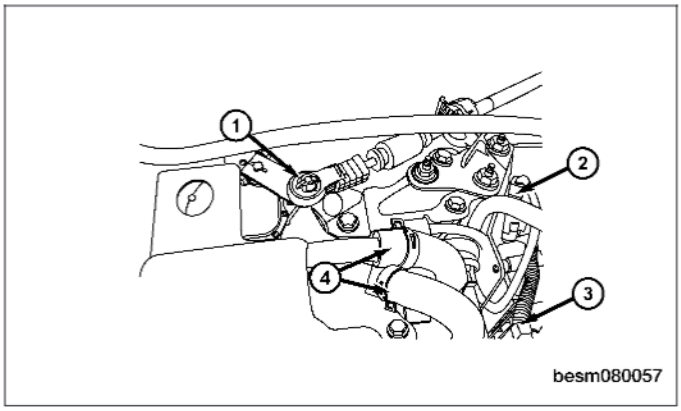
DPO Automatic Transaxle Assembly

Removal & Installation

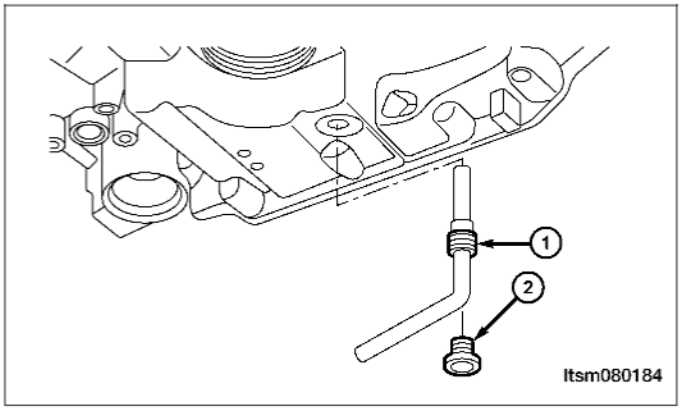
1. Raise and support the vehicle.
2. Remove the engine cover.
3. Remove the battery and battery tray (See Battery Removal & Installation in Section 05 Starting & Charging).
4. Remove the air cleaner and air duct assembly.
5. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
6. Remove the base mounting (1) of the air cleaner housing assembly.



7. Remove the transaxle ground cable.
8. Disconnect and remove the electrical connectors for the following components:
   - Vehicle speed sensor (2)
   - Crankshaft position sensor
   - Automatic transaxle assembly (3)
9. Disconnect the transaxle fluid coolant lines (4) using a suitable tool.
10. Remove the shift cable (1) from the transaxle assembly.



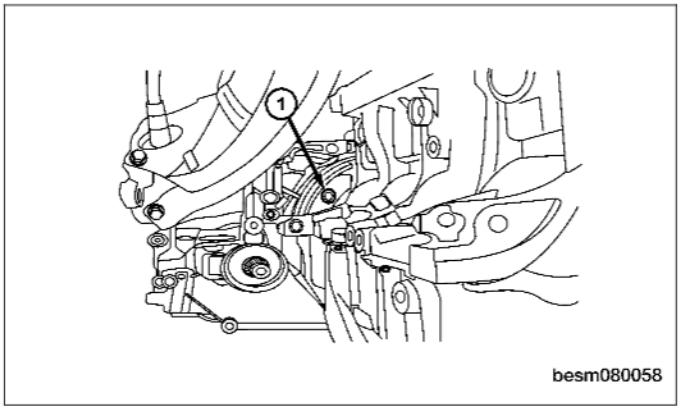
11. Raise the vehicle.
12. Remove the drain plug (2) with an inner square socket wrench.
13. Remove the fluid limiting duct (1) with an 8 mm inner hex socket wrench.



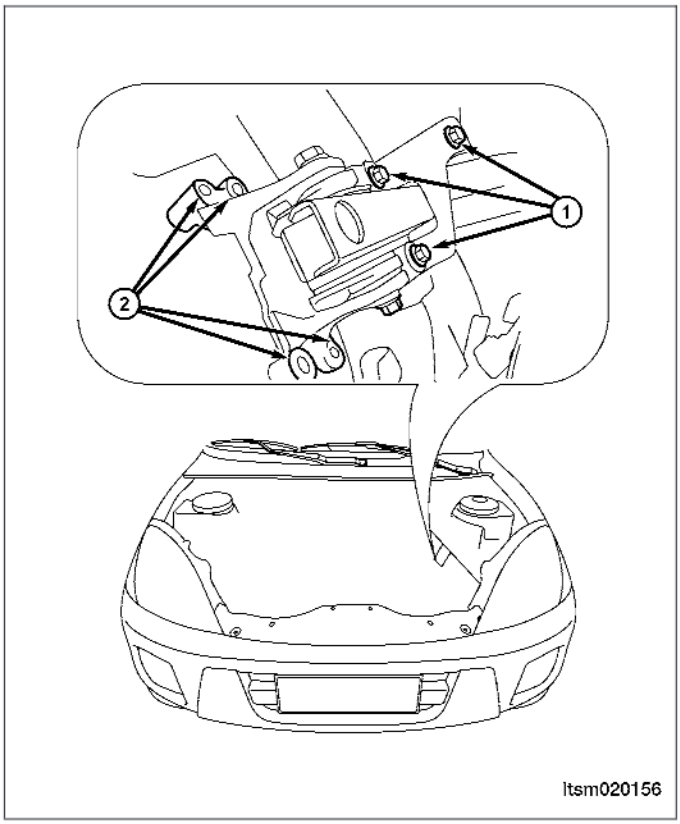
14. Drain the transaxle fluid.

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15. Remove the bolts attaching the transaxle cooling lines to the transaxle.
16. Remove the starter motor (See Starter Removal & Installation in Section 05 Starting & Charging).
17. Remove the bolts (1) attaching the drive plate to the torque converter (three bolts total).
(Tighten: Drive plate bolts to 75 N·m)



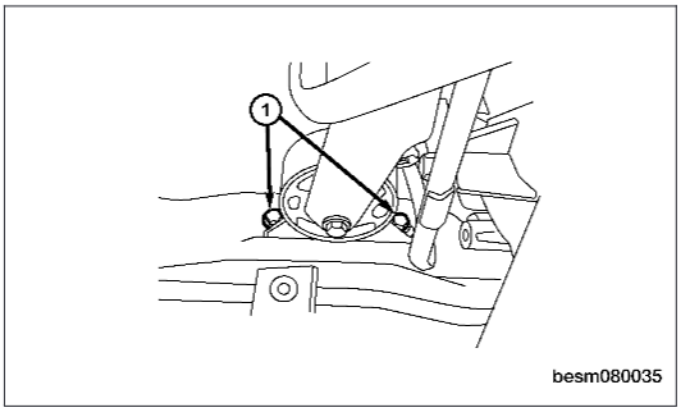
18. Remove the engine to transaxle upper bolts.
(Tighten: Engine to transaxle upper bolts to 80 N·m)
19. Remove both front axle shafts (See Front Axle Shaft Removal & Installation in Section 09 Driveline & Axle).
20. Remove transaxle mount nuts (2) and the transaxle mount bracket bolts (1).
(Tighten: Transaxle mount nut to 120 N·m)



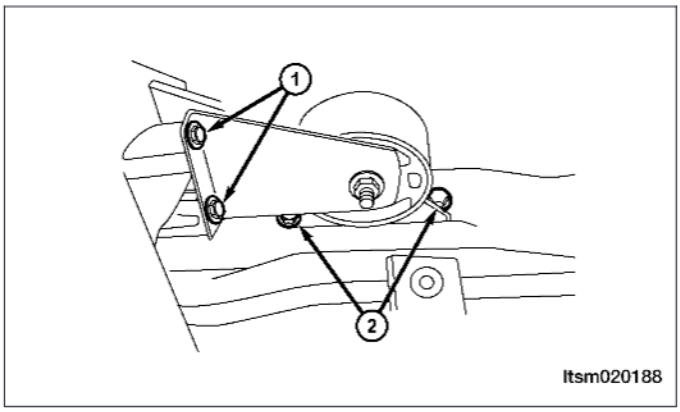
21. Remove the engine undercover and splash shields.
22. Support the engine using an engine support fixture or suitable jack.
23. Remove the front sub-frame assembly (See Sub-Frame Assembly Removal & Installation in Section 10 Suspension).
24. Remove the engine to transaxle lower bolts.
(Tighten: Engine to transaxle lower bolts to 80 N·m)
25. Remove the bolts that mount the side sill to vehicle body.
(Tighten: Side sill to vehicle body bolts to 120 N·m)

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26. Remove the front engine mount bolts (1).
(Tighten: Front mount bolts to 60 N·m)



27. Remove the rear engine mount bolts (1) and the rear engine mount bracket bolt (2).
(Tighten: Rear mount bolts to 40 N·m)



28. Remove the transaxle mount bolts.
(Tighten: Transaxle mount bolts to 40 N·m)
29. Separate the transaxle from the engine and remove the transaxle from the vehicle.

WARNING!

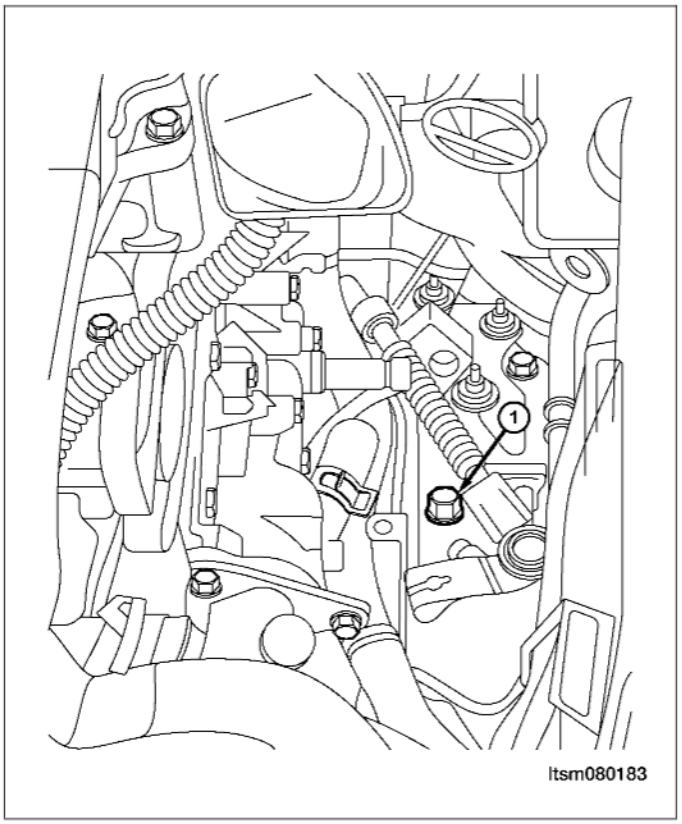
Use a suitable jack to support the transaxle during removal.

30. Installation is in the reverse order of removal.

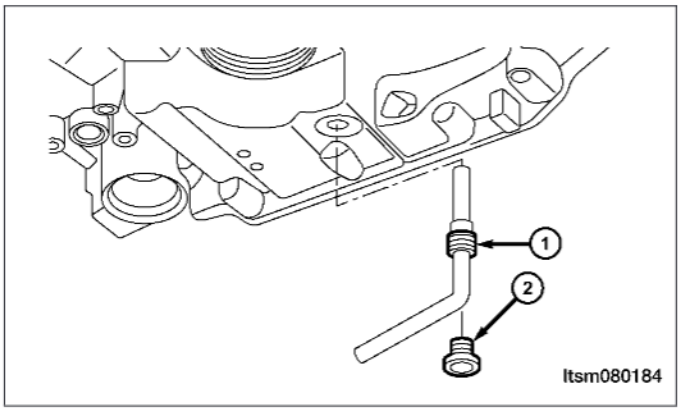
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Installation Notes:

- Refill the transaxle fluid through the fill hole (1) shown in the figure.



- To avoid fluid spills, make sure to use a funnel.
- Add 3.5 L of new automatic transaxle fluid into the transaxle.
- Start the engine and maintain an idle.
- Connect the X-431 scan tool and establish a connection with the TCM and monitor the transaxle fluid temperature.
- Open the drain plug (2) when the fluid temperature reaches 60 ± 1°. Loosen the fluid limiting duct (1) if necessary.



- Catch any fluid that drains out with a measuring cup.
- If no fluid drains out, or the drained fluid is less than 0.1 liter perform the following:
  - 1. Turn off the ignition switch.
  - 2. Add 0.5 liter fluid to the transaxle.
  - 3. Allow the transaxle fluid to cool down to 50°C.
  - 4. Start the engine and maintain an idle.
  - 5. Open the drain plug when the fluid temperature reaches 60 ± 1°C.
  - 6. Catch any fluid that drains out with a measuring cup.
  - 7. Repeat the above steps, until the drained fluid exceeds 0.1 liter.
  - 8. Tighten the drain plug to 33 N·m.

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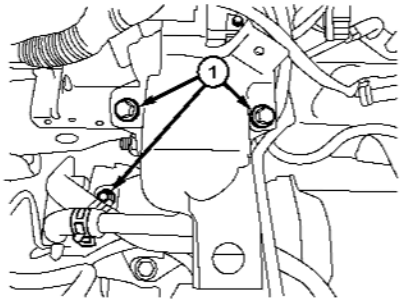
WARNING!

The gearshift lever must be shifted to gear P while adding transaxle fluid.

Automatic Shifter Selector

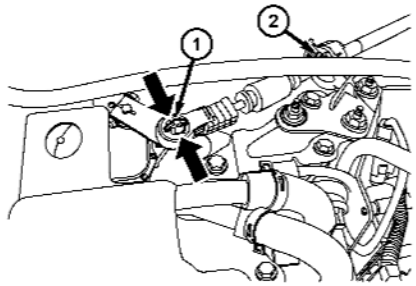
Removal & Installation

1. Raise and support the vehicle.
2. Disconnect the negative battery cable.
3. Remove the air cleaner and air duct transaxle assembly.
4. Remove the base mounting (1) of the air cleaner transaxle assembly.



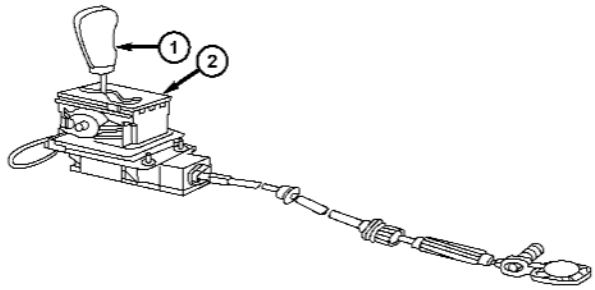
besm080038

5. Depress the clip then remove the shift cable (1) from the transaxle gearshift switch and remove the shift cable clamp (2).



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6. Remove the gearshift knob (1).
7. Remove the gearshift cover (2) from the lower console.

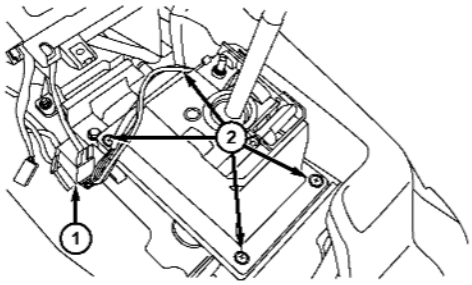


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8. Apply the parking brake (apply the parking brake handle to clear lower console during removal).
9. Remove the lower console (See Lower Console Removal & Installation in Section 15 Body & Accessories).

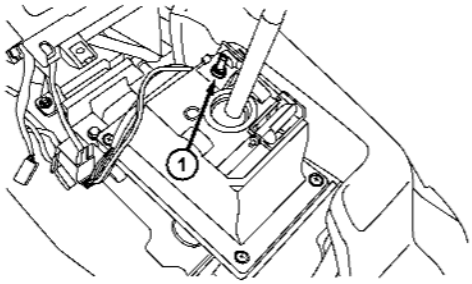
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10. Disconnect the gearshift mechanism connector (1).
11. Remove the shift cable from the gearshift mechanism.
12. Remove the four bolts (2) and then remove the gearshift mechanism from the bracket.
13. Installation is in the reverse order of removal.



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NOTE :
If the battery has low voltage, press the release switch (1) to move the gearshift lever.



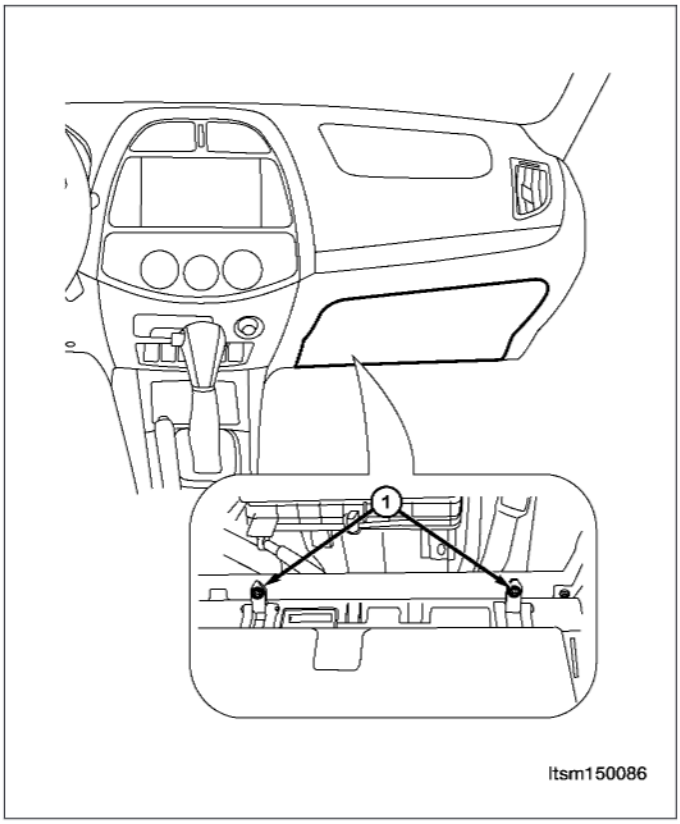
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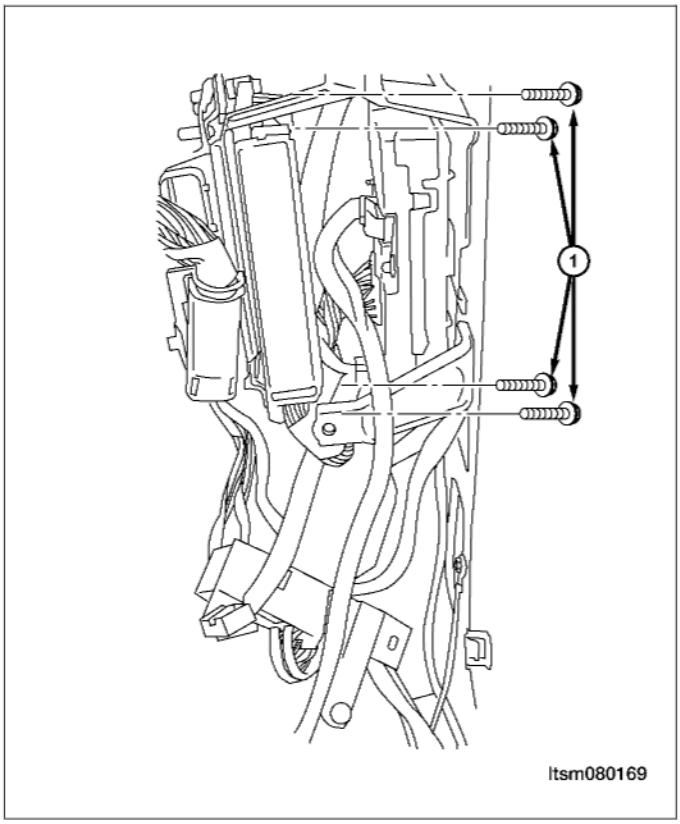
Transaxle Control Module (TCM)

Removal & Installation

1. Disconnect the negative battery cable.
2. Remove the glove box retaining bolts (1).
3. Disconnect the TCM electrical connectors.



4. Remove the four bolts (1) that mount the TCM to the instrument panel bracket.
5. Remove the TCM.
6. Installation is in the reverse order of removal.



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F4A4 AUTOMATIC TRANSAXLE

GENERAL INFORMATION 08-144
- Description 08-144
- Operation 08-145
- Specifications 08-147
- Special Tools 08-148
- Electrical Schematics 08-152
- Transaxle Control Module (TCM) Connector Pin-Out Table 08-157

DIAGNOSIS & TESTING 08-158
- Diagnostic Help 08-158
- Diagnostic Tools 08-158

Diagnostic Trouble Code (DTC) List 08-159
- F4A4 Automatic Transaxle DTC List 08-159

Diagnostic Trouble Code (DTC) Tests 08-160
- 15 - TFT Sensor Open Circuit 08-160
- 22 - Input Speed Sensor 08-163
- 23 - Output Speed Sensor Fault 08-168
- 26 - Brake Pedal Position Switch Circuit Malfunction 08-174
- 31 - Reverse/Low Solenoid Malfunction 08-177
- 32 - Low Speed Solenoid Malfunction 08-182
- 33 - 2nd Gear Solenoid Open Circuit 08-188
- 34 - Overdrive Solenoid Circuit Malfunction 08-194
- 36 - Damper Clutch System Control Solenoid Malfunction 08-200
- 41 - First Gear, Ratio Out Of Limits 08-206
- 42 - Second Gear, Ratio Out Of Limits 08-212
- 43 - Third Gear, Ratio Out Of Limits 08-218
- 44 - Fourth Gear, Ratio Out Of Limits 08-224
- 46 - Reverse Gear, Ratio Out Of Limits 08-230
- 54 - Electrical Relay Open Circuit 08-236

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F4A4 Automatic Transaxle Assembly 08-240
- Removal & Installation 08-240

Automatic Shifter Selector 08-243
- Removal & Installation 08-243

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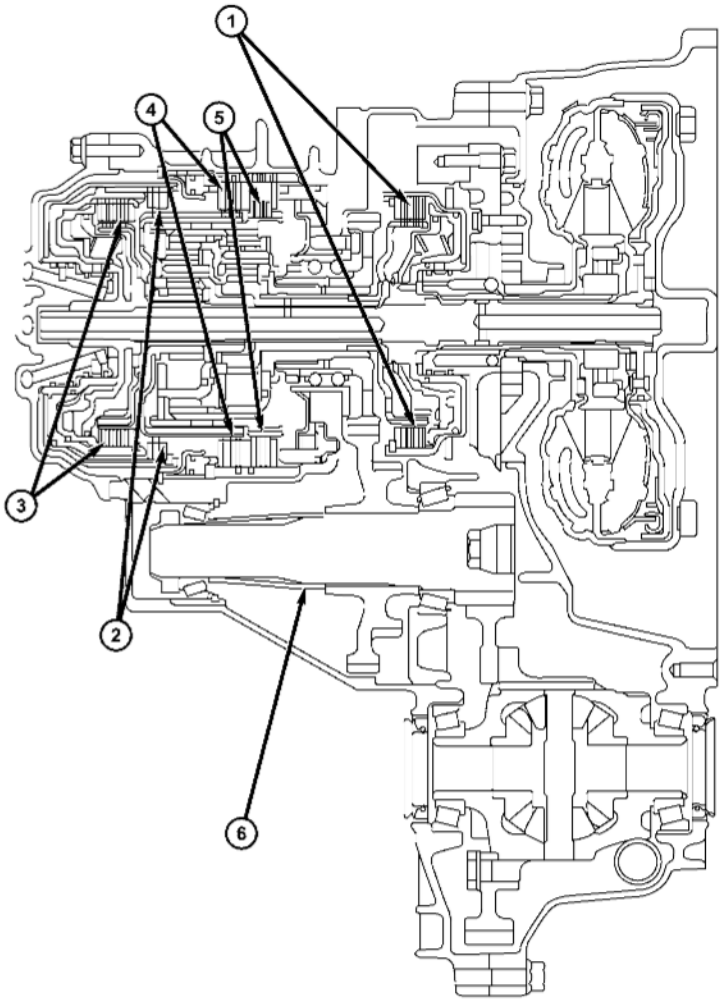
Description

The transaxle gear train is comprised of two rows of planetary gear set, one one-way clutch and five actuators (three composite disc clutches and two composite disc brakes.

It is controlled with adaptive electronic controls and monitors. The hydraulic system of the transaxle consists of the transaxle fluid, fluid passages, hydraulic valves, fluid pump, and various line pressure control components.

The Transaxle Control Module (TCM) is the heart of the electronic control system and relies on information from various direct and indirect inputs (sensors, switches, etc.) to determine driver demand and vehicle operating conditions. With this information, the ECM/TCM can calculate and perform timely and quality shifts through various output or control devices.

The TCM also performs certain self-diagnostic functions and provides comprehensive information (sensor data, DTCs, etc.) which is helpful in proper diagnosis and repair. This information can be viewed with the X-431 scan tool.



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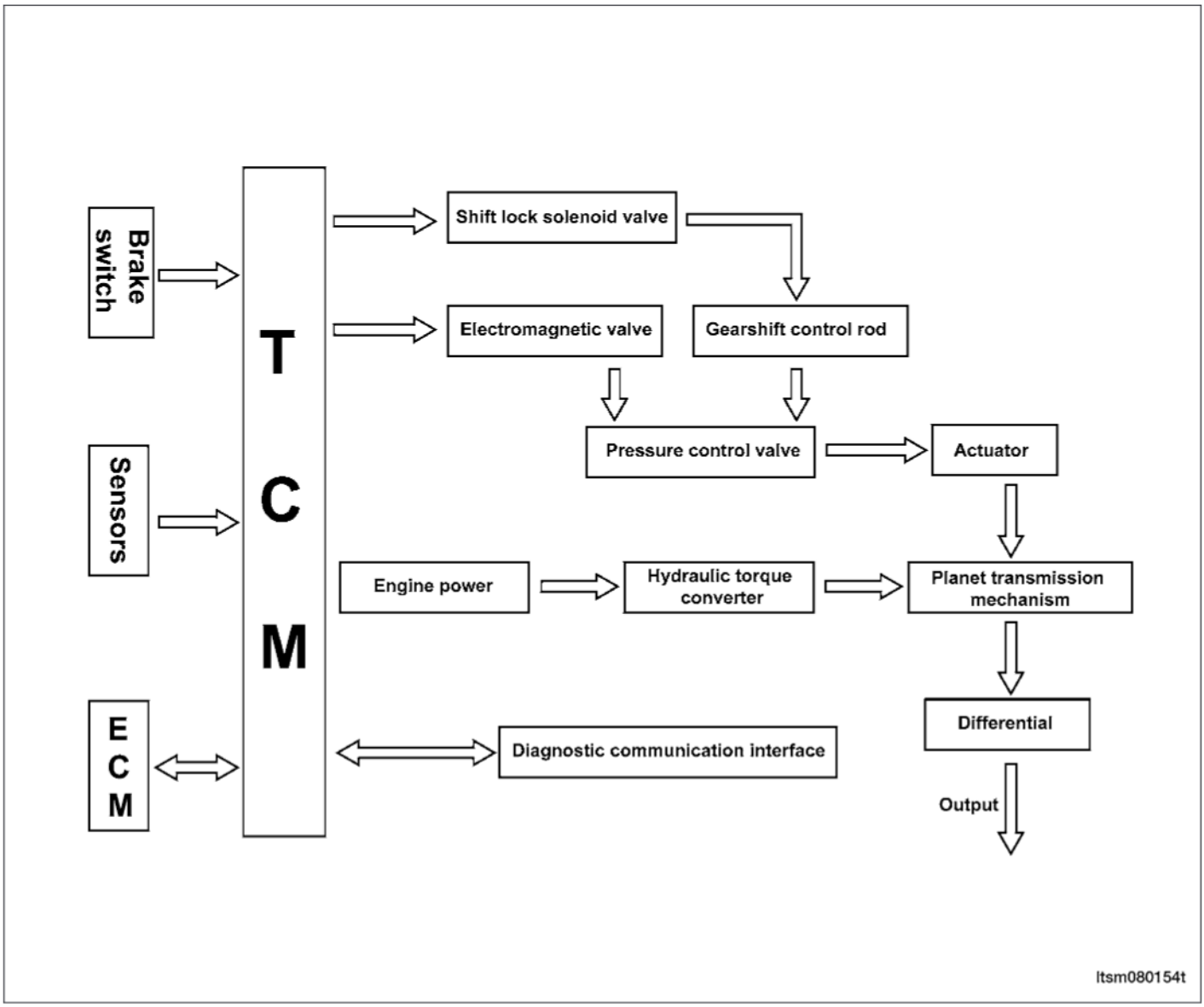
1 - Low Speed Clutch	4 - Gear 2 Brake
2 - Reverse Gear Clutch	5 - Low/Reverse Gear Brake
3 - Overdrive Clutch	6 - Output Shaft/Transfer Case Driven Gear

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Operation

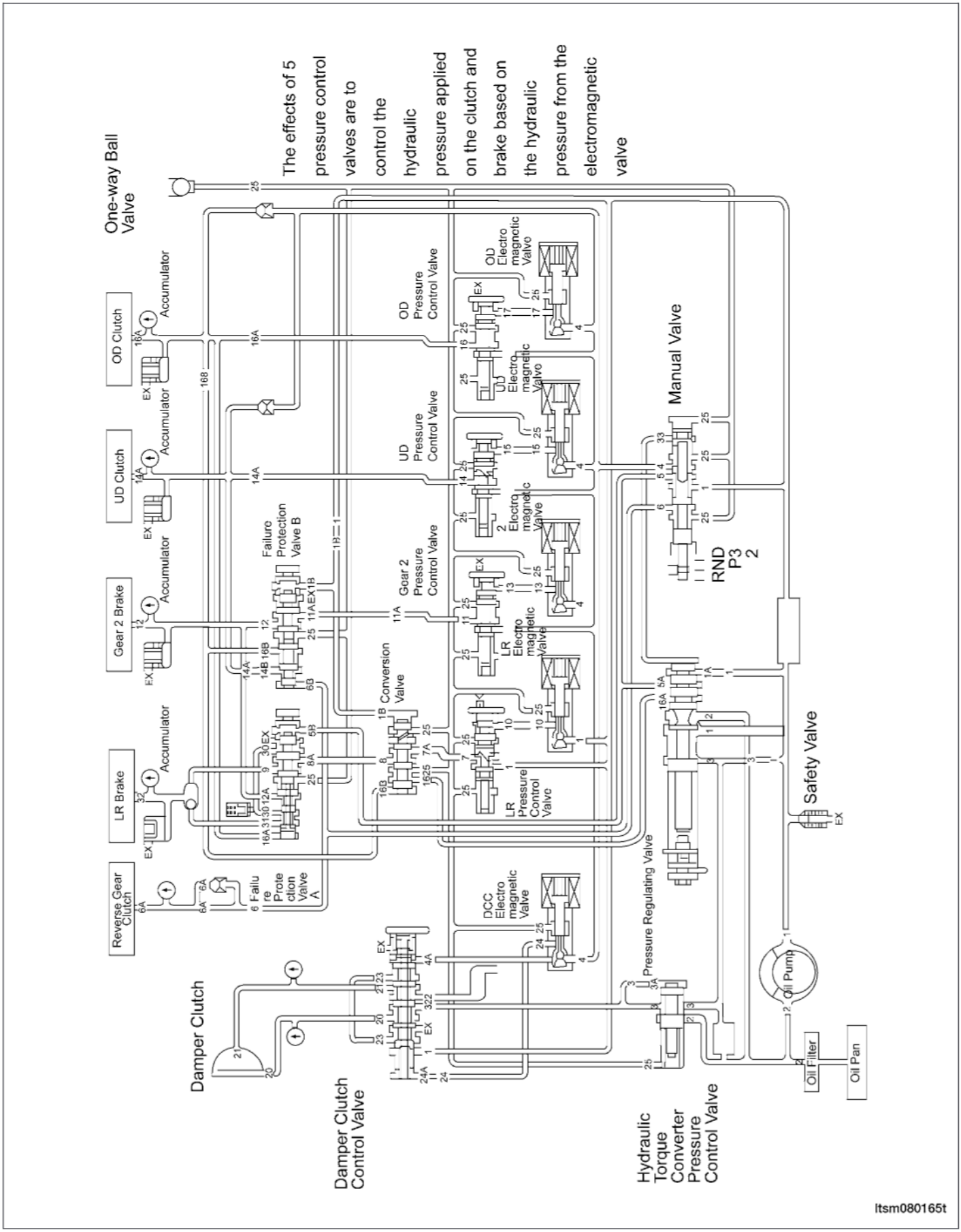
The transaxle control is divided into the electronic and hydraulic transaxle control functions. While the electronic transaxle control is responsible for gear selection and for matching the pressures to the torque to be transmitted, the transaxle's power supply control occurs via hydraulic elements in the electro-hydraulic control module. The fluid supply to the hydraulic elements, such as the torque converter, the shift elements and the hydraulic transaxle control, is provided by way of a fluid pump connected to the torque converter.

The Transaxle Control Module (TCM) allows for the precise adaptation of pressures to the corresponding operating conditions and to the engine output during the gearshift phase, resulting in a noticeable improvement in shift quality. The engine speed limit can be reached in the individual gears at full throttle and kickdown. The shift range can be changed in the forward gears while driving, but the TCM employs a downshift safeguard to prevent engine over speed. The system offers the additional advantage of flexible adaptation to different vehicle and engine variants.



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Transaxle Hydraulic Schematics



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Specifications

Related Operating Components

GEARSHIFT LEVER POSITION		GEAR RATIO	ENGINE START	PARKING MECHANISM	DRIVE			LOCK		
					LOW SPEED CLUTCH (UD)	REVERSE GEAR CLUTCH (REV)	OVERSPEED CLUTCH (OD)	LOW GEAR/ REVERSE GEAR BRAKE (LR)	GEAR BRAKE (2ND)	ONE-WAY CLUTCH (OWC)
P	Parking	-	Enabled	X	-	-	-	X	-	-
R	Reverse Gear	2.480	-	-	-	X	-	X	-	-
N	Neutral Gear	-	Enabled	-	-	-	-	X	-	-
D	Gear 1	2.842	-	-	X	-	-	X*	-	X
	Gear 2	1.529	-	-	X	-	-	-	X	-
	Gear 3	1.000	-	-	X	-	X	-	-	-
	Gear 4	0.712	-	-	-	-	X	-	X	-
3	Gear 1	2.842	-	-	X	-	-	X*	-	X
	Gear 2	1.529	-	-	X	-	-	-	X	-
	Gear 3	1.000	-	-	X	-	X	-	-	-
2	Gear 1	2.842	-	-	X	-	-	X*	-	X
	Gear 2	1.529	-	-	X	-	-	-	X	-
L	Gear 1	2.842	-	-	X	-	-	X	-	-

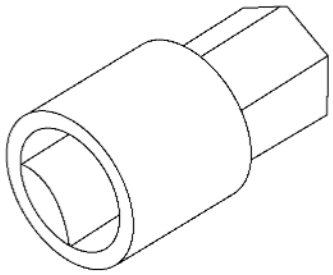
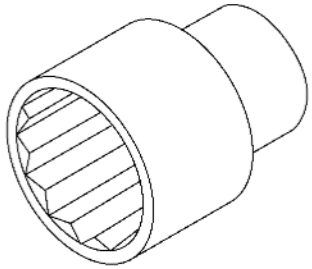
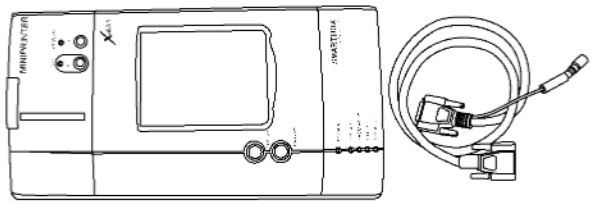
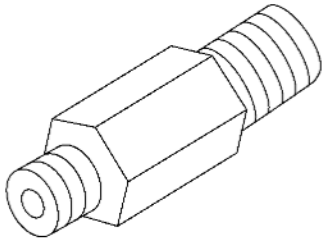
*Low gear/reverse gear is applied when vehicle speed is lower than 10 km/h. X = Operating Components

Lubrication Specifications

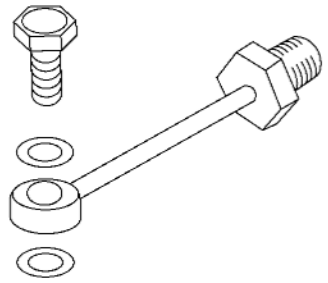
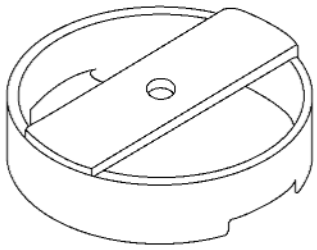
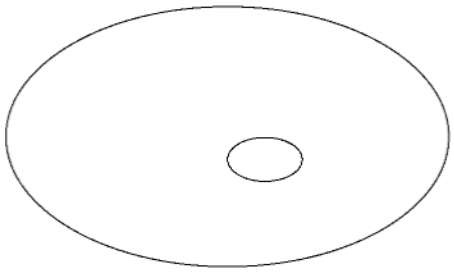
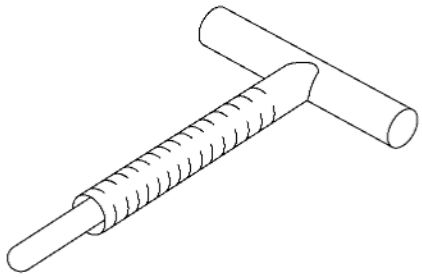
DESCRIPTION	ITEM
Transaxle Fluid Quantity	6.5L
Fluid Type	DEXTRON III
Fluid Change Cycle	40000 Km or 3 years

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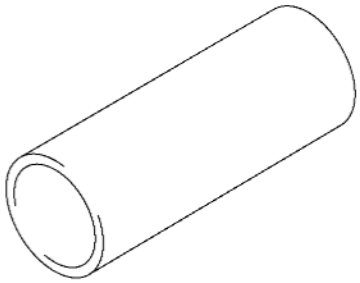
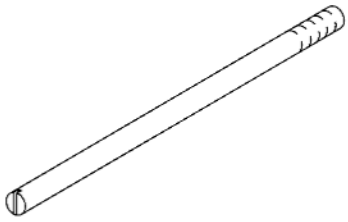
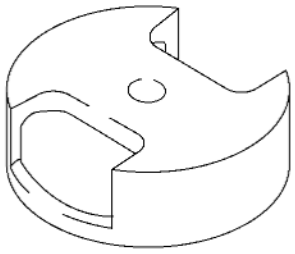
Special Tools

Torque Wrench Socket MB-990607	 ltsm080172
Special Socket (41) MB-991625	 ltsm080173
Diagnostic Scan Tool X-431	 besm030001
Fluid Pressure Gauge Connector MB-998332	 ltsm080170

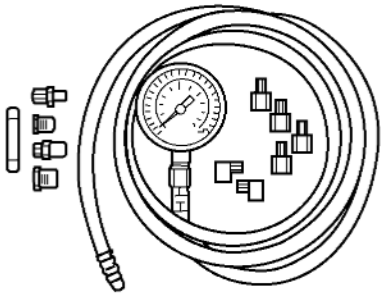
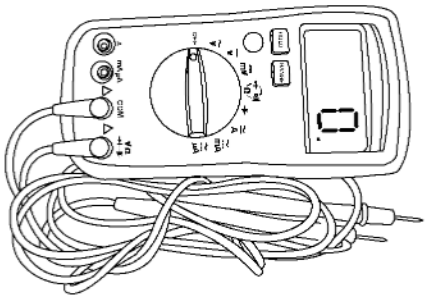
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Fluid Pressure Gauge Connector MB-998900	 ltsm080171
Spring Compressor MB-991625	 ltsm080174
Clearance Measurer MB-991631	 ltsm080175
Fluid Pump Dismounter MB-998333	 ltsm080176

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Bearing Fixer MB-998350	 ltsm080177
Guide Rod MB-998412	 ltsm080178
Spring Compressor MB-998907	 ltsm080179

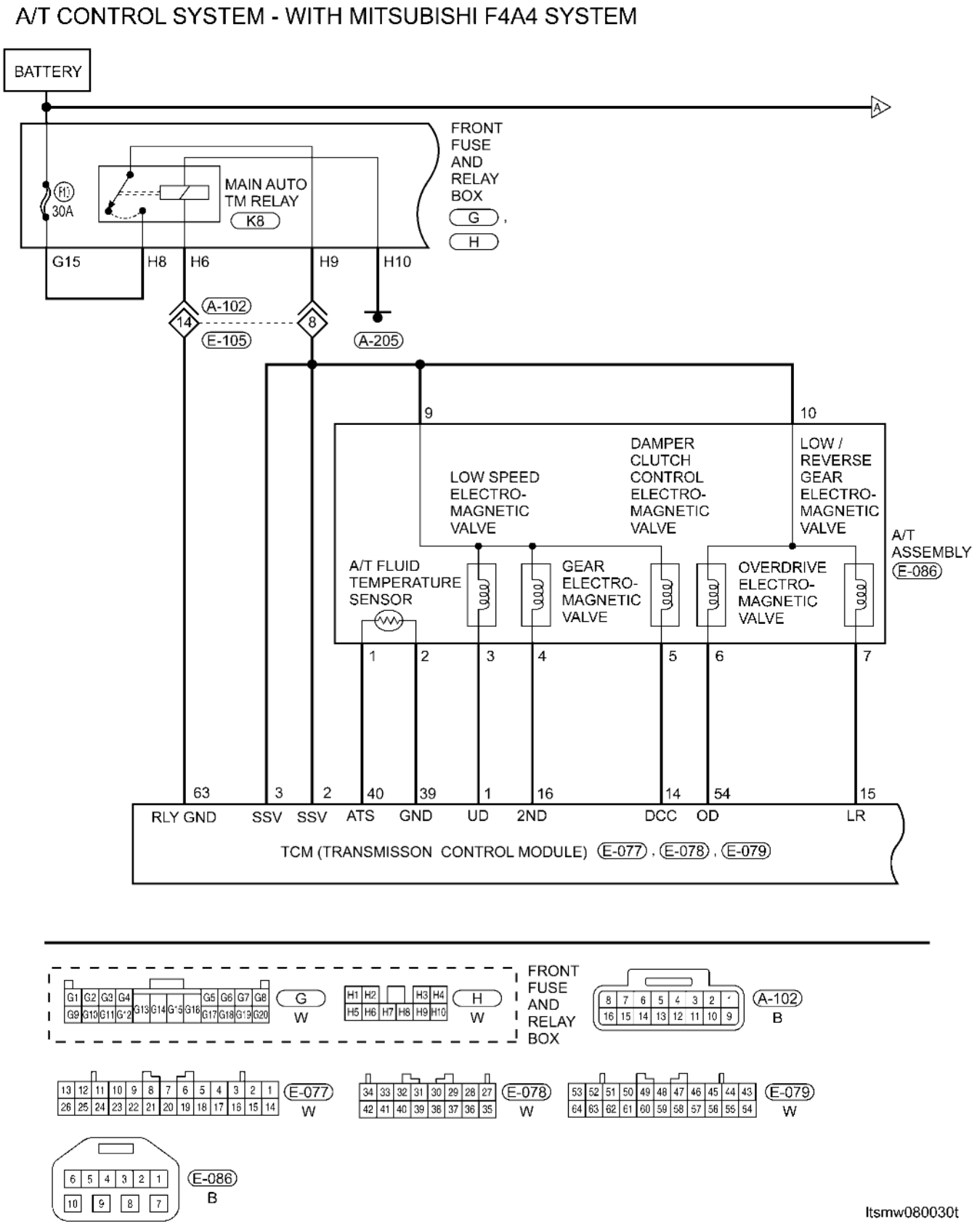
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Automatic Transaxle Fluid Pressure Gauge	 besm080059
Digital Multimeter Fluke 15B & 17B	 besm030002

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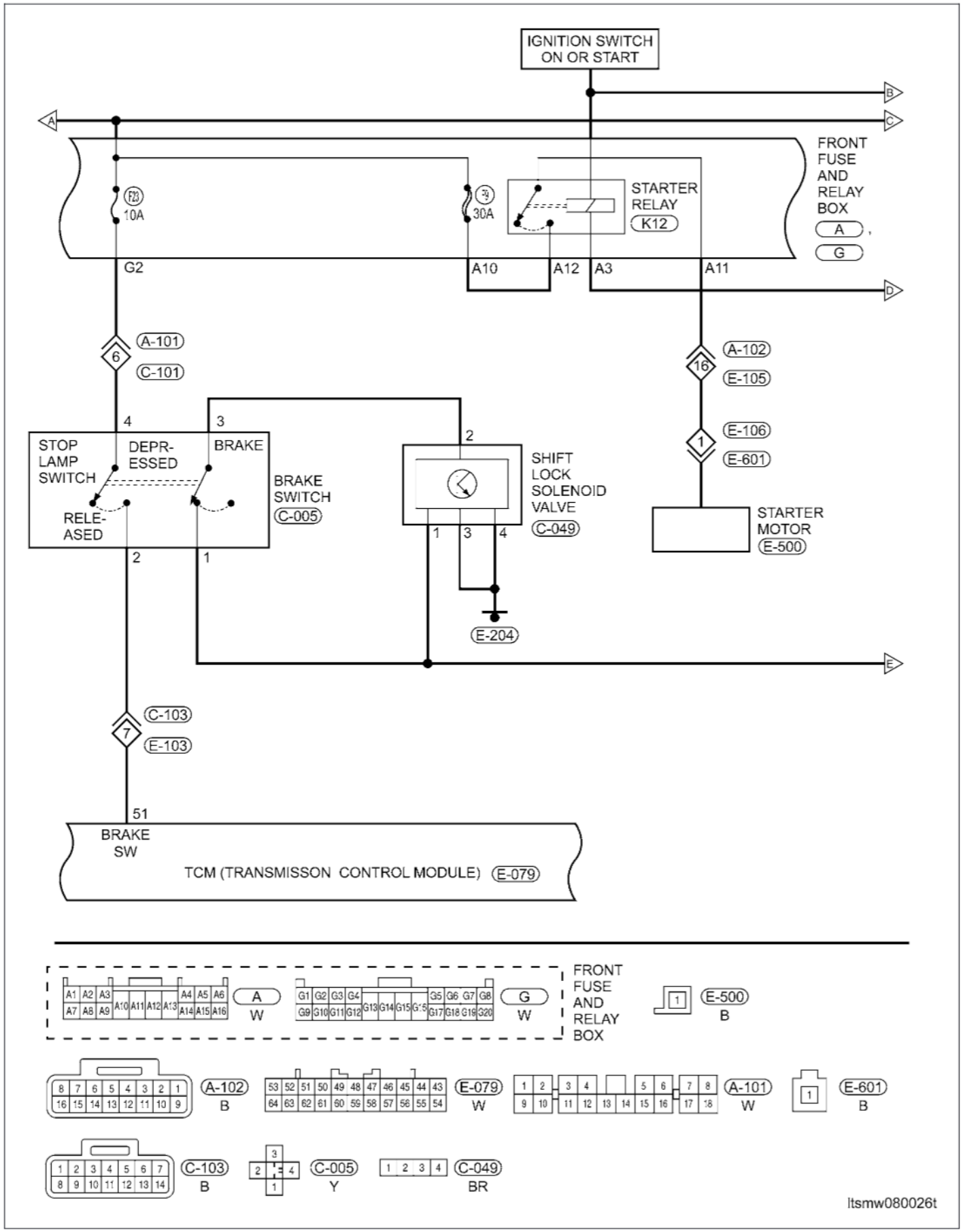
Electrical Schematics

Automatic Transaxle (Page 1 of 5)



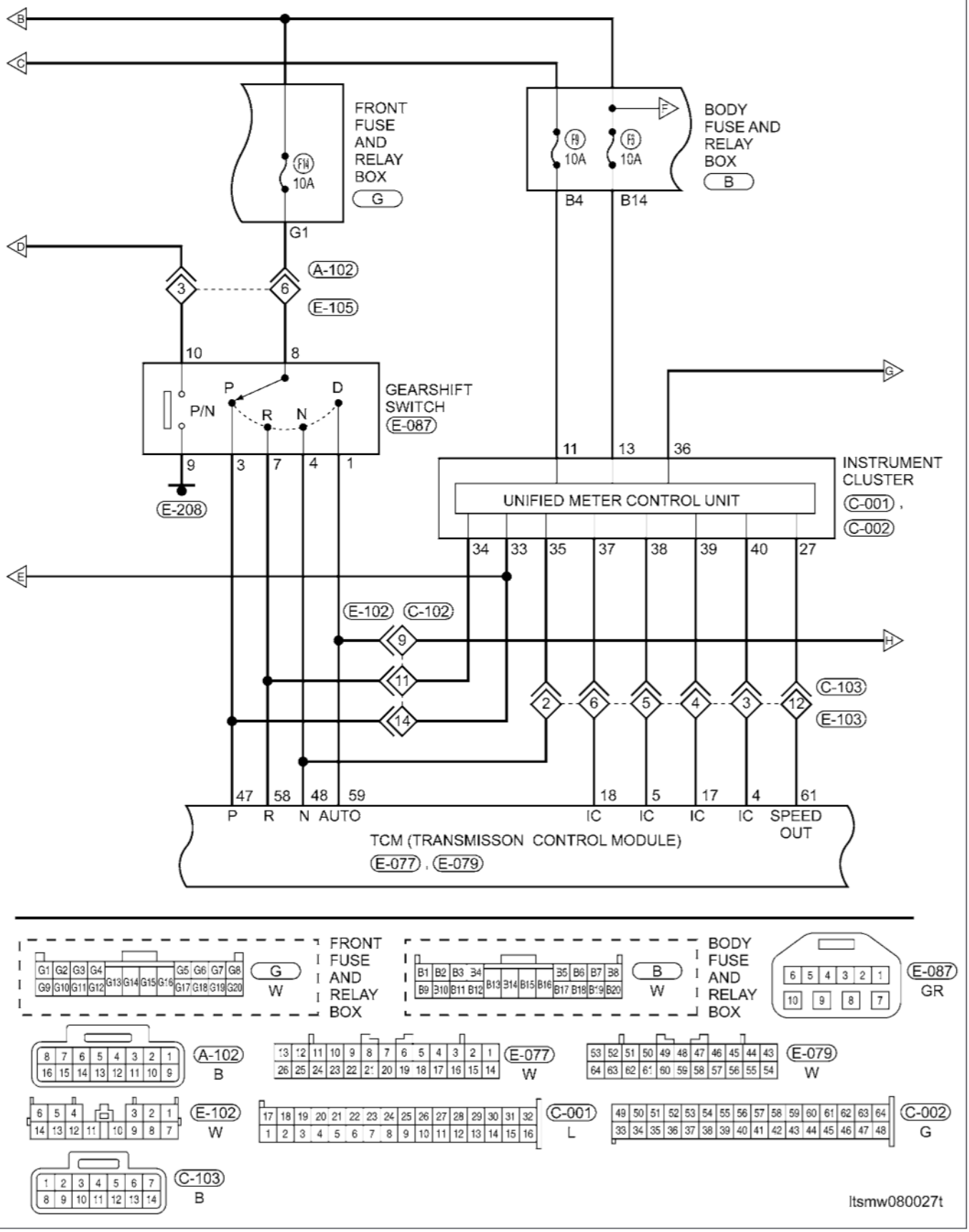
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Automatic Transaxle (Page 2 of 5)



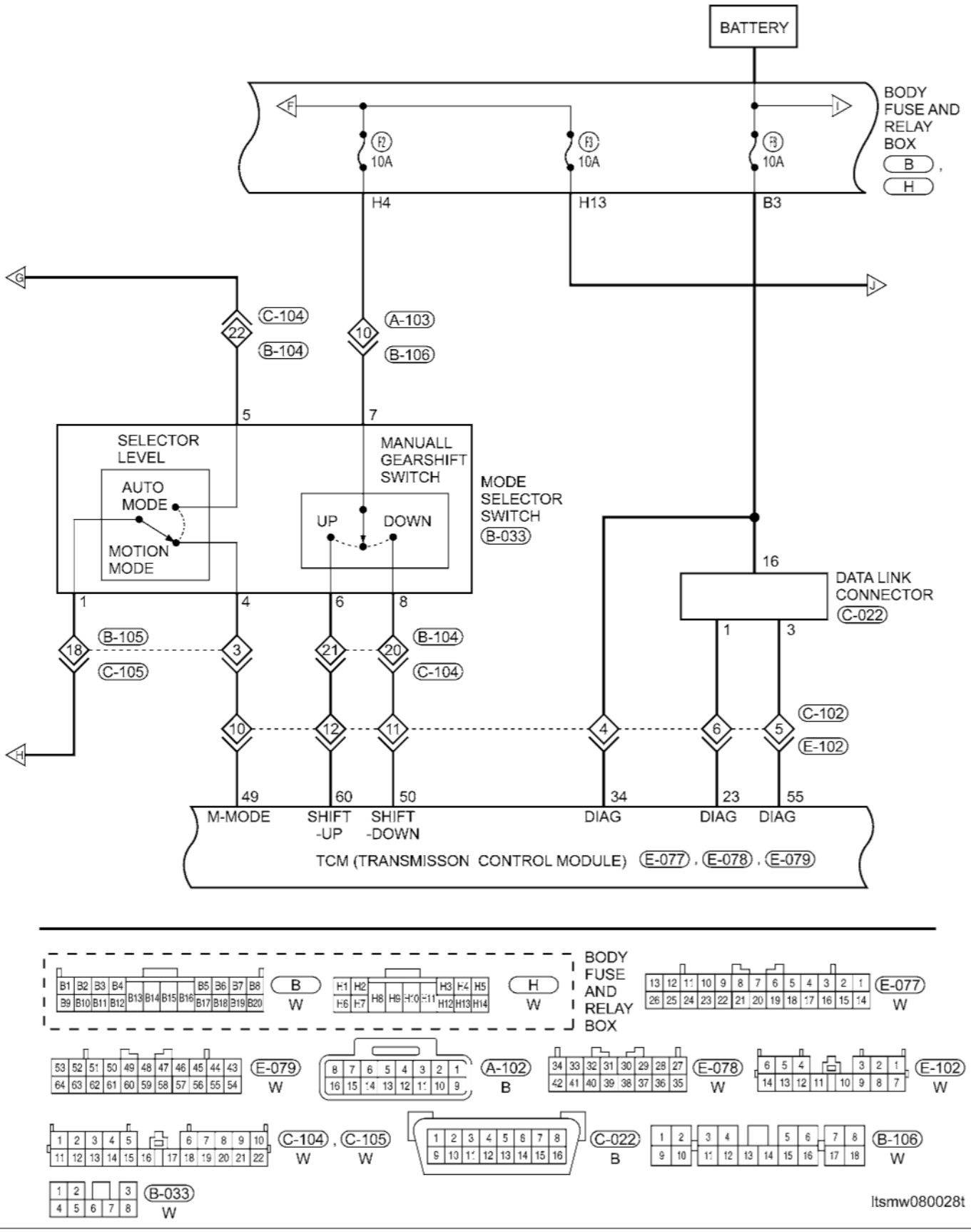
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Automatic Transaxle (Page 3 of 5)



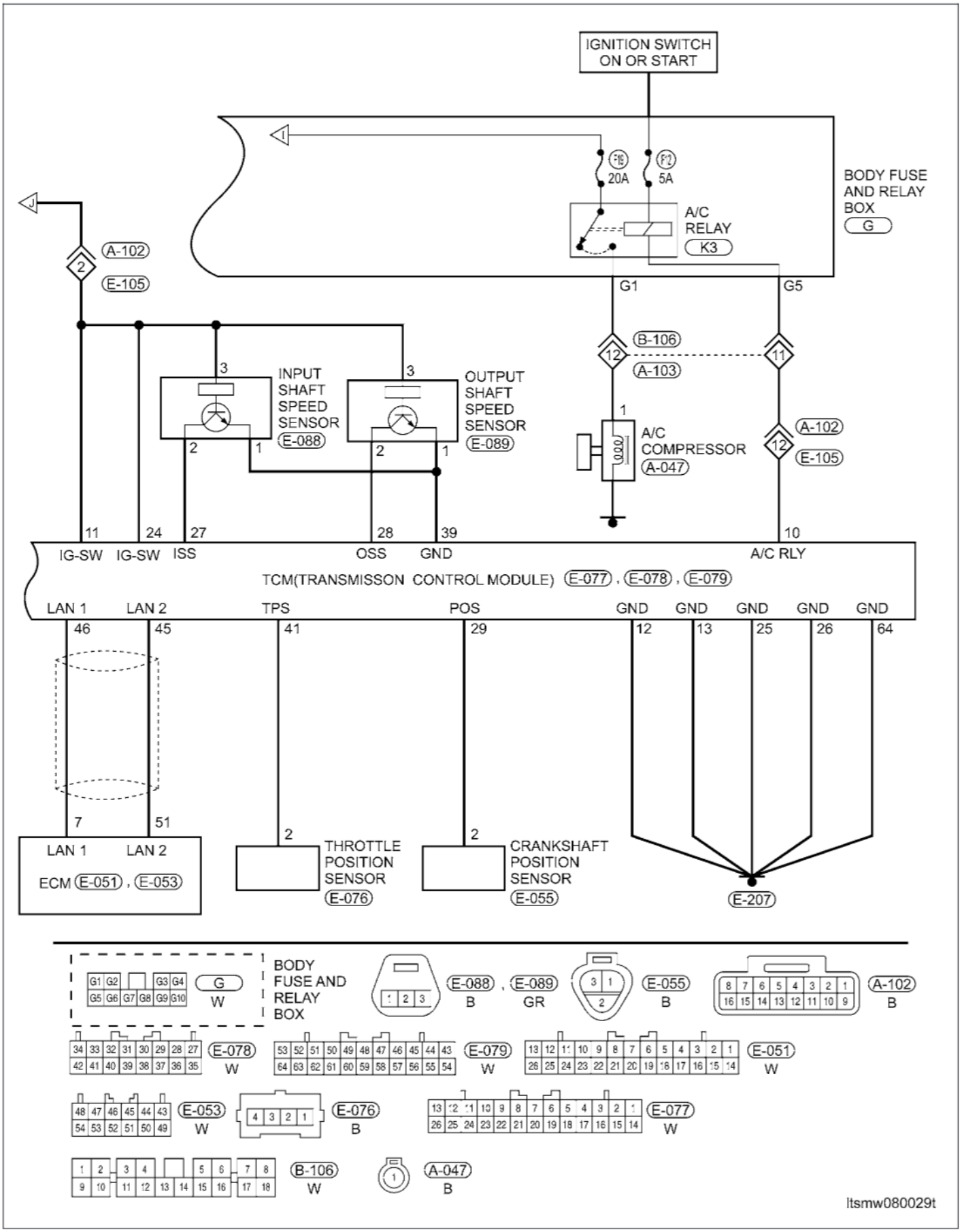
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Transaxle Control Module (TCM) Connector Pin-Out Table

TCM PIN-OUT TABLE

PIN	CIRCUIT IDENTIFICATION	PIN	CIRCUIT IDENTIFICATION
1	Low Speed Electromagnetic Valve	33	-
2	Relay Supply	34	Data Link Connector
3	Relay Supply	35	-
4	To Instrument Cluster	36	-
5	To Instrument Cluster	37	-
6	-	38	-
7	-	39	GND
8	-	40	TFT Sensor
9	-	41	TPS
10	A/C Relay Control	42	-
11	Ignition Supply	43	-
12	GND	44	-
13	GND	45	To ECM
14	Damper Clutch Control Electromagnetic Valve	46	To ECM
15	Low/Reverse Gear Electromagnetic Valve	47	Manual Gearshift Proof Switch ″P″
16	Gear Electromagnetic Valve	48	Manual Gearshift Proof Switch ″N″
17	To Instrument Cluster	49	Shifter Selector-Motion Vehicle Mode ″AUTO″
18	To Instrument Cluster	50	Shifter Selector-Gearshift Switch ″UP″
19	-	51	Brake Switch
20	-	52	-
21	-	53	-
22	-	54	Overdrive Electromagnetic Valve
23	Data Link Connector	55	Data Link Connector
24	Ignition Supply	56	-
25	GND	57	-
26	GND	58	Manual Gearshift Proof Switch ″R″
27	Input Shaft Speed Sensor	59	Manual Gearshift Proof Switch ″D″
28	Output Shaft Speed Sensor	60	Shifter Selector-Gearshift Switch ″DOWN″
29	Crankshaft Position Sensor	61	To Instrument Cluster
30	-	62	-
31	-	63	Main Auto TM Relay Control
32	-	64	GND

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DIAGNOSIS & TESTING

Diagnostic Help

1. Confirm that the malfunction is current and carry-out the diagnostic tests and repair procedures.
2. If the DTC cannot be deleted, it is a current fault.
3. Use a digital multimeter to perform voltage readings on the transaxle electronic system.
4. The scan tool connects to the Data Link Connector (DLC) and communicates with the Transaxle Control Module (TCM) over the CAN data circuit.
5. If the failure is intermittent, perform the following:
   - Check for loose connectors.
   - Look for any chafed, pierced, pinched, or partially broken wires.
   - Monitor the scan tool data relative to this circuit and wiggle test the wiring and connectors.
   - Look for the data to change or for the DTC to reset during the wiggle test.
   - Look for broken, bent, pushed out or corroded terminals.
   - Inspect the sensor and mounting area for any condition that would result in an incorrect signal, such as damage or foreign material.
6. Remove the TCM from the troubled vehicle and install in a new vehicle and test. If the DTC cannot be deleted, the TCM is malfunctioning. If the DTC can be deleted, return the TCM to the original vehicle.

Diagnostic Tools

Diagnostic Scan Tool X-431

Read the following when connecting the X-431 scan tool:
- Connect the scan tool to the Data Link Connector (DLC) for communication with the vehicle.
- The DLC is located on the driver side compartment under the steering column (it is attached to the instrument panel and accessible from the driver seat).
- The DLC is rectangular in design and capable of accommodating up to 16 terminals.
- The electrical connector has keying features to allow easy connection.

TCM Electrical Harness Test Tool

If using a TCM electrical harness test tool, you can diagnose the TCM harness while the TCM is still connected.
- Measure sensor and solenoid resistance (always measure resistance with the power off).
- Measure the signal voltage of the TCM (always measure voltage with the power on).

NOTE :
Using the TCM electrical harness test tool will help prevent electrical connector terminal damage.

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Diagnostic Trouble Code (DTC) List

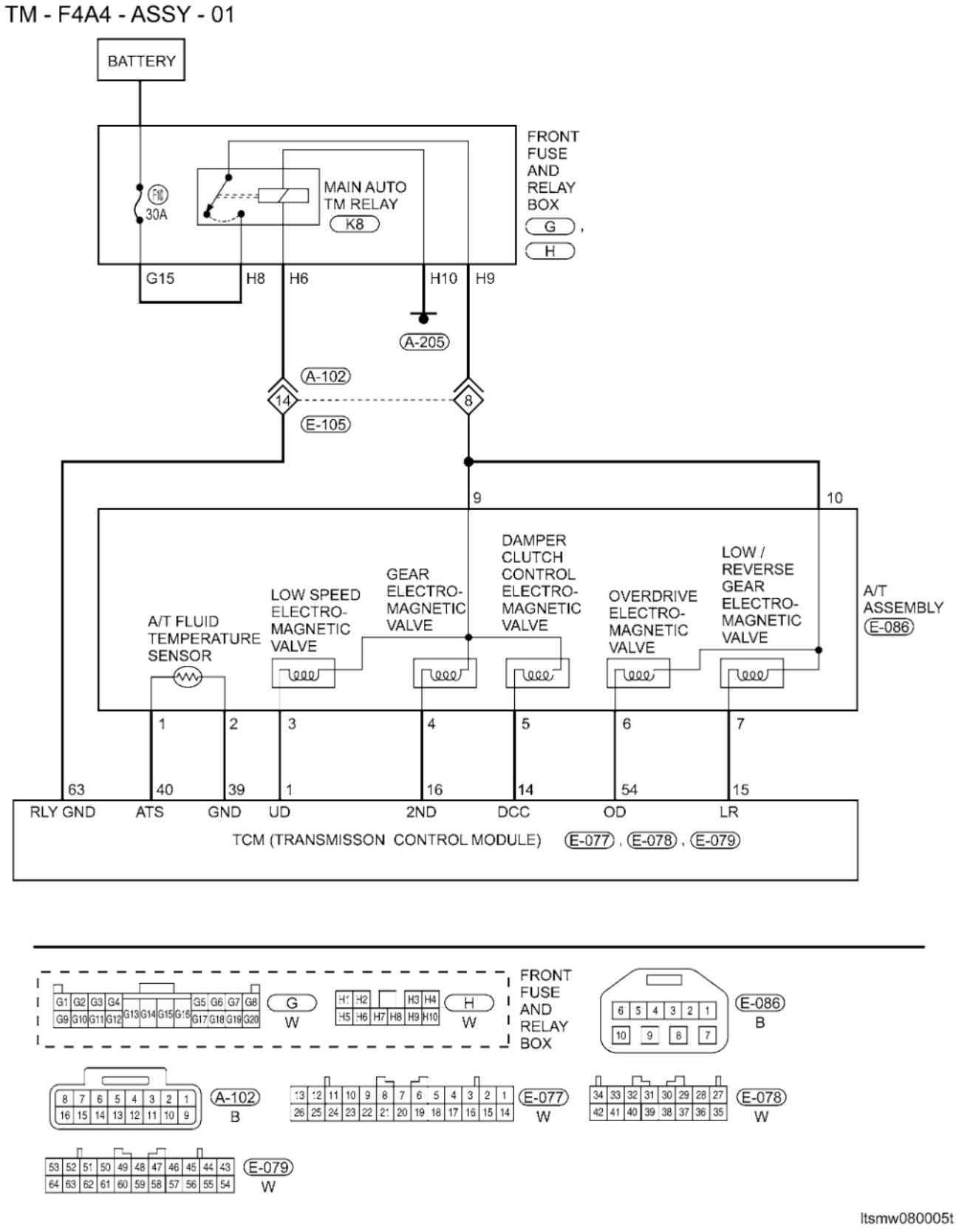
F4A4 Automatic Transaxle DTC List

DTC	DTC DEFINITION
11	TPS Short Circuit
12	TPS Open Circuit
14	TPS Abnormal Adjustment
15	TFT Sensor Open Circuit
21	CKP Sensor Malfunction
22	Input Speed Sensor
23	Output Speed Sensor Fault
26	Brake Pedal Position Switch Circuit Malfunction
29	Vehicle Speed Sensor Malfunction
31	Reverse/Low Solenoid Malfunction
32	UD Solenoid Open
33	2 Gear Solenoid Open Circuit
34	Overdrive Solenoid Circuit Malfunction
36	Damper Clutch System Control Solenoid Malfunction
41	First Gear, Ration Out Of Limits
42	Second Gear, Ration Out Of Limits
43	Third Gear, Ration Out Of Limits
44	Fourth Gear, Ration Out Of Limits
46	Reverse Gear, Ration Out Of Limits
51	CAN Data Bus Interface Malfunction
52	DCC Digital Command System Malfunction
54	Electrical Relay Open Circuit
56	Neutral Indicator Lamp Open Circuit ″

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Diagnostic Trouble Code (DTC) Tests

15 - TFT Sensor Open Circuit



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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
15	TFT sensor open circuit	Vehicle is driving	The Transaxle Control Module (TCM) will set this DTC when the TCM received voltage signal is more than 2.6 V form the sensor after the vehicle has driven for 10 minutes.	• TFT sensor • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- Drive the vehicle up to 10 km/h or more.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

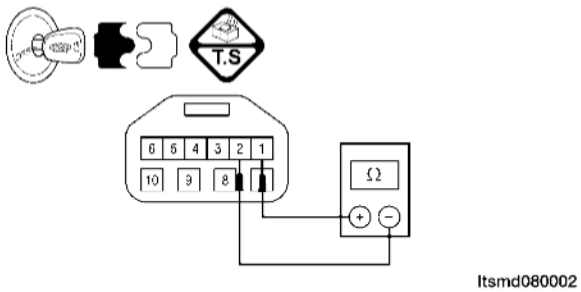
NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK TFT SENSOR RESISTANCE

- Turn ignition switch off.
- Disconnect A/T assembly connector E-086.
- Check TFT resistance between the TFT sensor terminals:

SENSOR	CONNECTOR	TERMINAL	TEMPERATURE	RESISTANCE KΩ
A/T sensor	E-086	1 - 2	0°C	16.7 - 20.5
			20°C	7.3 - 8.9
			40°C	3.4 - 4.2
			60°C	1.9 - 2.1
			80°C	1.0 - 1.2
			110°C	0.57 - 0.69



Is the check result normal?

Yes >> Go to the next step.

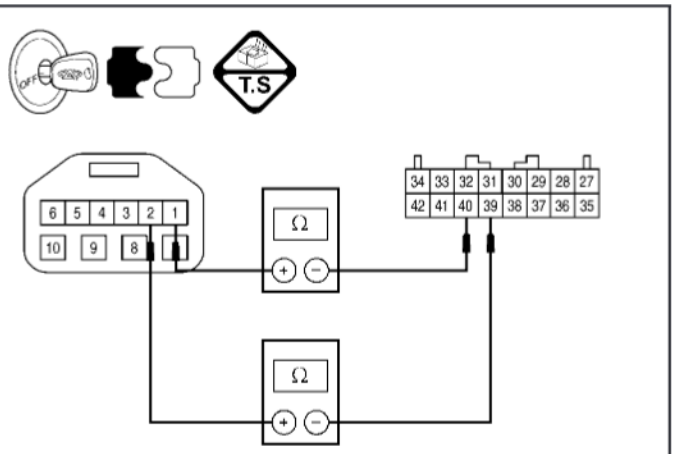
No >> Replace the TFT sensor.

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2. CHECK TFT SENSOR HARNESS

- Disconnect TCM connector.
- Check for continuity between the following A/T assembly terminals and TCM terminals:

A/T ASSEMBLY CONNECTOR TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY
1	40	Yes
2	39	Yes



- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to power or short to ground.

3. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

- Check TCM power supply and ground circuit.
- Reinstall any removed parts.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace damaged parts.

4. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC 15 still present?

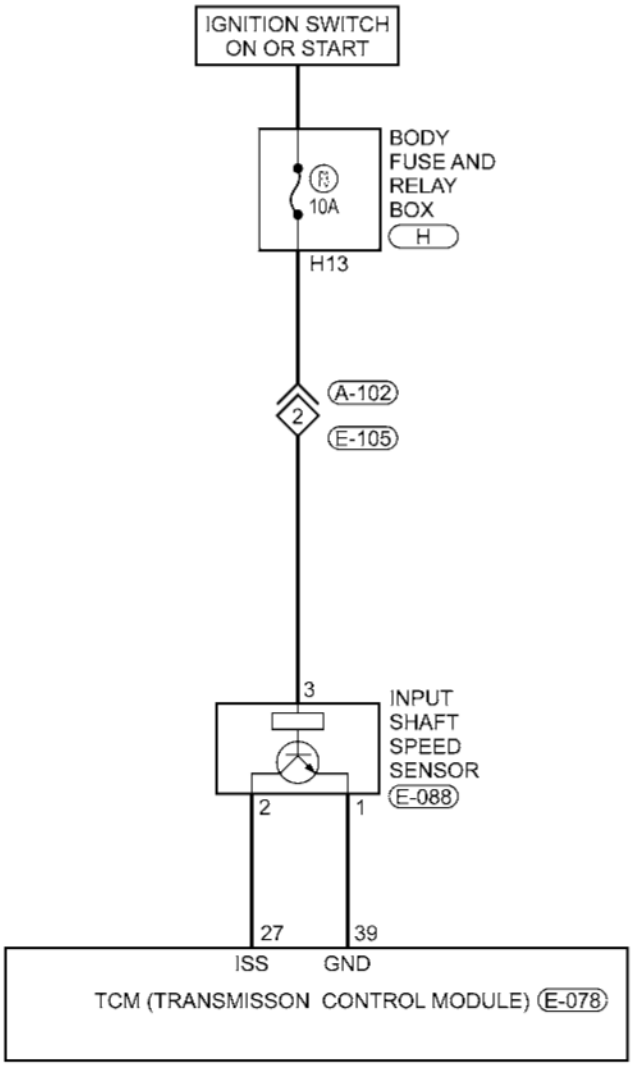
Yes >> Replace the TCM.

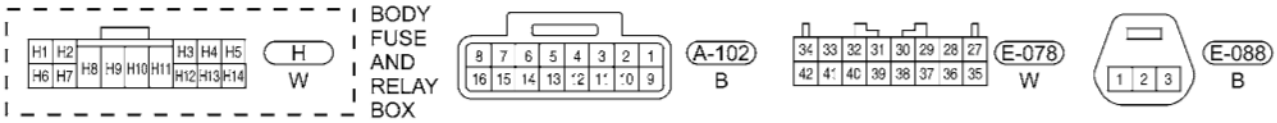
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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22 - Input Speed Sensor

TM - F4A4 - ISS - 01





ltsmw080006t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
22	Input speed sensor	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM didn't received pulse signal from the input shaft speed sensor for above 1 seconds when the vehicle is driving for 30 km/h at 3 or 4 gear. • If the DTC was set for 4 times, then the A/T will be locked in 3rd gear (D gear) or shifted to low gear when in sports mode.	• Input shaft speed sensor • The retainer of deceleration clutch • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- Drive the vehicle up to 10 km/h or more.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

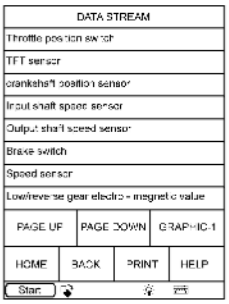
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T INPUT SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Vehicle start and read out the value of "INPUT SPEED SENSOR".

ITEM	CONDITION	DISPLAY VALUE	
Input speed sensor	During driving (lock-up ON)	Approximately matches the engine speed.	

ltsmd080001t

Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

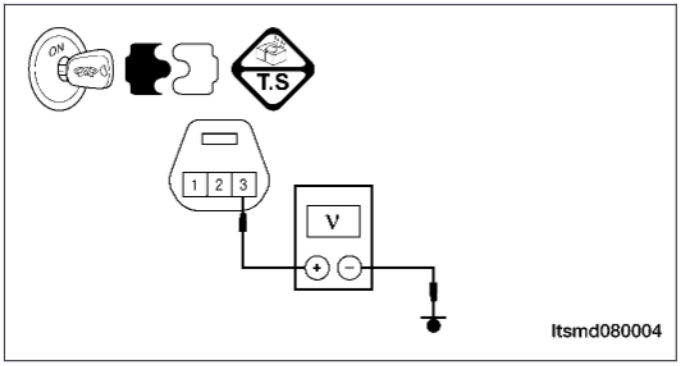
2. CHECK INPUT SHAFT SPEED SENSOR POWER SUPPLY

- Stop the vehicle and turn ignition switch off.
- Disconnect input shaft speed sensor electrical connector.
- Turn the ignition switch on.
- Check sensor power supply between sensor terminal 3 and ground in the sensor electrical connector E-088.
- Voltage should be more than 12 V.

Is the check result normal?

Yes >> Go to step 4.

No >> Go to the next step.



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3. DETECT MALFUNCTIONING PART

- Check the following:
  - Harness connectors A-102, E-105
  - Body fuse and relay box H13
  - Fuse 3 (10A)
  - Harness open or short between input shaft speed sensor and fuse

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power in harness or connectors.

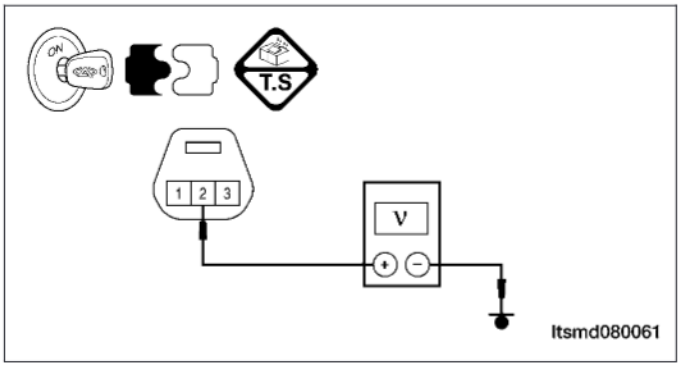
4. CHECK INPUT SHAFT SPEED SENSOR SIGNAL CIRCUIT

- Check sensor signal circuit between sensor terminal 2 and ground in the sensor electrical connector E-088.
- 5 V should exist.

Is the check result normal?

Yes >> Go to the next step.

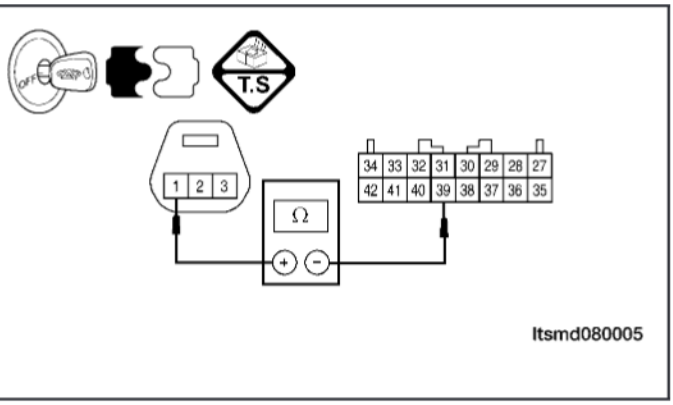
No >> Repair or replace open circuit or short to power or short to ground.



5. CHECK INPUT SHAFT SPEED SENSOR GROUND CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

INPUT SPEED SENSOR CONNECTOR TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY
1	39	Yes



- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace open circuit or short to power or short to ground.

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6. CHECK INPUT SHAFT SPEED SENSOR SIGNAL

- Connect the TCM and sensor electrical connector.
- Start the vehicle and perform the following:
  - Engine: 2000 RPM
  - Vehicle: 50 km/h
  - Gear: 3
- Check sensor signal between sensor terminal 2 and ground in the sensor electrical connector E-088 with the X-431 or oscilloscope.
- Make sure the wave shape is normal and signal voltage is fluctuating from 0 - 5 V.

Is the check result normal?

Yes >> Go to step 9.

No >> Go to the next step.

7. CHECK INPUT SHAFT SPEED SENSOR

- Perform the following:
  - Loosen the bolt of the sensor.
  - Remove the sensor.
  - Visually inspect the sensor for missing or chipped teeth.

Is the check result normal?

Yes >> Replace the input speed sensor.
Monitor the input speed sensor signal on the X-431 or oscilloscope.
- If the input speed sensor signals were normal, the system is OK.
- If the input speed sensor signals were still irregular or missing, go to step 8.

No >> Replace input speed sensor.

8. CHECK THE RETAINER OF DECELERATION CLUTCH

- Disassemble and inspect the A/T and replace the retainer for the deceleration clutch.
- Check for a chipped and damaged signal retainer for the deceleration clutch.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the retainer for the deceleration clutch.
Monitor the input speed sensor signal on the X-431 or oscilloscope.
If the signal pulse is not normal, repair the noise interference.

9. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is the check result normal?

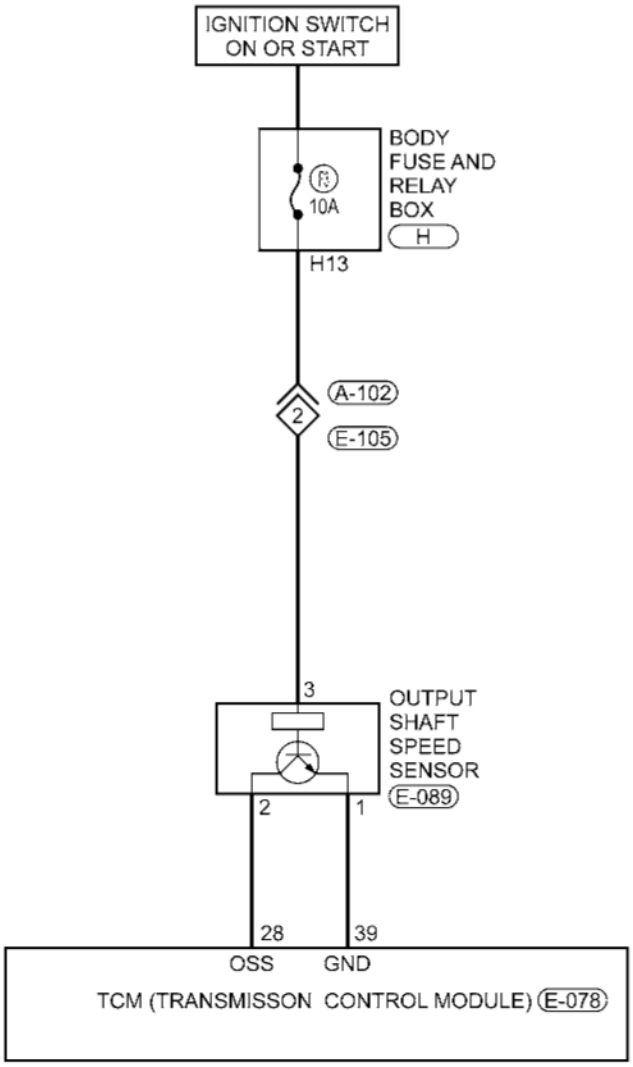
Yes >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

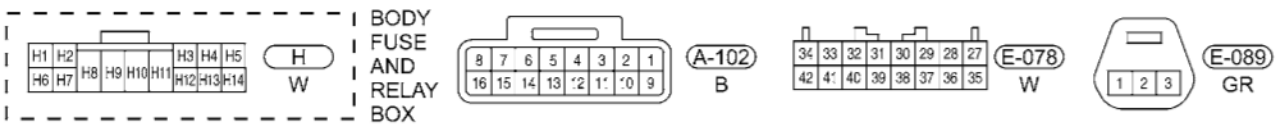
No >> Replace the TCM.

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23 - Output Speed Sensor Fault

TM - F4A4 - OSS - 01





ltsmw080007t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSE
23	Output speed sensor	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM didn't received pulse signal from the output shaft speed sensor for above 1 seconds when the vehicle is driving for 30 km/h at 3 or 4 gear. • If the DTC was set for 4 times, then the A/T will be locked in 3rd gear (D gear) or shifted to low gear when in sports mode.	• Output shaft speed sensor • Harness or connectors (The sensor circuit is open or shorted) • Transfer case driven and drive gear • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Turn ignition switch off.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle up to 30 km/h or more at 3 or 4 gear.
- Driving the vehicle uphill will help maintain the driving conditions required for this test.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

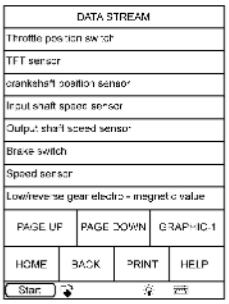
NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T OUTPUT SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Vehicle start and read out the value of ″OUTPUT SPEED SENSOR″.

ITEM	CONDITION	DISPLAY VALUE	
Output speed sensor	During driving	Approximately matches the speedometer reading.	

ltsmd080001t

Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

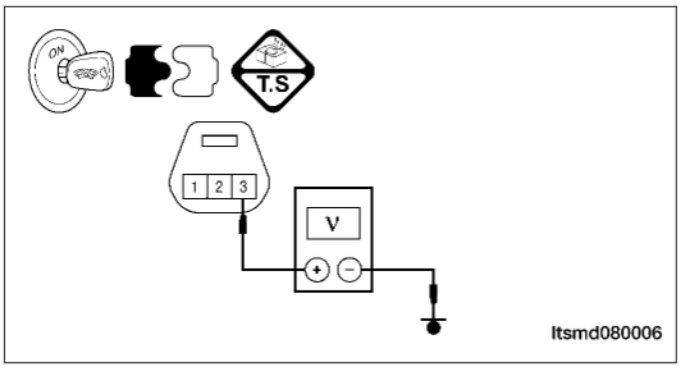
2. CHECK OUTPUT SHAFT SPEED SENSOR POWER SUPPLY

- Stop vehicle and turn ignition switch off.
- Disconnect output shaft speed sensor connector.
- Turn ignition switch on.
- Check sensor power supply between sensor terminal 3 and ground in the sensor electrical connector E-089.
- Voltage should be more than 12 V.

Is the check result normal?

Yes >> Go to step 4.

No >> Go to the next step.



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3. DETECT MALFUNCTIONING PART

- Check the following:
  - Harness connectors A-102, E-105
  - Body fuse and relay box H13
  - Fuse 3 (10A)
  - Harness for an open or short between output shaft speed sensor and fuse

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power in harness or connectors.

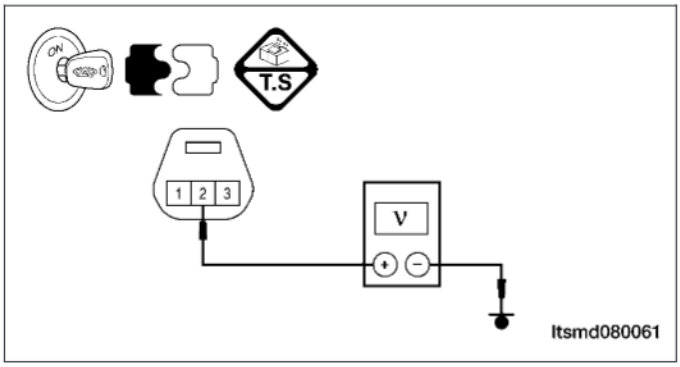
4. CHECK OUTPUT SHAFT SPEED SENSOR SIGNAL CIRCUIT

- Check sensor signal circuit between sensor terminal 2 and ground in the sensor electrical connector E-088.
- 5 V should exist.

Is the check result normal?

Yes >> Go to the next step.

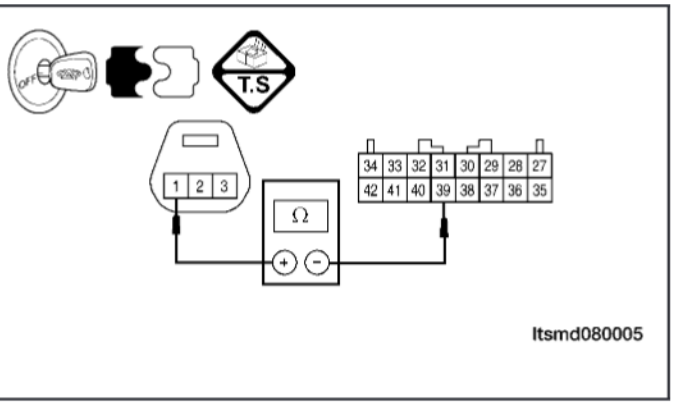
No >> Repair or replace the open circuit or short to power or short to ground.



5. CHECK OUTPUT SHAFT SPEED SENSOR GROUND CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

OUTPUT SPEED SENSOR CONNECTOR TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY
1	39	Yes



- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace circuit for an open or short to power or short to ground.

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6. CHECK OUTPUT SHAFT SPEED SENSOR SIGNAL

- Connect TCM and sensor connector.
- Start the vehicle and perform the following:
  - Engine: 2000 RPM
  - Vehicle: 50 km/h
  - Gear: 3
- Check sensor signal between sensor terminal 2 and ground in the sensor electrical connector E-089 with X-431 or oscilloscope.
- Make sure the wave shape is normal and signal voltage is fluctuating from 0-5 V.

Is the check result normal?

Yes >> Go to step 9.

No >> Go to the next step.

7. CHECK OUTPUT SHAFT SPEED SENSOR

- Perform the following:
  - Loose the bolt of the sensor.
  - Remove the sensor.
  - Visually inspect the sensor for missing or chipped teeth.

TERMINAL NO.	RESISTANCE Ω (25°C)
1 - 2	Except 0 or ∞
1 - 3	
2 - 3	

Is the check result normal?

Yes >> Replace the output speed sensor with a known good one.
Monitor the output speed sensor signal on the X-431 or oscilloscope.
- If the output speed sensor signals were normal, the system is OK.
- If the output speed sensor signals were still irregular or missing, go to step 8.

No >> Replace output speed sensor.

8. CHECK TRANSFER CASE DRIVEN GEAR AND DRIVE GEAR

- Disassemble and repair the A/T and replace or repair the transfer case driven gear and drive gear.
- Check for a chipped and damaged signal gear of the transfer case driven and drive gear.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace or repair the transfer case driven gear and drive gear.
Monitor the output speed sensor signal on the X-431 or oscilloscope.
If the signal pulse is not normal, repair the noise interference.

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9. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC 23 still present?

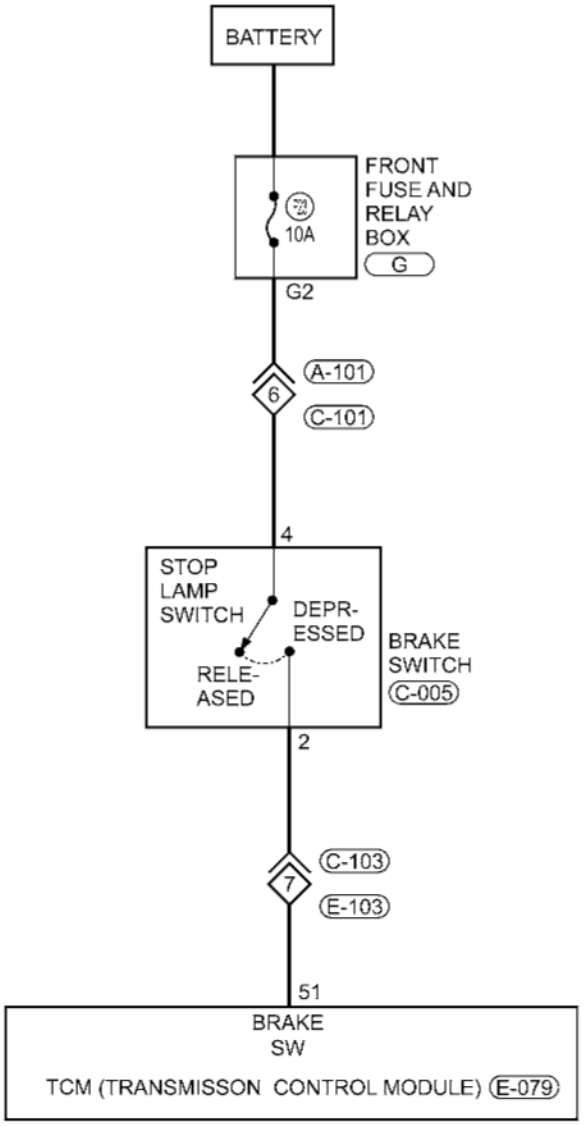
Yes >> Replace the TCM.

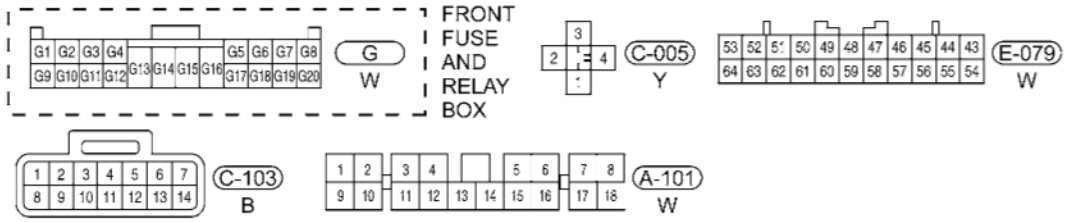
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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26 - Brake Pedal Position Switch Circuit Malfunction

TM - F4A4 - BPS - 01





ltsmw080008t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
26	Brake pedal position switch circuit malfunction	Vehicle is driving	The brake switch is on while vehicle is driving	• Brake switch • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

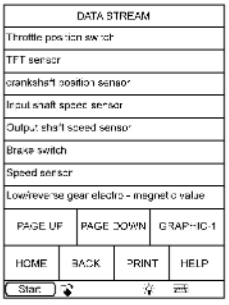
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine then select ″D″ position.
- Drive the vehicle.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK BRAKE PEDAL POSITION SWITCH SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start vehicle and read out the value of ″STOP LAMP SWITCH″.

ITEM	CONDITION	DISPLAY VALUE	
Stop lamp switch	During driving	OFF	 Itsmd080001t

Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

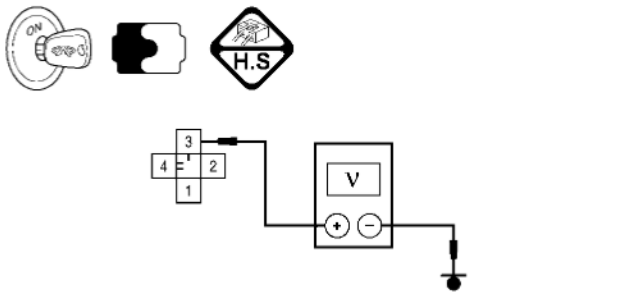
No >> Go to the next step.

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2. CHECK BRAKE SWITCH POWER SUPPLY

- Stop vehicle.
- Check sensor power supply between sensor terminal 3 and ground in the sensor electrical connector C-005.

BRAKE SWITCH CONDITION	VALUE (VOLT)
Depress brake switch	Battery voltage
Release brake switch	0



Is the check result normal?

Yes >> Go to the next step.

No >> Replace the brake switch.

3. DETECT MALFUNCTIONING PART

- Check the following:
  - Harness connectors A-102, E-105
  - Harness for a short between TCM and brake switch

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace short to power in harness or connectors.

4. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC 26 still present?

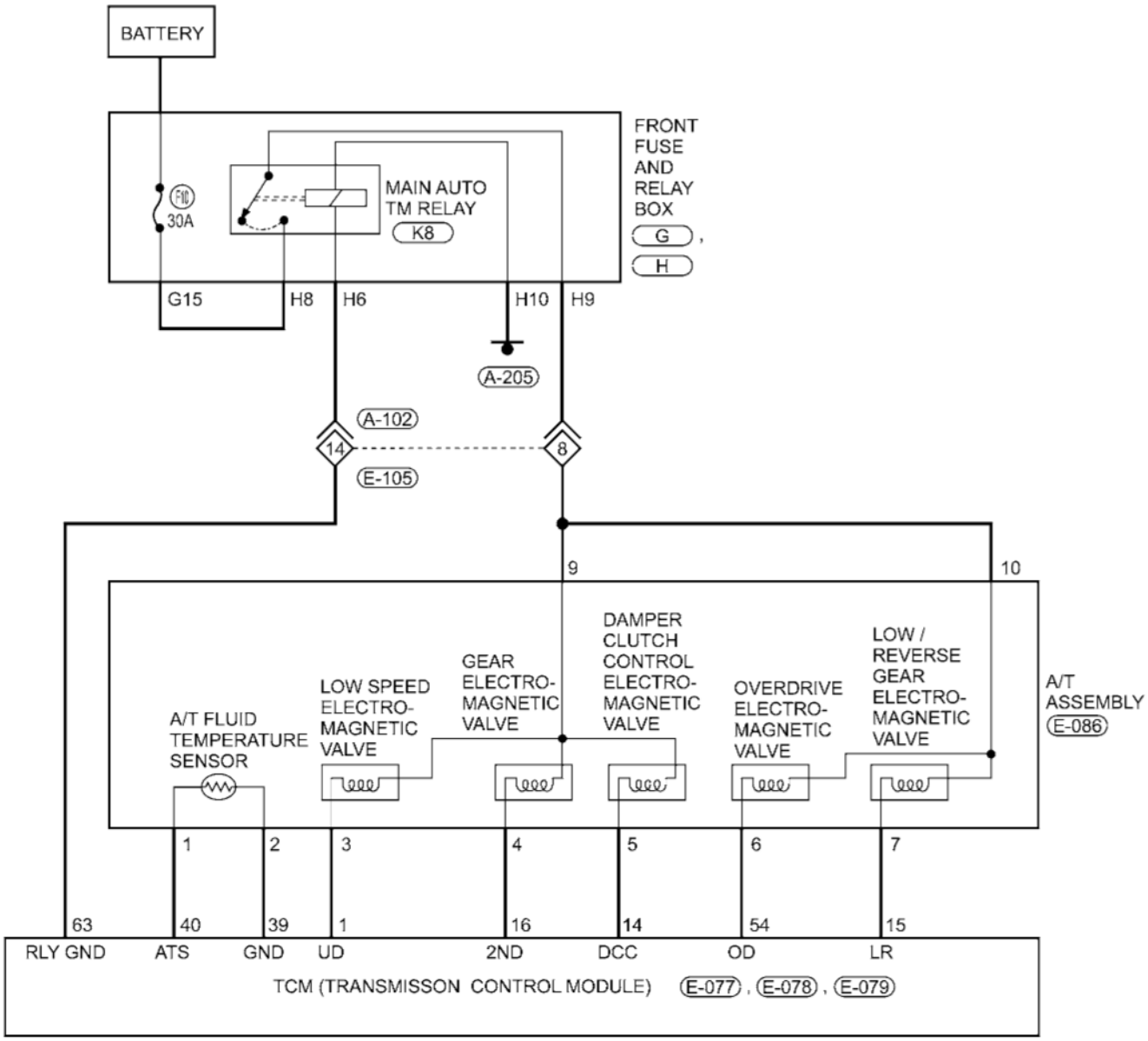
Yes >> Replace the TCM.

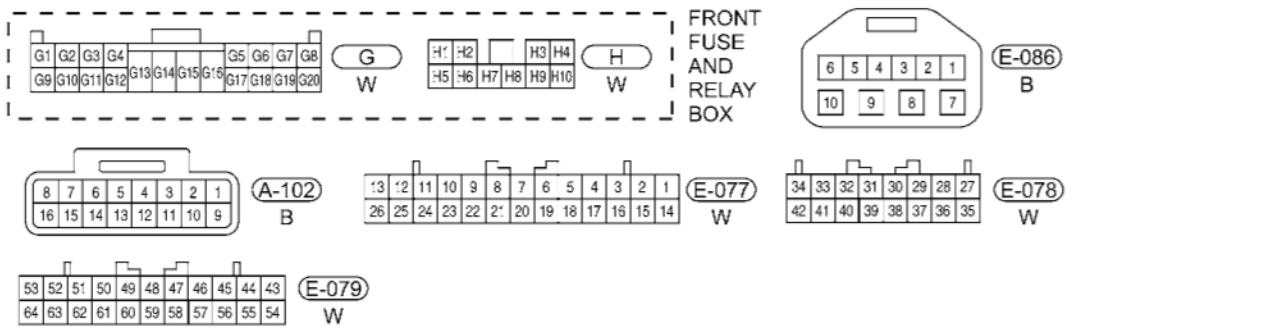
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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31 - Reverse/Low Solenoid Malfunction

TM - F4A4 - ASSY - 01





ltsmw080005t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC No.	DTC DEFINITION	DTC Detection Condition	DTC Set Condition	POSSIBLE CAUSES
31	Reverse/low (R/L) solenoid malfunction	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve. • If the DTC was set, then the A/T will be locked in 3rd gear (D gear).	• Solenoid • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



ltsmd080001t

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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

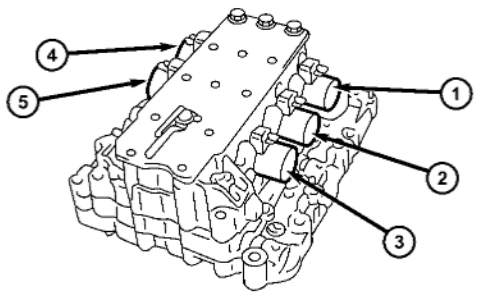
Yes >> Go to step 7.

No >> Go to the next step.

3. CHECK REVERSE/LOW GEAR ELECTRO-MAGNETIC VALVE

- Turn the ignition switch off.
- Disconnect A/T assembly connector.

NUMBER	SOLENOID	WIRE COLOR
1	Low Speed Electro-Magnetic Valve (UD)	White / Red
2	2nd Gear Electro-Magnetic Valve (2nd)	Yellow / Red
3	Damp clutch system control Electro-Magnetic Valve (DCC)	Brown / Yellow
4	Overdrive Electro-Magnetic Valve (OD)	Blue / Yellow
5	Low/reverse Gear Electro-Magnetic Valve (L/R)	Black / Red

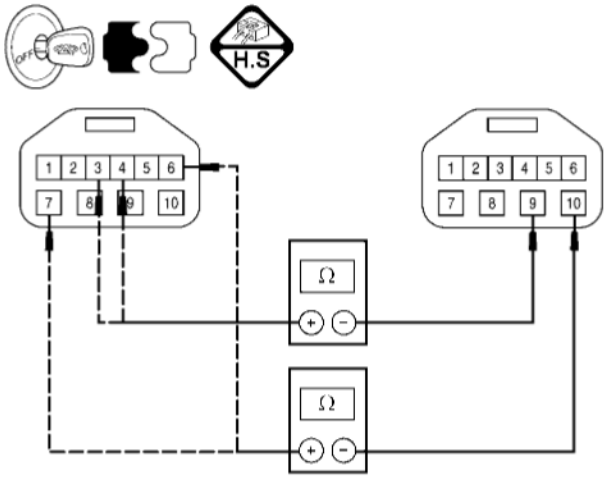


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- Check R/L solenoid resistance as shown in the following table:

A/T ASSEMBLY TERMINAL	LOW/ REVERSE GEAR ELECTRO-MAGNETIC VALVE (L/R)	OVERDRIVE ELECTRO-MAGNETIC VALVE (OD)	2ND GEAR ELECTRO-MAGNETIC VALVE (2ND)	LOW SPEED ELECTRO-MAGNETIC VALVE (UD)
	7 - 10	6 - 10	4 - 9	3 - 9
Resistance (23°C)	7.3 - 0.69 (Ω)			



Is the check result normal?

Yes >> Replace the L/R Electro-Magnetic Valve with a known good one. With the X-431, perform the solenoid actuate test.
- If the solenoid can be heard, the system is normal.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged L/R Electro-Magnetic Valve.

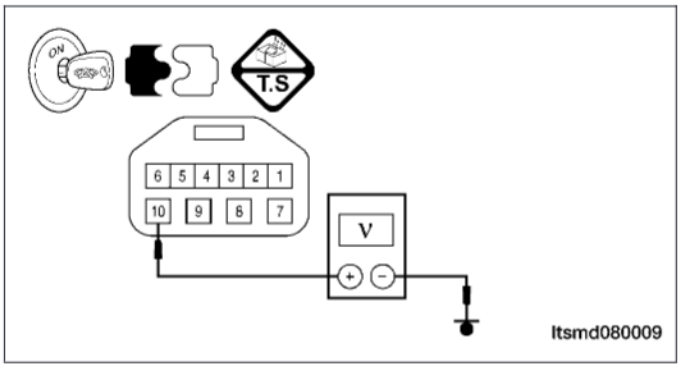
4. CHECK R/L SOLENOID POWER SUPPLY

- Turn the ignition switch on.
- Check R/L solenoid power supply between E-086 terminal 10 and ground in the A/T assembly connector E-086.
- Voltage should be more than 12 V.

Is the check result normal?

Yes >> Go to step 6.

No >> Go to the next step.



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5. DETECT MALFUNCTIONING PART

- Check the following:
  - Harness connectors A-102, E-105
  - Body fuse and relay box H9, H8, G15
  - Fuse 10 (30A)
  - Harness open or short between A/T assembly connector and fuse

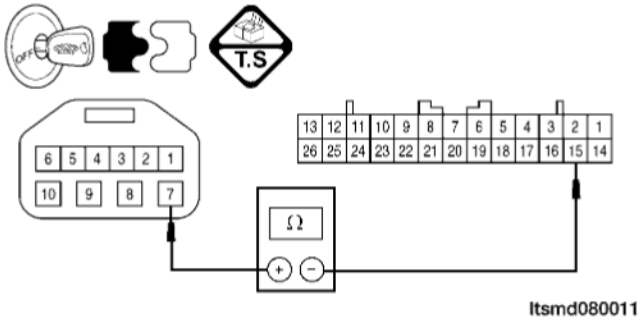
Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power in harness or connectors.

6. CHECK R/L SOLENOID CONTROL CIRCUIT

- Turn the ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

A/T ASSEMBLY TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY	
7	15	Yes	

- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to power or short to ground.

7. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is the check result normal?

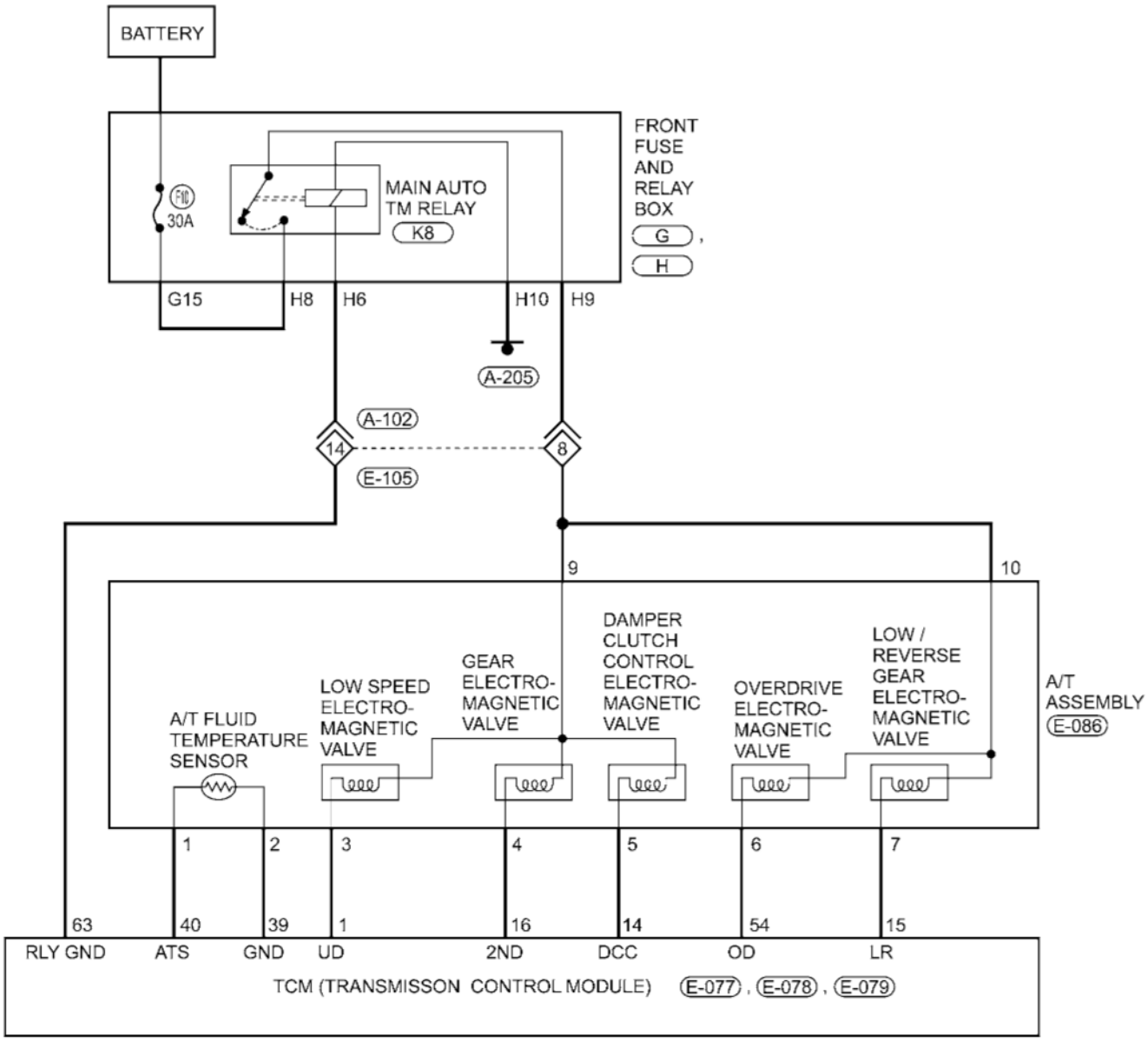
Yes >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

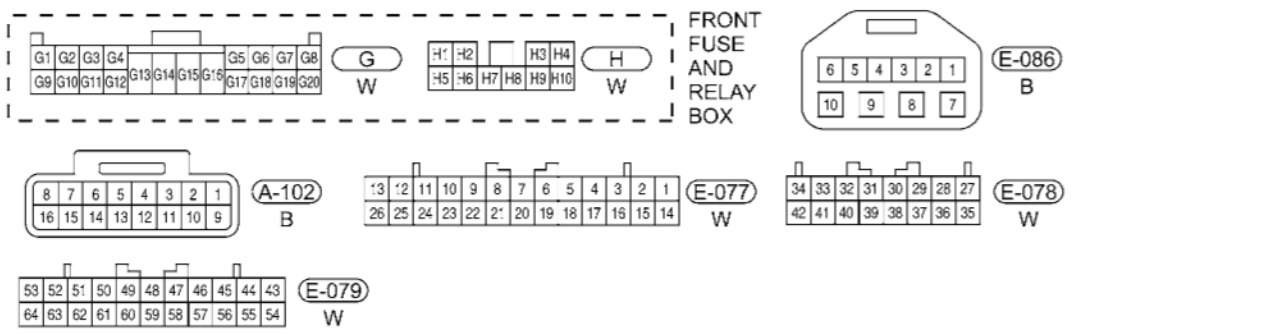
No >> Replace the TCM.

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32 - Low Speed Solenoid Malfunction

TM - F4A4 - ASSY - 01





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
32	Low speed solenoid malfunction	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve. • If the DTC was set, then the A/T will be locked in 3rd gear (D gear).	• Solenoid • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start the engine and warm it to normal operating temperature.
- Drive the vehicle.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

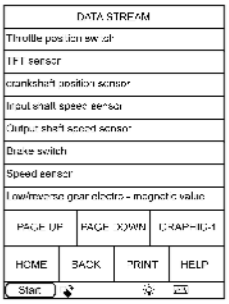
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Diagnostic Procedure

1. CHECK A/T SOLENOID VALVE SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 7.

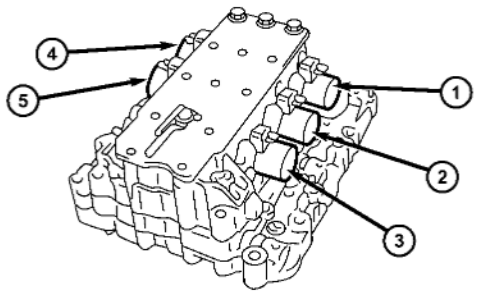
No >> Go to the next step.

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3. CHECK LOW SPEED ELECTRO-MAGNETIC VALVE

- Stop vehicle and turn ignition switch off.
- Disconnect A/T assembly connector.

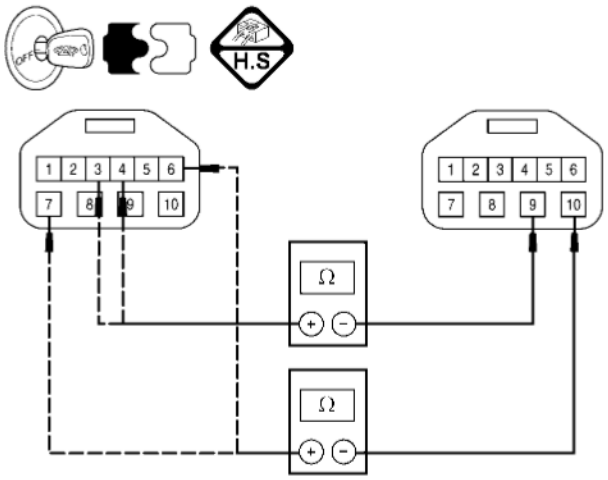
NUMBER	SOLENOID	WIRE COLOR
1	Low Speed Electro-Magnetic Valve (UD)	White / Red
2	2nd Gear Electro-Magnetic Valve (2nd)	Yellow / Red
3	Damp clutch system control Electro-Magnetic Valve (DCC)	Brown / Yellow
4	Overdrive Electro-Magnetic Valve (OD)	Blue / Yellow
5	Low/reverse Gear Electro-Magnetic Valve (L/R)	Black / Red



ltsmd080008

- Check UD solenoid resistance as shown in the following table:

A/T ASSEMBLY TERMINAL	LOW/ REVERSE GEAR ELECTRO-MAGNETIC VALVE (L/R)	OVERDRIVE ELECTRO-MAGNETIC VALVE (OD)	2ND GEAR ELECTRO-MAGNETIC VALVE (2ND)	LOW SPEED ELECTRO-MAGNETIC VALVE (UD)
	7 - 10	6 - 10	4 - 9	3 - 9
Resistance (23°C)	7.3 - 0.69 Ω			



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Is the check result normal?

Yes >> Replace the low speed Electro-Magnetic Valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, the system is normal.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged low speed Electro-Magnetic Valve.

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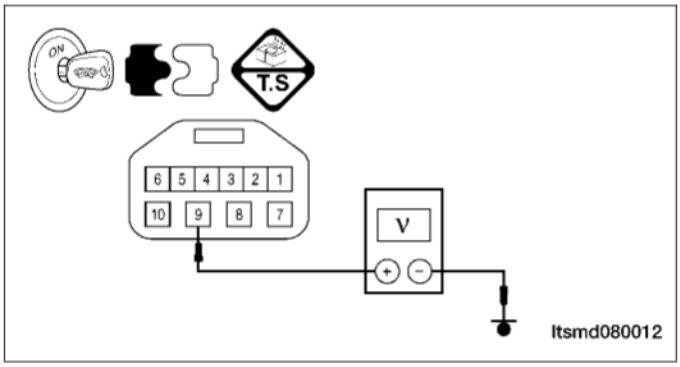
4. CHECK UD SOLENOID POWER SUPPLY

- Turn ignition switch on.
- Check UD solenoid power supply between E-086 terminal 9 and ground in the A/T assembly connector E-086.
- Voltage should be more than 12 V.

Is the check result normal?

Yes >> Go to step 6.

No >> Go to the next step.



5. DETECT MALFUNCTIONING PART

- Check the following:
  - Harness connectors A-102, E-105.
  - Body fuse and relay box H9, H8, G15.
  - Fuse 10 (30A).
  - Harness for an open or short between A/T assembly connector and fuse.

Is the check result normal?

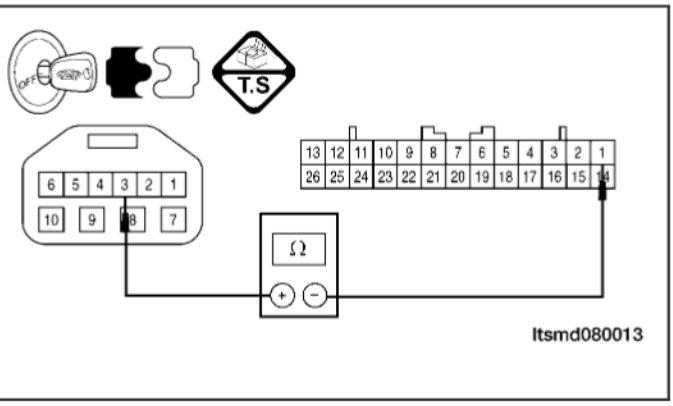
Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power in harness or connectors.

6. CHECK UD SOLENOID CONTROL CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

A/T ASSEMBLY TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY
3	1	Yes



- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for an open or short to power or short to ground.

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7. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

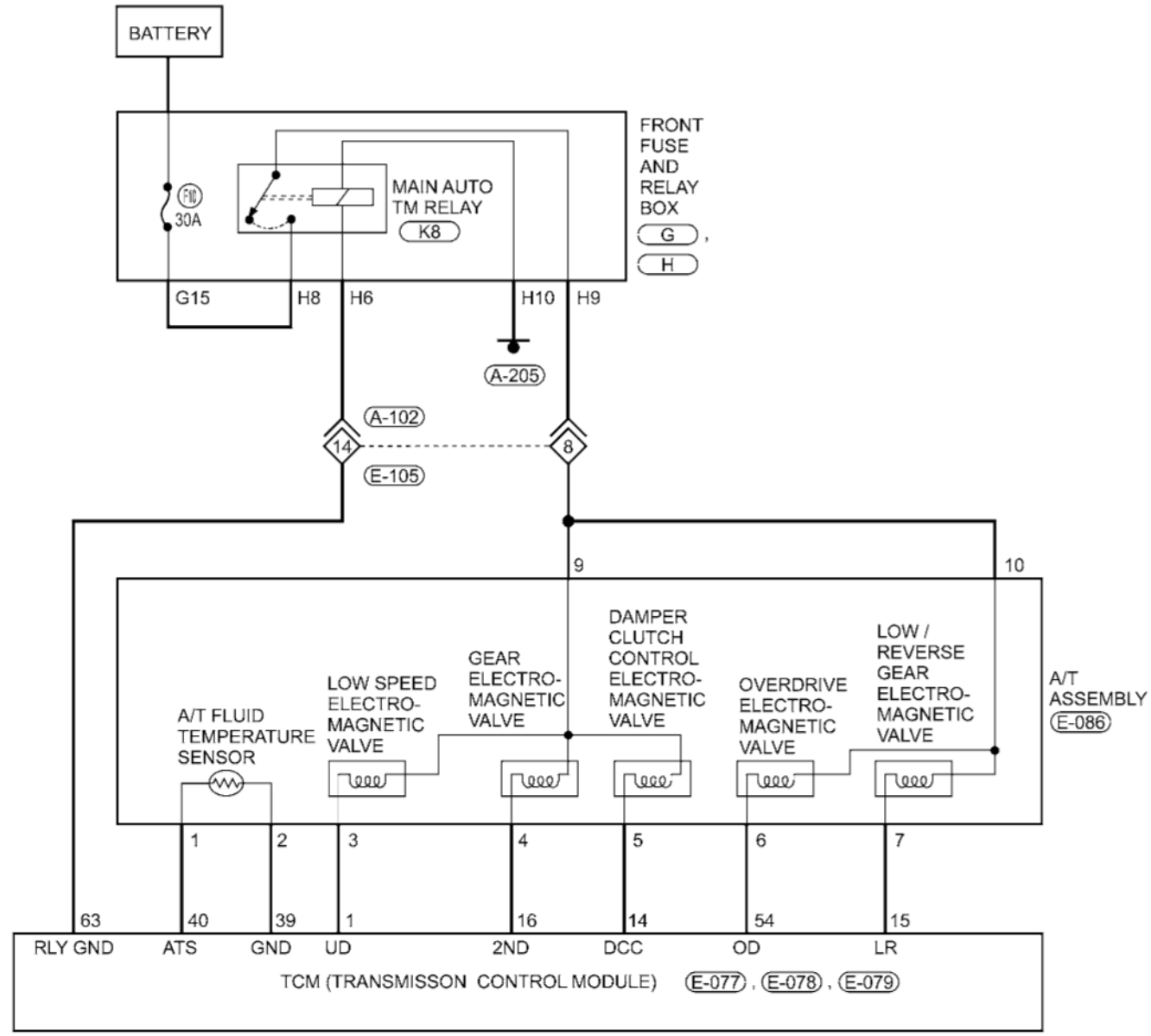
Is DTC 32 still present?

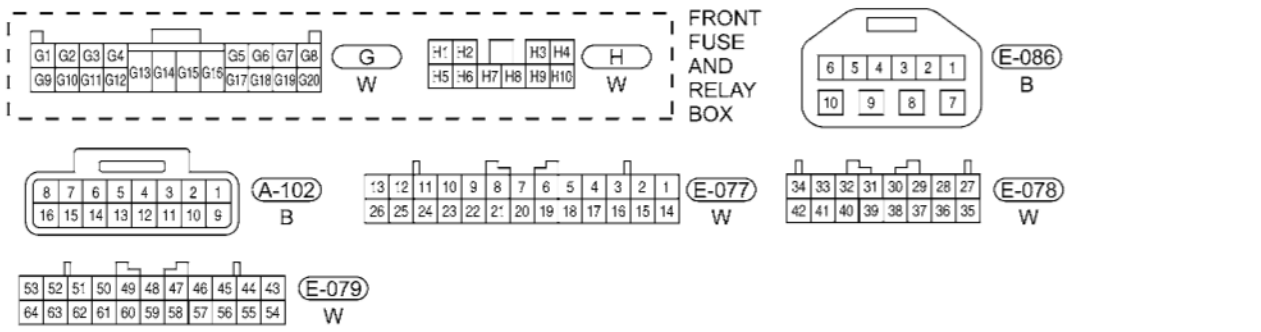
Yes >> Replace the TCM.

No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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33 - 2nd Gear Solenoid Open Circuit





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
33	2nd Gear solenoid open circuit	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve. • If the DTC was set, then the A/T will be locked at 3rd gear (D gear).	• Solenoid • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

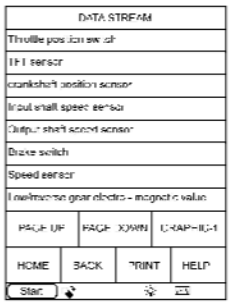
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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 7.

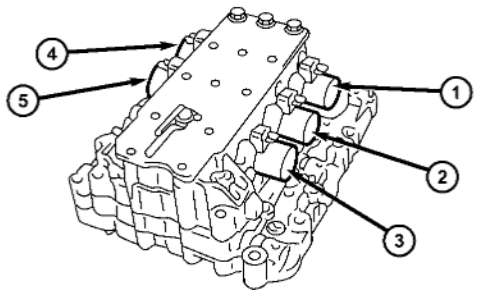
No >> Go to the next step.

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3. CHECK 2ND GEAR ELECTRO-MAGNETIC VALVE

- Stop vehicle and turn ignition switch off.
- Disconnect A/T assembly connector.

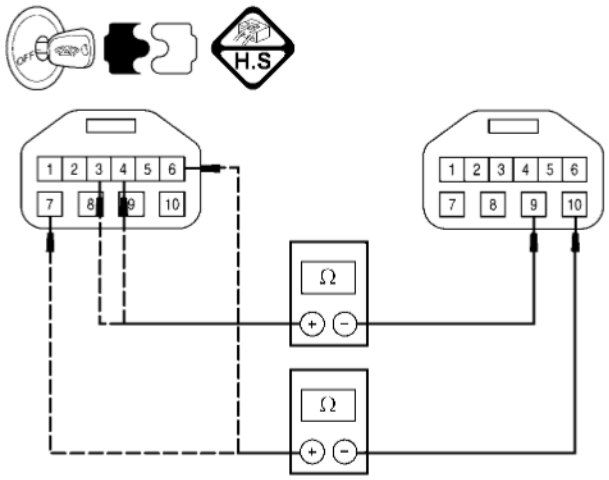
NUMBER	SOLENOID	WIRE COLOR
1	Low Speed Electro-Magnetic Valve (UD)	White / Red
2	2nd Gear Electro-Magnetic Valve (2nd)	Yellow / Red
3	Damp clutch system control Electro-Magnetic Valve (DCC)	Brown / Yellow
4	Overdrive Electro-Magnetic Valve (OD)	Blue / Yellow
5	Low/reverse Gear Electro-Magnetic Valve (L/R)	Black / Red



ltsmd080008

- Check 2nd solenoid resistance as shown in the following table:

A/T ASSEMBLY TERMINAL	LOW/ REVERSE GEAR ELECTRO-MAGNETIC VALVE (L/R)	OVERDRIVE ELECTRO-MAGNETIC VALVE (OD)	2ND GEAR ELECTRO-MAGNETIC VALVE (2ND)	LOW SPEED ELECTRO-MAGNETIC VALVE (UD)
	7 - 10	6 - 10	4 - 9	3 - 9
Resistance (23°C)	7.3 - 0.69 Ω			



ltsmd080010

Is the check result normal?

Yes >> Replace the 2nd gear Electro-Magnetic Valve with a known good one. With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, the system is normal.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged 2nd gear Electro-Magnetic Valve.

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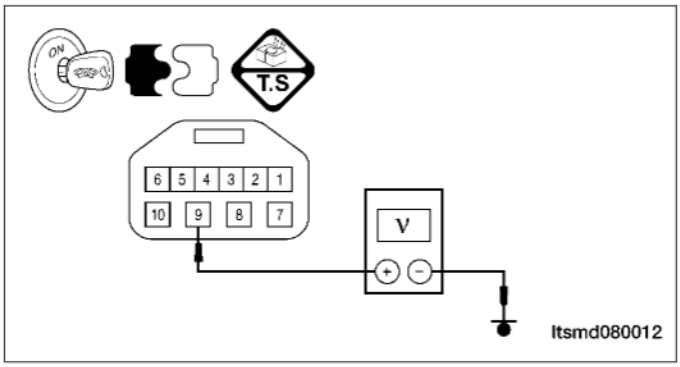
4. CHECK 2ND GEAR SOLENOID POWER SUPPLY

- Turn ignition switch on.
- Check 2nd gear solenoid power supply between E-086 terminal 9 and ground in the A/T assembly connector E-086.
- Voltage should be more than 12 V.

Is the check result normal?

Yes >> Go to step 6.

No >> Go to the next step.



5. DETECT MALFUNCTIONING PART

- Check the following:
  - Harness connectors A-102, E-105.
  - Body fuse and relay box H9, H8, G15.
  - Fuse 10 (30A).
  - Harness for an open or short between A/T assembly connector and fuse.

Is the check result normal?

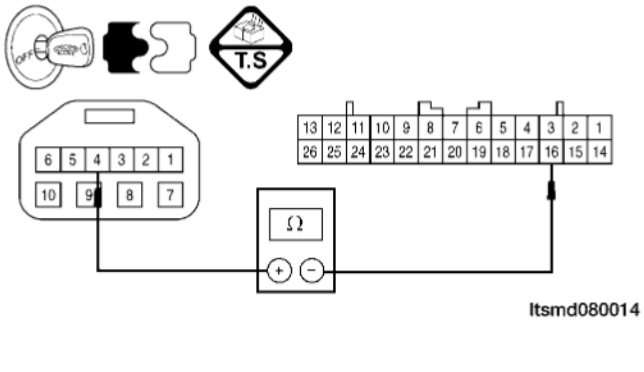
Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power in harness or connectors.

6. CHECK 2ND GEAR SOLENOID CONTROL CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

A/T ASSEMBLY TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY
4	16	Yes



- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to power or short to ground.

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7. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

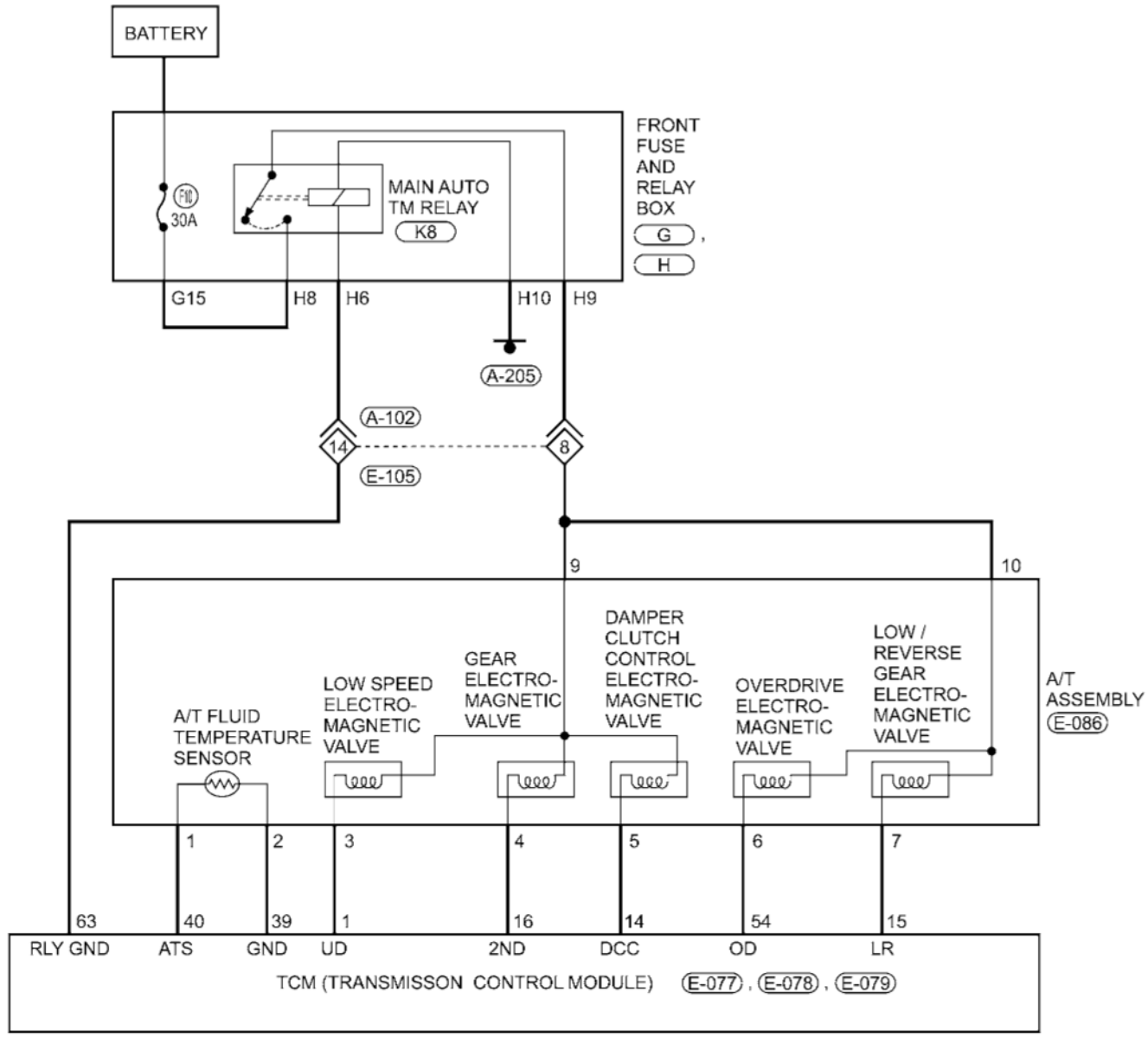
Is DTC 33 still present?

Yes >> Replace the TCM.

No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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34 - Overdrive Solenoid Circuit Malfunction



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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
34	Overdrive solenoid circuit malfunction	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve. • If the DTC was set, then the A/T will be locked in 3rd gear (D gear).	• Solenoid • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select D position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 7.

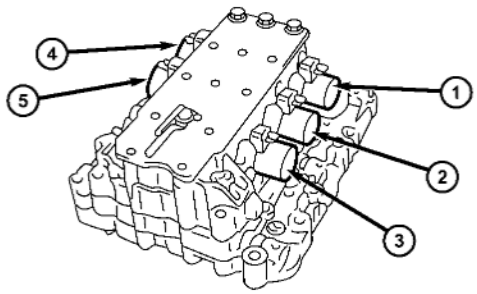
No >> Go to the next step.

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3. CHECK OVERDRIVE ELECTRO-MAGNETIC VALVE

- Stop vehicle and turn ignition switch off.
- Disconnect A/T assembly connector.

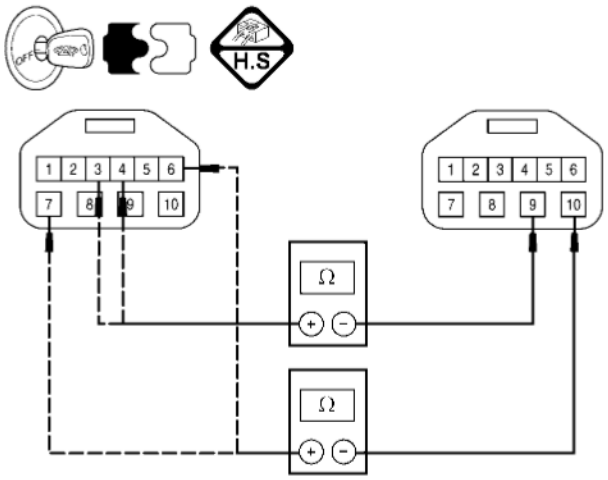
NUMBER	SOLENOID	WIRE COLOR
1	Low Speed Electro-Magnetic Valve (UD)	White / Red
2	2nd Gear Electro-Magnetic Valve (2nd)	Yellow / Red
3	Damp clutch system control Electro-Magnetic Valve (DCC)	Brown / Yellow
4	Overdrive Electro-Magnetic Valve (OD)	Blue / Yellow
5	Low/reverse Gear Electro-Magnetic Valve (L/R)	Black / Red



Itsmd080008

- Check OD solenoid resistance as shown in the following table:

A/T ASSEMBLY TERMINAL	LOW/ REVERSE GEAR ELECTRO-MAGNETIC VALVE (L/R)	OVERDRIVE ELECTRO-MAGNETIC VALVE (OD)	2ND GEAR ELECTRO-MAGNETIC VALVE (2ND)	LOW SPEED ELECTRO-MAGNETIC VALVE (UD)
	7 - 10	6 - 10	4 - 9	3 - 9
Resistance (23°C	7.3 - 0.69 Ω			



Itsmd080010

Is the check result normal?

Yes >> Replace the OD Electro-Magnetic Valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, the system is normal.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged OD Electro-Magnetic Valve.

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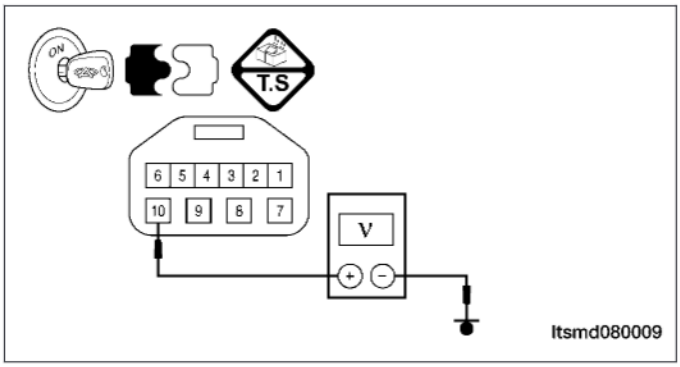
4. CHECK OD SOLENOID POWER SUPPLY

- Turn ignition switch on.
- Check OD solenoid power supply between E-086 terminal 10 and ground in the A/T assembly connector E-086.
- Voltage should be more than 12 V.

Is the check result normal?

Yes >> Go to step 6.

No >> Go to the next step.



5. DETECT MALFUNCTIONING PART

- Check the following:
  - Fuse 10 (30A).
  - Harness connectors A-102, E-105.
  - Body fuse and relay box H9, H8, G15.
  - Harness for an open or short between A/T assembly connector and fuse.

Is the check result normal?

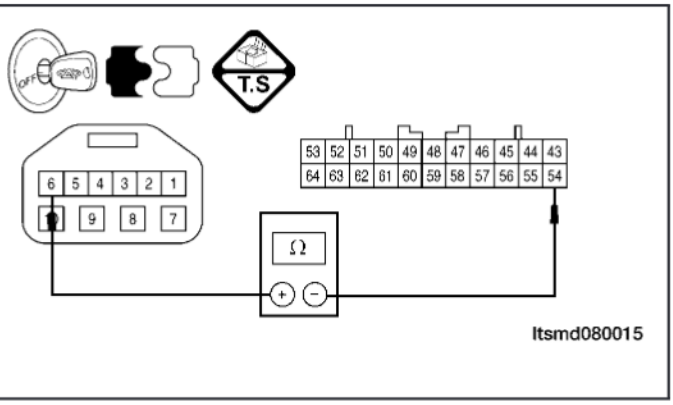
Yes >> Go to the next step.

No >> Repair or replace the circuit for an open or short to ground or short to power in harness or connectors.

6. CHECK OD SOLENOID CONTROL CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

A/T ASSEMBLY TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY
6	54	Yes



- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for an open or short to power or short to ground.

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7. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

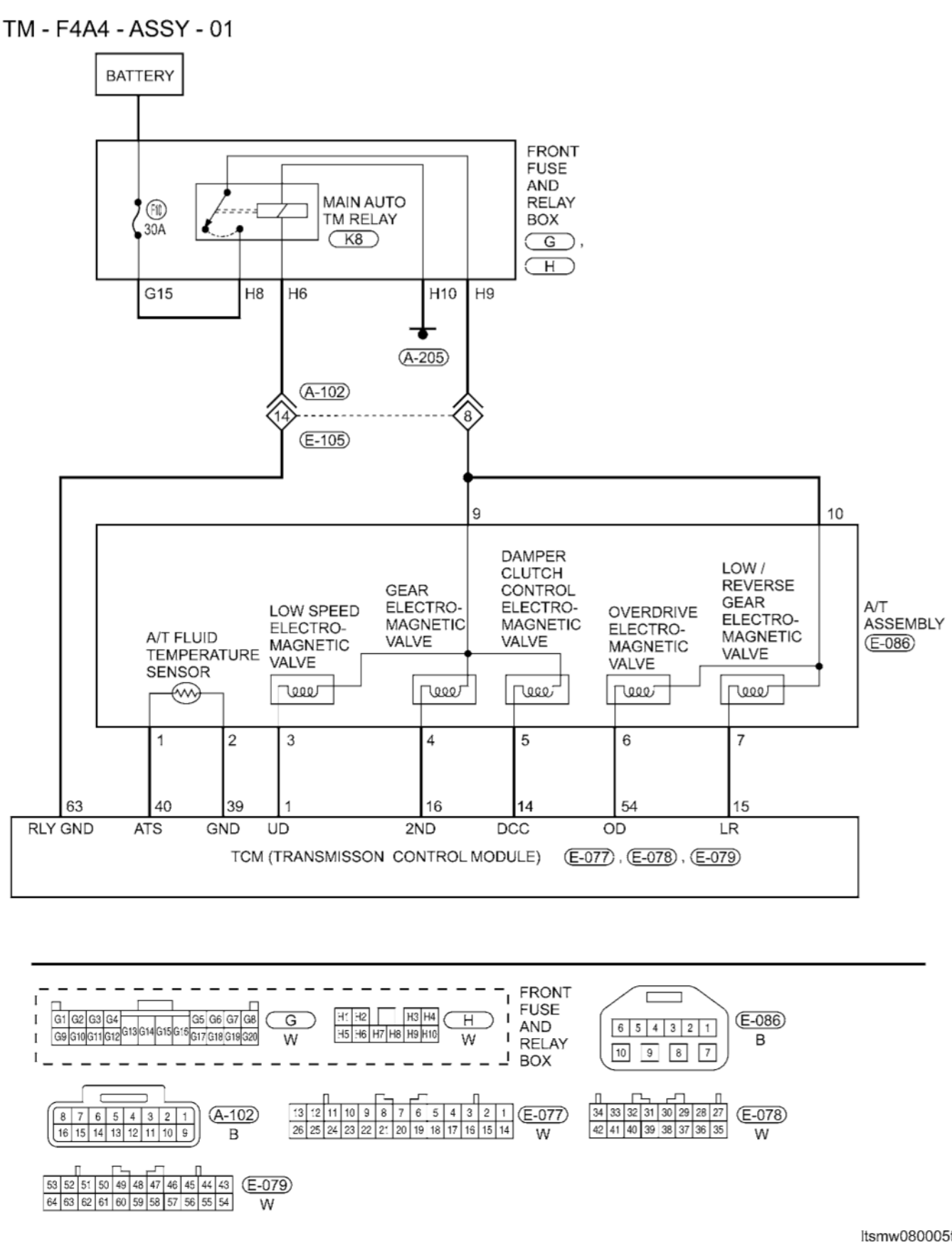
Is DTC 34 still present?

Yes >> Replace the TCM.

No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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36 - Damper Clutch System Control Solenoid Malfunction



ltsmw080005t

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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
36	Damper clutch system control (DCC) solenoid malfunction	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected an improper voltage drop when it tries to operate the solenoid valve. • The Transaxle Control Module (TCM) will set this DTC when the TCM detected that the duty cycle of damper clutch system control solenoid is 100 % for 4 seconds, and the TCM determines the damper clutch system control solenoid is not normal. • If the DTC 36 was set, then the A/T will be locked in 3rd gear (D gear).	• Solenoid • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :

While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

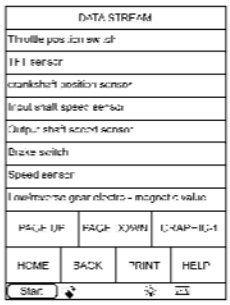
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Diagnostic Procedure

1. CHECK A/T SOLENOID SIGNAL

- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is the check result normal?

Yes >> The condition that caused this DTC is intermittent (See Diagnostic Help in Section 08 Transaxle & Transfer Case).

No >> Go to the next step.

2. ACTUATE TEST

- With X-431, perform the solenoid actuate test.
- The solenoid should be heard.

Is the check result normal?

Yes >> Go to step 7.

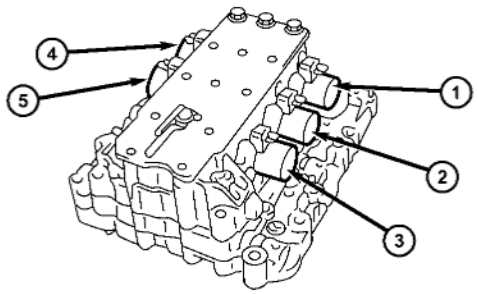
No >> Go to the next step.

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3. CHECK DCC ELECTRO-MAGNETIC VALVE

- Stop vehicle and turn ignition switch off.
- Disconnect A/T assembly connector.

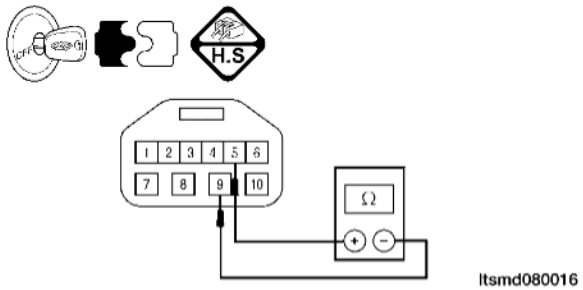
NUMBER	SOLENOID	WIRE COLOR
1	Low Speed Electro-Magnetic Valve (UD)	White / Red
2	2nd Gear Electro-Magnetic Valve (2nd)	Yellow / Red
3	Damp clutch system control Electro-Magnetic Valve (DCC)	Brown / Yellow
4	Overdrive Electro-Magnetic Valve (OD)	Blue / Yellow
5	Low/reverse Gear Electro-Magnetic Valve (L/R)	Black / Red



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- Check DCC solenoid resistance as shown in the following table:

A/T ASSEMBLY TERMINAL	DCC ELECTRO-MAGNETIC VALVE
	5 - 9
RESISTANCE (23°C)	7.3 - 0.69 Ω



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Is the check result normal?

Yes >> Replace the DCC Electro-Magnetic Valve with a known good one.
With X-431, perform the solenoid actuate test.
- If the solenoid can be heard, the system is normal.
- If the solenoid can't be heard, go to the next step.

No >> Replace the damaged DCC Electro-Magnetic Valve.

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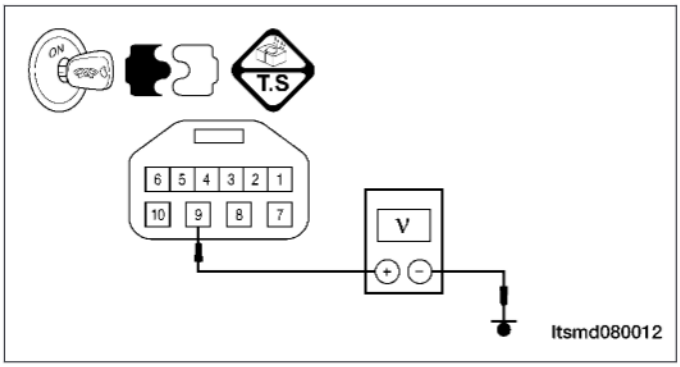
4. CHECK DCC SOLENOID POWER SUPPLY

- Turn the ignition switch on.
- Check DCC solenoid power supply between E-086 terminal 9 and ground in the A/T assembly connector E-086.
- Voltage should be more than 12 V.

Is the check result normal?

Yes >> Go to step 6.

No >> Go to the next step.



5. DETECT MALFUNCTIONING PART

- Check the following:
  - Fuse 10 (30A).
  - Harness connectors A-102, E-105.
  - Body fuse and relay box H9, H8, G15.
  - Harness for an open or short between A/T assembly connector and fuse.

Is the check result normal?

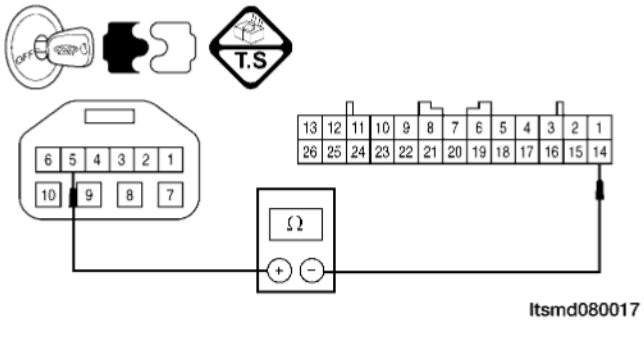
Yes >> Go to the next step.

No >> Repair or replace the open circuit or short to ground or short to power in harness or connectors.

6. CHECK DCC SOLENOID CONTROL CIRCUIT

- Turn ignition switch off.
- Disconnect TCM connector.
- Check for harness continuity between the following terminals:

A/T ASSEMBLY TERMINAL	TCM CONNECTOR TERMINAL	CONTINUITY
5	14	Yes



- Check the harness for short to power and short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for an open or short to power or short to ground.

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7. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC 36 still present?

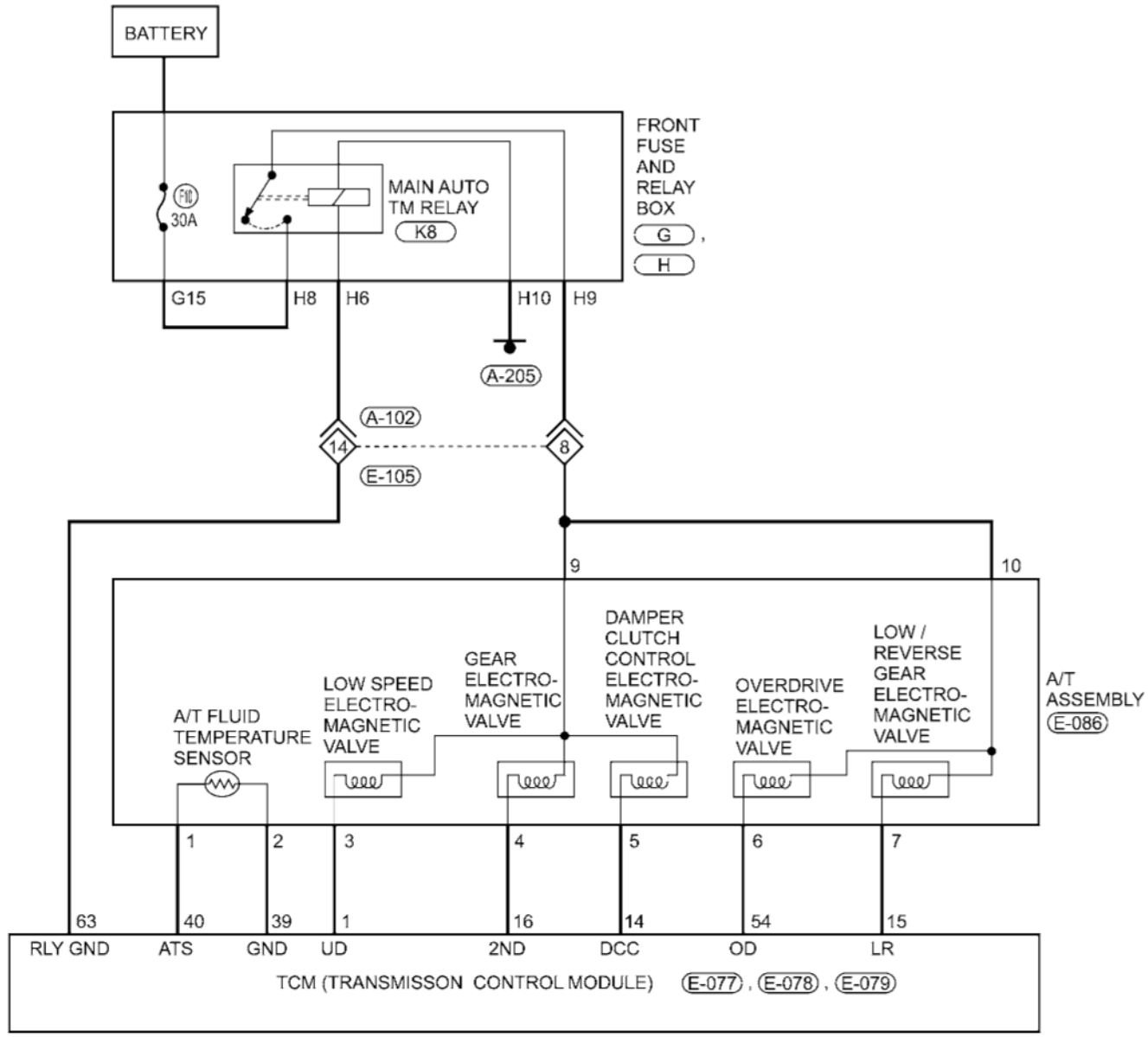
Yes >> Replace the TCM.

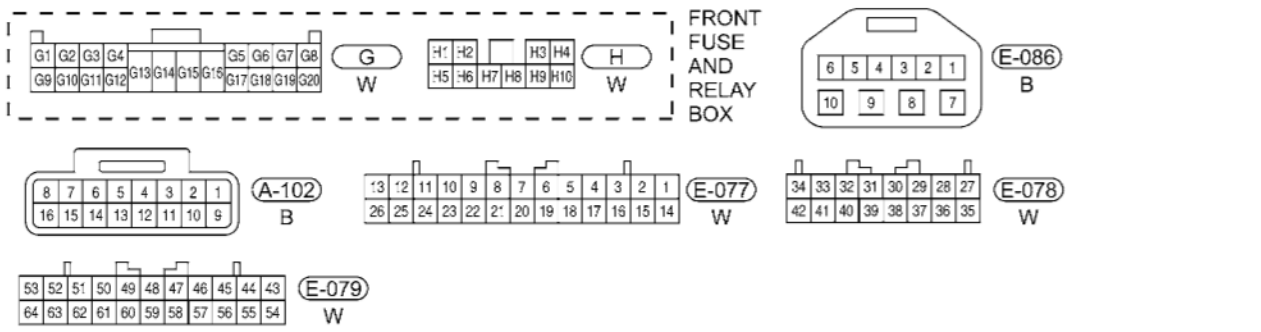
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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41 - First Gear, Ratio Out Of Limits

TM - F4A4 - ASSY - 01





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Operating Components Condition

- Related Operating Components

RELATED OPERATING COMPONENT											
GEARSHIFT LEVER POSITION		GEAR RATIO	ENGINE START	PARKING MECHANISM	DRIVE			LOCK		
					LOW SPEED CLUTCH (UD)	REVERSE GEAR CLUTCH (REV)	OVERSPEED CLUTCH (OD)	LOW GEAR/ REVERSE GEAR BRAKE (L/R)	GEAR 2ND BRAKE (2ND)	ONE-WAY CLUTCH (OWC)
P	Parking	-	Enabled	√	-	-	-	√	-	-
R	Reverse Gear	2.480	-	-	-	√	-	√	-	-
N	Neutral Gear	-	Enabled	-	-	-	-	√	-	-
D	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
	Gear 4	0.712	-	-	√	-	√	-	√	-
3	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
2	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
L	Gear 1	2.842	-	-	√	-	-	√	-	-

*** Low gear/reverse gear is applied when vehicle speed is lower than 10 km/h.**
√ Operating components

On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
41	First gear, ratio out of limits	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected that 1st Gear Ratio Error is already present. The output shaft speed signal is increased. • If the DTC was set 4 times, then the A/T will be locked in 3rd gear (D gear).	• Input shaft speed sensor • Output shaft speed sensor • The retainer of deceleration clutch • Transfer case driven and drive gear • Low/Reverse brake system • Low speed clutch system • Noise interference

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.

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- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :
Checking the automatic transaxle fluid quality and fluid level is the most basic check of the automatic transaxle. The fluid check is also an important inspection to determine if the transaxle will need to be disassembled.

CAUTION:
The burnt scent of ATF fluid indicates that the transaxle fluid is contaminated. The tiny particles in the fluid pan indicate that the transaxle is worn out and it will be necessary to overhaul the transaxle.

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK FLUID QUALITY AND FLUID LEVEL AND DTC

- Drive the vehicle, until the ATF reaches operating temperature (70° - 80°C).
- Park the vehicle on level ground.
- Shift the gear selector lever to all gear positions once, then shift to gear “N”.
- Clean and check the outside of the dipstick and remove the dipstick to check the fluid level.
- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is DTC 22 or 23 present?

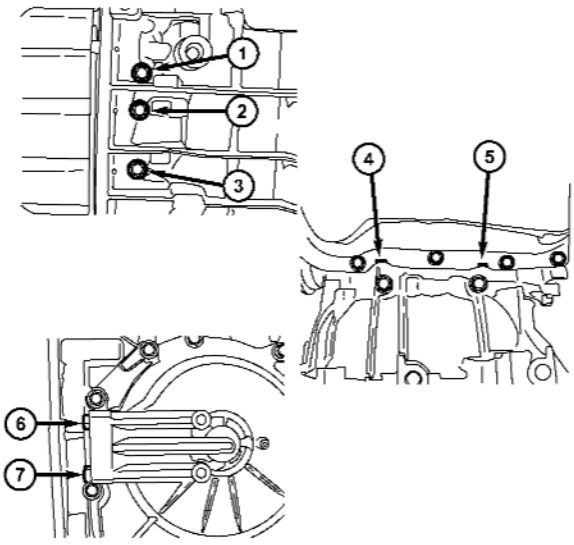
Yes >> If DTC 22 present, see diagnostic procedure for DTC 22 in 08 - Transaxle & Transfer Case.
If DTC 23 present, see diagnostic procedure for DTC 23 in 08 - Transaxle & Transfer Case.

No >> Go to the next step.

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2. HYDRAULIC TEST

- Preheat the fluid from engine to transaxle to 80-100°C.
- Lift the vehicle until the wheels can rotate freely.
- Connect the special fluid pressure gauge on the fluid pressure test port.



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Test Port

TEST PORT	1	2	3	4	5	6	7
Fluid pressure test port name	2nd (Gear 2 Brake) fluid pressure	UD (Low Speed Clutch) fluid pressure	L/R (Low/ Reverse Gear Brake) fluid pressure	DA (Damper Clutch Engagement) fluid pressure	DR (Damper Clutch Disengagement) fluid pressure	RV (Reverse Gear Clutch) fluid pressure	OD (Overdrive Clutch) fluid pressure

MEASURE STATUS			STANDARD FLUID PRESSURE KPA (PSI)					
GEAR LEVER POSITION	GEAR POSITION	ENGINE SPEED (RPM)	DECELERATION CLUTCH PRESSURE	REVERSE GEAR CLUTCH PRESSURE	OVERDRIVE CLUTCH PRESSURE	LOW/ REVERSE GEAR CLUTCH PRESSURE	SECONDARY BRAKE PRESSURE	TORQUE CONVERTER PRESSURE
P	-	2,500	-	-	-	310 - 390 (45 - 56)	-	250 - 390 (36 - 56)
R	Reverse Gear	2,500	-	1,270 - 1,770	-	1,270 - 1,770	-	500 - 700 (73-101)
N	Neutral Gear	2,500	-	-	-	310 - 390 (45 - 56)	-	250 - 390 (36 - 56)

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MEASURE STATUS			STANDARD FLUID PRESSURE KPA (PSI)					
GEAR LEVER POSITION	GEAR POSITION	ENGINE SPEED (RPM)	DECELERATION CLUTCH PRESSURE	REVERSE GEAR CLUTCH PRESSURE	OVERDRIVE CLUTCH PRESSURE	LOW/ REVERSE GEAR CLUTCH PRESSURE	SECONDARY BRAKE PRESSURE	TORQUE CONVERTER PRESSURE
D	Gear 1	2,500	1,010 - 1,050 (146 - 152)	-	-	1,010 - 1,050 (146 - 152)	-	500 - 700 (73 - 101)
	Gear 2	2,500	-	-	-	-	1,010 - 1,050 (146 - 152)	500 - 700 (73 - 101)
	Gear 3	2,500	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	-	-	450 - 650 (65 - 94)
	Gear 4	2,500	-	-	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	450 - 650 (65 - 94)

- In accordance with the shown status of standard fluid pressure measurement table, measure the fluid pressure of each measurement port. The measurement of each port should be within the standard range.
- If some measurement values is beyond the standard range, please refer to the fluid pressure measurement and diagnosis table for causes.

Is the check result normal?

Yes >> Go to step 5 for disc or plate abrasion.

No >> Go to the next step.

3. CHECK VALVE BODY ASSEMBLY AND FLUID PUMP AND PIPELINE

- Turn the ignition switch off.
- Disassemble and repair F4A4 automatic transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Check valve body and fluid pump and pipeline.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace damaged components and low speed clutch and reverse/low brake clutch for low pressure burned.

4. COMPRESSED AIR TEST

- Check low speed clutch system: Low speed clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.
- Check reverse/low brake clutch system: Reverse/low brake clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.

Is the check result normal?

Yes >> Go to the next step for disc or plate abrasion.

No >> Replace damaged components and low speed clutch and reverse/low brake clutch for low pressure burned.

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5. CHECK LOW SPEED CLUTCH SYSTEM

- Check low speed clutch system:
  - Check low speed clutch plate
  - Check low speed clutch disc
  - Snap ring
  - Clutch reaction disc
  - D-Ring
  - Spring retainer
  - Low speed clutch piston
  - Low speed clutch drum

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

6. CHECK REVERSE/LOW BRAKE SYSTEM

- Check reverse/low brake system:
  - Check reverse/low brake plate
  - Check reverse/low brake disc
  - Central support
  - Snap ring
  - Clutch reaction disc
  - Spring retainer
  - Reverse/low brake piston

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

7. CHECK DTC

- Assemble all disassembled components.
- Install the transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Fill the transaxle with new ATF:
  - Fill the ATF from the fill tube.
  - Reinstall the hose connector disassembled in step 1 and reinstall the dipstick (clean the dipstick before installing).
  - Shift the gear selector lever to each gear position and then shift to gear “N”.
  - Drive the vehicle until the ATF reaches operating temperature (70° - 80°C) and re-check the fluid level. The fluid level must be within the HOT range of dipstick.
  - Reinstall the dipstick into the transaxle.
  - With the X-431 scan tool, read TCM DTCs.
  - Refer to ″DTC Confirmation Procedure″.

Is DTC 41 still present?

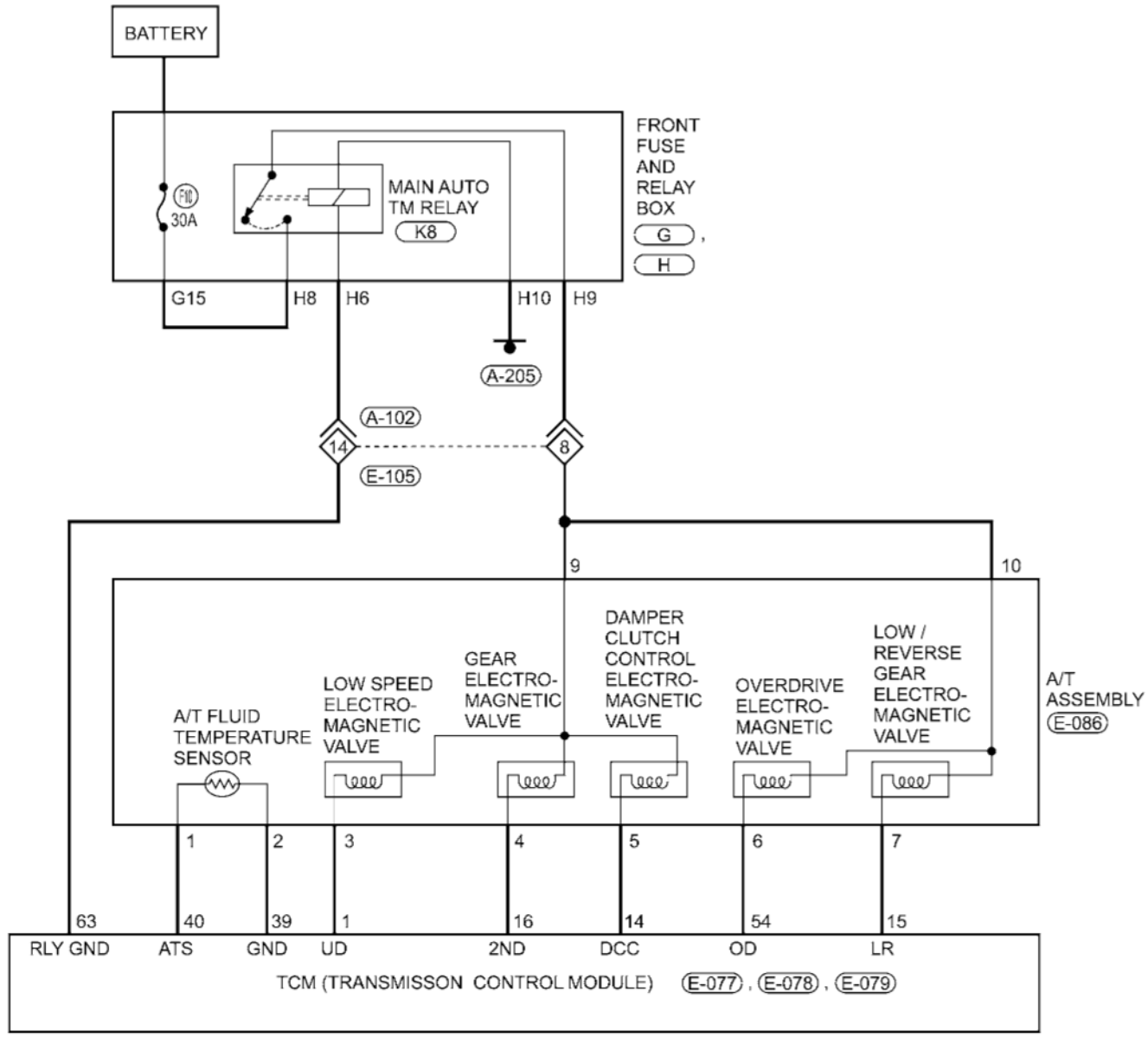
Yes >> Replace the TCM.

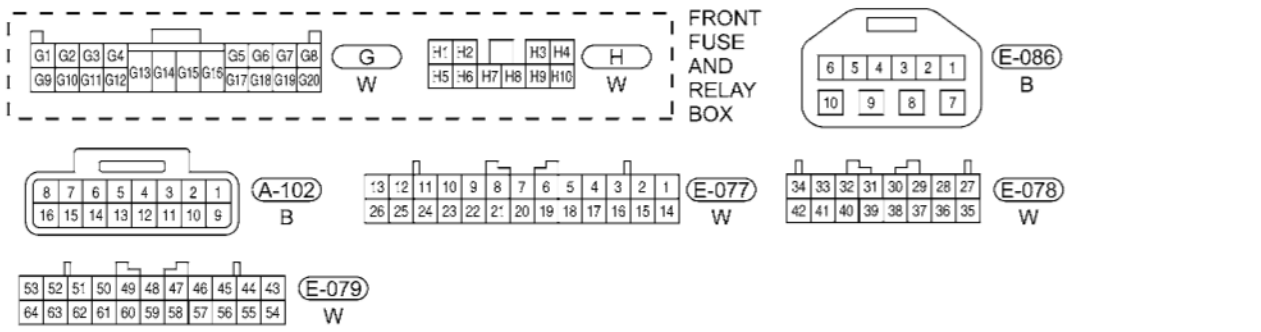
No >> The system is now operating properly.

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42 - Second Gear, Ratio Out Of Limits

TM - F4A4 - ASSY - 01





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Operating Components Condition

- Related Operating Components

RELATED OPERATING COMPONENT										
GEARSHIFT LEVER POSITION		GEAR RATIO	ENGINE START	PARKING MECHANISM	DRIVE			LOCK		
					LOW SPEED CLUTCH (UD)	REVERSE GEAR CLUTCH (REV)	OVERSPEED CLUTCH (OD)	LOW GEAR/ REVERSE GEAR BRAKE (L/R)	GEAR 2ND BRAKE (2ND)	ONE-WAY CLUTCH (OWC)
P	Parking	-	Enabled	√	-	-	-	√	-	-
R	Reverse Gear	2.480	-	-	-	√	-	√	-	-
N	Neutral Gear	-	Enabled	-	-	-	-	√	-	-
D	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
	Gear 4	0.712	-	-	√	-	√	-	√	-
3	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
2	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
L	Gear 1	2.842	-	-	√	-	-	√	-	-

*** Low gear/reverse gear is applied when vehicle speed is lower than 10 km/h.**
√ Operating components

On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
42	Second gear, ratio out of limits	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected that 2nd Gear Ratio Error is already present. The output shaft speed signal is increased. • If the DTC was set 4 times, then the A/T will be locked in 3rd gear (D gear).	• Input shaft speed sensor • Output shaft speed sensor • The retainer of deceleration clutch • Transfer case driven and drive gear • 2nd gear brake system • Low speed clutch system • Noise interference

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.

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- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :
Checking the automatic transaxle fluid quality and fluid level is the most basic check of the automatic transaxle. The fluid check is also an important inspection to determine if the transaxle will need to be disassembled.

CAUTION:
The burnt scent of ATF fluid indicates that the transaxle fluid is contaminated. The tiny particles in the fluid pan indicate that the transaxle is worn out and it will be necessary to overhaul the transaxle.

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK FLUID QUALITY AND FLUID LEVEL AND DTC

- Drive the vehicle, until the ATF reaches operating temperature (70° - 80°C).
- Park the vehicle on level ground.
- Shift the gear selector lever to all gear positions once, then shift to gear “N”.
- Clean and check the outside of the dipstick and remove the dipstick to check the fluid level.
- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is DTC 22 or 23 present?

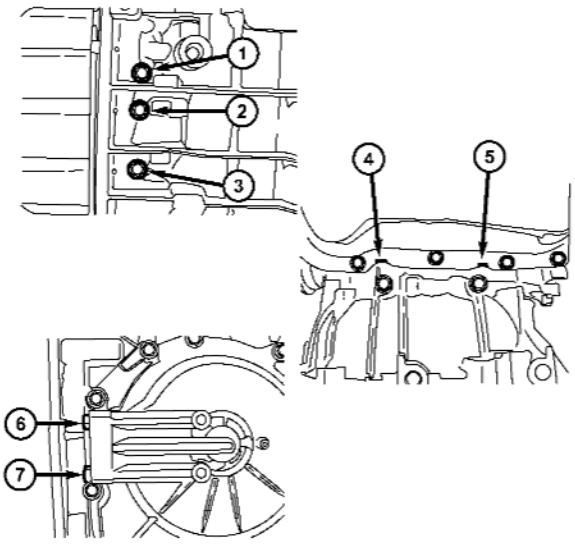
Yes >> If DTC 22 present, see diagnostic procedure for DTC 22 in 08 - Transaxle & Transfer Case
If DTC 23 present, see diagnostic procedure for DTC 23 in 08 - Transaxle & Transfer Case.

No >> Go to the next step.

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2. HYDRAULIC TEST

- Preheat the fluid from engine to transaxle to 80° - 100°C.
- Lift the vehicle until the wheels can rotate freely.
- Connect the special fluid pressure gauge on the fluid pressure test port.



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TEST PORT	1	2	3	4	5	6	7
Fluid pressure test port name	2nd (Gear 2 Brake) fluid pressure	UD (Low Speed Clutch) fluid pressure	L/R (Low/ Reverse Gear Brake) fluid pressure	DA (Damper Clutch Engagement) fluid pressure	DR (Damper Clutch Disengagement) fluid pressure	RV (Reverse Gear Clutch) fluid pressure	OD (Overdrive Clutch) fluid pressure

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MEASURE STATUS			STANDARD FLUID PRESSURE KPA (PSI)					
GEAR LEVER POSITION	GEAR POSITION	ENGINE SPEED (RPM)	DECELERATION CLUTCH PRESSURE	REVERSE GEAR CLUTCH PRESSURE	OVERDRIVE CLUTCH PRESSURE	LOW/ REVERSE GEAR CLUTCH PRESSURE	SECONDARY BRAKE PRESSURE	TORQUE CONVERTER PRESSURE
P	-	2,500	-	-	-	310 - 390 (45-56)	-	250 - 390 (36 - 56)
R	Reverse Gear	2,500	-	1,270 - 1,770	-	1,270 - 1,770	-	500 - 700 (73 - 101)
N	Neutral Gear	2,500	-	-	-	310 - 390 (45 - 56)	-	250 - 390 (36 - 56)
D	Gear 1	2,500	1,010 - 1,050 (146 - 152)	-	-	1,010 - 1,050 (146 - 152)	-	500 - 700 (73 - 101)
	Gear 2	2,500	-	-	-	-	1,010 - 1,050 (146 - 152)	500 - 700 (73 - 101)
	Gear 3	2,500	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	-	-	450 - 650 (65 - 94)
	Gear 4	2,500	-	-	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	450 - 650 (65 - 94)

- In accordance with the shown status of standard fluid pressure measurement table, measure the fluid pressure of each measurement port. The measurement of each port should be within the standard range.
- If some measurement values is beyond the standard range, please refer to the fluid pressure measurement and diagnosis table for causes.

Is the check result normal?

Yes >> Go to step 5 for disc or plate abrasion.

No >> Go to the next step.

3. CHECK VALVE BODY ASSEMBLY AND FLUID PUMP AND PIPELINE

- Turn the ignition switch off.
- Disassemble and repair F4A4 automatic transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Check valve body and fluid pump and pipeline.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace damaged components and low speed clutch and 2nd gear brake clutch for low pressure burned.

4. COMPRESSED AIR TEST

- Check low speed clutch system: Low speed clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.
- Check 2nd gear brake clutch system: 2nd gear brake clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.

Is the check result normal?

Yes >> Go to the next step for disc or plate abrasion.

No >> Replace all damaged components and low speed clutch and 2nd gear brake clutch.

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5. CHECK LOW SPEED CLUTCH SYSTEM

- Check low speed clutch system:
  - Check low speed clutch plate
  - Check low speed clutch disc
  - Snap ring
  - Clutch reaction disc
  - D-Ring
  - Spring retainer
  - Low speed clutch piston
  - Low speed clutch drum

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

6. CHECK 2ND GEAR BRAKE SYSTEM

- Check 2nd gear brake system:
  - Check 2nd gear brake plate
  - Check 2nd gear brake disc
  - Central support
  - Snap ring
  - Clutch reaction disc
  - Spring retainer
  - 2nd gear brake piston

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

7. CHECK DTC

- Assemble all disassembled components.
- Install the transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Fill the transaxle with new ATF:
  - Fill the ATF from the fill tube.
  - Reinstall the hose connector disassembled in step 1 and reinstall the dipstick (clean the dipstick before installing).
  - Shift the gear selector lever to each gear position and then shift to gear “N”.
  - Drive the vehicle until the ATF reaches operating temperature (70° - 80°C) and re-check the fluid level. The fluid level must be within the HOT range of dipstick.
  - Reinstall the dipstick into the transaxle.
  - With the X-431 scan tool, read TCM DTCs.
  - Refer to ″DTC Confirmation Procedure″.

Is DTC 42 present?

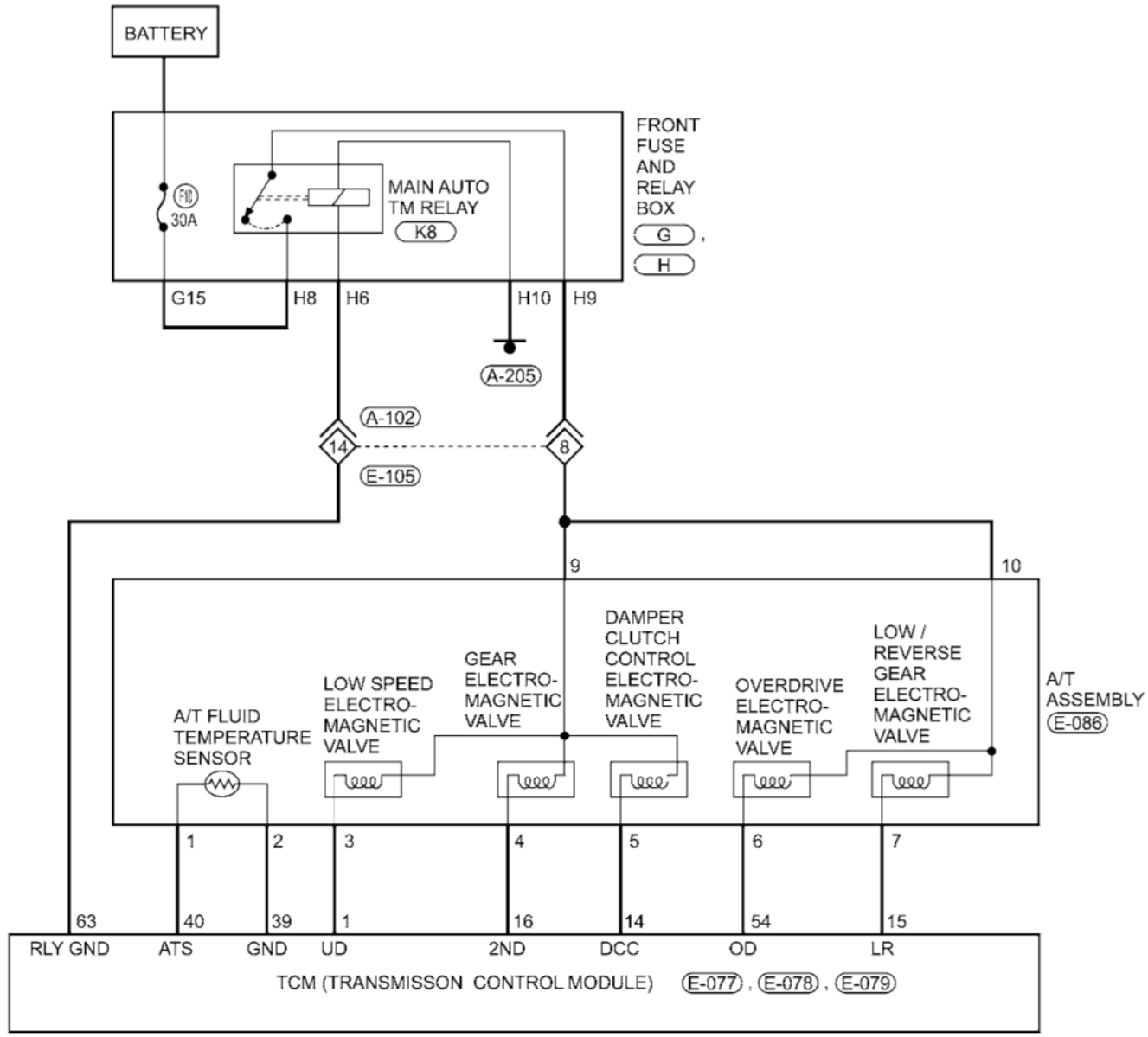
Yes >> Replace the TCM.

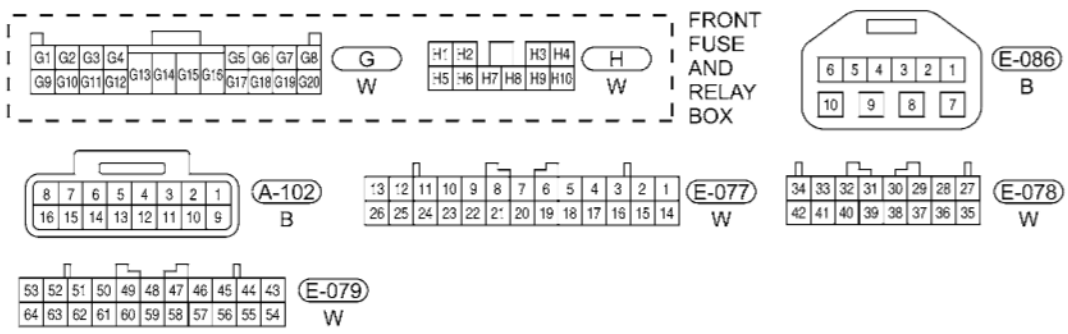
No >> The system is now operating properly.

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43 - Third Gear, Ratio Out Of Limits

TM - F4A4 - ASSY - 01





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Operating Components Condition

- Related Operating Components

RELATED OPERATING COMPONENT											
GEARSHIFT LEVER POSITION		GEAR RATIO	ENGINE START	PARKING MECHANISM	DRIVE			LOCK		
					LOW SPEED CLUTCH (UD)	REVERSE GEAR CLUTCH (REV)	OVERSPEED CLUTCH (OD)	LOW GEAR/ REVERSE GEAR BRAKE (L/R)	GEAR 2ND BRAKE (2ND)	ONE-WAY CLUTCH (OWC)
P	Parking	-	Enabled	√	-	-	-	√	-	-
R	Reverse Gear	2.480	-	-	-	√	-	√	-	-
N	Neutral Gear	-	Enabled	-	-	-	-	√	-	-
D	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
	Gear 4	0.712	-	-	√	-	√	-	√	-
3	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
2	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
L	Gear 1	2.842	-	-	√	-	-	√	-	-

*** Low gear/reverse gear is applied when vehicle speed is lower than 10 km/h.**
√ Operating components

On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
43	Third gear, ratio out of limits	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected that 3rd Gear Ratio Error is already present. The output shaft speed signal is increased. • If the DTC was set 4 times, then the A/T will be locked in 3rd gear (D gear).	• Input shaft speed sensor • Output shaft speed sensor • The retainer of deceleration clutch • Transfer case driven and drive gear • Overdrive clutch system • Low speed clutch system • Noise interference

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.
- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.

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- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :
Checking the automatic transaxle fluid quality and fluid level is the most basic check of the automatic transaxle. The fluid check is also an important inspection to determine if the transaxle will need to be disassembled.

CAUTION:
The burnt scent of ATF fluid indicates that the transaxle fluid is contaminated. The tiny particles in the fluid pan indicate that the transaxle is worn and it will be necessary to overhaul the transaxle.

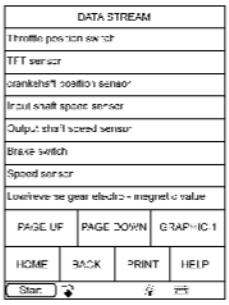
NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK FLUID QUALITY AND FLUID LEVEL AND DTC

- Drive the vehicle, until the ATF reaches operating temperature (70° - 80°C).
- Park the vehicle on level ground.
- Shift the gear selector lever to all gear positions once, then shift to gear “N”.
- Clean and check the outside of the dipstick and remove the dipstick to check the fluid level.
- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is DTC 22 or 23 present?

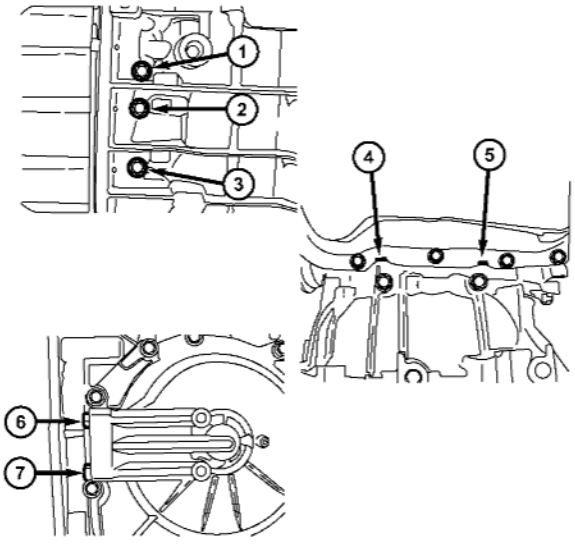
Yes >> If DTC 22 present, See diagnostic procedure for DTC 22 in 08 - Transaxle & Transfer Case.
If DTC 23 present, See diagnostic procedure for DTC 23 in 08 - Transaxle & Transfer Case.

No >> Go to the next step.

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2. HYDRAULIC TEST

- Preheat the fluid from engine to transaxle to 80°-100°C.
- Lift the vehicle until the wheels can rotate freely.
- Connect the special fluid pressure gauge to the fluid pressure test port.



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TEST PORT	1	2	3	4	5	6	7
Fluid pressure test port name	2nd (Gear 2 Brake) fluid pressure	UD (Low Speed Clutch) fluid pressure	L/R (Low/ Reverse Gear Brake) fluid pressure	DA (Damper Clutch Engagement) fluid pressure	DR (Damper Clutch Disengagement) fluid pressure	RV (Reverse Gear Clutch) fluid pressure	OD (Overdrive Clutch) fluid pressure

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MEASURE STATUS			STANDARD FLUID PRESSURE KPA (PSI)					
GEAR LEVER POSITION	GEAR POSITION	ENGINE SPEED (RPM)	DECELERATION CLUTCH PRESSURE	REVERSE GEAR CLUTCH PRESSURE	OVERDRIVE CLUTCH PRESSURE	LOW/ REVERSE GEAR CLUTCH PRESSURE	SECONDARY BRAKE PRESSURE	TORQUE CONVERTER PRESSURE
P	-	2,500	-	-	-	310 - 390 (45-56)	-	250 - 390 (36 - 56)
R	Reverse Gear	2,500	-	1,270 - 1,770	-	1,270 - 1,770	-	500 - 700 (73 - 101)
N	Neutral Gear	2,500	-	-	-	310 - 390 (45 - 56)	-	250 - 390 (36 - 56)
D	Gear 1	2,500	1,010 - 1,050 (146 - 152)	-	-	1,010 - 1,050 (146 - 152)	-	500 - 700 (73 - 101)
	Gear 2	2,500	-	-	-	-	1,010 - 1,050 (146 - 152)	500 - 700 (73 - 101)
	Gear 3	2,500	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	-	-	450 - 650 (65 - 94)
	Gear 4	2,500	-	-	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	450 - 650 (65 - 94)

- In accordance with the shown status of standard fluid pressure measurement table, measure the fluid pressure of each measurement port. The measurement of each port should be within the standard range.
- If some measurement values is beyond the standard range, please refer to the fluid pressure measurement and diagnosis table for causes.

Is the check result normal?

Yes >> Go to step 5 for disc or plate abrasion.

No >> Go to the next step.

3. CHECK VALVE BODY ASSEMBLY AND FLUID PUMP AND PIPELINE

- Turn the ignition switch off.
- Disassemble and repair F4A4 automatic transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Check valve body and fluid pump and pipeline.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace damaged components and low speed clutch and overdrive clutch for low pressure burned.

4. COMPRESSED AIR TEST

- Check low speed clutch system: Low speed clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.
- Check overdrive clutch system: Overdrive clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.

Is the check result normal?

Yes >> Go to the next step for disc or plate abrasion.

No >> Replace damaged components and low speed clutch and overdrive clutch for low pressure burned.

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5. CHECK LOW SPEED CLUTCH SYSTEM

- Stop vehicle and turn ignition switch off.
- Disassemble and repair F4A4 automatic transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Check low speed clutch system:
  - Check low speed clutch plate
  - Check low speed clutch disc
  - Snap ring
  - Clutch reaction disc
  - D-Ring
  - Spring retainer
  - Low speed clutch piston
  - Low speed clutch drum

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

6. CHECK OVERDRIVE CLUTCH SYSTEM

- Check overdrive clutch system:
  - Check overdrive clutch plate
  - Check overdrive clutch disc
  - Central support
  - Snap ring
  - Clutch reaction disc
  - Spring retainer
  - Overdrive clutch piston

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

7. CHECK DTC

- Assemble all disassembled components.
- Install the transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Fill the transaxle with new ATF:
  - Fill the ATF from the fill tube.
  - Reinstall the hose connector disassembled in step 1 and reinstall the dipstick (clean the dipstick before installing).
  - Shift the gear selector lever to each gear position and then shift to gear “N”.
  - Drive the vehicle until the ATF reaches operating temperature (70° - 80°C) and re-check the fluid level. The fluid level must be within the HOT range of dipstick.
  - Reinstall the dipstick into the transaxle.
  - With the X-431 scan tool, read TCM DTCs.
  - Refer to ″DTC Confirmation Procedure″.

Is DTC 43 present?

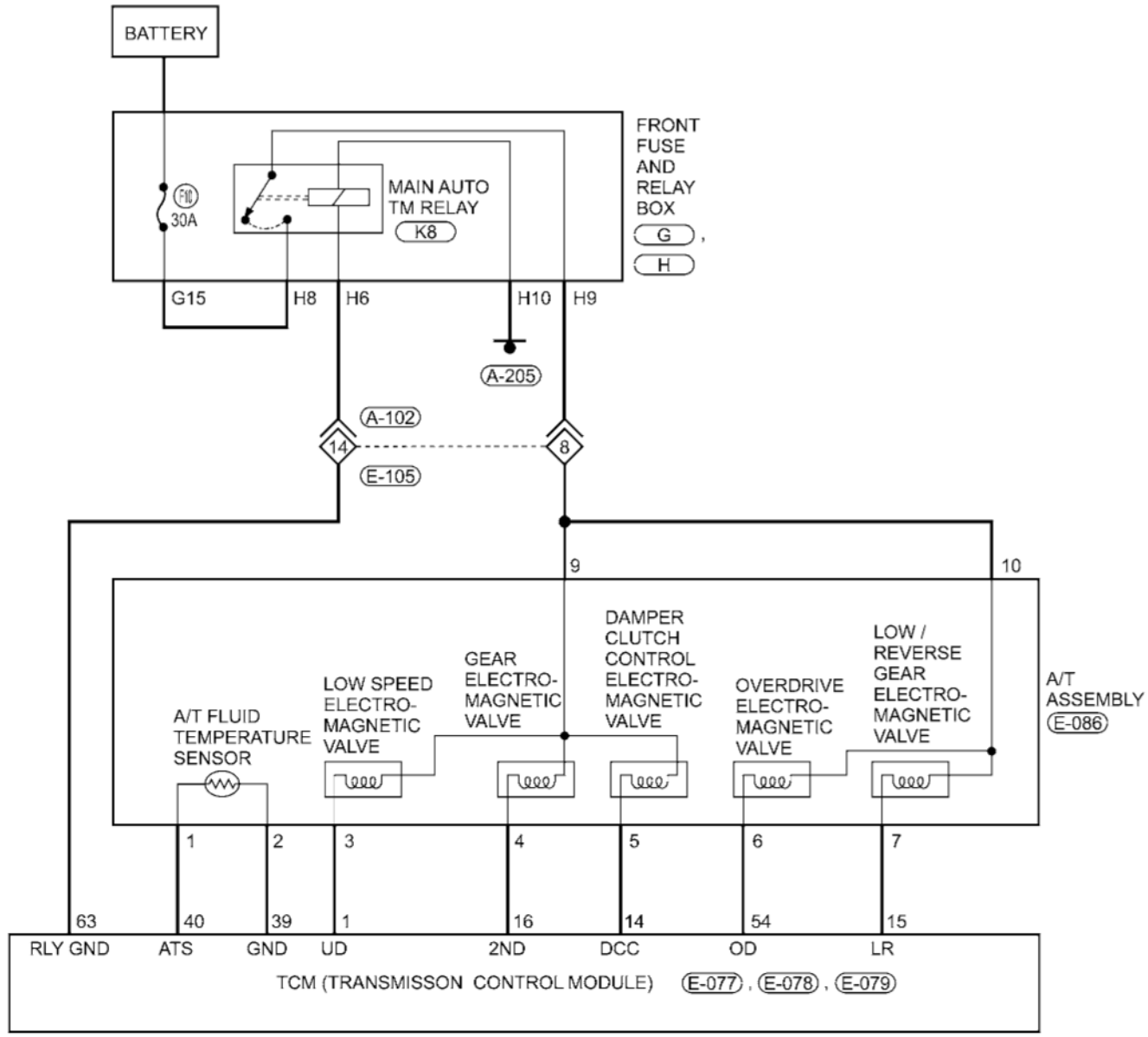
Yes >> Replace the TCM.

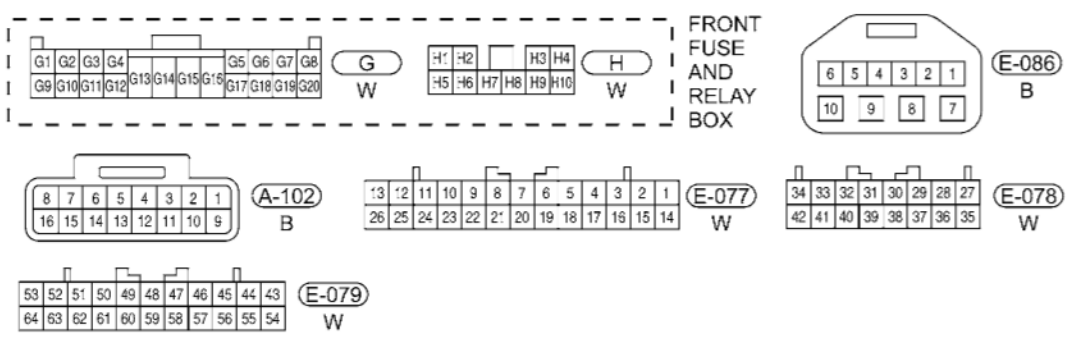
No >> The system is now operating properly.

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44 - Fourth Gear, Ratio Out Of Limits

TM - F4A4 - ASSY - 01





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Operating Components Condition

- Related Operating Components

RELATED OPERATING COMPONENT											
GEARSHIFT LEVER POSITION		GEAR RATIO	ENGINE START	PARKING MECHANISM	DRIVE			LOCK		
					LOW SPEED CLUTCH (UD)	REVERSE GEAR CLUTCH (REV)	OVERSPEED CLUTCH (OD)	LOW GEAR/ REVERSE GEAR BRAKE (L/R)	GEAR 2ND BRAKE (2ND)	ONE-WAY CLUTCH (OWC)
P	Parking	-	Enabled	√	-	-	-	√	-	-
R	Reverse Gear	2.480	-	-	-	√	-	√	-	-
N	Neutral Gear	-	Enabled	-	-	-	-	√	-	-
D	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
	Gear 4	0.712	-	-	√	-	√	-	√	-
3	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
2	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
L	Gear 1	2.842	-	-	√	-	-	√	-	-

*** Low gear/reverse gear is applied when vehicle speed is lower than 10 km/h.**
√ Operating components

On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
44	Fourth gear, ratio out of limits	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected that 4th Gear Ratio Error is already present. The output shaft speed signal is increased. • If the DTC was set 4 times, then the A/T will be locked in 3rd gear (D gear).	• Input shaft speed sensor • Output shaft speed sensor • The retainer of deceleration clutch • Transfer case driven and drive gear • Low speed clutch system • Overdrive clutch system • 2nd brake system • Noise interference

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.

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- After connection, press POWER key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE: Checking the automatic transaxle fluid quality and fluid level is the most basic check of the automatic transaxle. The fluid check is also an important inspection to determine if the transaxle will need to be disassembled.

CAUTION:
The burnt scent of ATF fluid indicates that the transaxle fluid is contaminated. The tiny particles in the fluid pan indicate that the transaxle is worn out and it will be necessary to overhaul the transaxle.

NOTE: While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK FLUID QUALITY AND FLUID LEVEL AND DTC

- Drive the vehicle, until the ATF reaches operating temperature (70° - 80°C).
- Park the vehicle on level ground.
- Shift the gear selector lever to all gear positions once, then shift to gear “N”.
- Clean and check the outside of the dipstick and remove the dipstick to check the fluid level.
- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is DTC 22 or 23 present?

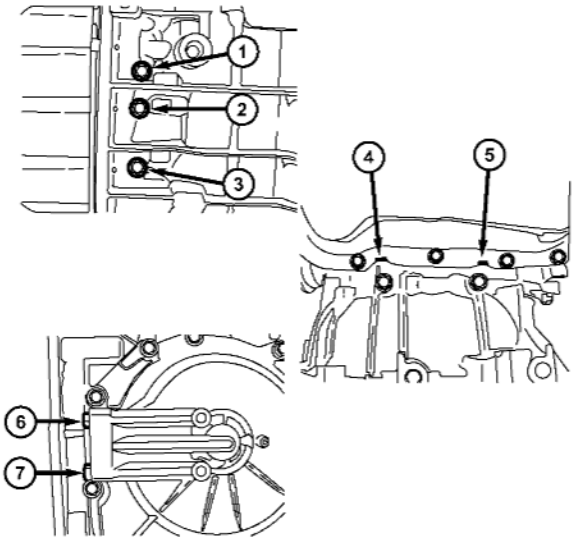
Yes >> If DTC 22 present, See diagnostic procedure for DTC 22 in 08 - Transaxle & Transfer Case.
If DTC 23 present, See diagnostic procedure for DTC 23 in 08 - Transaxle & Transfer Case.

No >> Go to the next step.

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2. HYDRAULIC TEST

- Preheat the fluid from engine to transaxle to 80°-100°C.
- Lift the vehicle until the wheels can rotate freely.
- Connect the special fluid pressure gauge on the fluid pressure test port.



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TEST PORT	1	2	3	4	5	6	7
Fluid pressure test port name	2nd (Gear 2 Brake) fluid pressure	UD (Low Speed Clutch) fluid pressure	L/R (Low/ Reverse Gear Brake) fluid pressure	DA (Damper Clutch Engagement) fluid pressure	DR (Damper Clutch Disengagement) fluid pressure	RV (Reverse Gear Clutch) fluid pressure	OD (Overdrive Clutch) fluid pressure

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MEASURE STATUS			STANDARD FLUID PRESSURE KPA (PSI)					
GEAR LEVER POSITION	GEAR POSITION	ENGINE SPEED (RPM)	DECELERATION CLUTCH PRESSURE	REVERSE GEAR CLUTCH PRESSURE	OVERDRIVE CLUTCH PRESSURE	LOW/ REVERSE GEAR CLUTCH PRESSURE	SECONDARY BRAKE PRESSURE	TORQUE CONVERTER PRESSURE
P	-	2,500	-	-	-	310 - 390 (45-56)	-	250 - 390 (36 - 56)
R	Reverse Gear	2,500	-	1,270 - 1,770	-	1,270 - 1,770	-	500 - 700 (73 - 101)
N	Neutral Gear	2,500	-	-	-	310 - 390 (45 - 56)	-	250 - 390 (36 - 56)
D	Gear 1	2,500	1,010 - 1,050 (146 - 152)	-	-	1,010 - 1,050 (146 - 152)	-	500 - 700 (73 - 101)
	Gear 2	2,500	-	-	-	-	1,010 - 1,050 (146 - 152)	500 - 700 (73 - 101)
	Gear 3	2,500	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	-	-	450 - 650 (65 - 94)
	Gear 4	2,500	-	-	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	450 - 650 (65 - 94)

- In accordance with the shown status of standard fluid pressure measurement table, measure the fluid pressure of each measurement port. The measurement of each port should be within the standard range.
- If some measurement values is beyond the standard range, please refer to the fluid pressure measurement and diagnosis table for causes.

Is the check result normal?

Yes >> Go to step 5 for disc or plate abrasion.

No >> Go to the next step.

3. CHECK VALVE BODY ASSEMBLY AND FLUID PUMP AND PIPELINE

- Turn the ignition switch off.
- Disassemble and repair F4A4 automatic transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Check valve body and fluid pump and pipeline.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace damaged components and 2nd gear brake clutch and overdrive clutch for low pressure burned.

4. COMPRESSED AIR TEST

- Check 2nd gear brake clutch system: 2nd gear brake clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.
- Check overdrive clutch system: overdrive clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.

Is the check result normal?

Yes >> Go to the next step for disc or plate abrasion.

No >> Replace damaged components and 2nd gear brake clutch and overdrive clutch for low pressure burned.

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5. CHECK 2ND GEAR BRAKE SYSTEM

- Check 2nd gear brake system:
  - Check 2nd gear brake plate
  - Check 2nd gear brake disc
  - Central support
  - Snap ring
  - Clutch reaction disc
  - Spring retainer
  - 2nd gear brake piston

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

6. CHECK OVERDRIVE CLUTCH SYSTEM

- Check overdrive clutch system:
  - Check overdrive clutch plate
  - Check overdrive clutch disc
  - Central Support
  - Snap Ring
  - Clutch Reaction Disc
  - Spring Retainer
  - overdrive clutch piston

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

7. CHECK DTC

- Assemble all disassembled components.
- Install the transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Fill the transaxle with new ATF:
  - Fill the ATF from the fill tube.
  - Reinstall the hose connector disassembled in step 1 and reinstall the dipstick (clean the dipstick before installing).
  - Shift the gear selector lever to each gear position and then shift to gear “N”.
  - Drive the vehicle until the ATF reaches operating temperature (70° - 80°C) and re-check the fluid level. The fluid level must be within the HOT range of dipstick.
  - Reinstall the dipstick into the transaxle.
  - With the X-431 scan tool, read TCM DTCs.
  - Refer to ″DTC Confirmation Procedure″.

Is DTC 44 present?

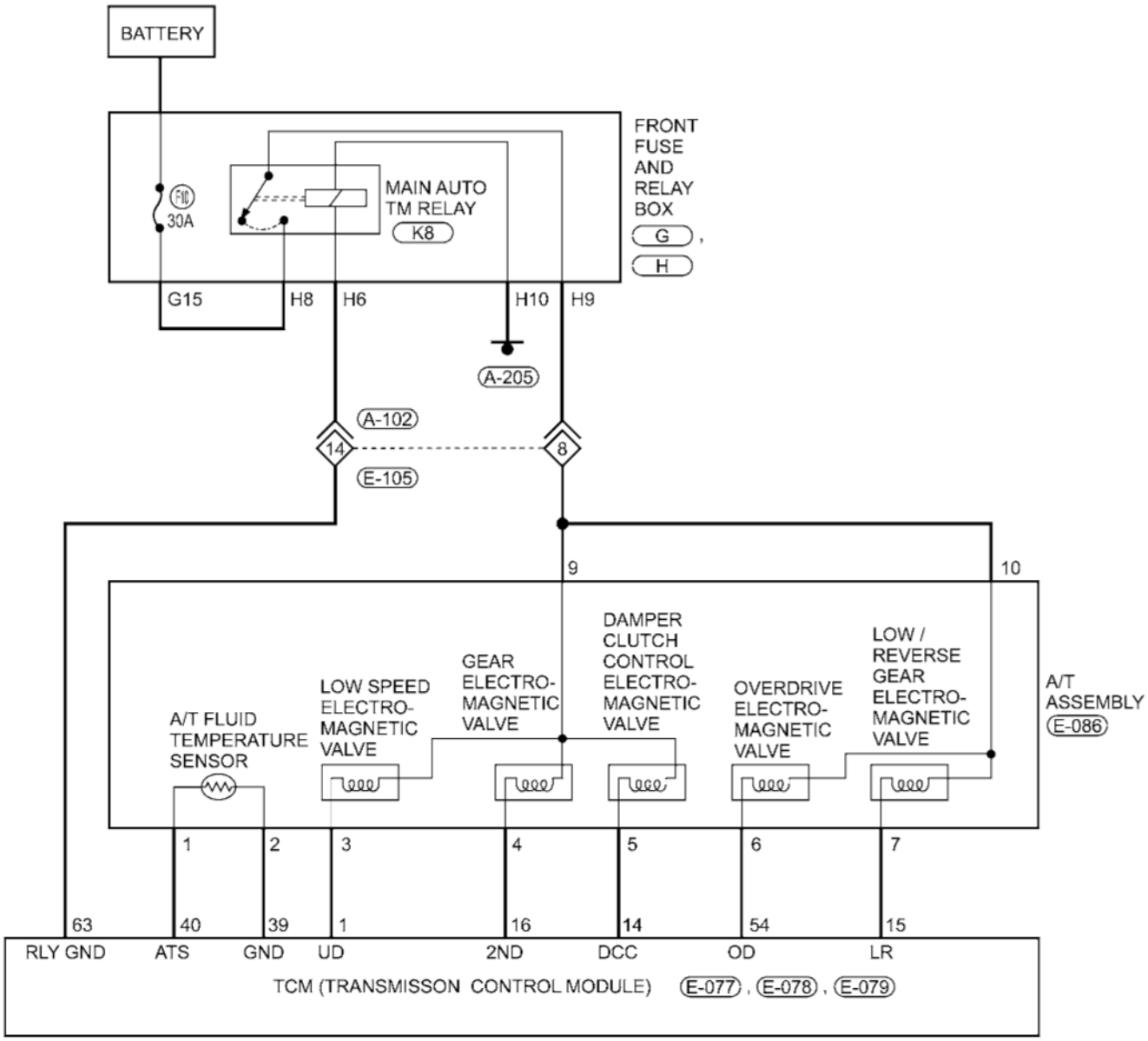
Yes >> Replace the TCM.

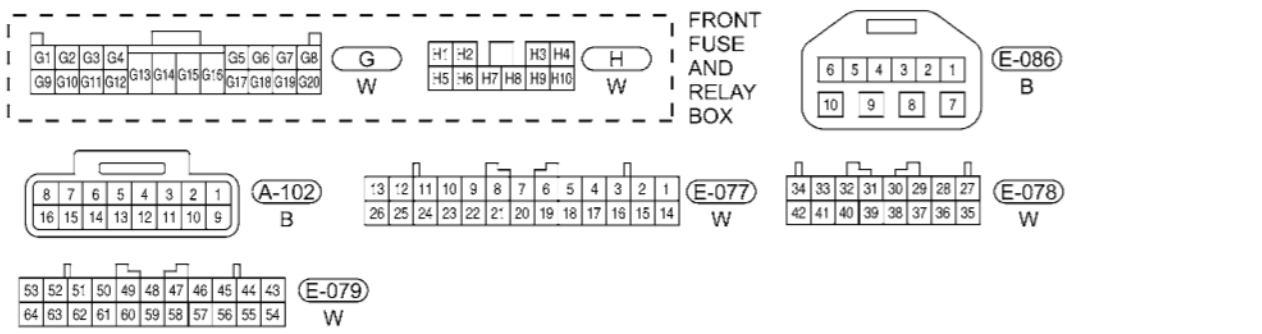
No >> The system is now operating properly.

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46 - Reverse Gear, Ratio Out Of Limits

TM - F4A4 - ASSY - 01





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Operating Components Condition

- Related Operating Components

RELATED OPERATING COMPONENT											
GEARSHIFT LEVER POSITION		GEAR RATIO	ENGINE START	PARKING MECHANISM	DRIVE			LOCK		
					LOW SPEED CLUTCH (UD)	REVERSE GEAR CLUTCH (REV)	OVERSPEED CLUTCH (OD)	LOW GEAR/ REVERSE GEAR BRAKE (L/R)	GEAR 2ND BRAKE (2ND)	ONE-WAY CLUTCH (OWC)
P	Parking	-	Enabled	√	-	-	-	√	-	-
R	Reverse Gear	2.480	-	-	-	√	-	√	-	-
N	Neutral Gear	-	Enabled	-	-	-	-	√	-	-
D	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
	Gear 4	0.712	-	-	√	-	√	-	√	-
3	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
	Gear 3	1.000	-	-	√	-	√	-	-	-
2	Gear 1	2.842	-	-	√	-	-	√*	-	√
	Gear 2	1.529	-	-	√	-	-	-	√	-
L	Gear 1	2.842	-	-	√	-	-	√	-	-

*** Low gear/reverse gear is applied when vehicle speed is lower than 10 km/h.**
√ Operating components

On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
46	Reverse gear, ratio out of limits	Vehicle is driving	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected that reverse Gear Ratio Error is already present. The output shaft speed signal is increased. • If the DTC was set 4 times, then the A/T will be locked in 3rd gear (D gear).	• Input shaft speed sensor • Output shaft speed sensor • The retainer of deceleration clutch • Transfer case driven and drive gear • Reverse gear clutch system • low gear/reverse gear brake (L/R) system • Noise interference

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.

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- After connection, press POWER key to start X-431.
- Turn ignition switch on, with the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature, then select ″D″ position.
- Drive the vehicle in 1st, 2nd, 3rd and 4th gears.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :
Checking the automatic transaxle fluid quality and fluid level is the most basic check of the automatic transaxle. The fluid check is also an important inspection to determine if the transaxle will need to be disassembled.

CAUTION:
The burnt scent of ATF fluid indicates that the transaxle fluid is contaminated. The tiny particles in the fluid pan indicate that the transaxle is worn and it will be necessary to overhaul the transaxle.

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK FLUID QUALITY AND FLUID LEVEL AND DTC

- Drive the vehicle, until the ATF reaches operating temperature (70° - 80°C).
- Park the vehicle on level ground.
- Shift the gear selector lever to all gear positions once, then shift to gear “N”.
- Clean and check the outside of the dipstick and remove the dipstick to check the fluid level.
- With the scan tool, select view DTC and data stream for A/T.
- Start the engine.
- Monitor the value of the gear position as indicated in the following table while driving:

GEAR POSITION	ELECTRO-MAGNETIC VALVE				
	L/R	GEAR 2	UD	OD	DCC (REF)
Gear 1	Off	On	Off	On	Off
Gear 2	On	Off	Off	On	On
Gear 3	On	Off	Off	Off	On
Gear 4	On	Off	On	Off	On
Reverse gear	Off	On	On	On	Off
Neutral gear/ Parking	Off	On	On	On	Off



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Is DTC 22 or 23 present?

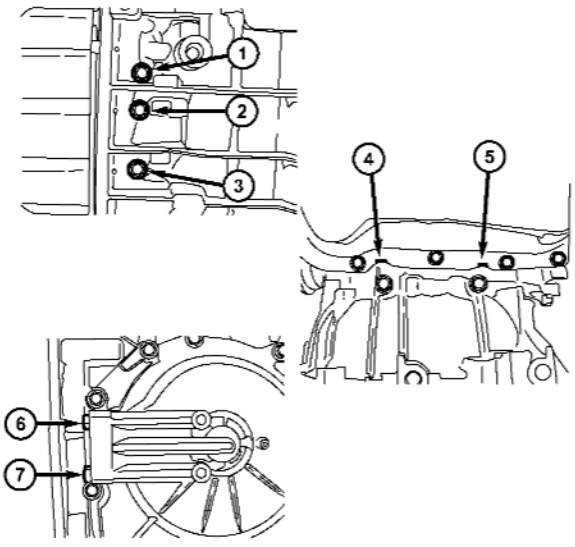
Yes >> If DTC 22 present, See diagnostic procedure for DTC 22 in 08 - Transaxle & Transfer Case.
If DTC 23 present, See diagnostic procedure for DTC 23 in 08 - Transaxle & Transfer Case.

No >> Go to the next step.

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2. HYDRAULIC TEST

- Preheat the fluid from engine to transaxle to 80 - 100°C.
- Lift the vehicle until the wheels can rotate freely.
- Connect the special fluid pressure gauge on the fluid pressure test port.



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TEST PORT	1	2	3	4	5	6	7
Fluid pressure test port name	2nd (Gear 2 Brake) fluid pressure	UD (Low Speed Clutch) fluid pressure	L/R (Low/ Reverse Gear Brake) fluid pressure	DA (Damper Clutch Engagement) fluid pressure	DR (Damper Clutch Disengagement) fluid pressure	RV (Reverse Gear Clutch) fluid pressure	OD (Overdrive Clutch) fluid pressure

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MEASURE STATUS			STANDARD FLUID PRESSURE KPA (PSI)					
GEAR LEVER POSITION	GEAR POSITION	ENGINE SPEED (RPM)	DECELERATION CLUTCH PRESSURE	REVERSE GEAR CLUTCH PRESSURE	OVERDRIVE CLUTCH PRESSURE	LOW/ REVERSE GEAR CLUTCH PRESSURE	SECONDARY BRAKE PRESSURE	TORQUE CONVERTER PRESSURE
P	-	2,500	-	-	-	310 - 390 (45-56)	-	250 - 390 (36 - 56)
R	Reverse Gear	2,500	-	1,270 - 1,770	-	1,270 - 1,770	-	500 - 700 (73 - 101)
N	Neutral Gear	2,500	-	-	-	310 - 390 (45 - 56)	-	250 - 390 (36 - 56)
D	Gear 1	2,500	1,010 - 1,050 (146 - 152)	-	-	1,010 - 1,050 (146 - 152)	-	500 - 700 (73 - 101)
	Gear 2	2,500	-	-	-	-	1,010 - 1,050 (146 - 152)	500 - 700 (73 - 101)
	Gear 3	2,500	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	-	-	450 - 650 (65 - 94)
	Gear 4	2,500	-	-	590 - 690 (85 - 100)	-	590 - 690 (85 - 100)	450 - 650 (65 - 94)

- In accordance with the shown status of standard fluid pressure measurement table, measure the fluid pressure of each measurement port. The measurement of each port should be within the standard range.
- If some measurement values is beyond the standard range, please refer to the fluid pressure measurement and diagnosis table for causes.

Is the check result normal?

Yes >> Go to step 5 for disc or plate abrasion.

No >> Go to the next step.

3. CHECK VALVE BODY ASSEMBLY AND FLUID PUMP AND PIPELINE

- Turn the ignition switch off.
- Disassemble and repair F4A4 automatic transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Check valve body and fluid pump and pipeline.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace damaged components and low speed clutch and reverse gear clutch for low pressure burned.

4. COMPRESSED AIR TEST

- Check low speed clutch system: Low speed clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.
- Check reverse gear clutch system: Reverse gear clutch piston should be active and maintain pressure when compressed air is applied to the fluid hole.

Is the check result normal?

Yes >> Go to the next step for disc or plate abrasion.

No >> Replace damaged components and low speed clutch and reverse gear clutch for low pressure burned.

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5. CHECK LOW SPEED CLUTCH SYSTEM

- Stop vehicle and turn ignition switch off.
- Disassemble and repair F4A4 automatic transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Check low speed clutch system:
  - Check low speed clutch plate
  - Check low speed clutch disc
  - Snap ring
  - Clutch reaction disc
  - D-Ring
  - Spring retainer
  - Low speed clutch drum
  - Low speed clutch piston

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

6. CHECK REVERSE GEAR CLUTCH SYSTEM

- Check reverse gear clutch system:
  - Reverse gear clutch plate
  - Reverse gear clutch disc
  - Central support
  - Snap ring
  - Clutch reaction disc
  - Spring retainer
  - Reverse gear clutch piston

Is the check result normal?

Yes >> Go to the next step.

No >> Replace the damaged components.

7. CHECK DTC

- Assemble all disassembled components.
- Install the transaxle assembly (See Automatic Transaxle Removal & Installation in Section 08 Transaxle & Transfer Case).
- Fill the transaxle with new ATF:
  - Fill the ATF from the fill tube.
  - Reinstall the hose connector disassembled in step 1 and reinstall the dipstick (clean the dipstick before installing).
  - Shift the gear selector lever to each gear position and then shift to gear “N”.
  - Drive the vehicle until the ATF reaches operating temperature (70° - 80°C) and re-check the fluid level. The fluid level must be within the HOT range of dipstick.
  - Reinstall the dipstick into the transaxle.
- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC 46 present?

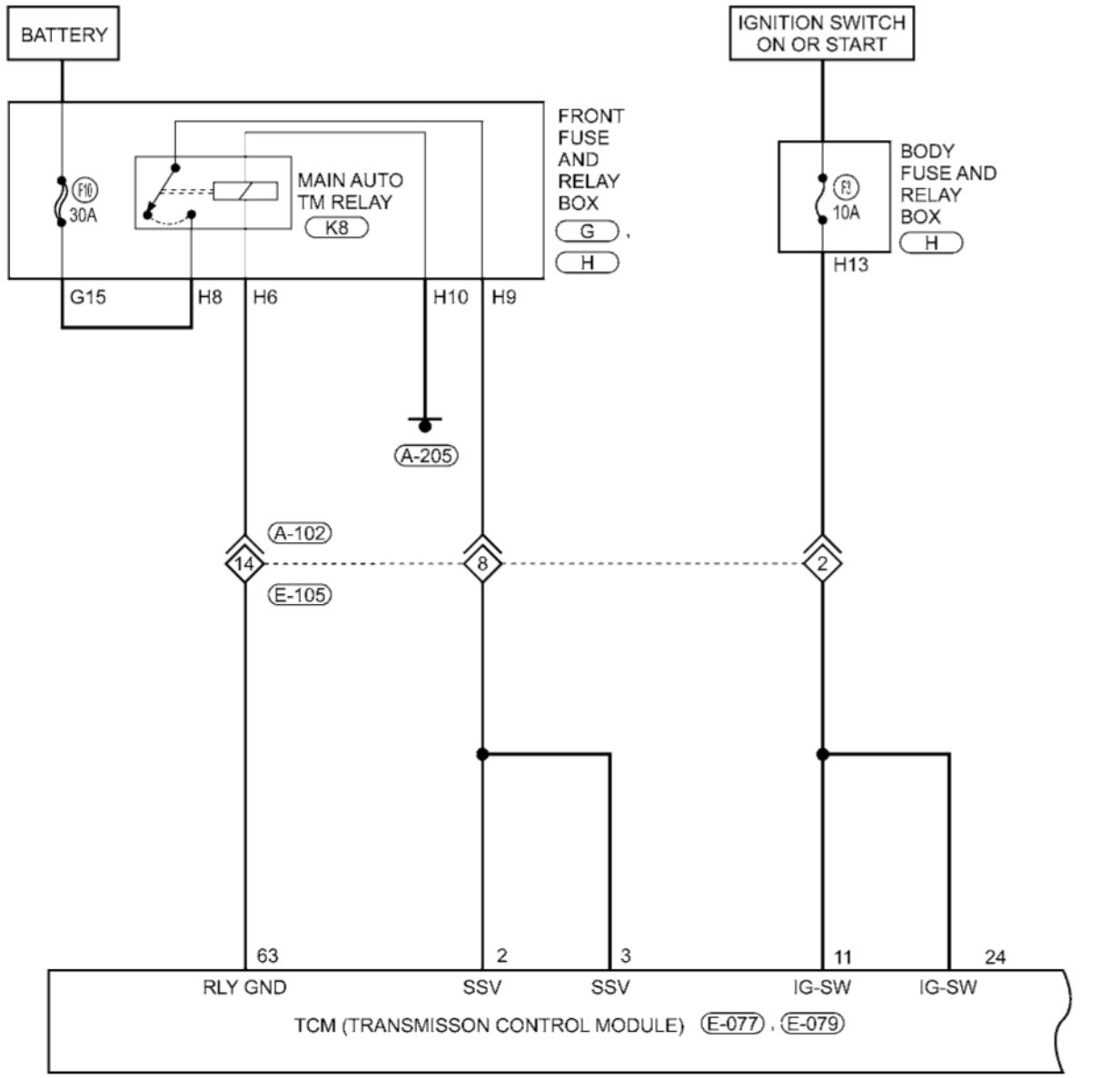
Yes >> Replace the TCM.

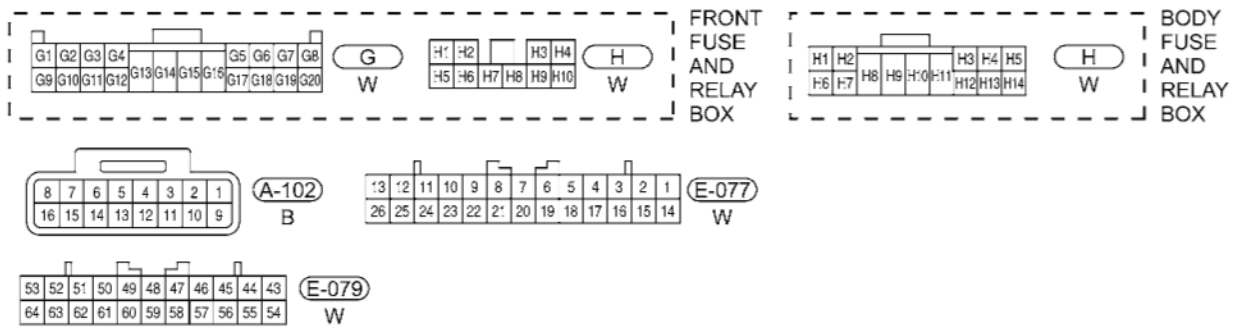
No >> The system is now operating properly.

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54 - Electrical Relay Open Circuit

TM - F4A4 - PWR - 01





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On Board Diagnostic Logic

- Self-diagnosis detection logic.

DTC NO.	DTC DEFINITION	DTC DETECTION CONDITION	DTC SET CONDITION	POSSIBLE CAUSES
54	Electrical relay open circuit	Ignition switch on	• The Transaxle Control Module (TCM) will set this DTC when the TCM detected that the A/T control voltage is below 7 V. • If the DTC was set, then the A/T will be locked in 3rd gear (D gear) or shifted to low gear when in sports mode.	• A/T control relay • Harness or connectors (The sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure:

Before performing the following procedure, confirm that battery voltage is more than 12 V.

- Connect the X-431 scan tool to the Data Link Connector (DLC) - use the most current software available.
- After connection, press POWER key to start X-431.
- Turn the ignition switch on.
- With the scan tool, view and erase stored DTCs in the TCM.
- Start engine and warm it to normal operating temperature.
- With the scan tool, select view DTC and data stream.
- If the DTC is detected, the DTC condition is current. Go to Diagnostic Procedure - Step 1.
- If the DTC is not detected, the DTC condition is intermittent (See Diagnostic Help and Intermittent DTC Troubleshooting in Section 08 Transaxle & Transfer Case for more information).

NOTE :
While performing electrical diagnosis & testing, always refer to the electrical schematics for specific circuit and component information.

Diagnostic Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch off.
- Loosen and retighten ground screws on the body (See Ground Inspection in Section 12 Brakes).
- Inspect the ground connection C-201 mounting position (See Vehicle Wiring Harness Layout - Main Harness in Section 16 Wiring).

Are the ground connections OK?

Yes >> Go to the next step.

No >> Repair or replace the ground connections.

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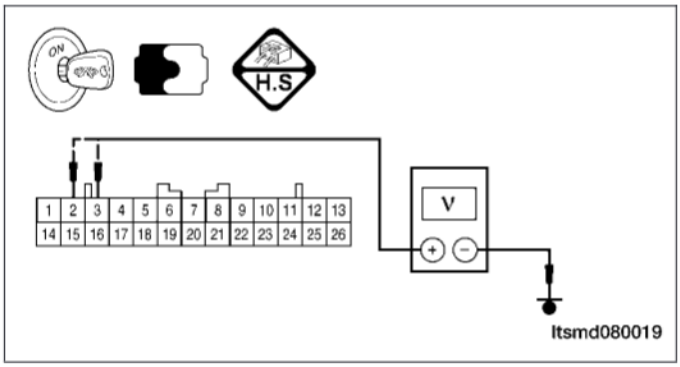
2. CHECK A/T RELAY SUPPLY VOLTAGE

- Turn ignition switch ON and then OFF.
- Check voltage between TCM terminals 2, 3 and ground.
- Turn ignition switch ON, battery voltage will exist.
- After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.

Is the check result normal?

Yes >> Go to step 8.

No >> Go to the next step.



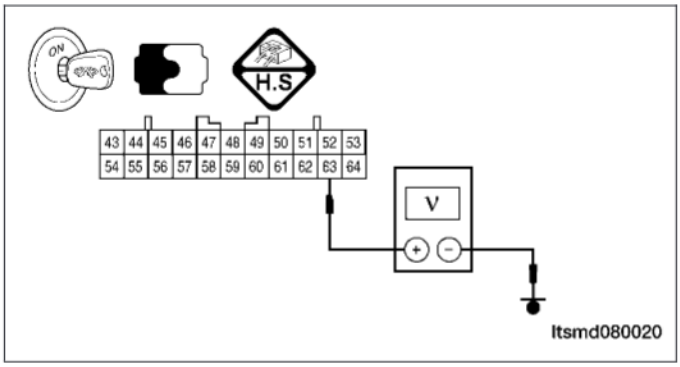
3. CHECK A/T RELAY CONTROL VOLTAGE

- Turn ignition switch on.
- Check voltage between ECM terminal 63 and ground.
- Voltage should be more than 12 V.

Is the check result normal?

Yes >> Go to the next step.

No >> Go to step 8.



4. CHECK A/T RELAY CONTROL VOLTAGE CIRCUIT

- Disconnect TCM harness connector.
- Disconnect front fuse and relay box harness connector H.
- Check harness continuity between TCM terminal 63 and front fuse and relay box terminal H6.
- Check harness continuity between front fuse and relay box terminal H10 and front fuse and ground.
- Check harness connector A-102, E-105, terminal 11.
- Continuity should exist.
- Check the harness for short to power or short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for an open or short to ground or short to power in harness or connectors.

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5. CHECK A/T RELAY SUPPLY CIRCUIT

- Check harness continuity between TCM terminal 2, 3 and front fuse and relay box terminal H9.
- Check for harness continuity between front fuse and relay box terminal H8 and G15.
- Check harness connector A-102, E-105, terminal 1.
- Continuity should exist.
- Check the harness for short to ground.

Is the check result normal?

Yes >> Go to the next step.

No >> Repair or replace the circuit for an open or short to ground in harness or connectors.

6. CHECK FUSE

- Disconnect Fuse 10 (30A) fuse from the front fuse and relay box.
- Check fuse 10 (30A).

Is the check result normal?

Yes >> Go to the next step.

No >> Replace fuse 10 (30A).

7. CHECK FRONT FUSE AND RELAY BOX

- Check front fuse and relay box.

Is the check result normal?

Yes >> Go to the next step.

No >> Replace front fuse and relay box.

8. CHECK DTC

- With the X-431 scan tool, read TCM DTCs.
- Refer to ″DTC Confirmation Procedure″.

Is DTC 54 still present?

Yes >> Replace the TCM.

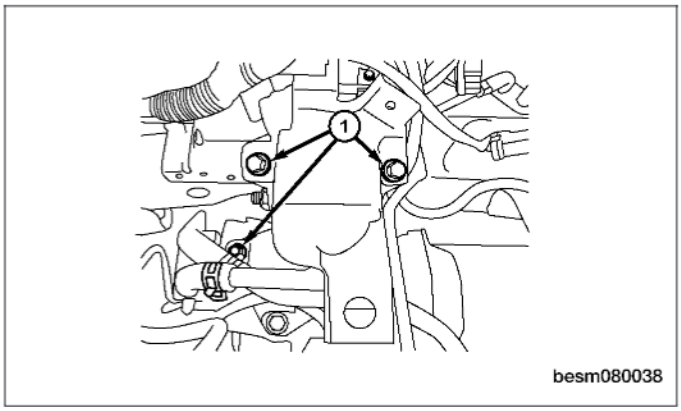
No >> The system is now operating properly.
Reassemble the vehicle and road test to verify the customers complaint is repaired.

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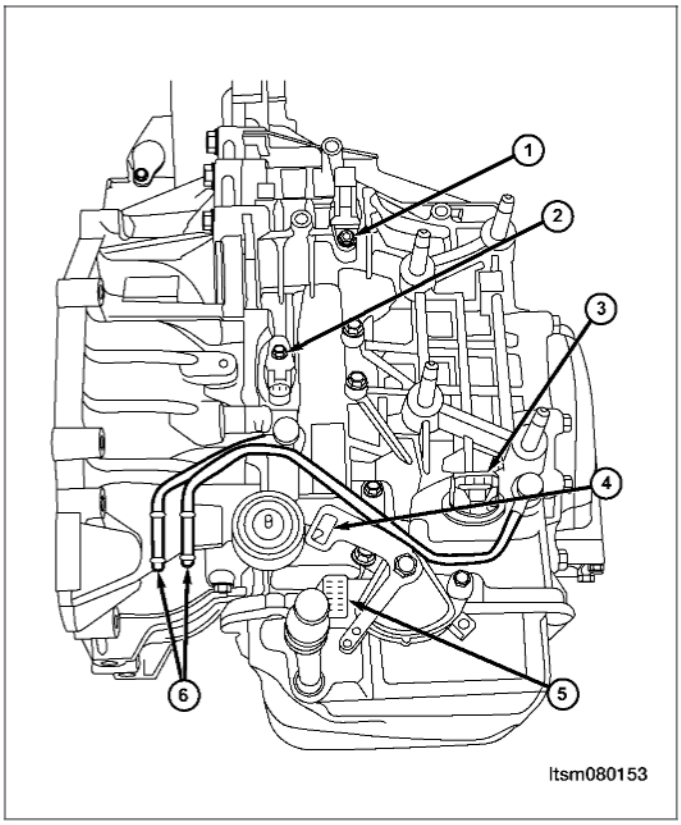
F4A4 Automatic Transaxle Assembly

Removal & Installation

1. Raise and support the vehicle.
2. Disconnect the negative battery cable.
3. Remove the battery and battery tray (See Battery Removal & Installation in Section 05 Starting & Charging).
4. Remove the air cleaner and air duct assembly.
5. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
6. Remove the base mounting bolts (1) of the air cleaner housing assembly.



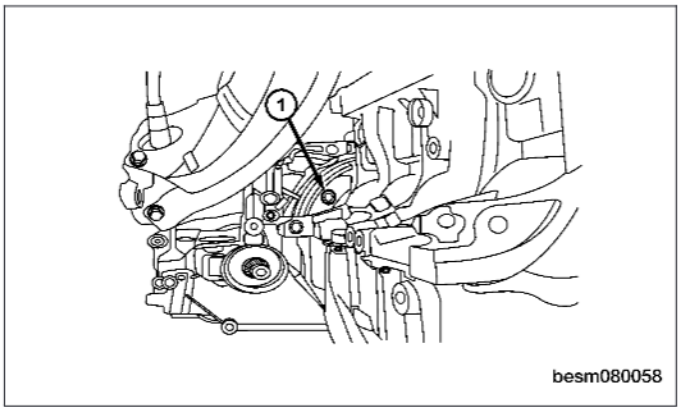
7. Disconnect and remove the electrical connectors for the following components:
   - Output shaft sensor (1)
   - Input shaft sensor (2)
   - Electromagnetic valve switch connector (3)
   - Gear switch connector (5)
8. Disconnect the transaxle fluid lines (6) using a suitable tool.
9. Remove the shift cable (4) from the transaxle assembly.



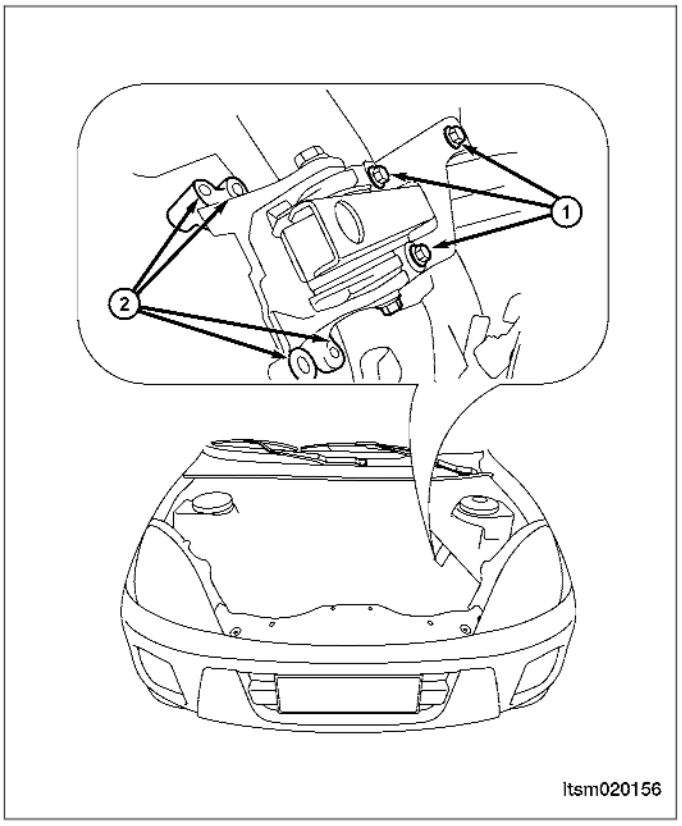
10. Remove the starter motor (See Starter Removal & Installation in Section 05 Starting & Charging).

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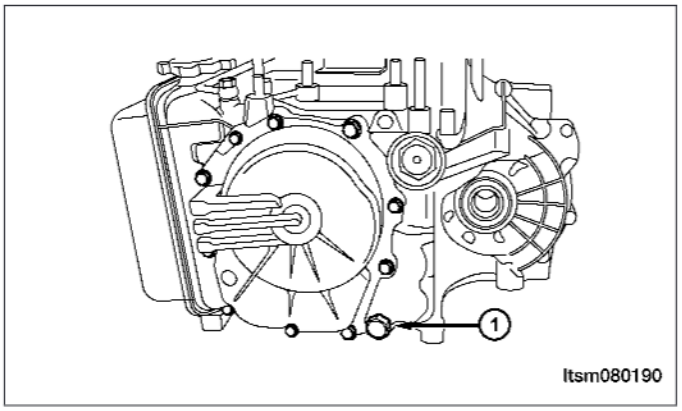
11. Remove the bolts (1) attaching the drive plate to the torque converter.
(Tighten: Drive plate bolts to 75 N·m)



12. Support the engine using an engine support fixture or suitable jack.
13. Remove the engine to transaxle upper bolts and remove the bracket.
(Tighten: Engine to transaxle upper bolts to 80 N·m)
14. Remove transaxle mount nuts (2) and the transaxle mount bracket bolts (1).
(Tighten: Transaxle mount nuts to 120 N·m)

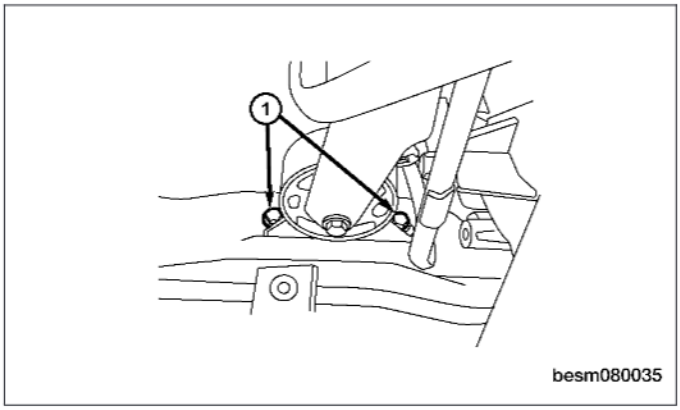


15. Raise the vehicle.
16. Remove the drain plug (1) and drain the transaxle fluid.

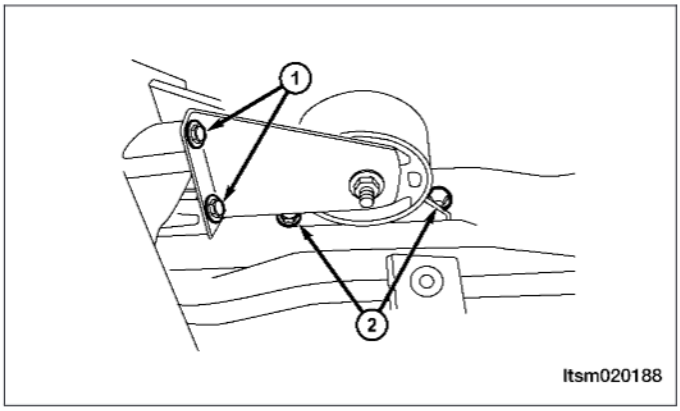


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17. Remove both front axle shafts (See Front Axle Shaft Removal & Installation in Section 09 Driveline & Axle).
18. Remove the engine undercover and splash shields.
19. Remove the engine to transaxle lower bolts.
    (Tighten: Engine to transaxle lower bolts to 80 N·m)
20. Remove the bolts that mount the side sill to vehicle body.
    (Tighten: Side sill to vehicle body bolts to 120 N·m)
21. Remove the front engine mount bolts (1).
    (Tighten: Front mount bolts to 60 N·m)



22. Remove the rear engine mount bolts (2) and the rear engine mount bracket bolts (1).
    (Tighten: Rear mount bolts to 40 N·m)



23. Remove the sub-frame assembly (See Sub-Frame Assembly Removal & Installation in Section 10 Suspension).
24. Remove the engine to transaxle lower bolts.
    (Tighten: Transaxle mount bolts to 40 N·m)
25. Separate the transaxle from the engine and remove the transaxle from the vehicle.

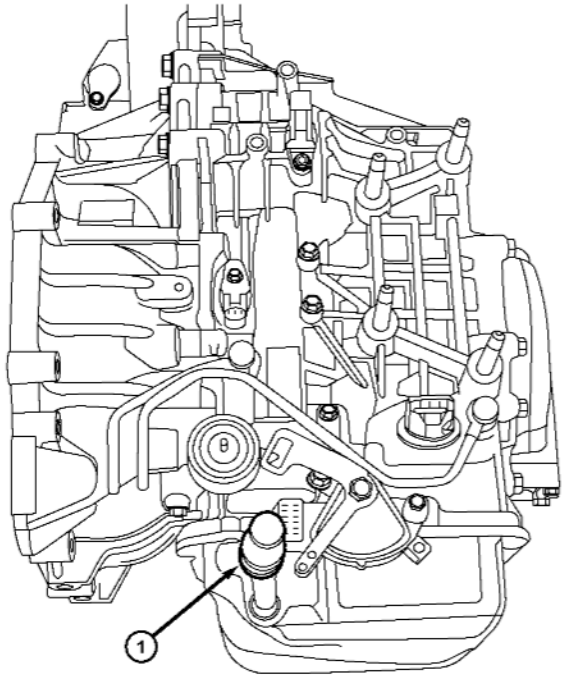
WARNING!
Use a suitable jack to support the transaxle during removal.

26. Installation is in the reverse order of removal.

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Installation Notes:

- Check the transaxle fluid level.
  - Drive the vehicle until the ATF reaches operating temperature (70° - 80°C).
  - Park the vehicle on level ground.
  - Shift the gear selector lever to all gear positions once, then shift to gear “N”.
  - Clean and check the outside of the dipstick and remove the dipstick to check the fluid level.
  - Check if the transmission fluid level is within the HOT marking of the dipstick. If lower than the HOT marking, refill the transaxle until the fluid level is above the HOT marking.
- After installation, check for any fluid leakage and verify the transaxle fluid level is correct. Refill the transaxle fluid through the fill hole (1) shown in the figure.



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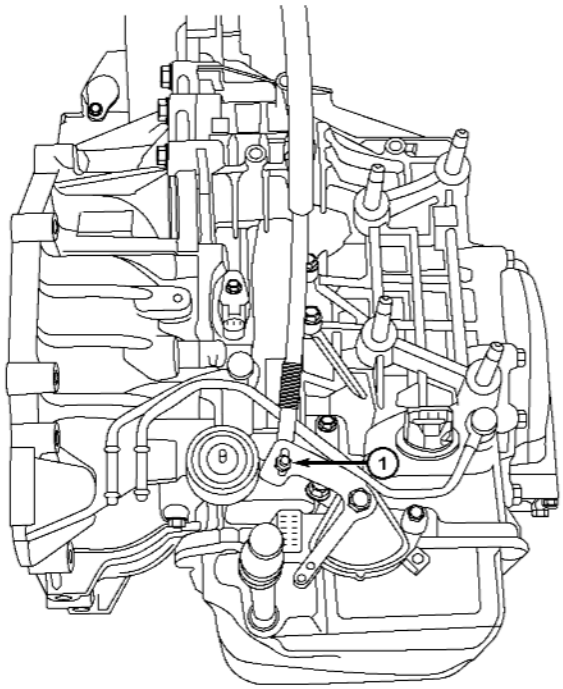
Automatic Shifter Selector

Removal & Installation

1. Raise and support the vehicle.
2. Disconnect the negative battery cable.
3. Remove the air cleaner and air duct assembly.
4. Remove the base mounting of the air cleaner housing assembly.

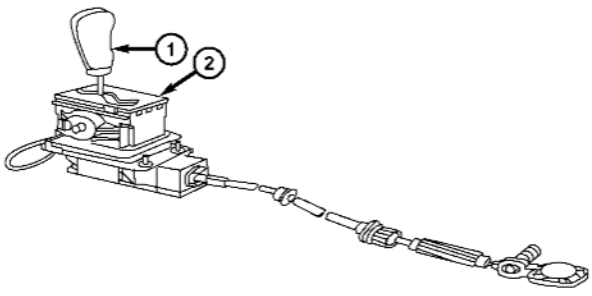
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5. Remove the shift cable adjusting bolt (1) from the transaxle gearshift switch.



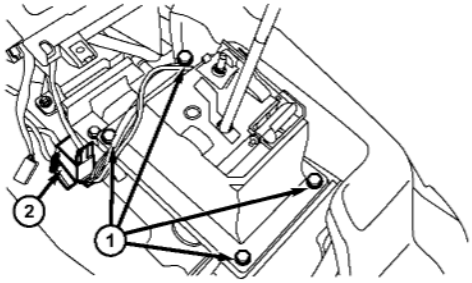
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6. Remove the gearshift knob (1).
7. Remove the gearshift cover (2) from the lower console.



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8. Apply the parking brake (apply parking brake handle to clear lower console during removal).
9. Remove the lower console (See Lower Console Removal & Installation in Section 15 Body & Accessories).
10. Remove the shift cable from the gearshift mechanism.
11. Disconnect the electrical connector (2).
12. Remove the four bolts (1) and then remove the gearshift mechanism from the bracket.

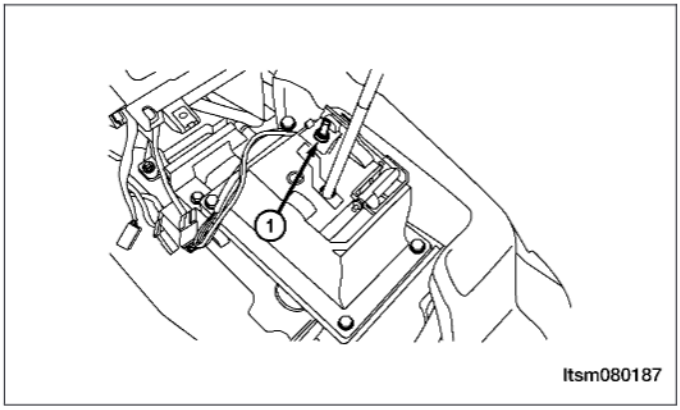


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13. Installation is in the reverse order of removal.

NOTE :
If the battery has low voltage, press the release switch (1) to move the gearshift lever.



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5-SPEED MANUAL TRANSAXLE

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- Operation 08-250
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DIAGNOSIS & TESTING 08-259
- Abnormal Noise 08-259
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Manual Transaxle Assembly 08-260
- Removal & Installation 08-260

Gear Selector & Shifter Assembly 08-264
- Removal & Installation 08-264
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MANUAL TRANSAXLE UNIT REPAIR 08-270

Transaxle 08-270
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Output Shaft 08-287
- Disassemble 08-287
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Output Gear For Reverse Gear 08-296
- Disassemble 08-296
- Inspection 08-296

5th-Reverse Gear Shift Fork 08-297
- Disassemble 08-297
- Assemble 08-298

3rd-4th Gear Shift Fork 08-298
- Disassemble 08-298
- Assemble 08-299

1st-2nd Gear Shift Fork 08-299
- Disassemble 08-299
- Assembly 08-300

Transaxle Clutch Housing Assembly 08-301
- Disassemble 08-301
- Assembly 08-303

Transaxle Main Housing Assembly 08-305
- Assembly 08-305

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GENERAL INFORMATION

Description

The QR523 five-speed transaxle is a constant-mesh manual transaxle that is synchronized in all gear ranges, including reverse.

The transaxle consists of three major sub-assemblies:

- Input shaft
- Output shaft
- Differential transaxle assembly

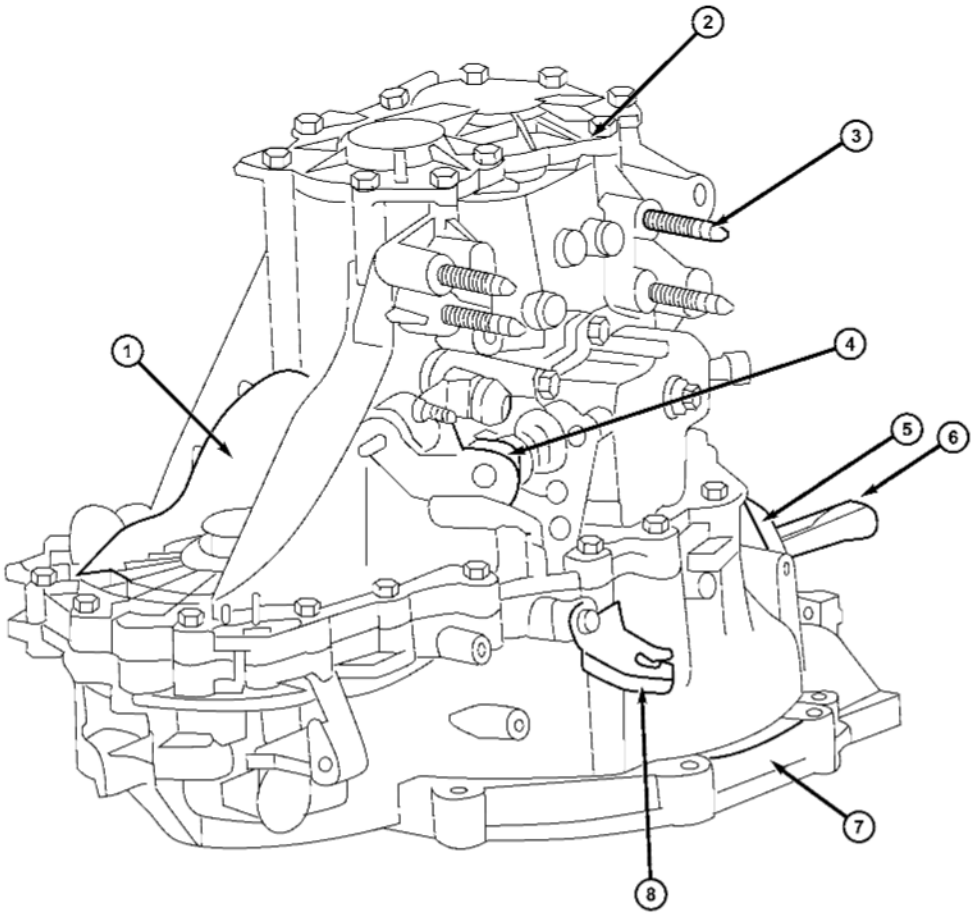
The transaxle shift system consists of the following components:

- Mechanical shift cover
- Shift rails
- Shift forks

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- Shift cables

QR523 External View

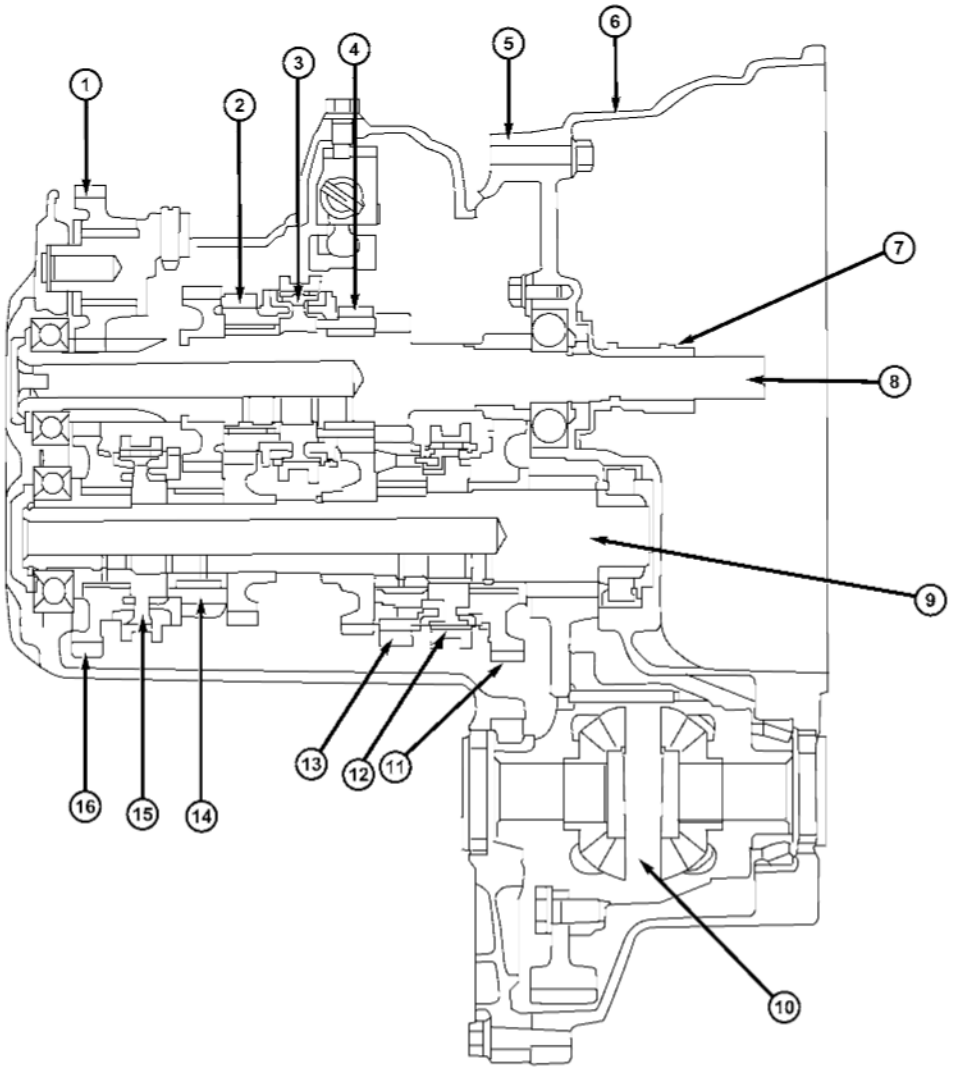


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1 - Transaxle Housing Assembly	5 - Release Fork Dust Boot
2 - Bearing Cap Assembly	6 - Release Fork
3 - Stud Bolt	7 - Clutch Housing Assembly
4 - Gear-Shifting Mechanism Assembly	8 - Hydraulic Clutch Line Bracket

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QR523 Internal View



1 - Idler Assembly	9 - Output Shaft
2 - Pinion Gear, 4th Gear	10 - Differential Assembly
3 - 3rd-4th Gear Synchronizer	11 - Driven Gear of 1st Gear
4 - Pinion Gear, 3rd Gear	12 - 1st-2nd Gear Synchronizer
5 - Transaxle Housing	13 - Driven Gear, 2nd Gear
6 - Clutch Housing	14 - Driven Gear, 5th Gear
7 - Release Bearing Saddle	15 - Synchronizer of 5th-Gear and Reserve Gear
8 - Input Shaft	16 - Gear, Reverse Gear

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Operation

The following are the details of the manual transaxle:

Neutral

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. Since no synchronizers are engaged on either the input or output shafts, power is not transmitted to the output shafts, power is not transmitted to the output shaft and the differential does not turn.

1st Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft first gear is integral to the input shaft, and is in constant mesh with the intermediate shaft first speed gear. Because of this constant mesh, the output shaft first speed gear freewheels until first gear is selected. As the gearshift lever is moved to the first gear position, the 1-2 fork moves the 1-2 synchronizer sleeve towards first gear on the output shaft. The synchronizer sleeve engages the first gear clutch teeth, engaging the gear to the output shaft, and allowing power to transmit through the output shaft to the differential.

2nd Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft second gear is integral to the input shaft, and is in constant mesh with the output shaft second speed gear. Because of this constant mesh, the output shaft second speed gear freewheels until second gear is selected. As the gearshift lever is moved to the second gear position, the 1-2 fork moves the 1-2 synchronizer sleeve towards second gear on the output shaft. The synchronizer sleeve engages the second gear clutch teeth, engaging the gear to the output shaft, and allowing power to transmit through the output shaft to the differential.

3rd Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft third speed gear is in constant mesh with the output shaft 3-4 cluster gear which is fixed to the output shaft. Because of this constant mesh, the input shaft third speed gear freewheels until third gear is selected. As the gearshift lever is moved to the third gear position, the 3-4 fork moves the 3-4 synchronizer sleeve towards third gear on the input shaft. The synchronizer sleeve engages the third gear clutch teeth, engaging the gear to the input shaft, and allowing power to transmit through the output shaft to the differential.

4th Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft fourth speed gear is in constant mesh with the output shaft 3-4 cluster gear which is fixed to the output shaft. Because of this constant mesh, the input shaft fourth speed gear freewheels until fourth gear is selected. As the gearshift lever is moved to the fourth gear position, the 3-4 fork moves the 3-4 synchronizer sleeve towards fourth gear on the input shaft. The synchronizer sleeve engages the fourth gear clutch teeth, engaging the gear to the input shaft, and allowing power to transmit through the output shaft to the differential.

5th Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft fifth speed gear is pressed on to the input shaft, and is in constant mesh with the output shaft fifth speed gear. Because of this constant mesh, the output shaft fifth speed gear freewheels until fifth gear is selected. As the gearshift lever is moved to the fifth gear position, the 5-R fork moves the 5-R synchronizer sleeve towards the output shaft fifth speed gear. The synchronizer sleeve engages the fifth gear clutch teeth, engaging the gear to the input shaft, and allowing power to transmit through the output shaft to the differential.

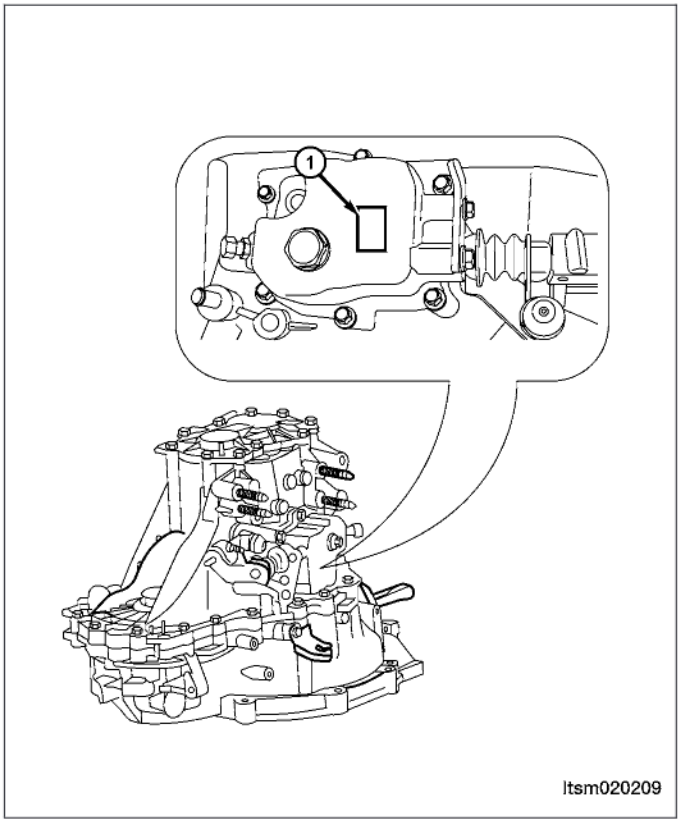
Reverse Gear

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft reverse gear is integral to the input shaft, and is in constant mesh with the reverse idler gear. The reverse idler gear, which reverses the rotation of the output shaft, is in constant mesh with the output shaft reverse gear. Because of this constant mesh, the output shaft reverse gear freewheels until reverse gear is selected. As the gearshift lever is moved to the reverse gear position, the 5-R fork moves the 5-R synchronizer sleeve towards the output shaft reverse gear. The synchronizer sleeve engages the reverse gear clutch teeth, engaging the gear to the output shaft, and allowing power to transmit through the output shaft to the differential.

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Transaxle Identification Number

The transaxle serial number can be found on a metal tag (1) fastened to the transaxle case on the clutch housing. The third row data is the transaxle serial number.



Specifications

Maintenance Specifications

DESCRIPTION	ALLOWABLE RANGE (mm)	LIMIT VALUE (mm)
Axial Clearance Of Input Shaft Front Bearing	-0.01 - 0.21	-
Axial Clearance Of Input Shaft Rear Bearing	-0.01 - 0.12	-
Axial Clearance Of Input Shaft Fifth Gear	-0.01 - 0.09	-
Axial Clearance Of Output Shaft Front Bearing	-0.01 - 0.12	-
Axial Clearance Of Output Shaft Rear Bearing	-0.01 - 0.09	-
Axial Clearance Of Output Shaft Third Gear	-0.01 - 0.09	-
Back Clearance Of Differential Case Planetary Gear	0.025 - 0.150	-
Clearance Between The Gear And The Back Of Synchronizer Ring	-	0.05
Pretension Of Differential Case	0.05 - 0.11	-

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Sealants and Adhesives

DESCRIPTION	SPECIFIED SEALANTS AND ADHESIVES
Clutch Housing to Transaxle Housing	Three Arrow 1216E
Control Case to Transaxle Housing	
Lower Head to Transaxle Housing	

Torque Specifications

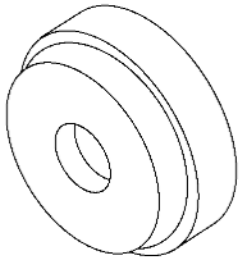
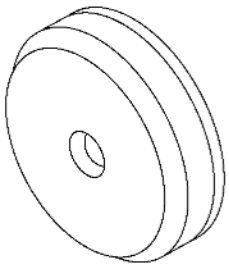
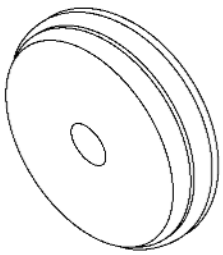
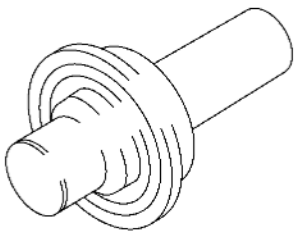
DESCRIPTION	TORQUE (N·m)
Bottom Cover-Transaxle Installation Bolts	6.2 - 7.6
Backup Lamp Switch	28.7 - 35.3
Clutch Housing-Transaxle Housing Installation Bolts	39.5 - 48.5
Clutch Release Bearing Saddle Retainer Installation Bolts	8.8 - 10.8
Gear-Shifting Mechanism Assembly Installation Bolts	16.1 - 19.9
Gear-Shifting Staying Wire Bracket Installation Bolts	16.1 - 19.9
Idling Gear Assembly Installation Bolts	43.1 - 52.9
Main Gearbox Driven Gear Installation Bolts	118.5 - 145.5
Speedometer Gear Installation Bolts	3.5 - 4.3

Technical Data

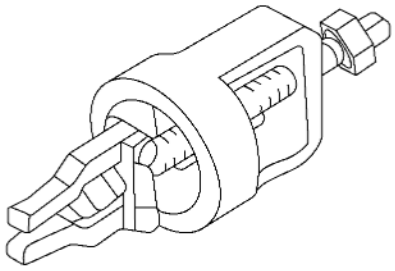
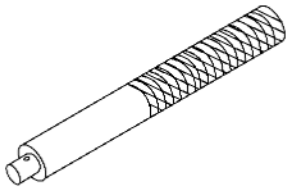
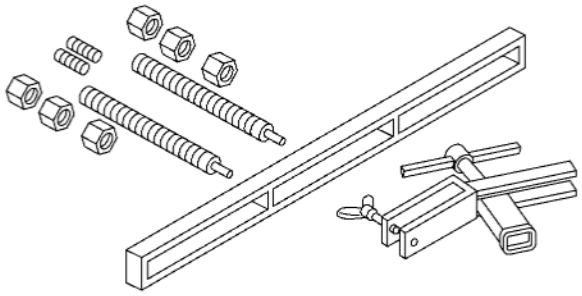
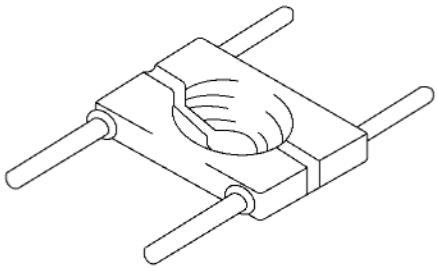
TYPE	MECHANICAL GEAR COUPLING	
Gear Position	Transaxle Ratio	Gear Ratio
1st	3.583	43/12
2nd	1.947	37/19
3rd	1.379	40/29
4th	1.030	34/33
5th	0.820	32/39
Reverse	3.363	37/11
Final Drive	4.313	69/16
Transaxle Fluid Type	GL-4 75W-90	
Transaxle Fluid Quantity	2.2 L	
Rated Torque	230 N·m	
Rated Speed	5500 RPM	
Rated Power	100 KW	
Center Distance	204 mm	
Input Shaft Spline	Tooth number	20
	Module	1.0583
	Pressure angle	30°
	External diameter	ϕ22.224 mm (0/-0.3)
	Inner diameter	ϕ19.675 mm (0/-0.2)
Physical Dimension	398.5×522×355.7	

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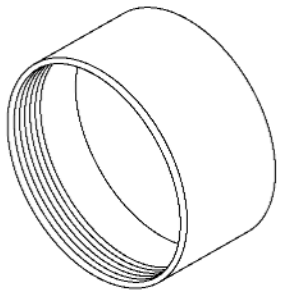
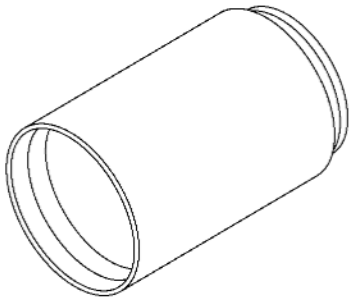
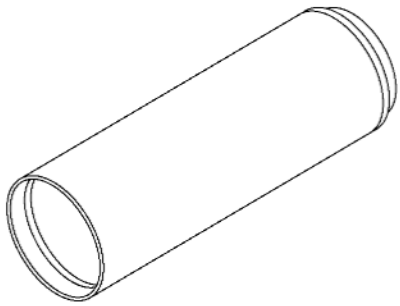
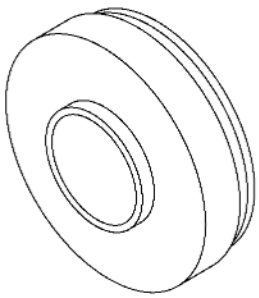
Special Tools

Installer Connector MB-990926	 ltsm080001
Installer Connector MB-990934	 ltsm080002
Installer Connector MB-990935	 ltsm080003
Fluid Seal/Differential Installer MB-998325	 ltsm080004

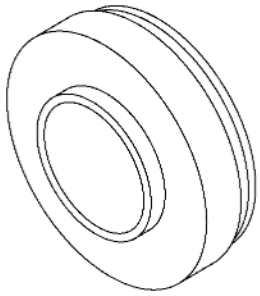
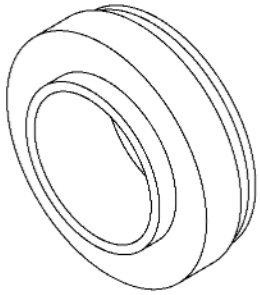
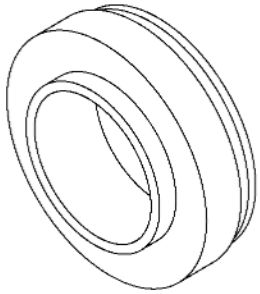
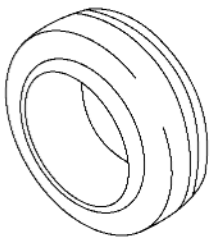
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Bearing Outer Race Remover MB-998346	 ltsm080005
Handle MB-990938	 ltsm020026
Valve Spring Compressor MB-998772	 ltsm020012
Bearing Remover MB-998801	 ltsm080006

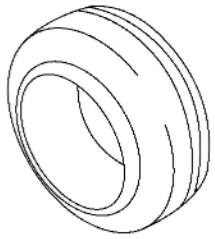
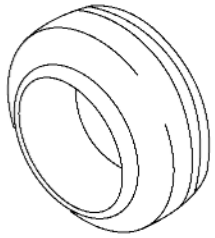
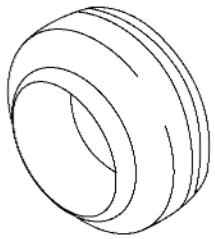
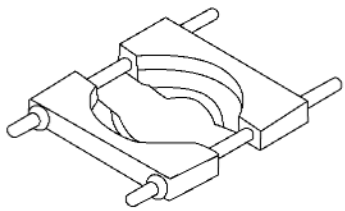
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Installer Cap MB-998812	 ltsm080007
Installer (100) MB-998813	 ltsm080008
Installer Connector (200) MB-998814	 ltsm080009
Installer Connector (30) MB-998816	 ltsm080010

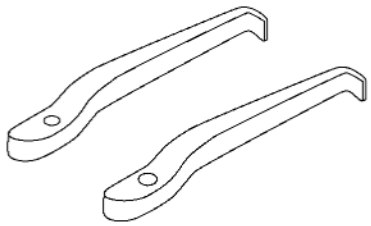
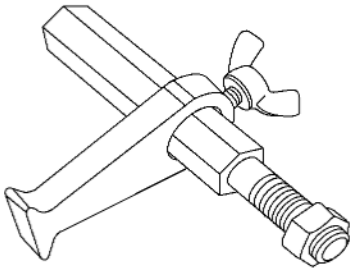
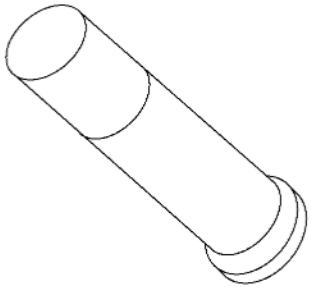
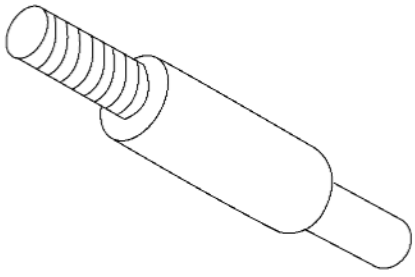
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Installer Connector (34) MB-998817	 ltsm080011
Installer Connector (38) MB-998818	 ltsm080012
Installer Connector (40) MB-998819	 ltsm080013
Installer Connector (46) MB-998822	 ltsm080014

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Installer Connector (48) MB-998823	 ltsm080015
Installer Connector (50) MB-998824	 ltsm080016
Installer Connector (52) MB-998825	 ltsm080017
Bearing Remover MB-998917	 ltsm080018

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Hook MB-999566	 ltsm080019
Flywheel Fixture CH-20043	 ltsm020211
Bearing Installer CH-30028	 ltsm020213
Bearing Extractor 09917-58010	 ltsm020212

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DIAGNOSIS & TESTING

Abnormal Noise

Transaxle noise is most often a result of worn or damaged components. Chipped, broken gear or synchronizer teeth, and worn bearings all cause noise.

Inspect the following:
- Insufficient lubrication
- Incorrect lubricant
- Mis-assembled or damaged internal components
- Improper operation

Symptom Diagnostics

Hard Shifting
- Hard shifting may be caused by a mis-adjusted crossover cable. If hard shifting is accompanied by gear clash, synchronizer clutch and stop rings or gear teeth may be worn or damaged.

Slips Out Of Gear
- Transaxle disengagement may be caused by misaligned or damaged shift components, or worn teeth on the drive gears or synchronizer components. Incorrect transaxle assembly also causes gear disengagement.

Low Lubricant Level
- Insufficient transaxle lubricant is usually the result of leaks, or inaccurate fluid level check or refill method. Vehicle must be level to accurately check fluid level. Leakage is evident by the presence of fluid around the leak point. If leakage is not evident, the condition is probably the result of an under fill.
- If air-powered lubrication equipment is used to fill a transaxle, be sure the equipment is properly calibrated. Equipment out of calibration can lead to an under fill condition.

Clutch Problems
- Worn, damaged, or misaligned clutch components can cause difficult shifting, gear clash, and noise.
- A worn or damaged clutch disc, pressure plate, or a faulty slave cylinder can cause hard shifting and gear clash.

Abnormal Noise
- Transaxle noise is most often a result of worn or damaged components. Chipped, broken gear or synchronizer teeth, and worn bearings all cause noise.

  Inspect the following:

  - Insufficient lubrication
  - Incorrect lubricant
  - Improperly assembled or damaged internal components

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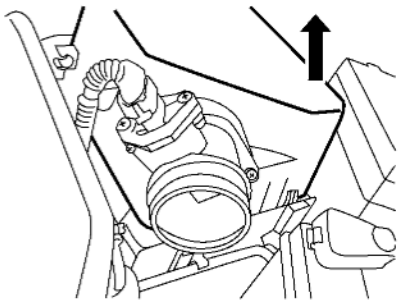
ON-VEHICLE SERVICE

Manual Transaxle Assembly

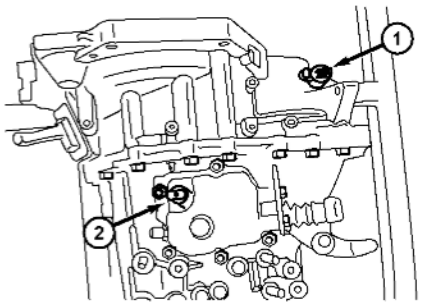
Removal & Installation

NOTE :
The following special tools are required to perform the repair procedure:
- MB-990938 - Handle
- MB-990935 - Installer Connector

1. Raise and support the vehicle.
2. Disconnect the negative battery cable.
3. Remove the battery and battery tray (See Battery Removal & Installation in Section 05 Starting & Charging).
4. Remove air cleaner and air duct.


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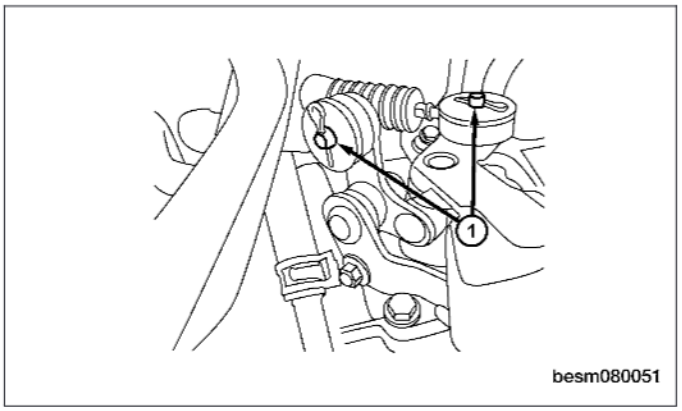
5. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
6. Remove the base mounting of the air cleaner housing assembly.
7. Remove the backup lamp switch (2) and vehicle speed sensor (1).



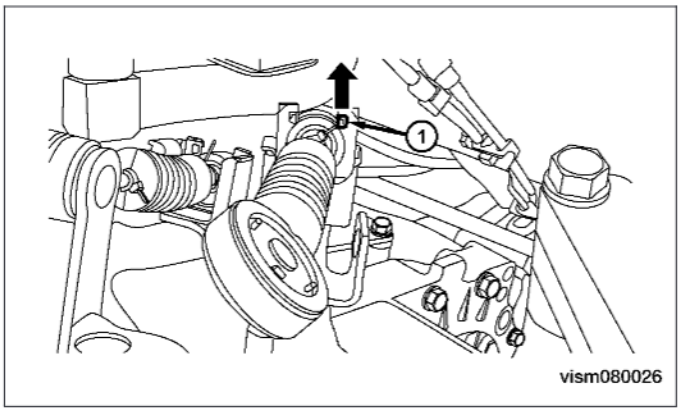
Itsm030029

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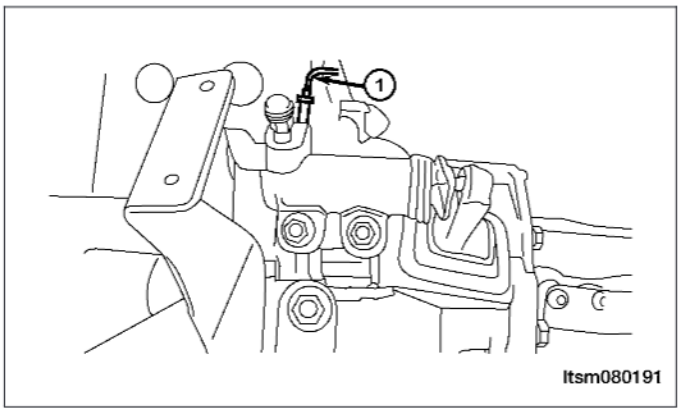
8. Remove the two shift cables (1) from the transaxle.



9. Remove the shift cable clamp (1) from the shift cable bracket.

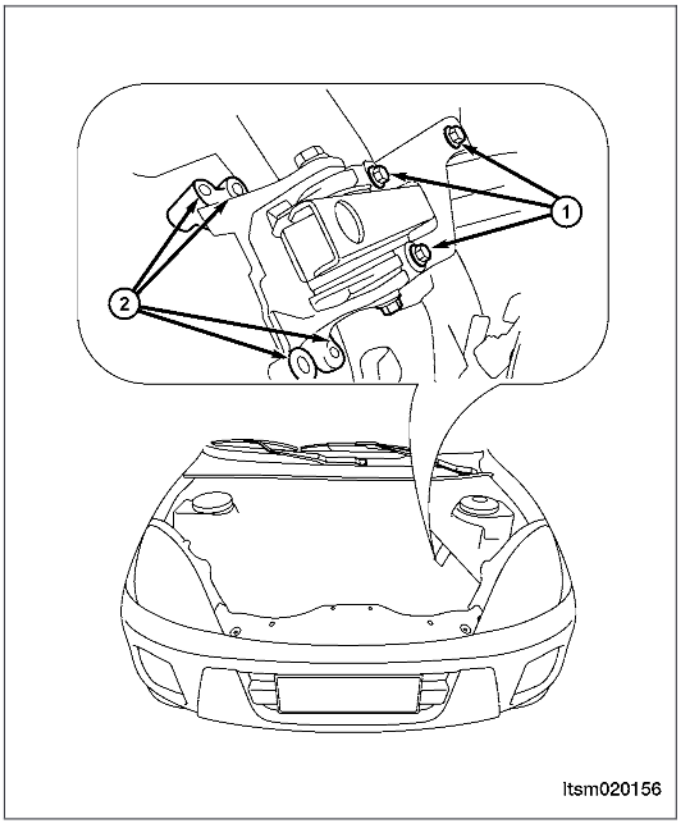


10. Remove the clutch master cylinder outlet pipe (1) from the clutch slave cylinder.
    (Tighten: Outlet pipe bolt to 17 ± 1 N·m)
11. Remove the starter motor (See Starter Removal & Installation in Section 05 Starting & Charging).
12. Support the engine using an engine support fixture or suitable jack.
13. Remove the engine to transaxle upper bolts and remove the bracket.
    (Tighten: Engine to transaxle upper bolts to 80 N·m)

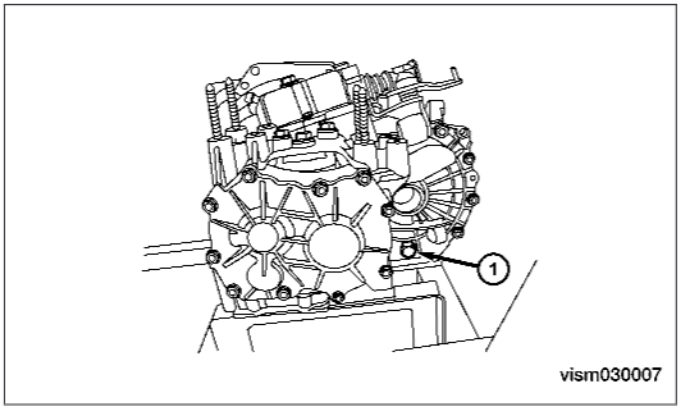


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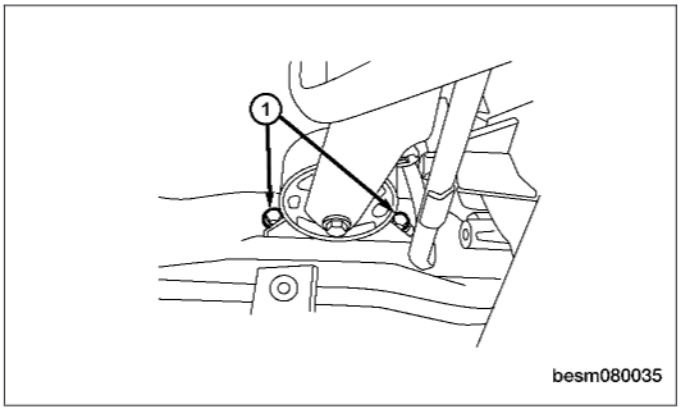
14. Remove transaxle mount nuts (2) and the transaxle mount bracket bolts (1).
(Tighten: Transaxle mount nuts to 120 N·m)



15. Raise the vehicle.
16. Remove the transaxle drain plug (1) and drain the transaxle fluid.

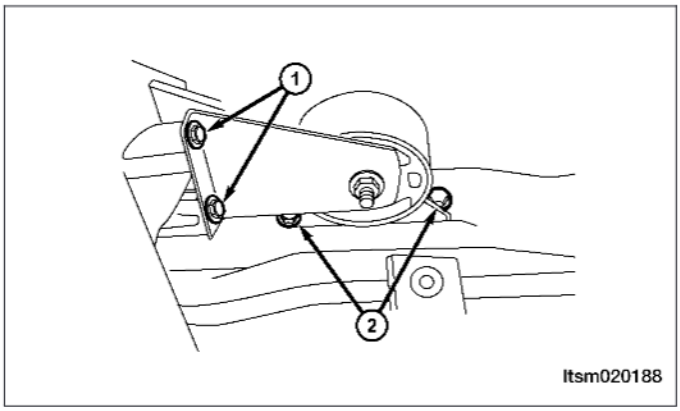


17. Remove both front axle shafts (See Front Axle Shaft Removal & Installation in Section 09 Driveline & Axle).
18. Remove the engine undercover and splash shields.
19. Remove the front engine mount bolts (1).
(Tighten: Front mount bolts to 60 N·m)



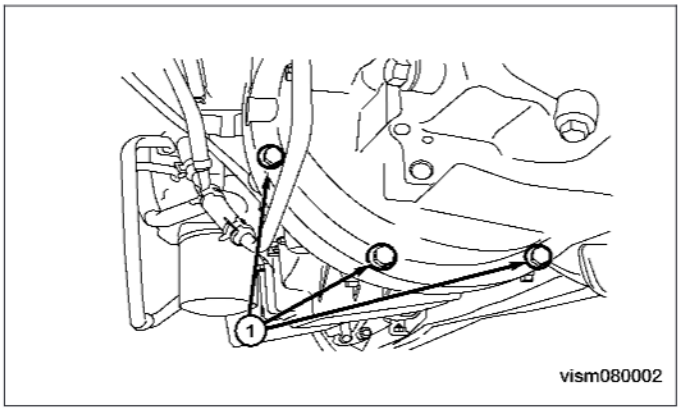
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20. Remove the rear engine mount bolts (2) and the rear engine mount bracket bolts (1).
(Tighten: Rear mount bolts to 40 N·m)



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21. Remove the sub-frame assembly (See Sub-Frame Assembly Removal & Installation in Section 10 Suspension).
22. Remove the engine to transaxle lower bolts (1).
(Tighten: Transaxle mount bolts to 40 N·m)
23. Separate the transaxle from the engine and remove it from the vehicle.



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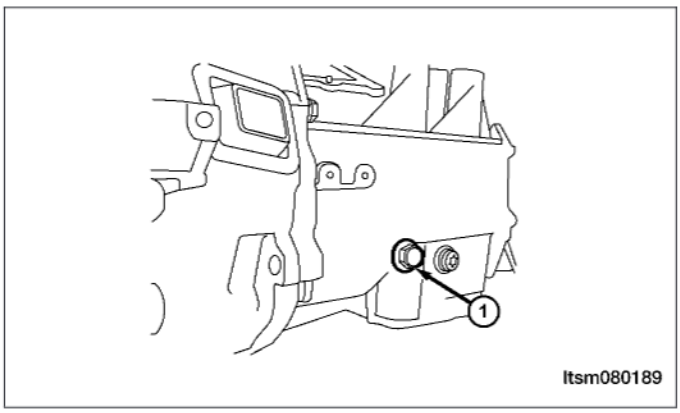
WARNING!

Support the transaxle with a suitable jack while removing the transaxle.

24. Installation is in the reverse order of removal.

Installation Notes:

- Refill 2.2L transaxle fluid through the fill hole (1) until the fluid starts to leak from the fill hole.
- After installation, check for any fluid leakage and verify the transaxle fluid level is correct.

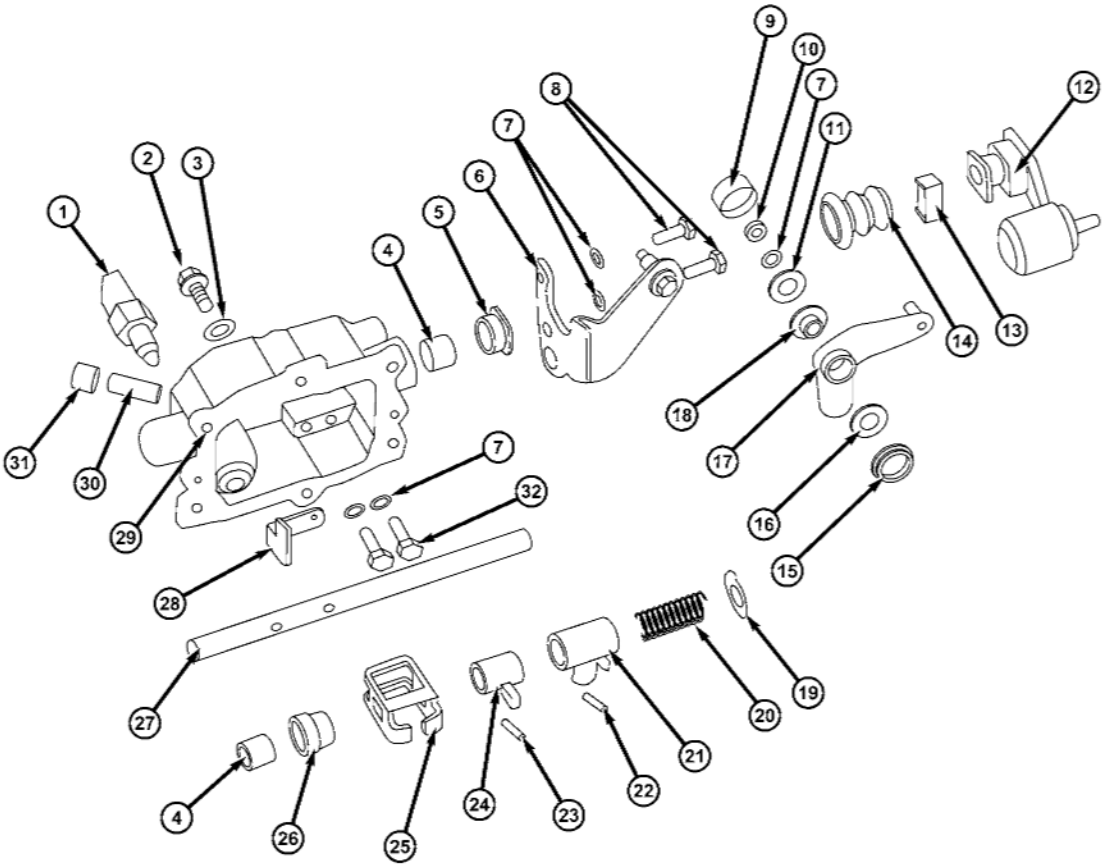


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Gear Selector & Shifter Assembly

Removal & Installation

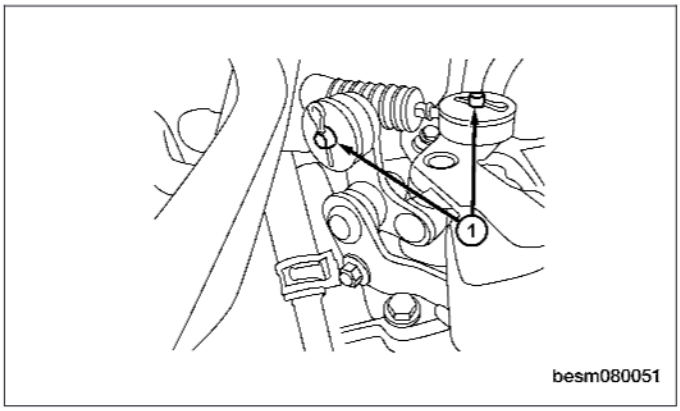


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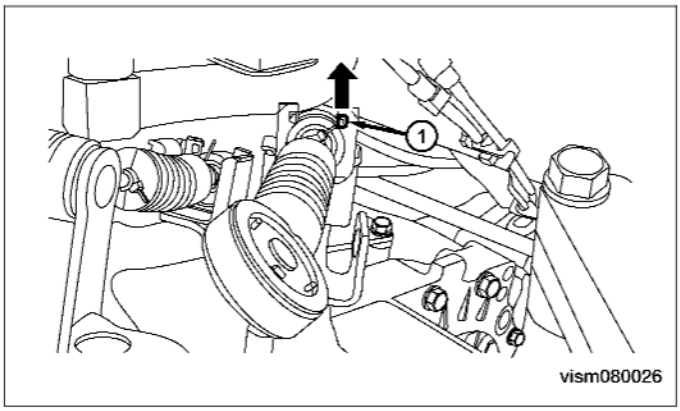
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1 - Backup Lamp Switch Assembly	17 - Gear Selecting Arm Assembly
2 - Limit Stop Screw-Interlocking Plate	18 - Upper Bushing-Gear Selecting Arm
3 - Plain Washer-Interlocking Plate Limit Stop Screw	19 - Baffle-Rear Neutral Position Return Spring
4 - Bearing-Gear Shift Mechanism	20 - Rear Neutral Retracting Spring
5 - Lower Lining - Selector Lever	21 - Reverse Gear Lock Assembly
6 - Selector Lever Assembly	22 - Reverse Gear Lock Assembly Pin
7 - Washer	23 - Selector Finger Pin
8 - Bolt	24 - Selector Finger
9 - Upper Dust Boot - Selector Lever	25 - Interlock Plate Assembly
10 - Nut	26 - Front Neutral Retracting Spring Assembly
11 - Plain Washer-Gear Selecting Arm Nu	27 - Gearshift Shaft
12 - Gear Shifting Arm Assembly	28 - Retainer-Reverse Gear Lock
13 - Gear Shifting Drive Slider	29 - Gear Shift Mechanism Housing
14 - Dust Cap-Gear Shifting Shaft Fluid Seal	30 - Air Duct
15 - Lower Dust Cap-Gear Selecting Arm	31 - Air Duct Cap
16 - Lower Bushing-Gear Selecting Arm	32 - Bolt

1. Disconnect the negative battery cable.
2. Remove the air cleaner housing assembly.
3. Remove the two shift cables (1) from the transaxle.



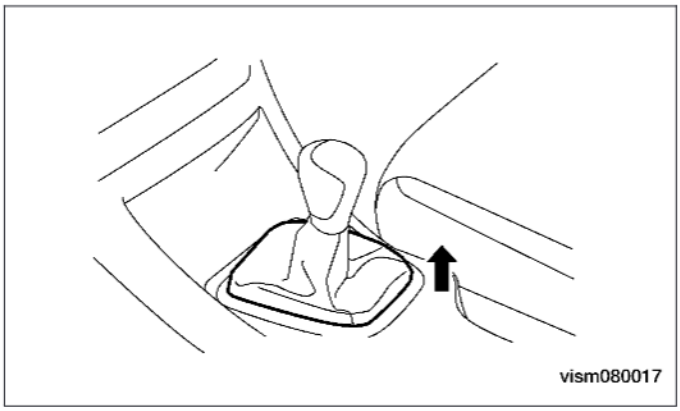
4. Remove the shift cable clamp (1) from the shift cable bracket.



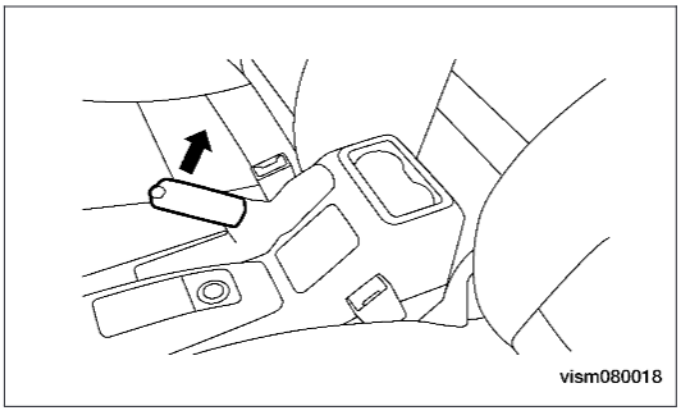
5. Raise and support the vehicle.

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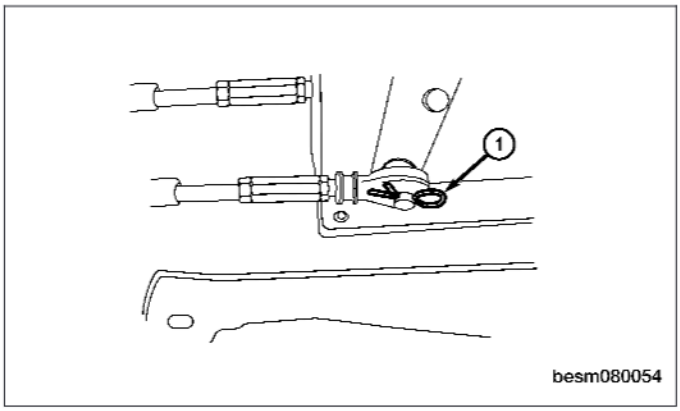
6. Remove the gearshift knob.
7. Remove the gearshift boot from the lower console.


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8. Apply the parking brake (apply parking brake handle to clear lower console upon removal).

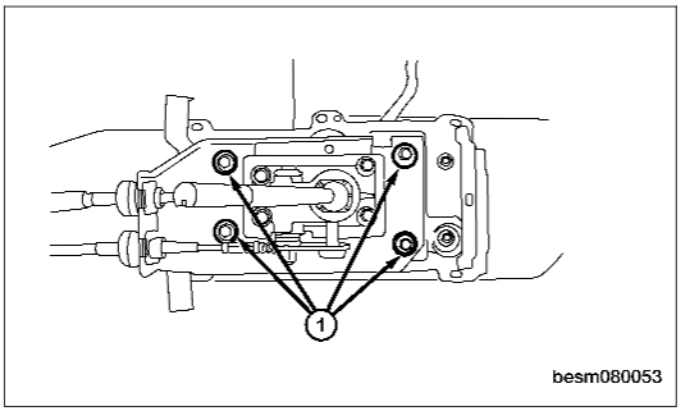

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9. Remove the lower console (See Lower Console Removal & Installation in Section 15 Body & Accessories).
10. Remove the clip on the gearshift mechanism and then remove the crossover cable and the selector cable (1) from the gearshift mechanism.



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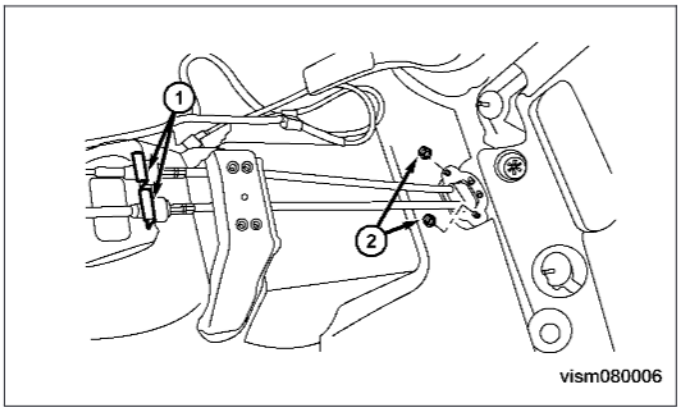
11. Remove the four bolts (1) and then remove the gearshift mechanism from the bracket.



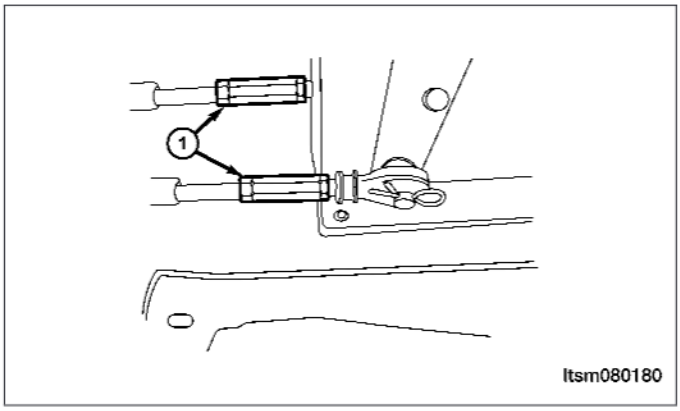
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12. Remove the selector cable clamps (1) and bracket retaining bolts (2).
13. Remove the gear selector & shifter assembly.
14. Installation is in the reverse order of removal.

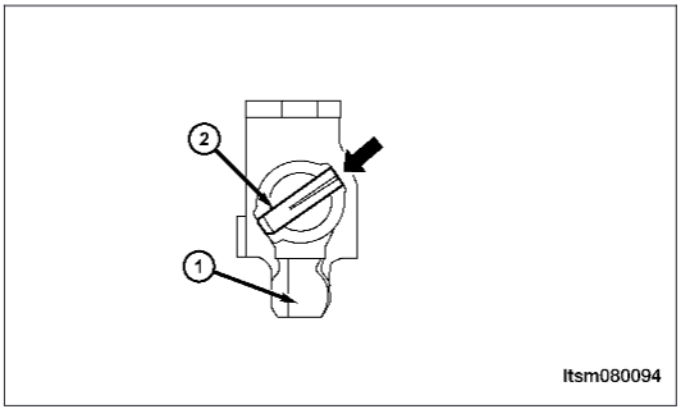


NOTE :
Selector cable can be adjusted with the adjusting bolt (1). Adjust bolts as needed to obtain proper cable adjustment.



Disassembly

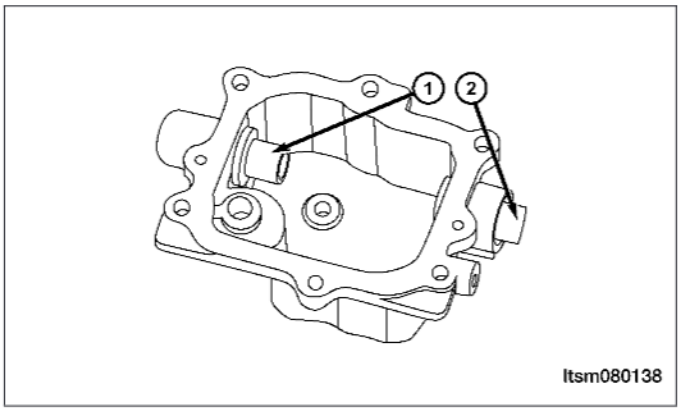
1. Drive out the locking selector finger (1) pin following the direction as shown in the diagram.
2. Drive out the locking pin (2) reverse gear lock assembly pin.
3. Remove all of the components from shaft.
4. Thoroughly clean and check all parts, replace any worn parts as necessary.



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Assembly

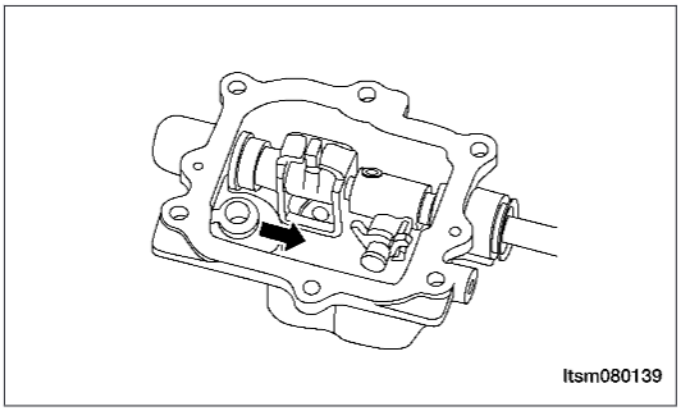
1. Carefully press and fit two gear shift mechanism (1) & (2) bearings to the corresponding position on the gear shift mechanism housing. The bearing (1) should be pressed to the end, both end faces of the bearing should align with the hole end faces of the housing bearing. The side of the bearing with letters should be placed outwards.



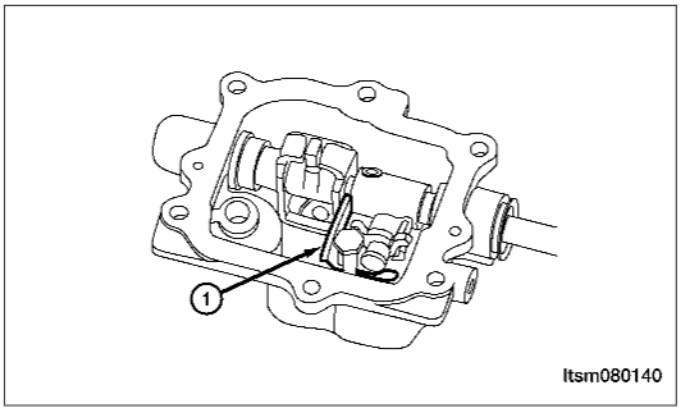
2. Press the air duct into the housing orifice to ensure the air duct is in the proper position.
3. Press and fit the fluid seal of the gearshift shaft into the fluid seal hole of the housing, ensure the fluid seal is pressed and fitted in position.

NOTE :
Apply transaxle fluid to the fluid lip seal.

4. Install the gearshift shaft through the fluid seal and into the housing of gear shift mechanism.
5. Following the direction of the arrow, install the rear neutral return spring stop, rear neutral return spring, reverse gear lock assembly, selector finger and interlock plate assembly, front neutral return spring assembly onto the gearshift shaft (as shown in the figure). Check the turn-down rims of rear neutral return spring stop, and ensure they have entered into corresponding vent groove of the housing. One end of main body of reverse gear lock with blind hole shall face rear neutral return spring stop. And the small end face of front neutral return spring assembly shall face towards selector finger.



6. Insert the gearshift shaft into the bearing.
7. Install the reverse gear limiter lock mechanism (1) (as shown in the figure).
   (Tighten: Reverse gear limiter bolt to 22 N·m)

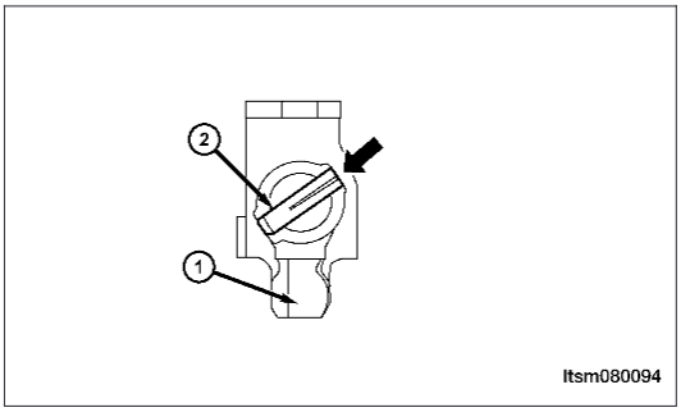


8. Install the gearshift fluid seal dust boot to the gearshift shaft fluid seal.
9. Install the gearshift lever assembly to the gearshift shaft, then press it in the pin hole of gearshift lever assembly, finally install the pin.

NOTE :
Neither end of the pin is allowed to protrude beyond the two end surfaces of the pin holes.

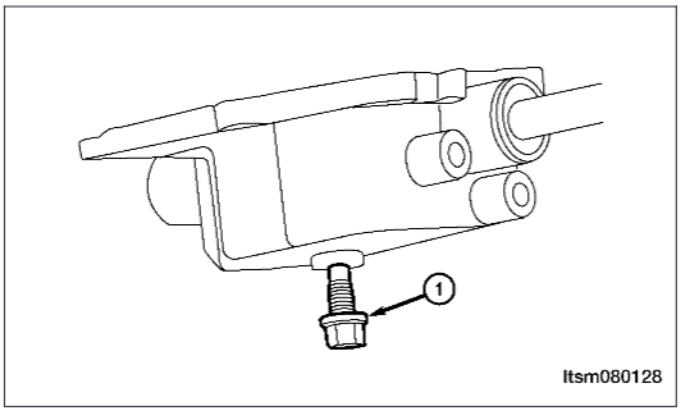
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10. Align the selector finger (1) and fork shaft spring pin (2), install the spring pin of selector finger (as shown by the arrow in the figure).



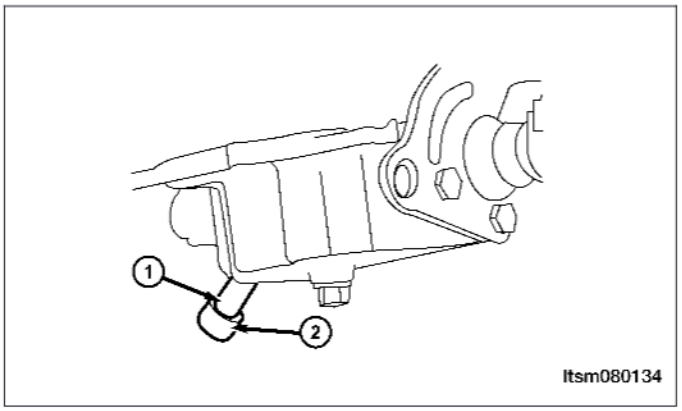
Itsm080094

11. Tighten the interlock plate limit bolt (1) together with the shim to the housing (as shown in the figure). The tightening torque of the bolt is 30 N·m. Check front end circular cylinder of the bolt to ensure it is in the corresponding groove of selector finger.



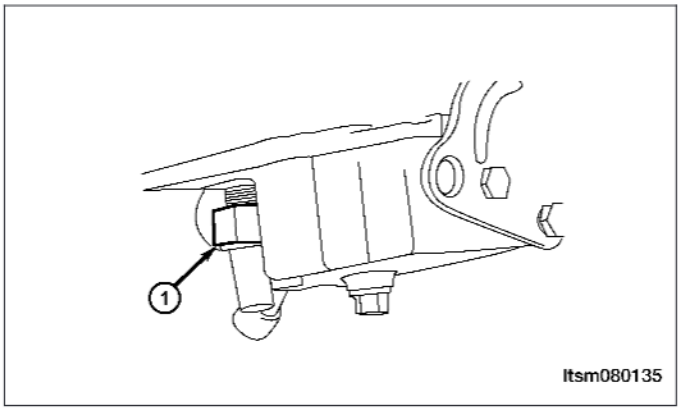
Itsm080128

12. Check the gearshift shaft to ensure it is able to rotate and perform axial movement freely.
13. Install air duct (1) and air duct cap (2). Apply sealant to the surface of the inserted part of air duct.



Itsm080134

14. Install the backup light switch assembly (1). (Tighten: Backup light switch to 32 N·m)



Itsm080135

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MANUAL TRANSAXLE UNIT REPAIR

Transaxle

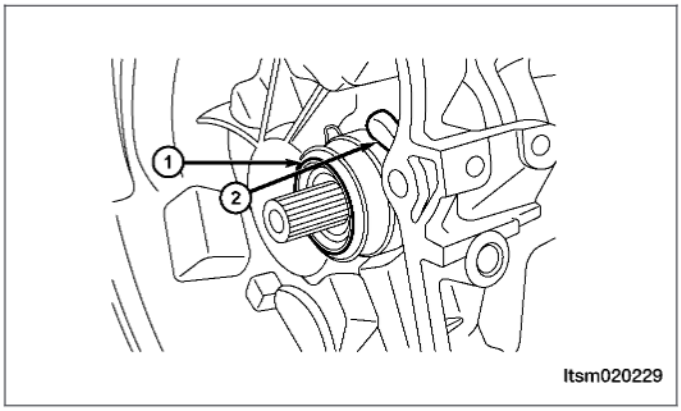
Specifications

Torque Specifications

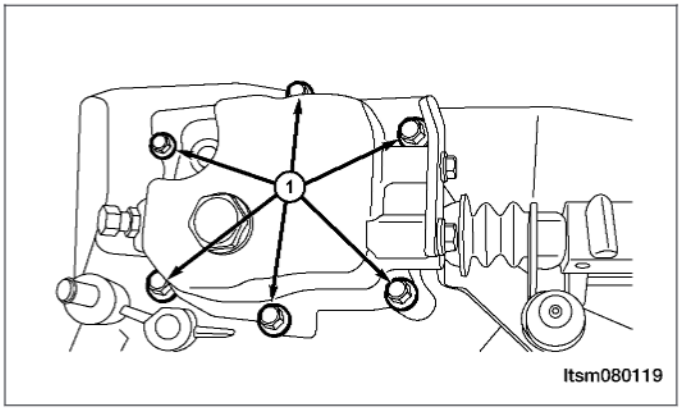
DESCRIPTION	TORQUE (N·m)
Gear Shift Mechanism Housing Bolt	18
Gear Positions Self-Locking Bolt	35
Reverse Gear Bolt	20
Reverse Gear Cap Bolt	20
Rear Transaxle Bearing End-Plate Bolt	6.9
Transaxle To Clutch Housing Bolt	44
Bearing Input Shaft Bolt	18

Disassembly

1. Place the transaxle on a workbench.
2. Remove the clutch fork (2) and remove the release bearing (1).
   NOTE: The release bearing (1) is not serviceable.

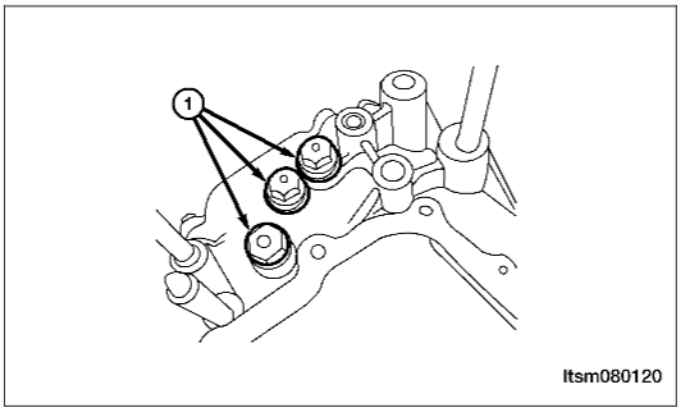


3. Set the transaxle gear in the neutral position. Remove the gear shift mechanism housing retaining bolts (1), and remove the gear shift mechanism housing.
   (Tighten: Gear shift mechanism housing bolts to 18 N·m)

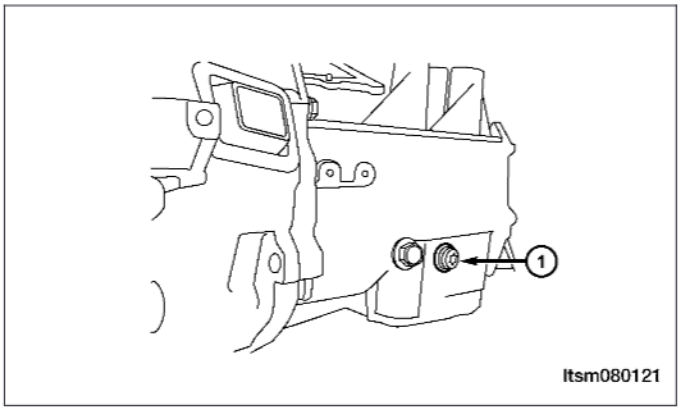


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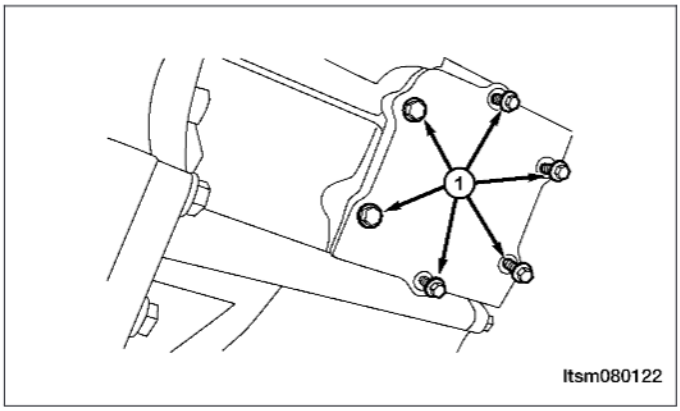
4. Remove the three gear positions self-locking bolts (1).
   (Tighten: Three gear positions self-locking bolts to 35 N·m)



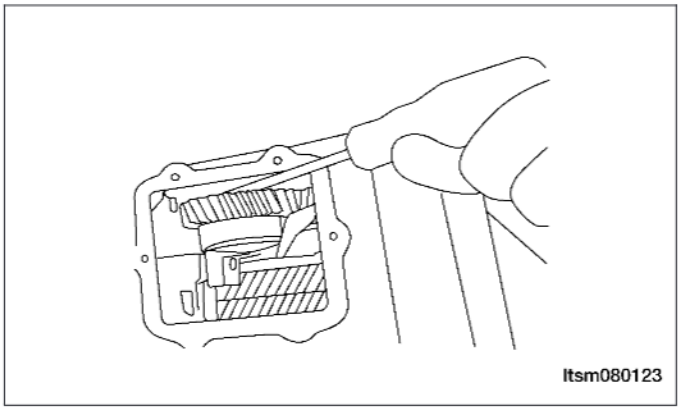
5. Remove the reverse gear bolt (1).
   (Tighten: Reverse gear bolt to 20 N·m)



6. Remove the 6 reverse gear cap bolts (1), and remove the cap.
   (Tighten: Reverse gear cap bolts to 20 N·m)

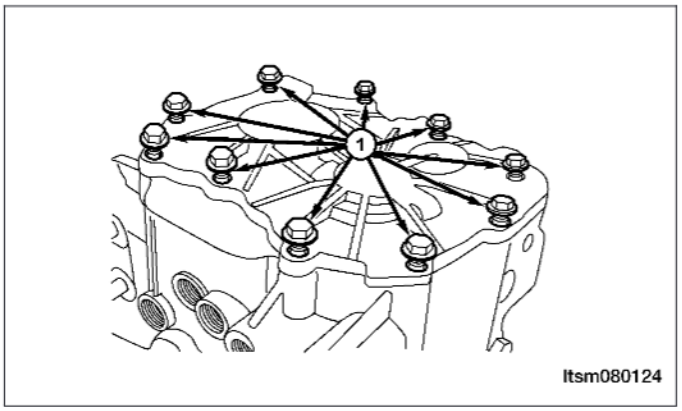


7. Gently pry the idler gear downward using a screwdriver, and then remove the idler gear assembly.

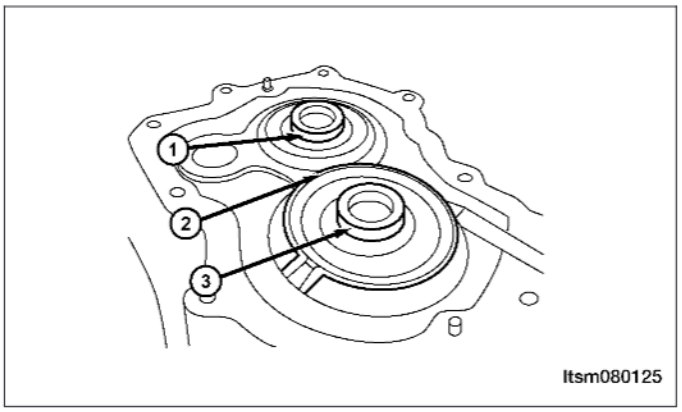


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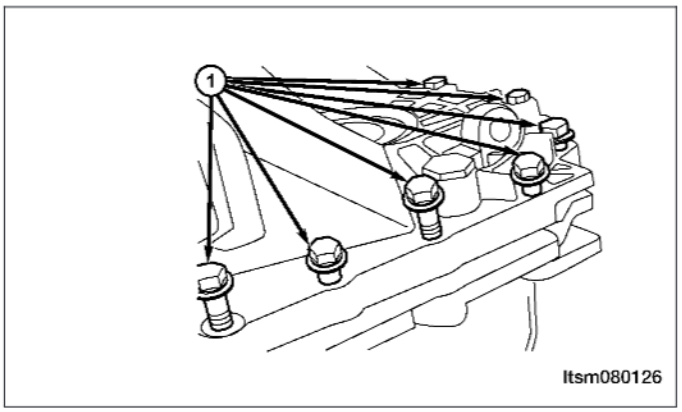
8. Remove the 10 rear transaxle bearing end-plate bolts (1), and then remove the bearing cap.
   (Tighten: Rear transaxle bearing end-plate bolts to 6.9 N·m)



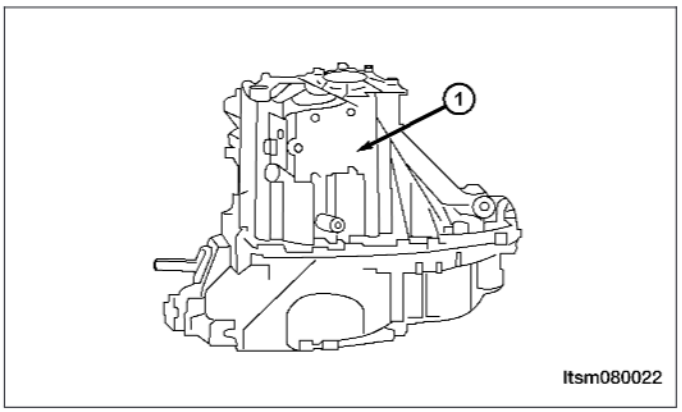
9. Remove shaft clip (3) and shaft clip (1) from the shafts, and then remove bearing collar (2).



10. Remove the transaxle to clutch housing bolts (1), and then use a pry bar to remove the transaxle housing.
    (Tighten: Transaxle to clutch housing bolts to 44 N·m)

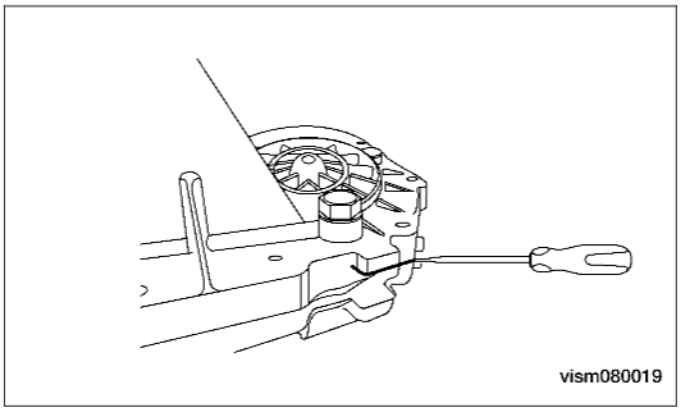


11. Perform the following steps to remove the transaxle housing (1).

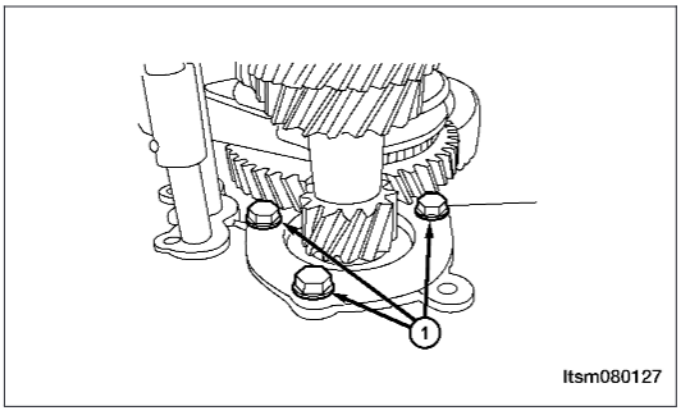


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12. Tap the transaxle housing and use a suitable tool to remove the transaxle housing.


vism080019

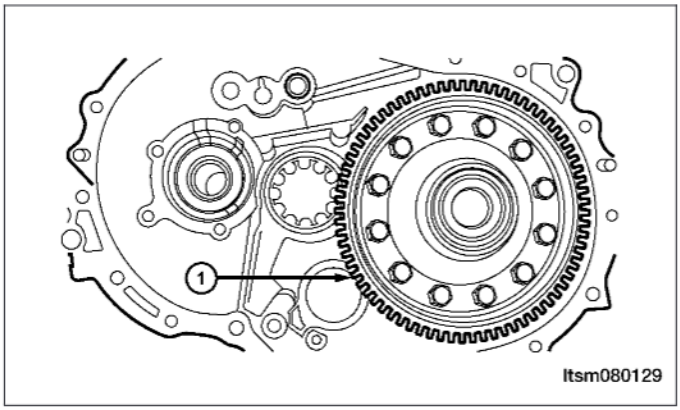
13. Remove the 3 front bearing input shaft bolts (1). (Tighten: Bearing input shaft bolts to 18 N·m)



ltsm080127

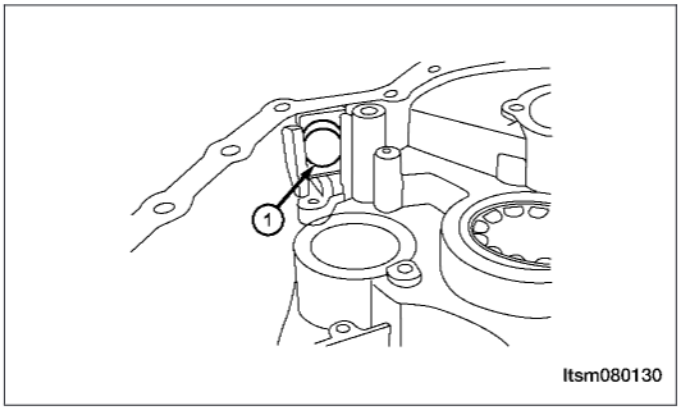
14. Grasp the input shaft assembly, output shaft assembly, 1st-2nd shift fork, 3rd-4th shift fork and 5th-reverse fork shaft together and remove.
15. Remove the differential assembly (1) upward (as shown in the figure).

    NOTE: Pre-tighten the shim of the differential cone bearing.



ltsm080129

16. Remove the magnet (1) and wipe the magnet clean.

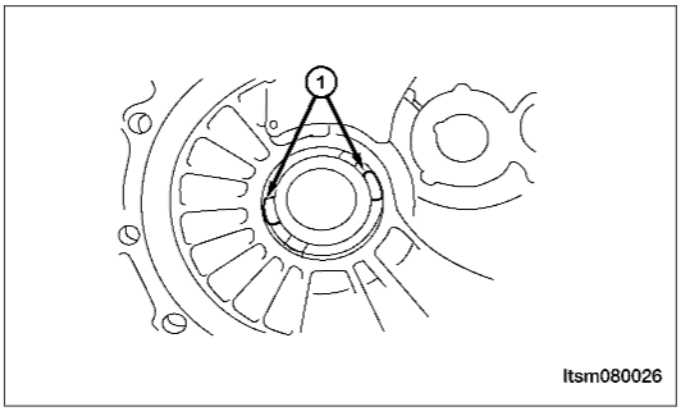


ltsm080130

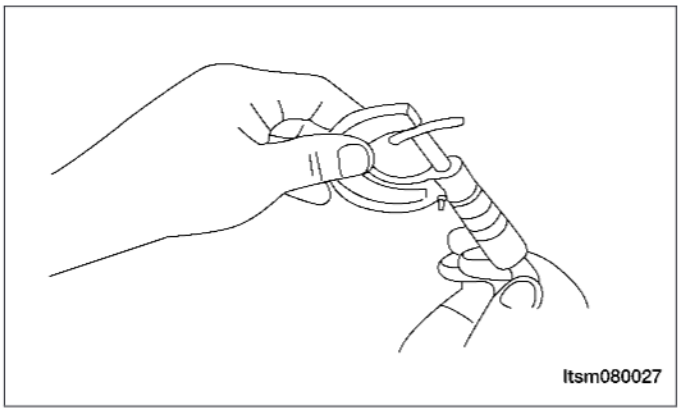
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Inspection

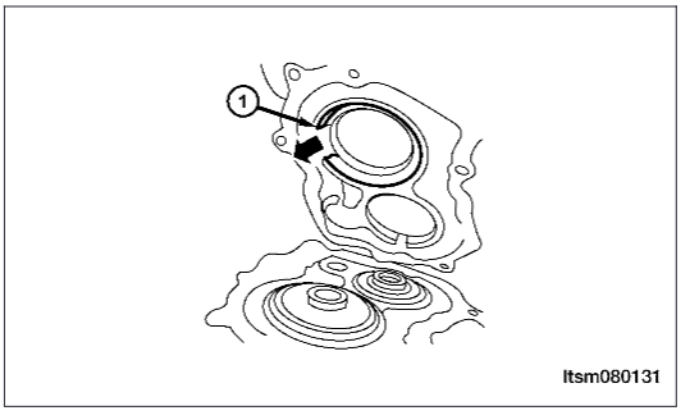
1. Place a tin solder sheet (1) (approximate length is 10 mm and diameter is 1.6 mm) on the specified part of the transaxle housing, and then install the differential outer bearing race.
2. Install the clutch housing, and tighten the bolts to the specified torque.
3. Replace the tin solder sheets with thicker tin solder sheets.



4. With a micrometer, measure the thickness (T) of the flattened tin solder sheet.
   - Select the thickness of the shim to be installed according to the following equation.
     - Thickness of washer: (T + 0.005 mm) - (T + 0.11 mm)

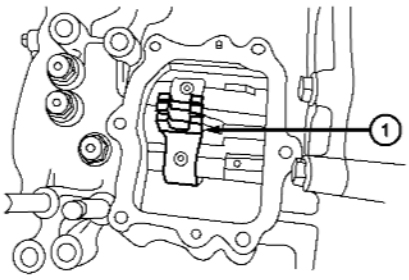


5. Do not clean the release bearing.
6. Clean the sealing surface of all contaminates, remove all old sealant, and clean all bolt holes.
7. Check all parts for damage, replace any damaged parts if necessary.
8. Always align the bearing cap (1) with the shaft opening. Align the bearing collar to the bearing cap opening (as the two circular rings indicate in the figure).



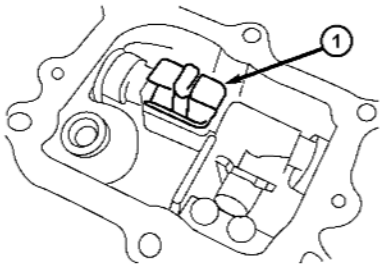
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9. Place the transaxle in the neutral position when installing the self-locking bolts for the gear positions. The notches (1) of the shift fork guide block should align in the same line.



Itsm080132

10. Place the transaxle in the neutral position (1) when the gear shift mechanism housing assemble is in the position of the selector finger in the gear shift mechanism housing assembly shown in the figure.

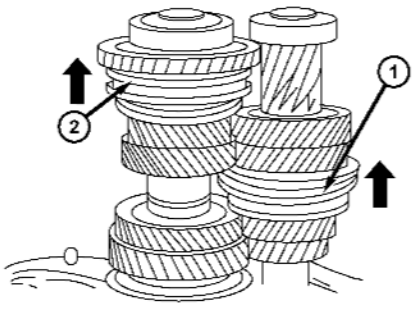


Itsm080133

11. Alternate tightening each bolt to the specified torque.

Assembly

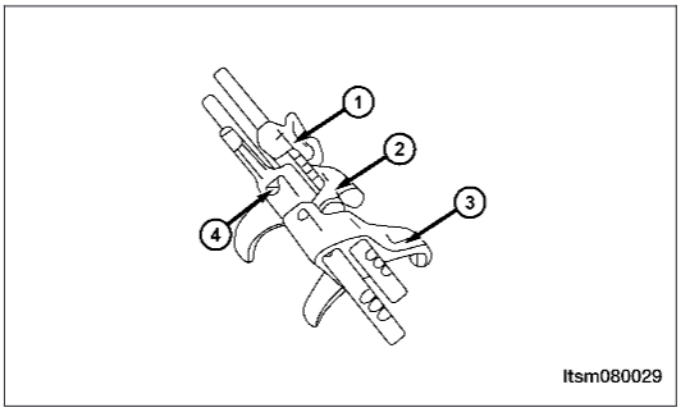
1. Install the input shaft together with the output shaft.
2. Install the 5th-reverse gear shifting fork/fork stalk-5th-reverse gear fork/3rd-4th gear shifting fork/fork stalk–3rd-4th fork.
3. Move the gear bushing-3rd-4th gear (1) and the gear bushing-5th-reverse gear (2) in the direction shown in the figure.



Itsm080028

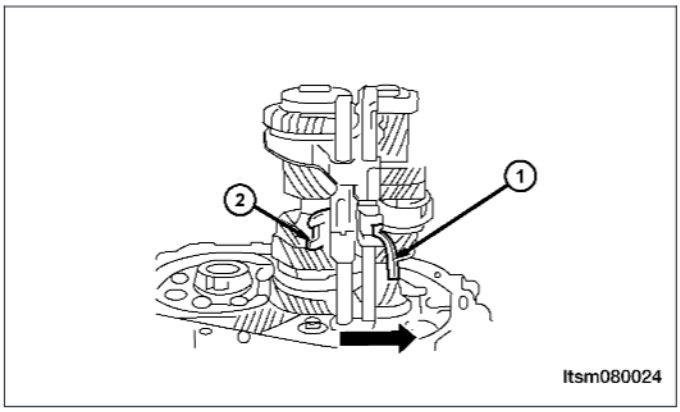
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4. Install the 3rd-4th gear shifting fork (2) and its fork stalk (1) and the 5th-reverse gear shifting fork (3) and its stalk (4).



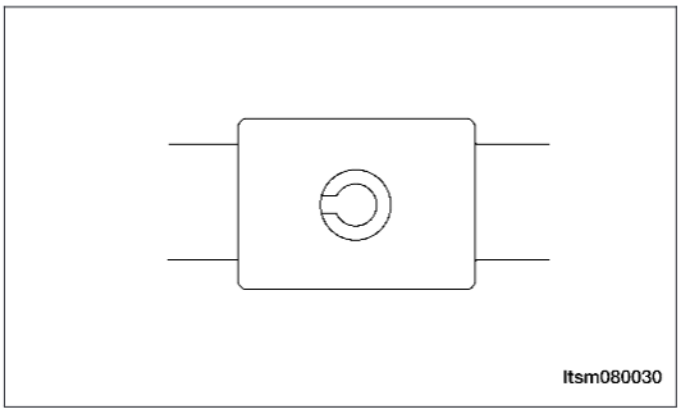
ltsm080029

5. Install all gear shifting forks into the gear hub, and at the same time, move the fork stalks (1) & (2) in the direction shown in the figure.

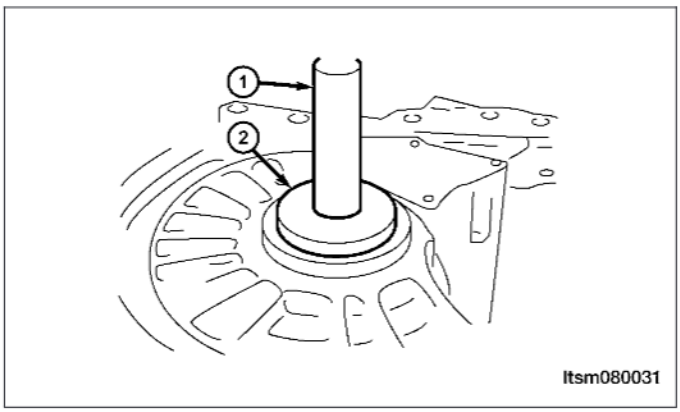


ltsm080024

6. Install the locking pin.


ltsm080030

7. Using special tools MB-990938 (1) and MB-990935 (2), install the outer bearing race.

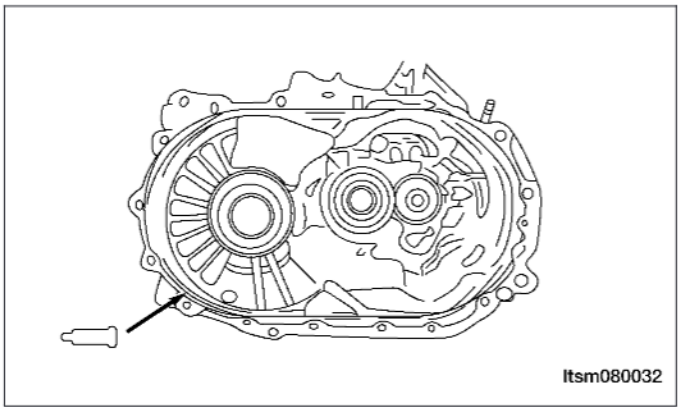


ltsm080031

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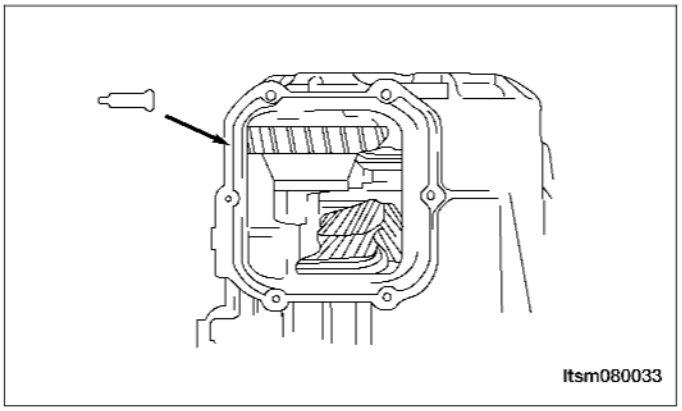
8. Install the transaxle housing.
9. Apply a 1 mm to 1.2 mm diameter of sealant on the specified position of the transaxle housing.

CAUTION:
The sealant line applied should be uniform and continuous and without breaks.

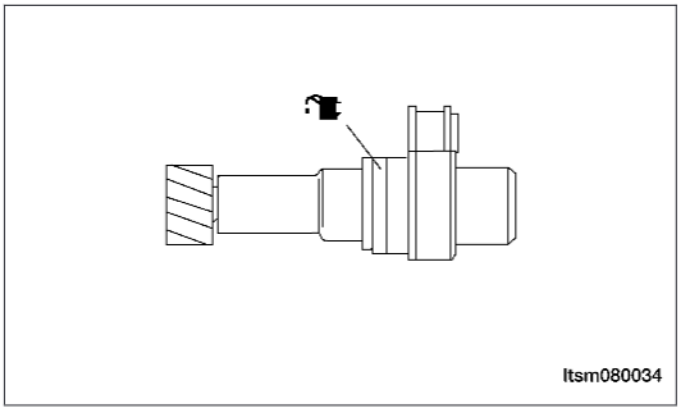


10. Tighten the transaxle housing bolts to the specified torque.
11. Install the bottom transaxle cover.
12. Apply a 1 mm to 1.2 mm diameter of sealant on the specified position of the transaxle housing.

CAUTION:
The sealant line applied should be uniform and continuous and without breaks.

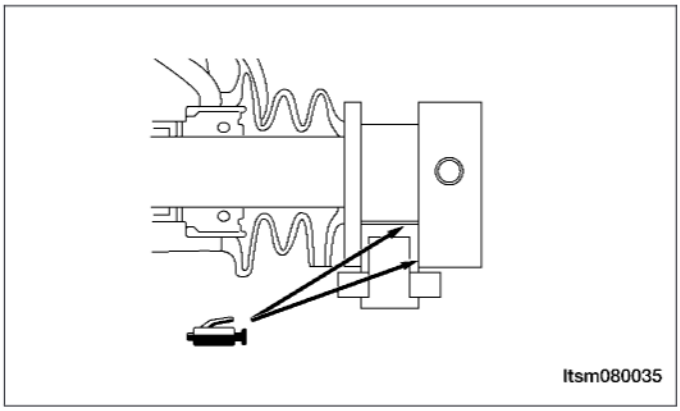


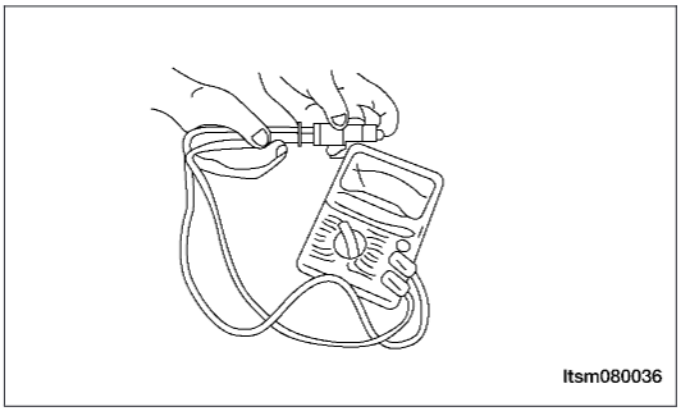
13. Apply transaxle fluid to the O-ring of speed sensor. (Transaxle fluid: 75W-90)



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14. Install the vehicle speed sensor.
15. Install the gear shifting arm assembly. Apply lubricating fluid on the contact surface of the gear shifting drive slider and the gear shifting arm assembly. (The specified lubricating fluid: Mobilux Ep2)





STATUS OF SWITCH	CIRCUIT
Pressed	Off
Released	On

16. Inspect the backup lamp switch. Inspect the switch for broken terminal or an open circuit.

Input Shaft

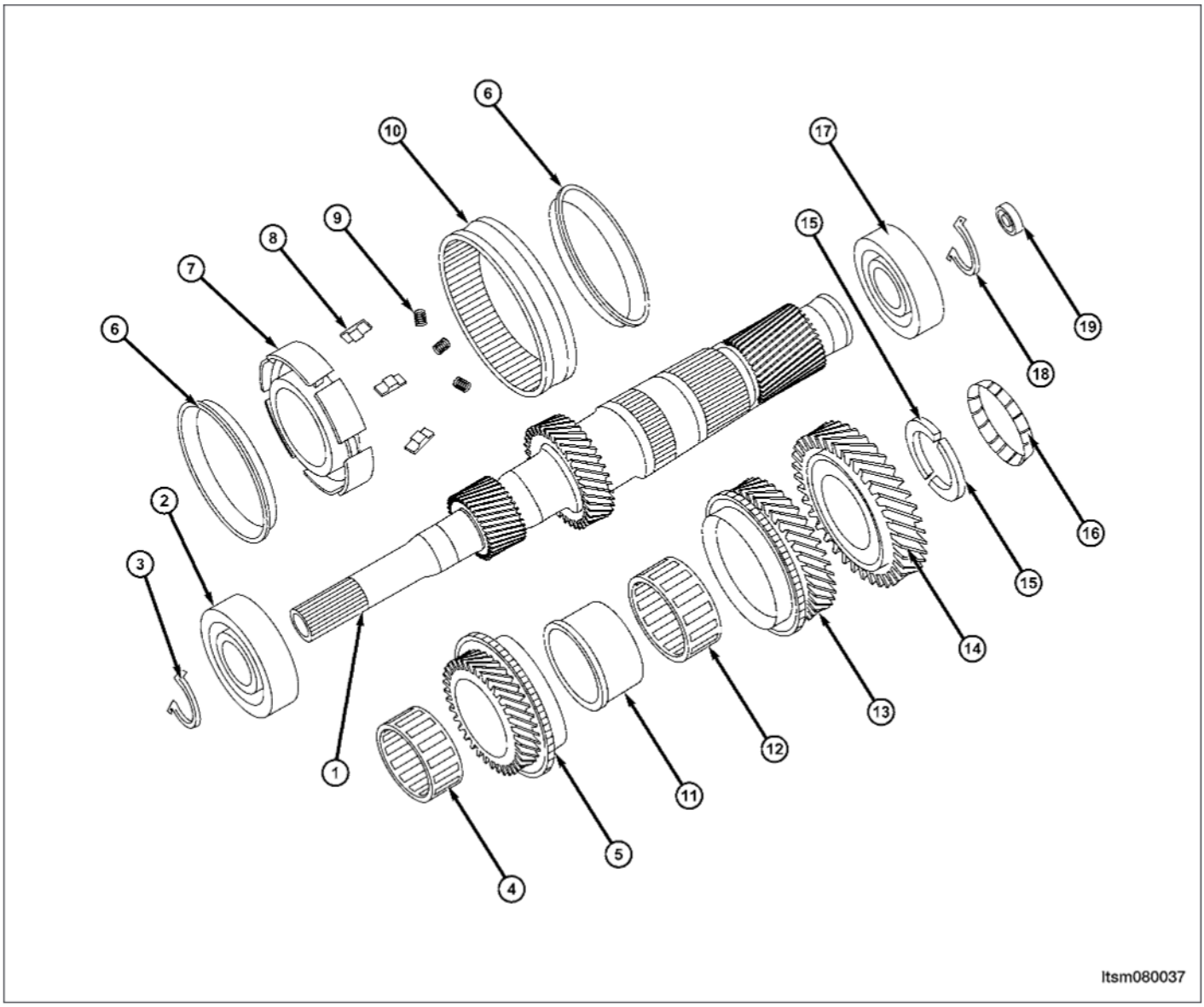
Specifications

Clearance Specifications

SYNCHRONIZER RING	VALUE OF A (mm)	WEARING LIMIT
1st-2nd Gear	1.10 - 1.17	0.05 mm
3rd-4th Gear	1.35 - 1.90	0.05 mm
5th Gear	1.10 - 1.17	0.05 mm

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Disassemble

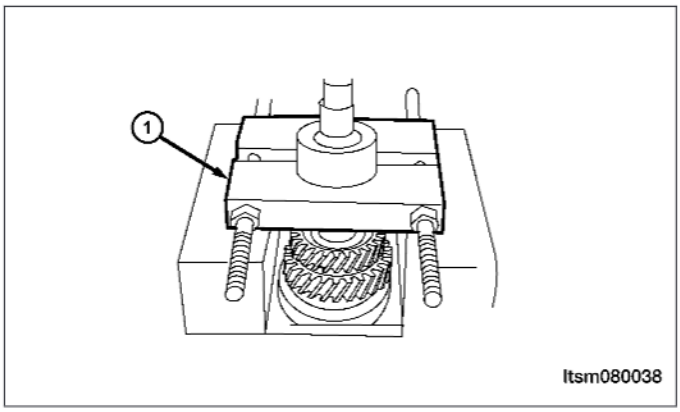


1 - Input Shaft	11 - Gear Bushing-4th Gear
2 - Input Shaft Front Bearing	12 - Needle Bearing-2nd-4th Gear
3 - Snap Ring	13 - 4th Driving Gear Assembly
4 - Needle Bearing-3rd Gear	14 - 5th Driving Gear
5 - 3rd Driving Gear Assembly	15 - Thrust Ring-5th Driving Gear
6 - Synchronizer Ring-3rd-4th Gear	16 - Clip-5th Driving Gear Thrust Plate
7 - Gear Hub-3rd-4th Gear	17 - Input Shaft Rear Bearing
8 - Guide Block	18 - Snap Ring-Input Shaft Rear Bearing
9 - Spring-3rd-4th Gear Synchronizer	19 - Seal-Input Shaft Fluid-Collecting Hole
10 - Hub Sleeve-3rd-4th Gear	

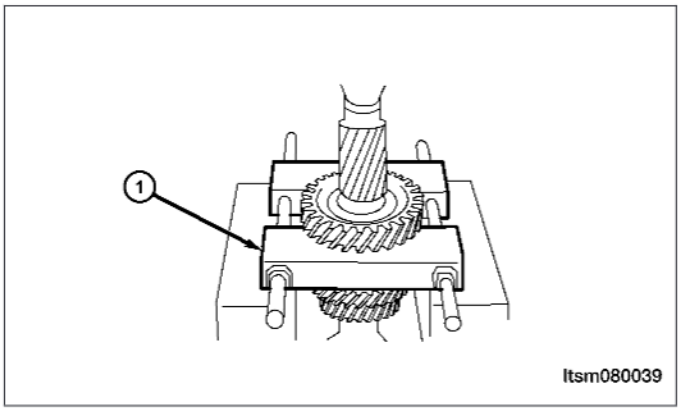
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NOTE :
The following special tools are required to perform the repair procedure:
- MB-998801 - Bearings Remover
- MB-998812 - Installer Cap
- MB-998813 - Installer (100 mm)
- MB-998816 - Installer Connector (30 mm)
- MB-998825 - Installer Connector (52 mm)
- MB-998824 - Installer Connector (50 mm)

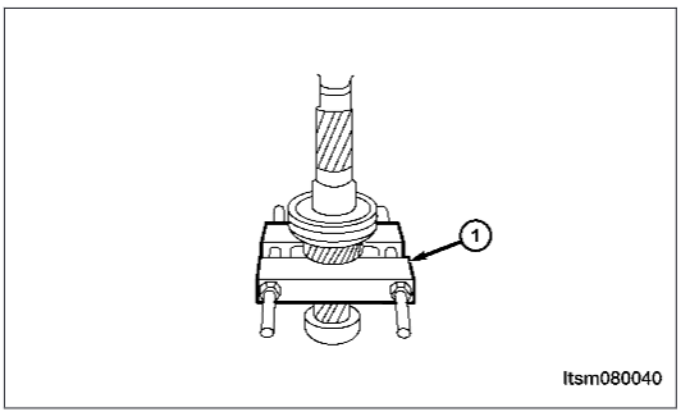
1. Using special tool MB-998801 (1), disassemble the input shaft rear bearing.



2. Using special tool MB-998801 (1), disassemble the 5th driving gear.

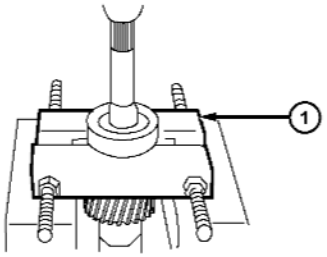


3. Disassemble the sleeve-4th gear.
   Mount special tool MB-998801 (1) on the 3rd driving gear to disassemble the sleeve-4th gear.



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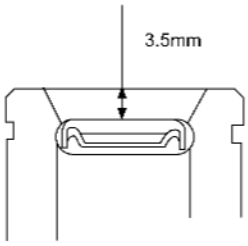
4. Using special tool MB-998801 (1), disassemble the input shaft front bearing.



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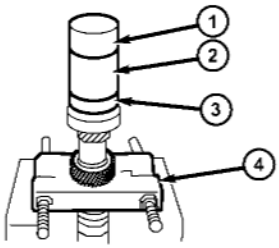
Assemble

1. Install the input shaft seal.
   Press the seal in until the dimension shown in the figure is obtained.



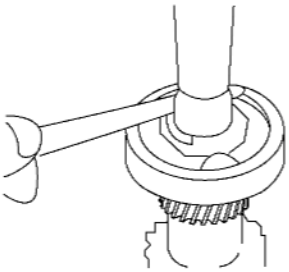
ltsm080042

2. Using special tools MB-998801 (4), MB-998812 (1), MB-998813 (2) and MB-998816 (3), install the input shaft front bearing.



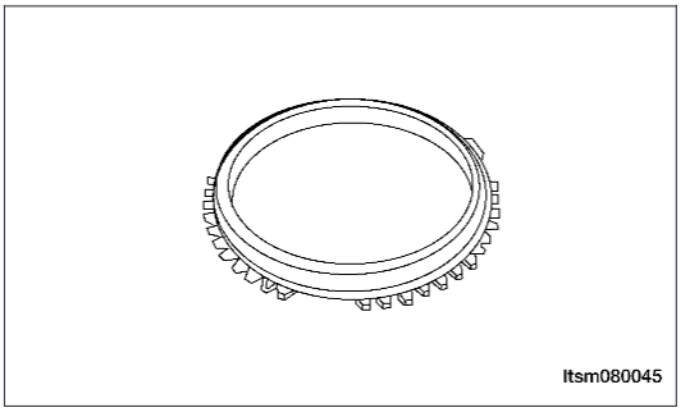
ltsm080043

3. Install the input shaft front shaft snap ring.
   Select a snap ring to maintain the axial clearance standard.
   (The standard value: 0.01 mm - 0.12 mm)

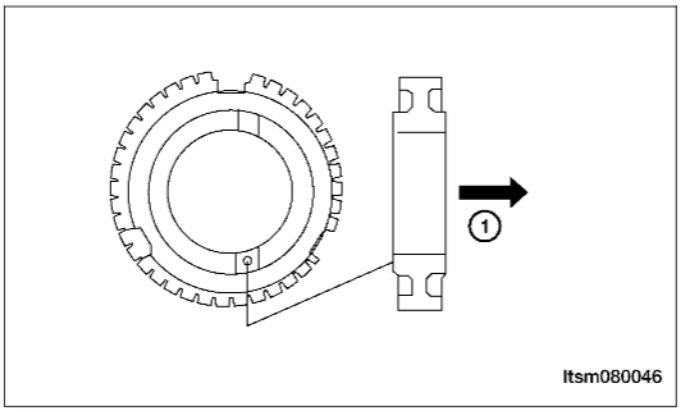

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4. Install the synchronizer spring.
   Install the synchronizer spring in the specified position of the synchronizer ring, shown in the figure.

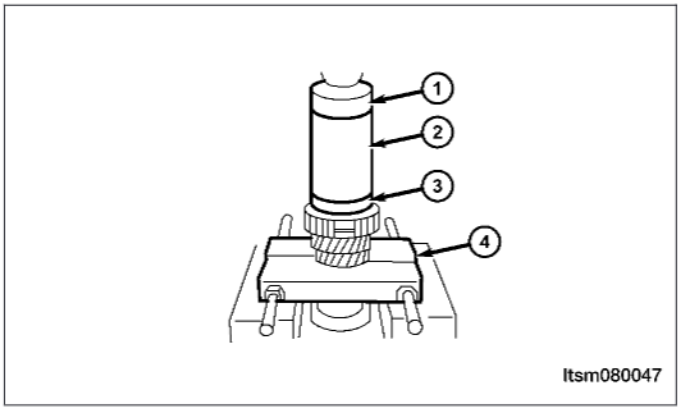


5. Install the gear hub-3rd-4th gear.
   Install the gear hub-3rd-4th gear in the direction shown in the figure.

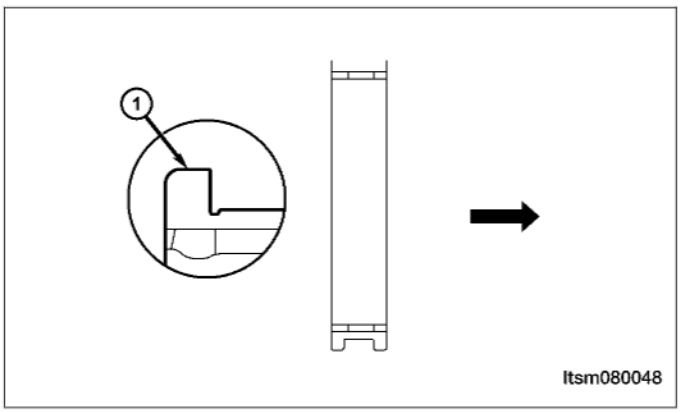


CAUTION:
Ensure that the synchronizer ring is not locked when installing the gear hub.

6. Using special tools MB-998801 (4), MB-998812 (1), MB-998813 (2) and MB-998825 (3), install the gear bushing-3rd-4th gear.

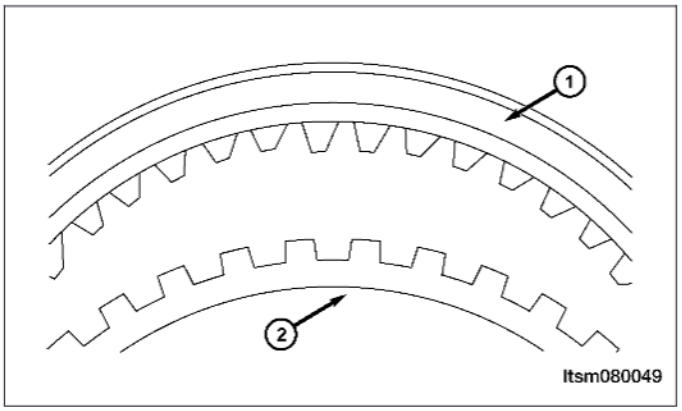


7. Install the hub sleeve in the direction shown in the figure.

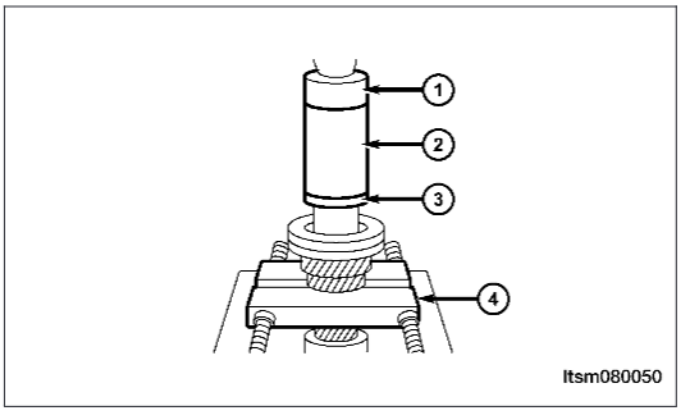


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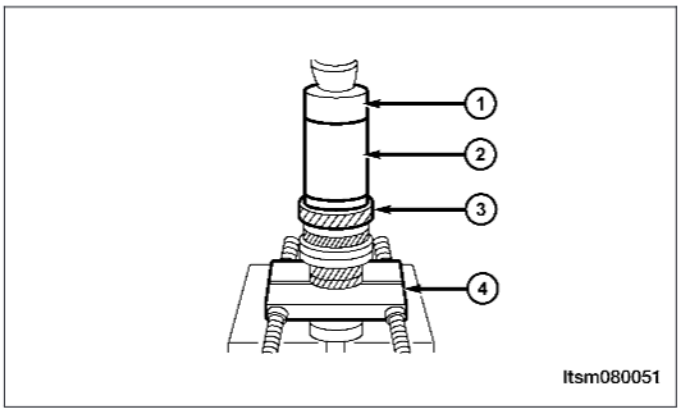
8. Ensure that these two deep tooth spaces of gear hub (1) & (2) are correctly aligned with the two high racks of the gear hub during the installation of gear bushing.



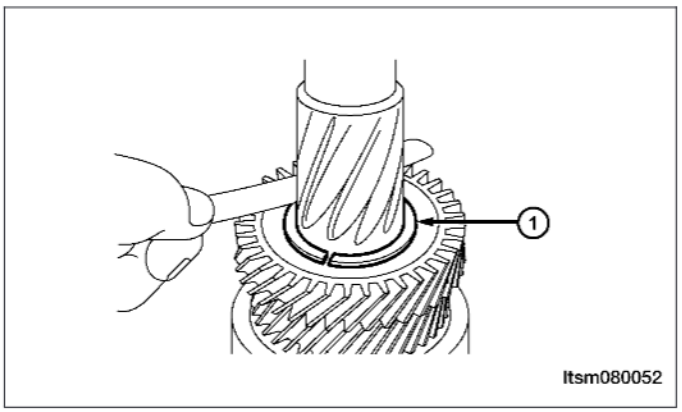
9. Using special tools MD-998801 (4), MD-998812 (1), MD-998813 (2), and MD-998824 (3), install the sleeve-4th gear.



10. Using special tools MD-998801 (4), MD-998812 (1), MD-998813 (2), and MD-998824 (3), install the 5th driving gear.

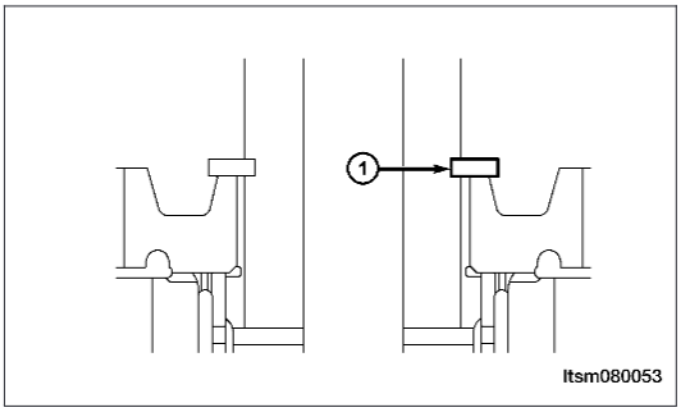


11. Installation of transaxle housing assembly.
Select the thickness of the thrust plate (1) 5th driving gear to maintain the proper axial clearance of input shaft 5th driving gear shaft.
(The Standard Value: 0.01 mm to 0.09 mm)

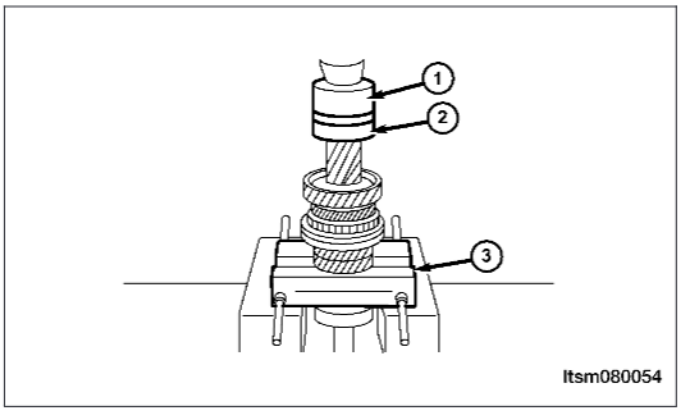


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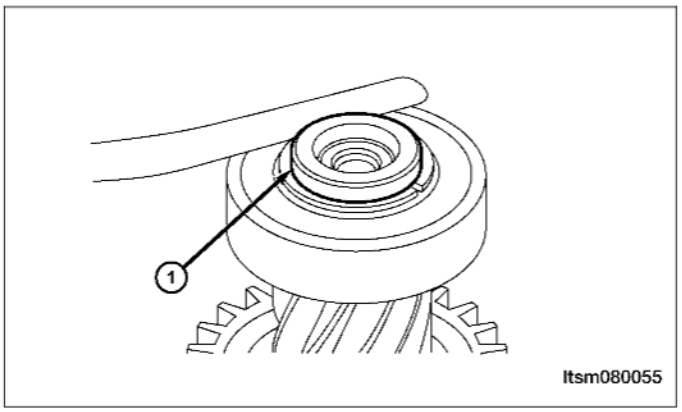
12. Install the clip-5th driving gear thrust plate (1).
Ensure that the thrust plate doesn't tilt when installing the clip.



13. Using special tools MD-998801 (3), MD-998812 (1) and MD-998818 (2), install the input shaft rear bearing.



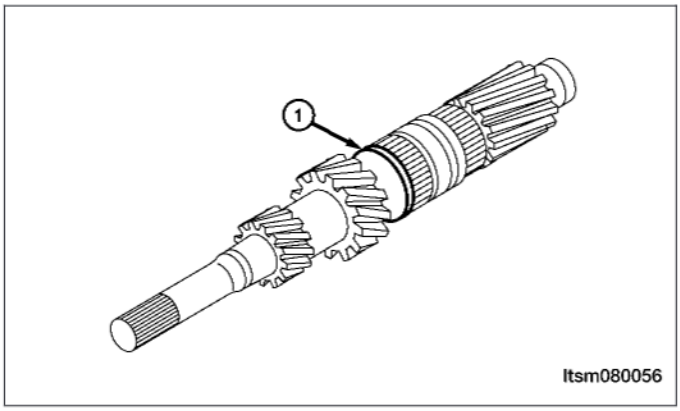
14. Install the snap ring.
Select the thickness of snap ring (1) to maintain the proper axial clearance of input shaft rear bearing.
(Standard Value: 0.01 mm to 0.12 mm)



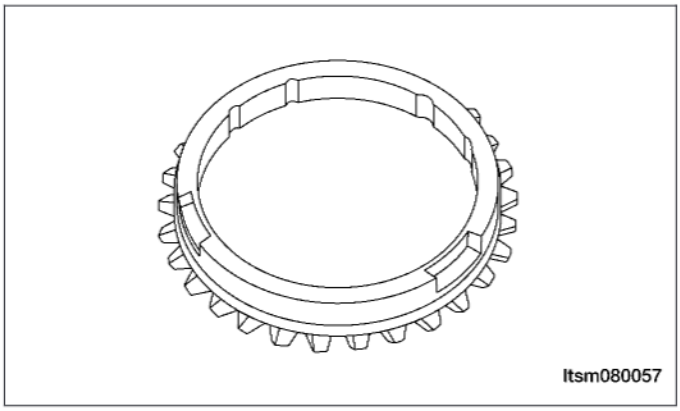
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Inspection

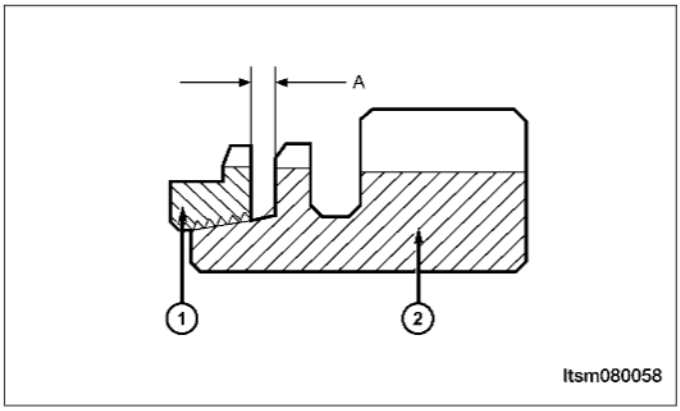
1. Input Shaft
   - Inspect the external surface of the input shaft and needle bearings (1) for any damage or excessive wear.
   - Inspect the input shaft spline for any damage or excessive wear.



2. Needle Bearing
   Inspect the input shaft and gears for smooth operation.
3. Synchronizer Ring
   - Inspect the synchronizer rings for any damage or signs of breakage in the surface of synchronizer rings.



   - Press synchronizer ring (1) 3rd-4th gear (2), and then examine the clearance “A”. If the “A” is less than the limit value, the synchronizer ring and 3rd-4th gear should be replaced.(Limit Value: 0.5 mm)

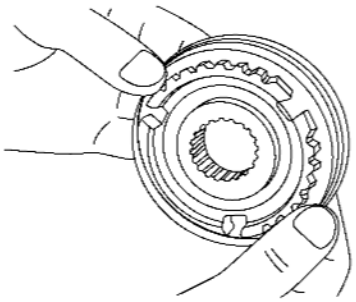


1 - Synchronizer Ring
2 - Gear

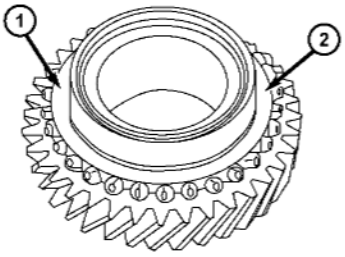
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4. Gear Hub and Hub of Synchronizer
   - Assemble the gear bushing together with the gear hub of synchronizer, and then inspect for smooth operation without lockup.
   - Inspect the front/rear of the interior surface of the gear bushing for any damage.
   - Inspect the synchronizer springs for any weak springs or damage.

     NOTE: If it is necessary to replace the gear bushing and gear hub of the synchronizer, they are only serviced as a complete set.


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5. 3rd-4th Driven Gear
   - Inspect the gear surface of the skew gear and clutch gear (1) for any damage.
   - Inspect the conical surface of the synchronizer (2) for thickening, damage or wear.
   - Inspect the internal diameter of the front/rear surface of the gear.

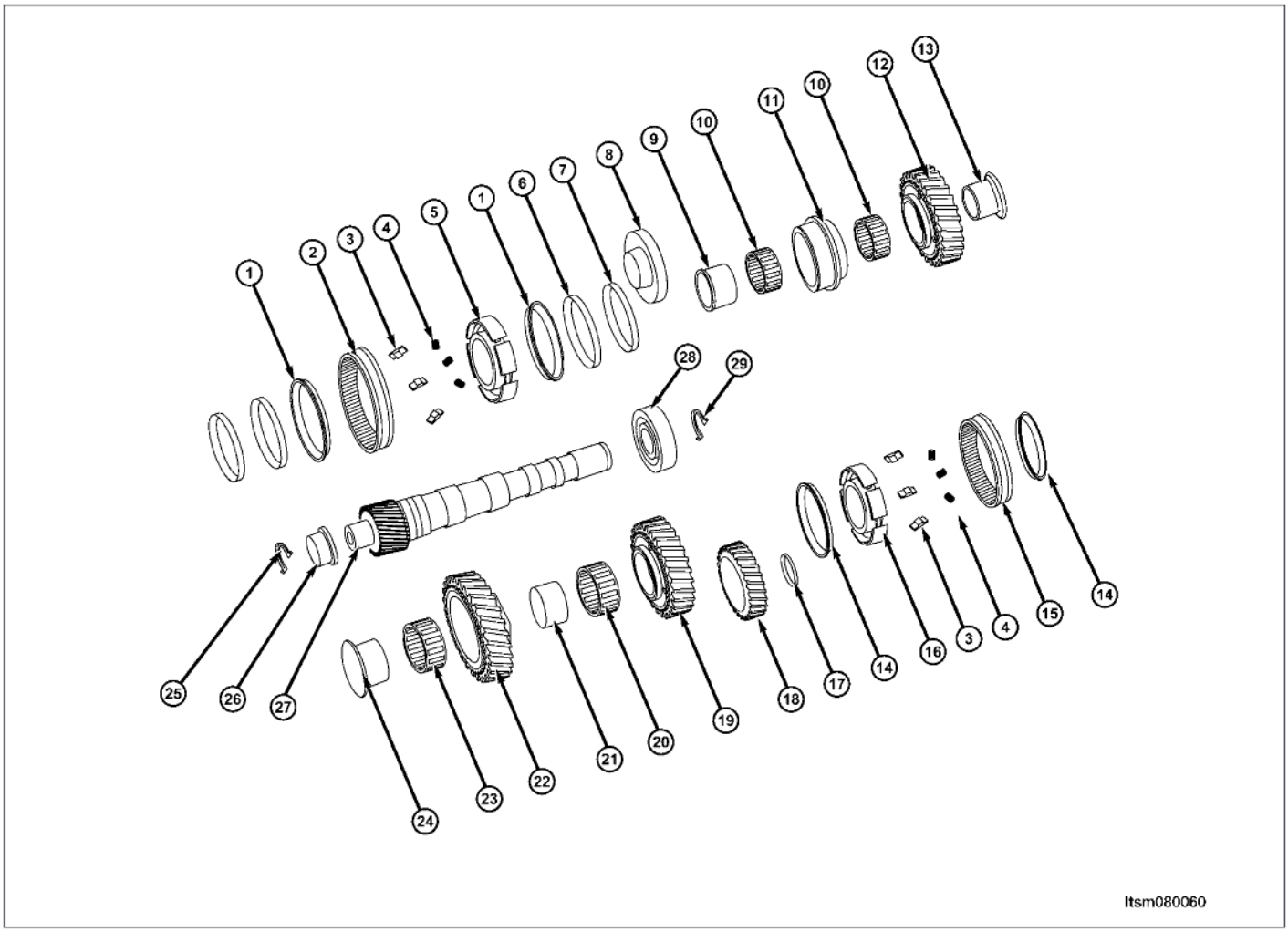


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Output Shaft

Disassemble

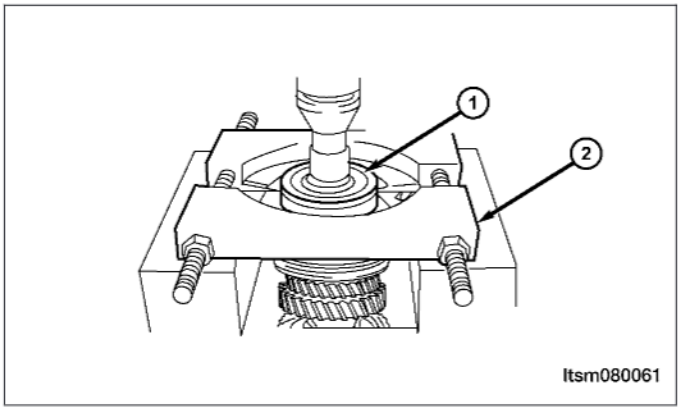


1 - Outer Ring-1st-2nd Synchronization Ring	16 - Gear Hub-5th-Reverse Gear
2 - Gear Hub Sleeve-1st-2nd Synchronizer	17 - Snap Ring-3rd Driven Gear
3 - Guide Block	18 - 3rd Driven Gear
4 - Spring-1st-2nd Gear And 5th-Reverse Gear Synchronizer	19 - 2nd Driven Gear Assembly
5 - Gear Hub-1st-2nd Gear	20 - Needle Bearing-2nd Gear
6 - Steel Ring-1st-2nd Synchronization Ring	21 - Sleeve-2nd Gear
7 - Inner Ring-1st-2nd Synchronization Ring	22 - 1st Driven Gear Assembly
8 - 4th Driven Gear	23 - Needle Bearing-1st Gear
9 - Gear Bushing-5th Gear	24 - Sleeve-1st Gear
10 - Needle Bearing-Reverse Gear	25 - Snap Ring-Output Shaft Front Bearing
11 - 5th Driven Gear Assembly	26 - Output Shaft Front Bearing
12 - Reverse Driven Gear Assembly	27 - Output Shaft
13 - Sleeve-Reverse Gear	28 - Output Shaft Rear Bearing
14 - Synchronization Ring-3rd-4th Gear And 5th-Reverse Gear	29 - Snap Ring-Output Shaft Rear Bearing
15 - Gear Hub Sleeve-5th-Reverse Gear	

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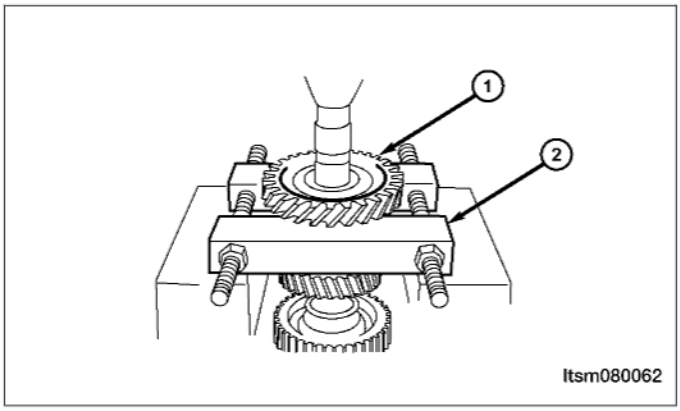
NOTE :
The following special tools are required to perform the repair procedure:
- MB-998801 - Bearing Remover
- MB-998812 - Installer Cap
- MB-998814 - Installer Connector (200 mm)
- MB-998813 - Installer (100)
- MB-998818 - Installer Connector (38 mm)
- MB-998819 - Installer Connector (40 mm)
- MB-998822 - Installer Connector (46 mm)
- MB-998825 - Installer Connector (52 mm)

1. Using special tool MB-998917 (2), disassemble the output shaft rear bearing (1).



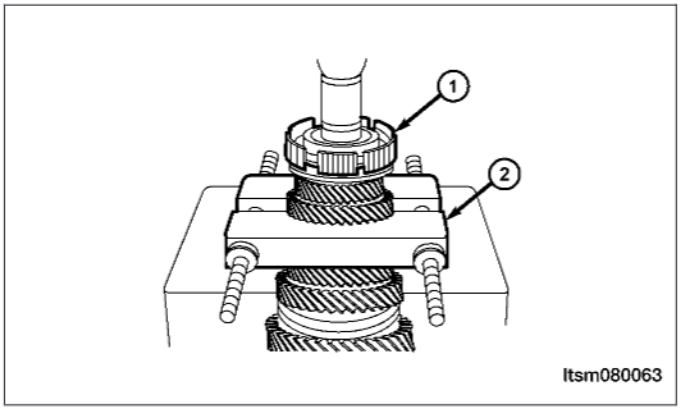
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2. Disassemble the reverse gear sleeve (1).
   Install special tool MB-998801 (2) on the reverse driven gear, and then disassemble the sleeve.



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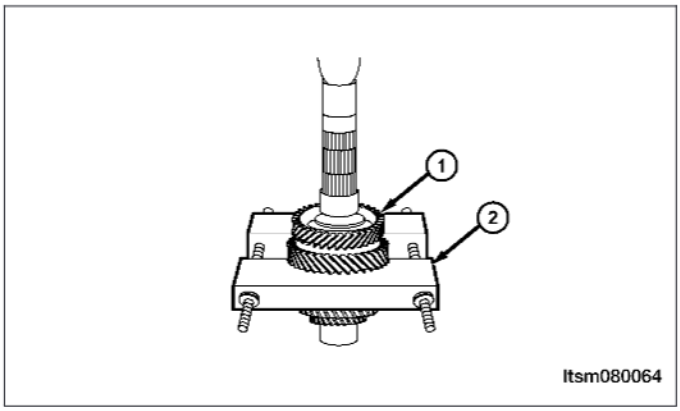
3. Disassemble the 5th-reverse gear synchronizer hub (1).
   Install special tool MB-998801 (2) on the 4th driven gear, and then disassemble the gear hub-5th-reverse gear.



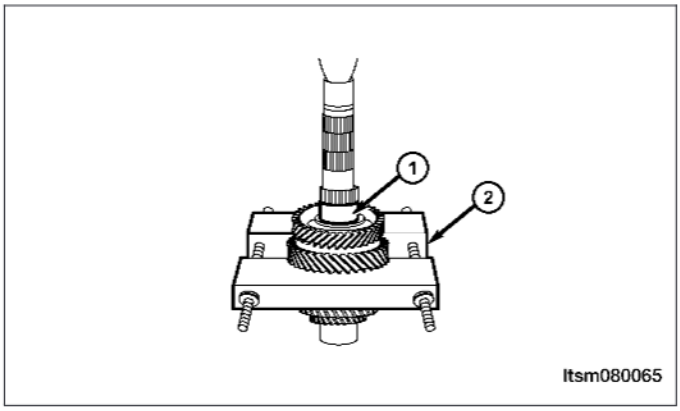
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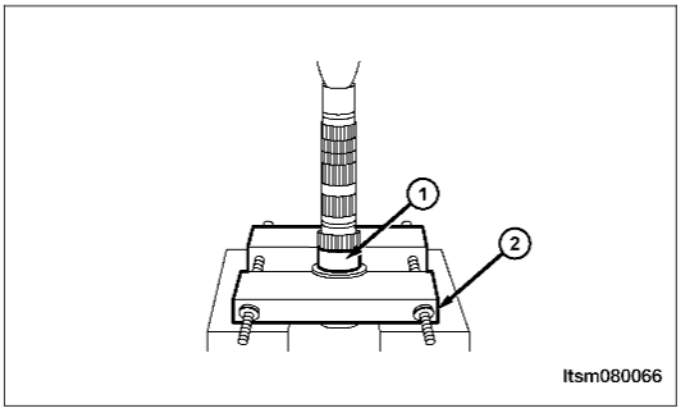
4. Disassemble the 3rd driven gear (1).
   Install special tool MB-998917 (2) on the 2nd driven gear, and then disassemble the 3rd driven gear.



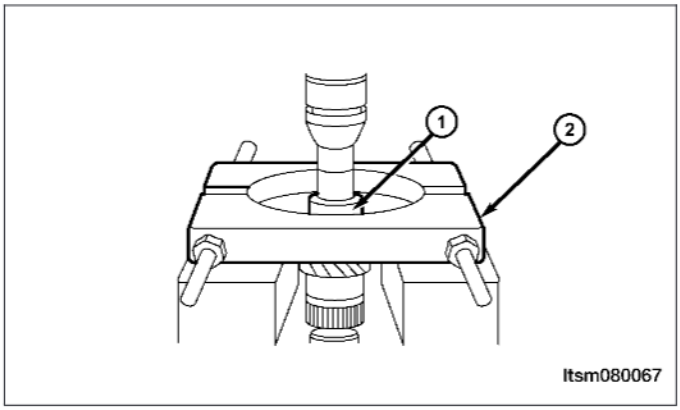
5. Disassemble the sleeve-2nd gear (1).
   Install special tool MB-998917 (2) on the 1st driven gear, and then disassemble the sleeve-2nd gear.



6. Using special tool MB-998801 (2), disassemble the sleeve-1st gear (1).



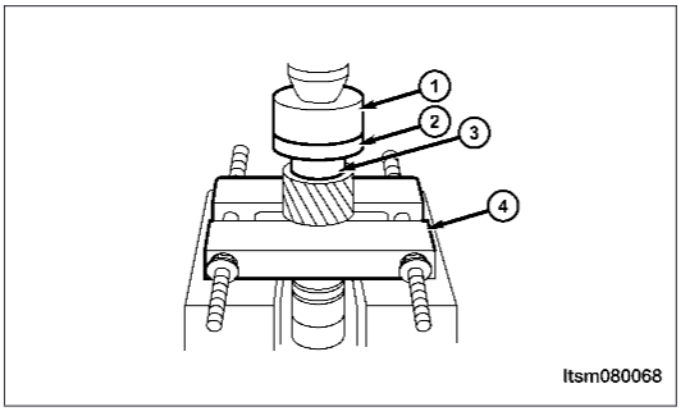
7. Using special tool MB-998917 (2), disassemble the output shaft front bearing race (1).



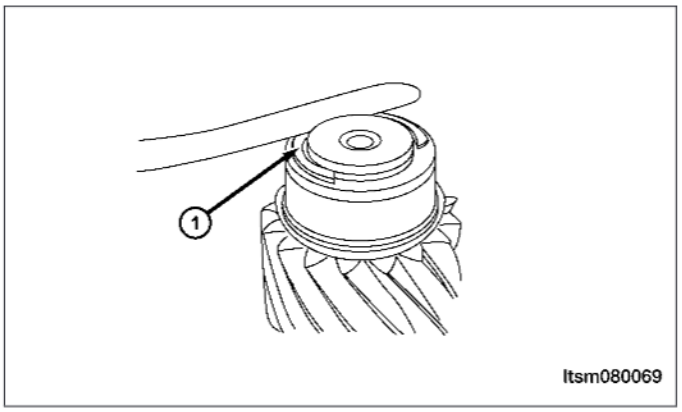
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Assemble

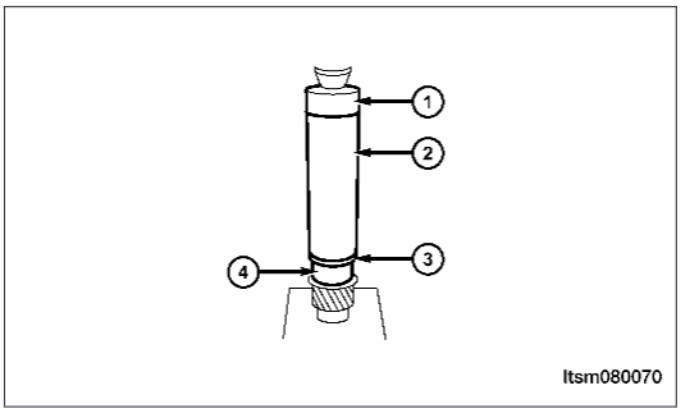
1. Using special tools MB-998801 (4), MB-998812 (1) and MB-998818 (2), install the output shaft front bearing race (3).



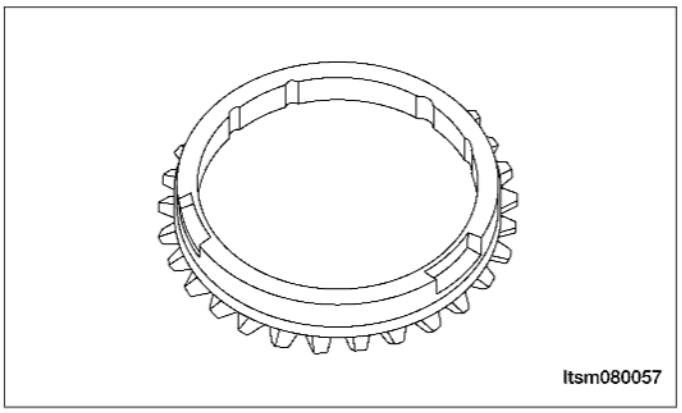
2. Install the snap ring-output shaft front bearing (1). Select the snap ring and install it to maintain the proper axial clearance of the output shaft front bearing.
(Standard Value: 0.01 mm to 0.12 mm)



3. Using special tools MB-998812 (1), MB-998814 (2) and MB-998825 (3), install the sleeve-1st gear (4).

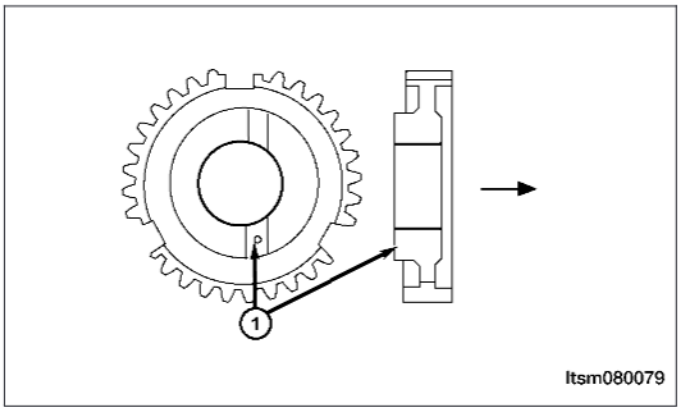


4. Install the 1st-2nd gear synchronization ring.
Install the 1st-2nd gear synchronizer ring correctly on the specified position of synchronizer ring shown in the figure.

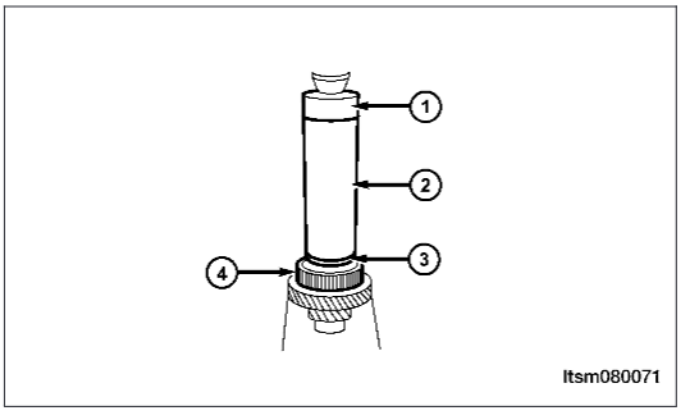


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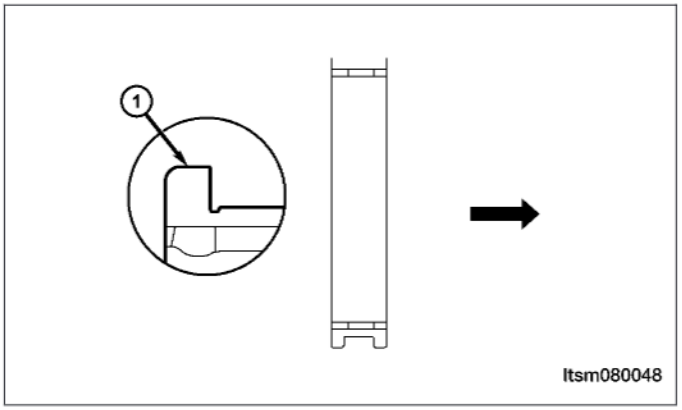
5. Install the gear hub-1st-2nd gear.
   Install the gear hub-1st-2nd gear in the position (1) shown in the figure.



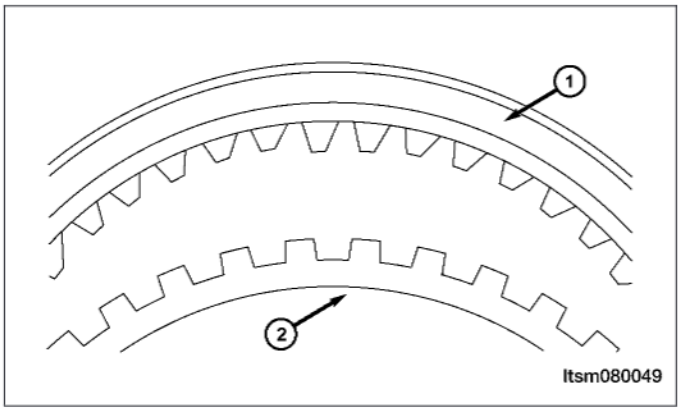
CAUTION:
Using special tools MD-998814 (1), MD-998815 (2) and MD-998825 (3), install the synchronizer ring (4). Ensure that the synchronizer ring is not locked when installing the gear hub.



6. Install the gear hub sleeve-1st-2nd gear synchronizer.
   - Install the gear bushing on the position (1) shown in the figure.

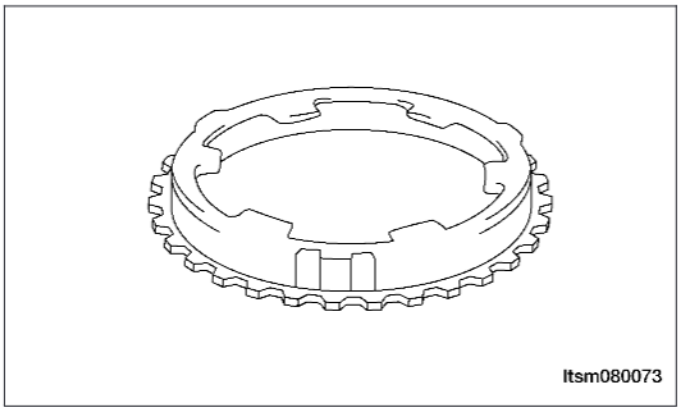


   - Ensure that the two deep tooth spaces of the gear hub (1) are correctly aligned with the two high racks of the gear hub during the installation of gear bushing.

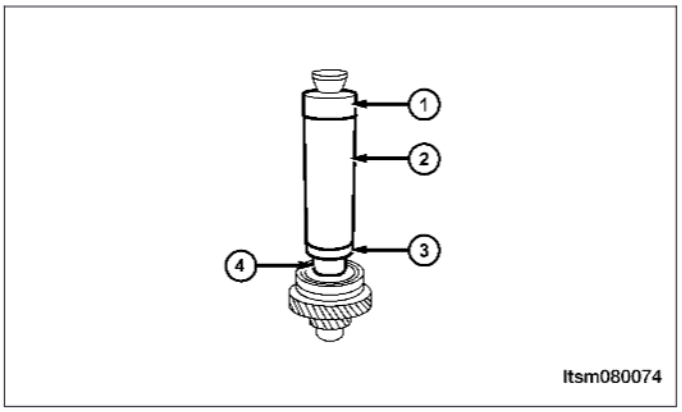


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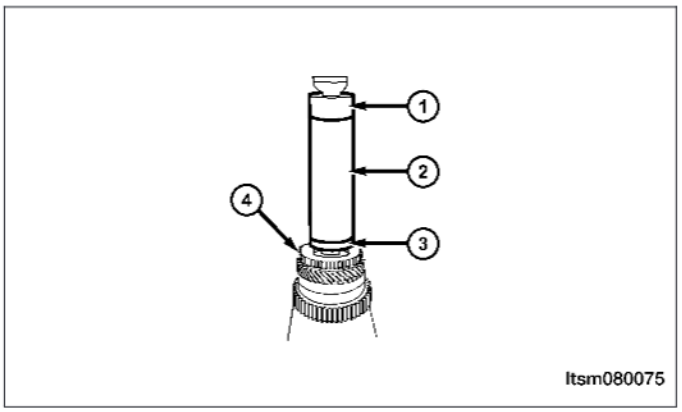
7. Install the synchronizer Ring.



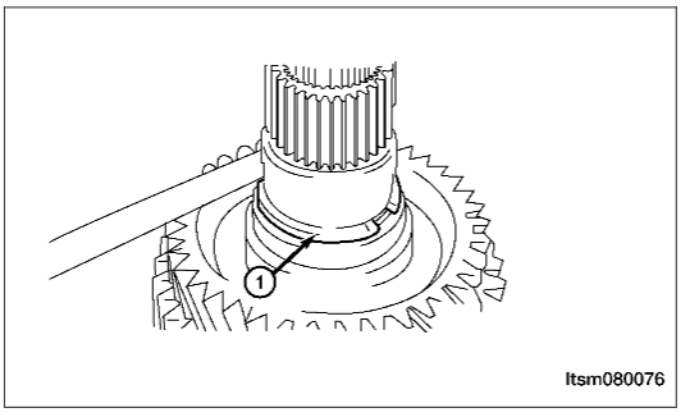
8. Using special tools MB-998812 (1), MB-998814 (2) and MB-998822 (3), install the sleeve-2nd gear (4).



9. Using special tools MB-998812 (1), MB-998814 (2) and MB-998822 (3), install the 3rd driven gear (4).

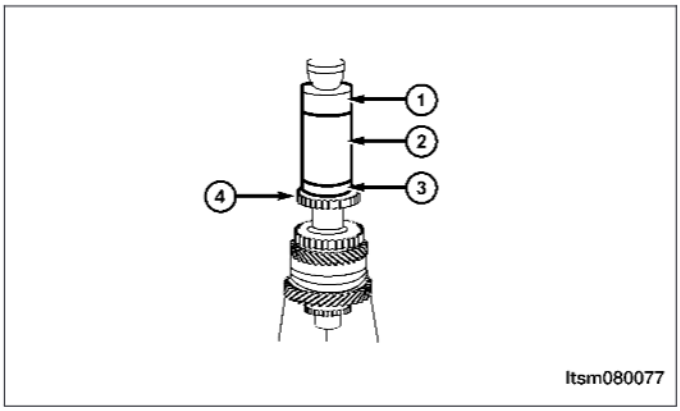


10. Install the snap ring-3rd driven gear (1). Install the snap ring to maintain the proper axial clearance of the output shaft 3rd driven gear.
(Standard Value: -0.01 mm to 0.09 mm)



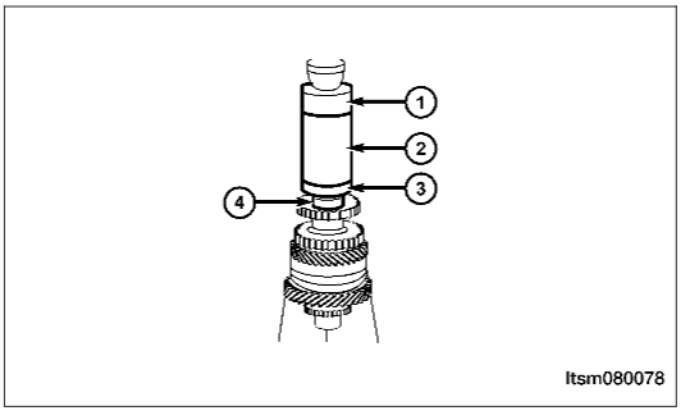
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11. Using special tools MB-998812 (1), MB-998813 (2) and MB-998819 (3), install the 4th driven gear (4).



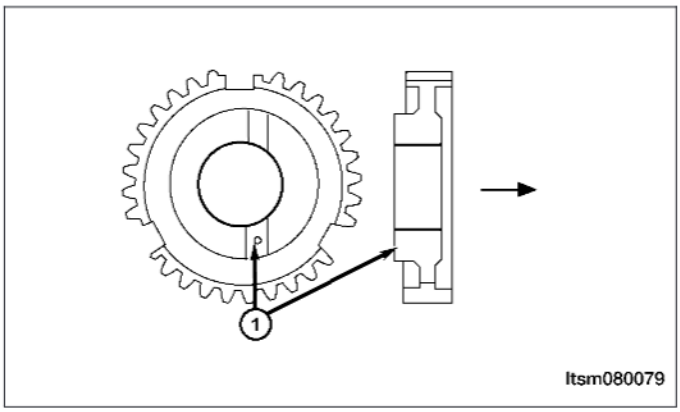
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12. Using special tools MB-998812 (1), MB-998813 (2) and MB-998819 (3), install the sleeve-5th gear (4).



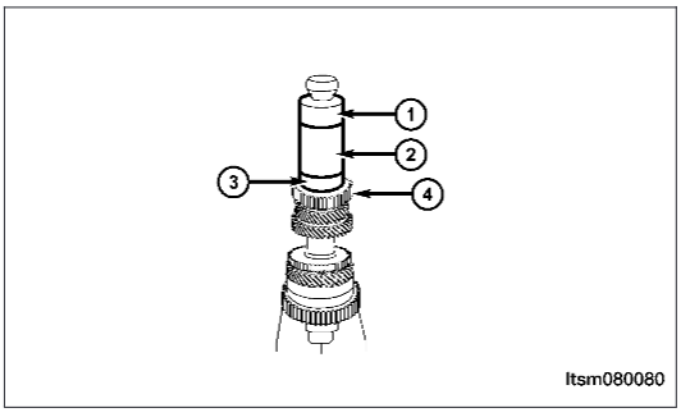
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13. Install the gear hub-5th-reverse gear.
Install the gear hub-5th-reverse gear in the position (1) shown in the figure.



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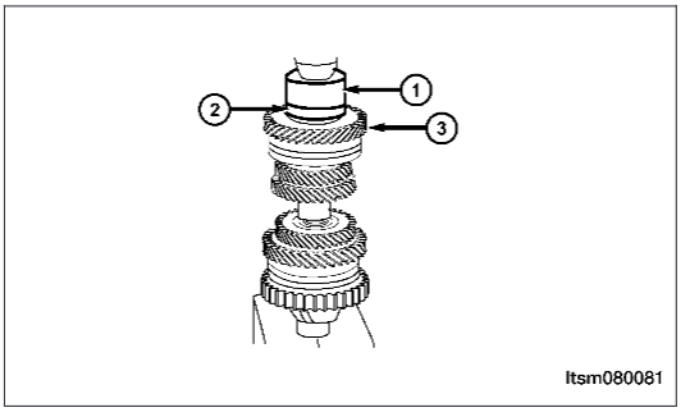
CAUTION:
Using special tools MD-998812 (1), MD-998813 (2) and MD-998819 (3), install the synchronizer ring (4). Ensure that the synchronizer ring is not locked when installing the gear hub-5th-reverse gear.



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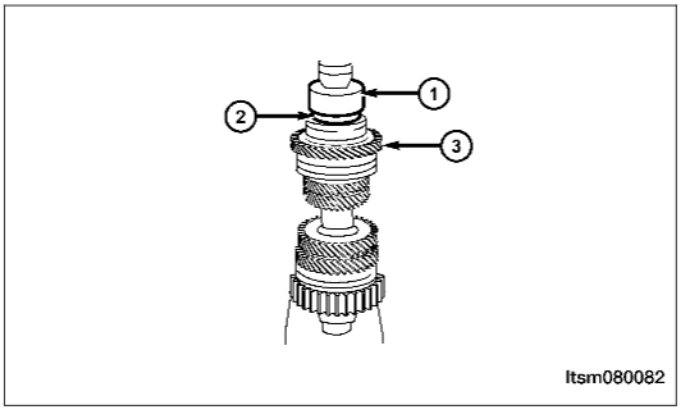
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14. Using special tools MB-998812 (1) and MB-998818 (2), install the reverse driven gear/needle bearing-reverse gear/sleeve-reverse gear (3).



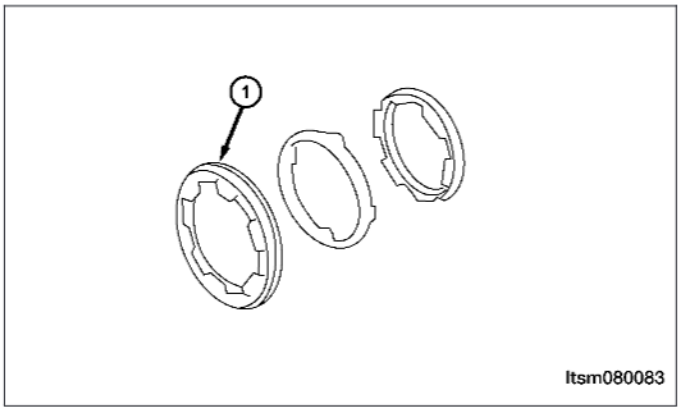
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15. Using special tools MB-9988112 (1) and MB-998818 (2), install the input shaft rear bearing (3).



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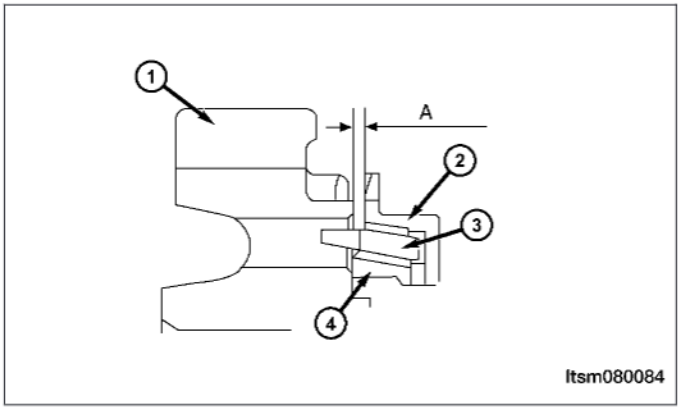
16. Install the outer ring-1st-2nd gear synchronizer ring/steel ring-1st-2nd gear synchronization ring/inner ring-1st-2nd gear synchronization ring (1).
    - Inspect the conical surface of the clutch gear for any damage or breakage on the gear surface.



ltsm080083

    - Install the outer ring (2) and inner ring (4), and then press them down to the gear (1) to measure the clearance “A”. If “A” is less than the limit value, the rings (3) should be replaced-.Limit Value: 0.5 mm

CAUTION:
The outer ring, inner ring or steel, are replaced as a complete set.

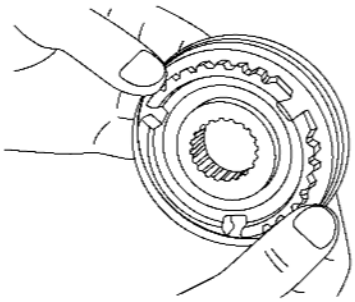


ltsm080084

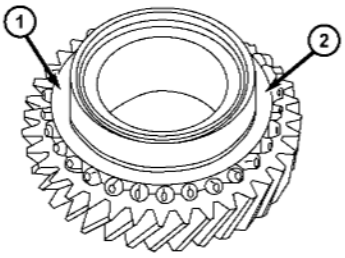
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17. Install the gear bushing and hub of synchronizer:
    - Assemble the gear bushing together with the gear hub of synchronizer, and then inspect for smooth operation without lockup.
    - Inspect the front/rear of the interior surface of the gear bushing for any damage.
    - Inspect the synchronizer springs for any weak springs or damage.

    CAUTION: The gear bushing or gear hub of the synchronizer are replaced as a complete set.


ltsm080059

18. Install the transaxle gear:
    - Inspect the gear surface of the skew gear and clutch gear (1) for any damage.
    - Inspect the conical surface of the synchronizer (2) for thickening, damage or wear.
    - Inspect the internal diameter of the front/rear surface of the gear.

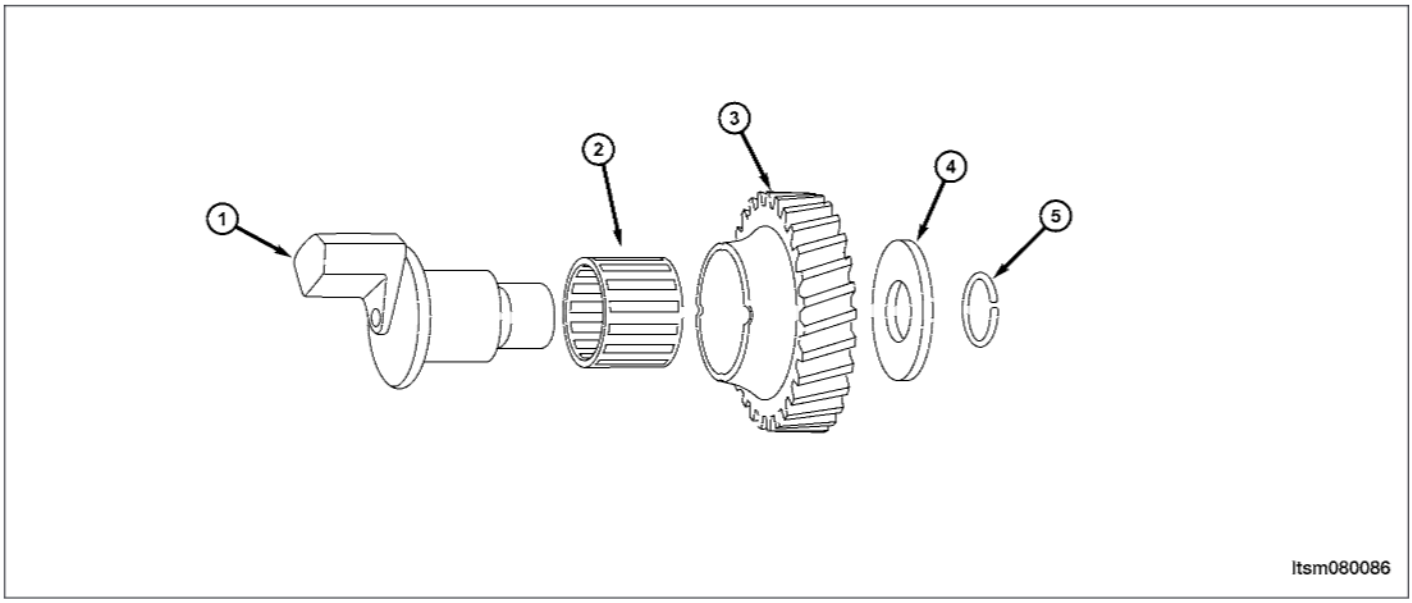


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Output Gear For Reverse Gear

Disassemble



1 - Idler Gear Shaft	4 - Thrust Plate
2 - Needle Bearing	5 - Thrust Plate Snap Ring
3 - Reverse Gear	

1. Remove the thrust plate snap ring (5)
2. Separate the thrust plate (4) and the reverse gear (3).
3. Separate the needle bearing (2) and idle gear shaft (1).

Inspection

Needle Bearing

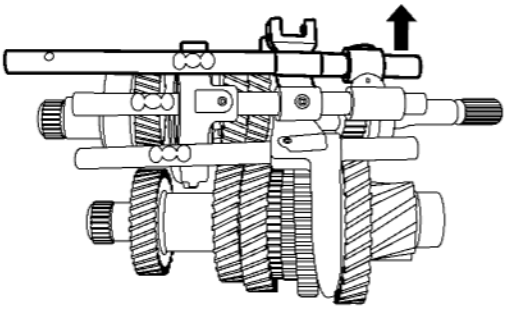
- Assemble the shaft together with the gear, and then examine whether they can slide smoothly without sagging or noise.
- Inspect the bearing cage for any damage.

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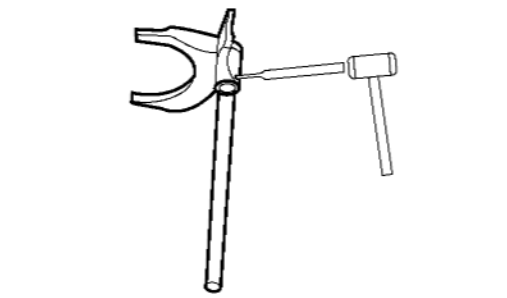
5th-Reverse Gear Shift Fork

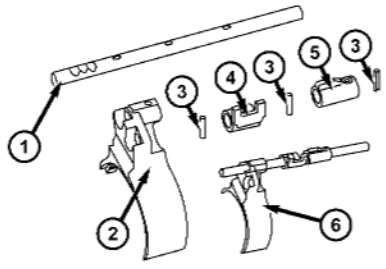
Disassemble

1. Separate the 5th-Reverse shift fork from the shift fork assembly.



2. Use a suitable tool to remove the shift fork spring pin from the shift fork and the shift fork shaft.





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1 - 5th Shift Fork Shaft	4 - Reverse Fork Rack
2 - 5th Shift Fork	5 - Driving Block - Backup Light Switch
3 - Spring Pin for Fork Shaft	6 - 5th-Reverse Shift Fork Shaft Assembly

3. Remove the spring pins (3) from the 5th shift fork shaft (1).
4. Separate the 5th shift fork (2) and the reverse fork rack (4) from the 5th shift fork shaft (1).
5. Separate the backup lamp switch driving block (5) from the 5th shift fork shaft (1).

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Assemble

Assemble in the reverse order of disassembly.

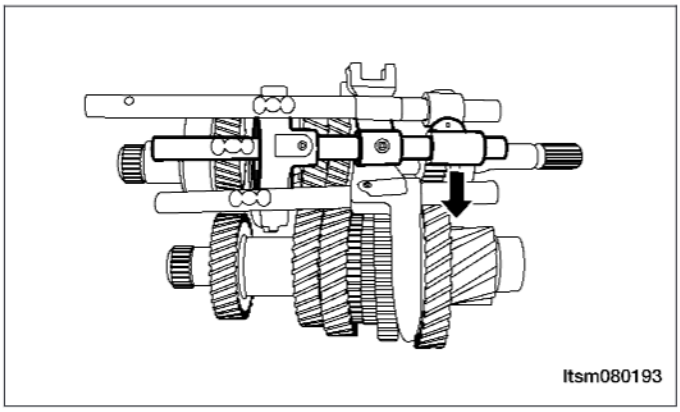
NOTE :

- Check and ensure the shift fork is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check and ensure the fork rack is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check and ensure backup light driving block is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check the fork shaft surface for any damage.
- Check the position of the three spring pins, ensure the pins are in proper alignment. The extension of both ends of the three spring pins should not exceed 3 mm.

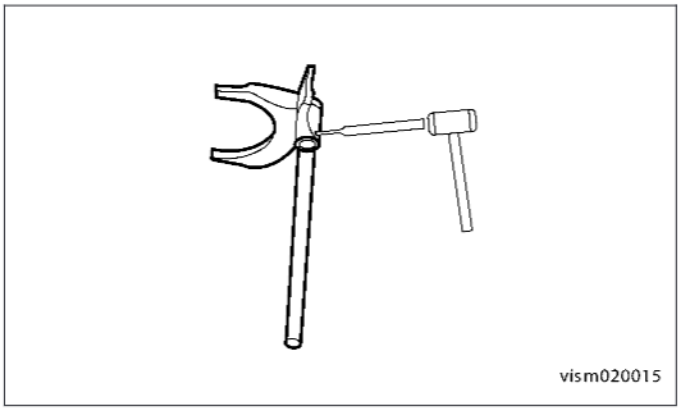
3rd-4th Gear Shift Fork

Disassemble

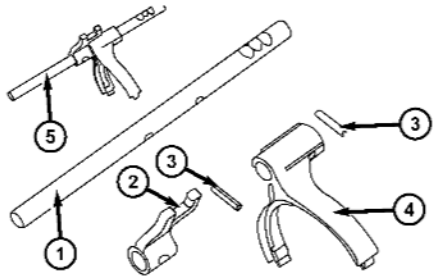
1. Separate the 3rd-4th shift fork from the shift fork assembly.



2. Use a suitable tool to remove the shift fork spring pin from the shift fork and the shift fork shaft.



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1 - 3rd-4th Shift Fork Shaft	4 - 3rd-4th Shift Fork
2 - Fork Rack - 3rd-4th Gear Shift Fork	5 - 3rd-4th Shift Fork Shaft Assembly
3 - Spring Pin for Fork Shaft	

3. Remove the spring pins (3) from the 3rd-4th shift fork shaft (1).
4. Separate the 5th shift fork (4) and the fork rack (2) from the 3rd-4th shift fork shaft (1).

Assemble

Assemble in the reverse order of disassembly.

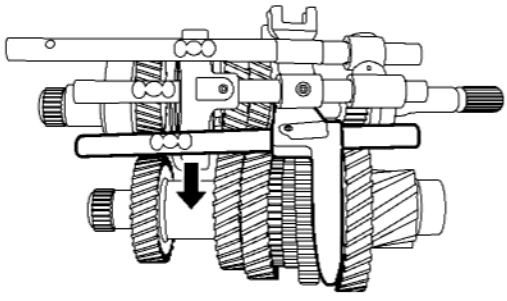
NOTE :

- Check and ensure the shift fork is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check and ensure the fork rack is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check the fork shaft surface for any damage.
- Check the position of the three spring pins, ensure the pins are in proper alignment. The extension of both ends of the three spring pins should not exceed 3 mm.

1st-2nd Gear Shift Fork

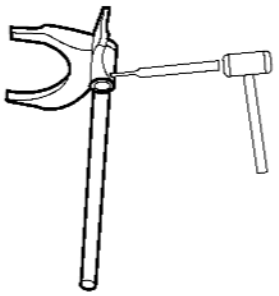
Disassemble

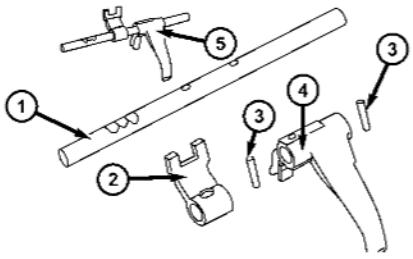
1. Separate the 1st-2nd shift fork from the shift fork assembly.


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2. Use a suitable tool to remove the shift fork spring pin from the shift fork and the shift fork shaft.


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1 - 1st-2nd Shift Fork Shaft	4 - 1st-2nd Shift Fork
2 - Fork Rack - 1st-2nd Gear Shift Fork	5 - 1st-2nd Shift Fork Shaft Assembly
3 - Spring Pin for Fork Shaft	

3. Remove the spring pins (3) from the 1st-2nd shift fork shaft (1).
4. Separate the 1st-2nd shift fork (4) and the fork rack (2) from the 1st-2nd shift fork shaft (1).

Assembly

Assemble in the reverse order of disassembly.

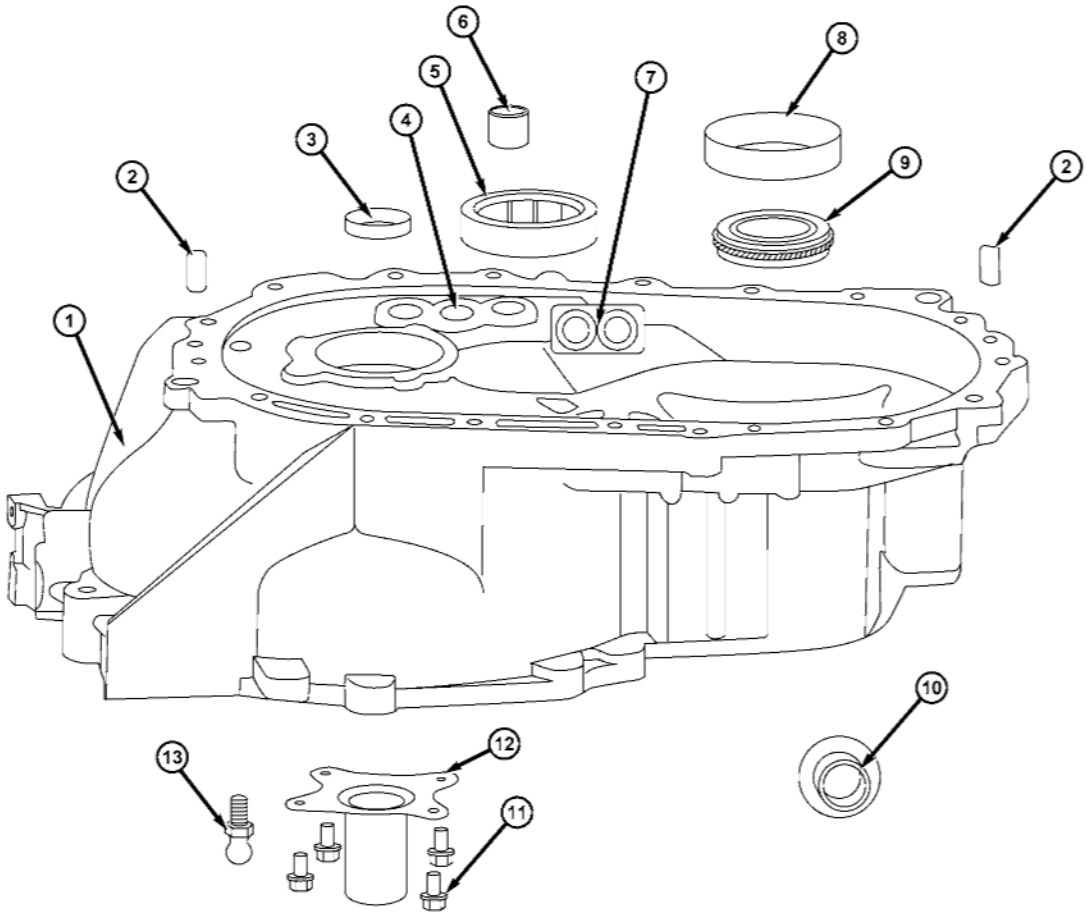
NOTE :

- Check and ensure the shift fork is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check and ensure the fork rack is properly installed to the fork shaft, there should be NO axial or radial motion in the fork shaft.
- Check the fork shaft surface for any damage.
- Check the position of the three spring pins, ensure the pins are in proper alignment. The extension of both ends of the three spring pins should not exceed 3 mm.

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Transaxle Clutch Housing Assembly

Disassemble



ltsm080095

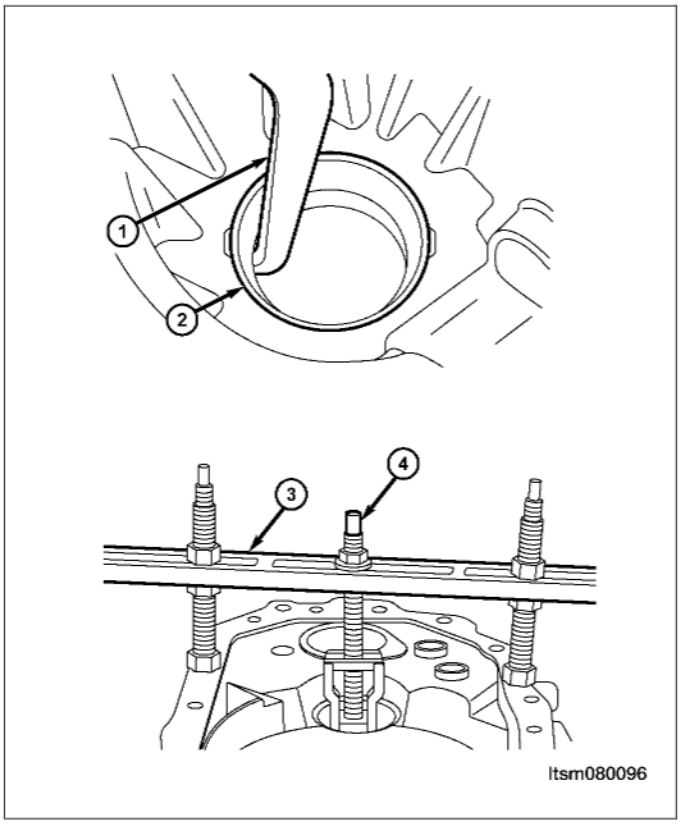
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1 - Clutch Housing
2 - Pin GB119 A10×20
3 - Fluid Seal-Input Shaft
4 - Bushing-Gear Shifting Mechanism
5 - Output Shaft Front Bearing
6 - Bearing-Gear Shifting Mechanism
7 - Magnetic Assembly

8 - Front/Rear Bearing Of Differential
9 - Fluid Seal-Differential
10 - Speedometer Banking Cover
11 - Bolt GB5787 M6×12
12 - Release Bearing Race
13 - Buttonhead-Seat Release Fork

NOTE :
The following special tools are required to perform the repair procedure:
- MB-998772 - Valve Spring Compressor
- MB-999566 - Hook
- MB-990938 - Handle
- MB-990935 - Installer Connector
- MB-990934 - Installer Connector
- MB-998325 - Fluid Seal Installer
- MB-990926 - Installer Connector

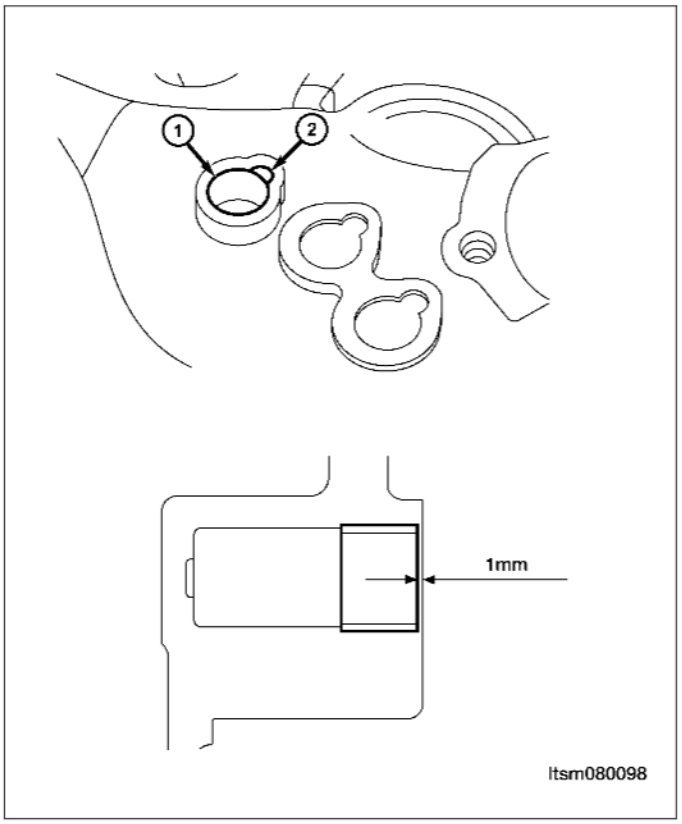
1. Using special tools MB-999566 (1), MB-996772 (3), and MD-998348 (4), disassemble the outer race of the front/rear bearing (2) of the differential.



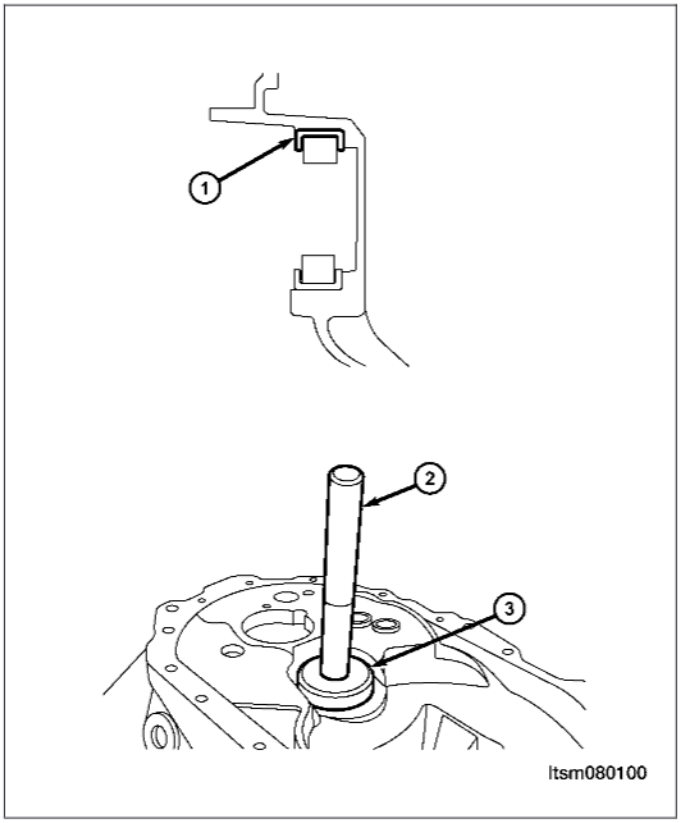
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Assembly

1. Install the bushing.
   Press the bushing (1) into position (2) as shown in the figure.

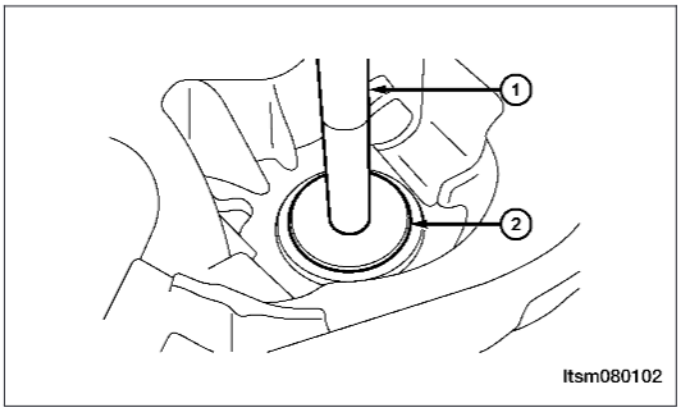


2. Using special tools MB-990938 (2) and MB-990934 (3), install the outer race-output shaft bearing (1).
   Install the outer race with the stamped side in the position shown in the figure.

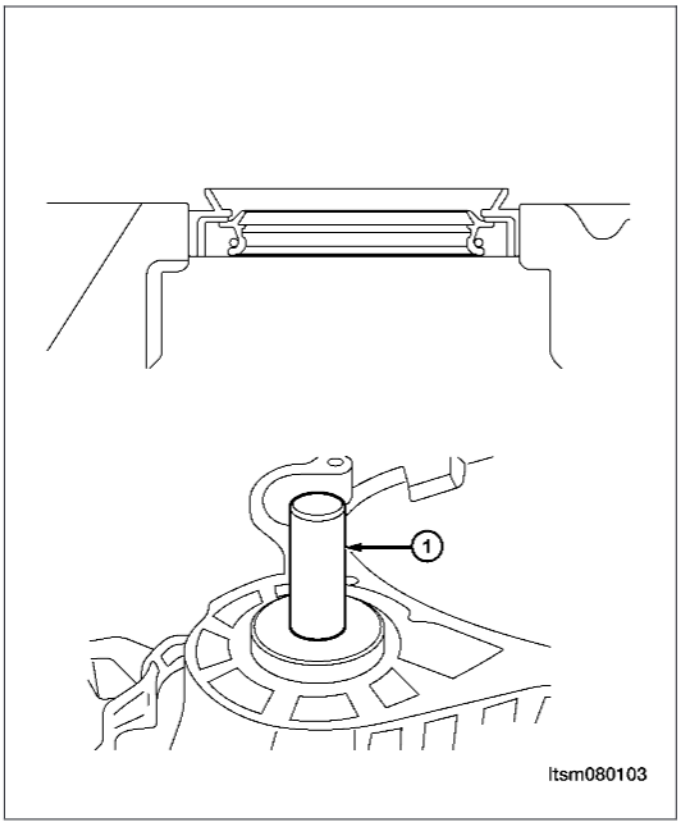


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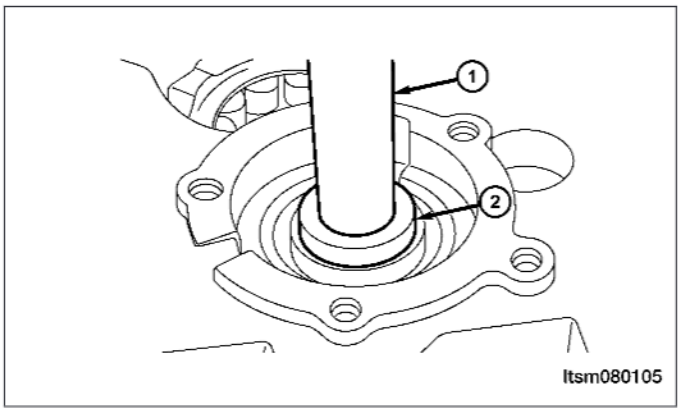
3. Using special tools MB - 990938 (1), and MB - 990935 (2), install the race-differential bearing.



4. Using special tools MB-998325 (1), install the fluid seal-differential.
   Apply transaxle fluid on the fluid seal lip.
   (Specified fluid: 75W-90)



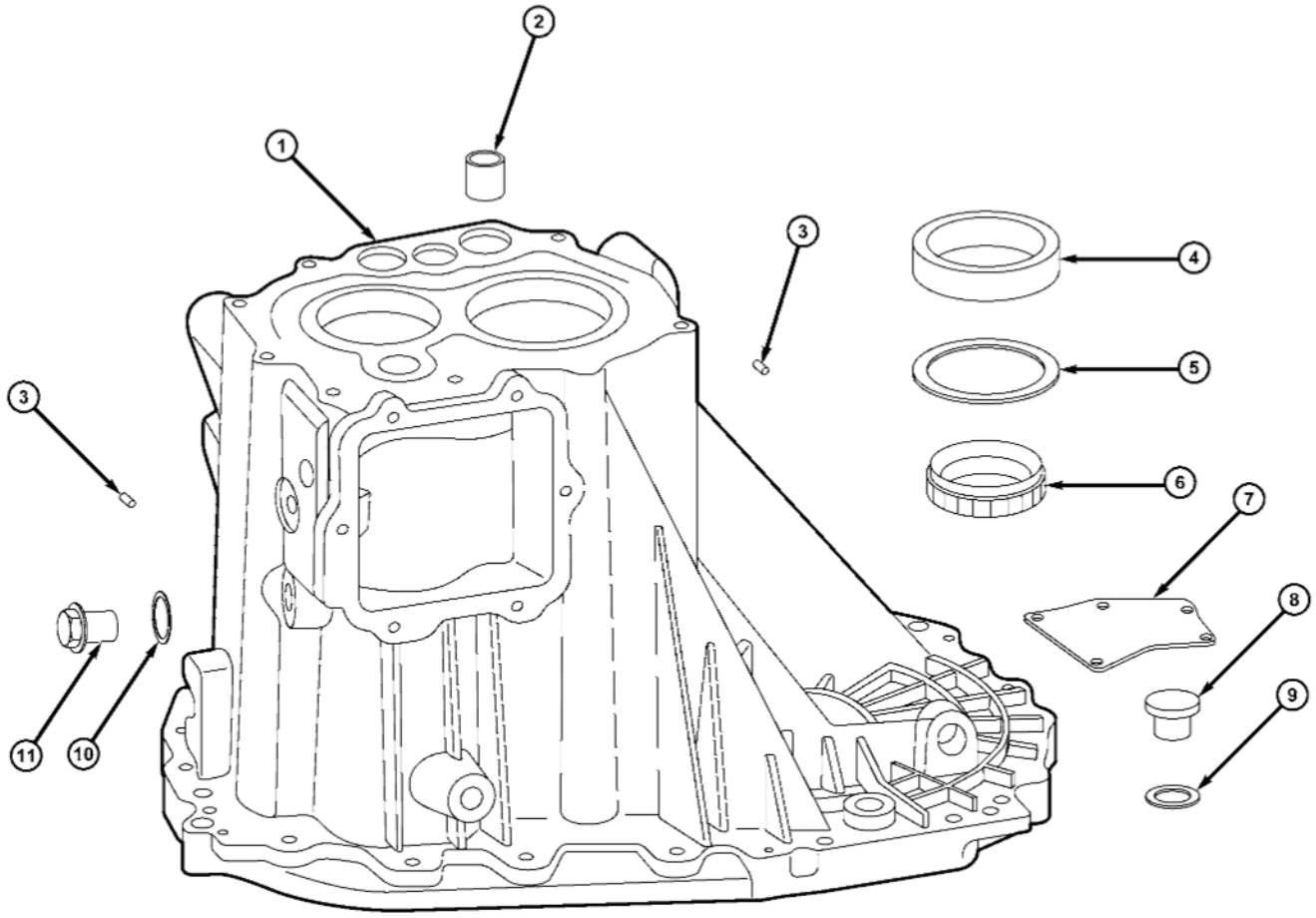
5. Using special tool MB-990938 (1) and MB-990926 (2), install the input shaft fluid seal.
   Apply the lubricating grease on the fluid seal lip.
   (Specified lubricating grease: Mobilux Ep2 or equivalents)



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Transaxle Main Housing Assembly

Assembly

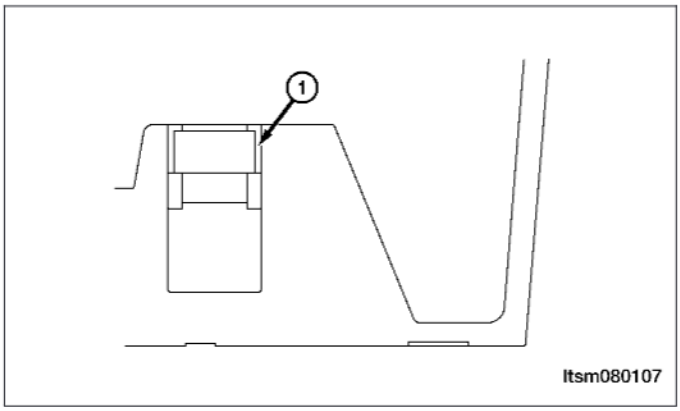


1 - Transaxle Housing	7 - Fluid Baffle
2 - Bearing-Gear Shifting Mechanism	8 - Fluid Draining Screw Plug
3 - Pin GB119	9 - Plain Washer-Fluid Draining Screw Plug
4 - Outer Race Of Front/Rear Bearing Of Differential	10 - Plain Washer-Fluid Limiting Screw Plug
5 - Adjustment Gasket-Differential Rear Bearing	11 - Fluid Limiting Screw Plug
6 - Fluid Seal-Differential	

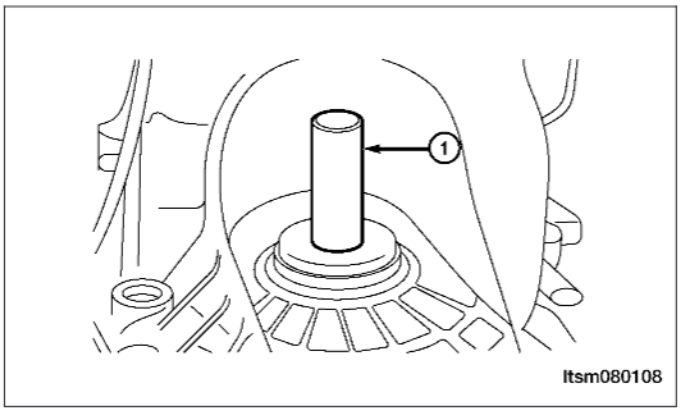
NOTE :
The following special tools are required to perform the repair procedure:
- MD-998325 - Fluid Installer

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1. Install the bearing-gear shifting mechanism (1). Press the bearing in until it is flush with the surface of housing.



2. Install the differential fluid seal. Inspect the fluid seal for damage. Apply lubricating grease on the external diameter and inner lip of the fluid seal, and then use special tool MD-998325 (1) to install the seal into position. (Lubricating grease: Mobilux Ep2)



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FRONT DIFFERENTIAL

GENERAL INFORMATION 08-308
- Description 08-308
- Operation 08-310
- Specifications 08-310
- Special Tools 08-310

DIFFERENTIAL UNIT REPAIR 08-312

Differential Carrier 08-312
- Removal & Installation 08-312
- Inspection 08-313
- Assembly 08-313

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GENERAL INFORMATION

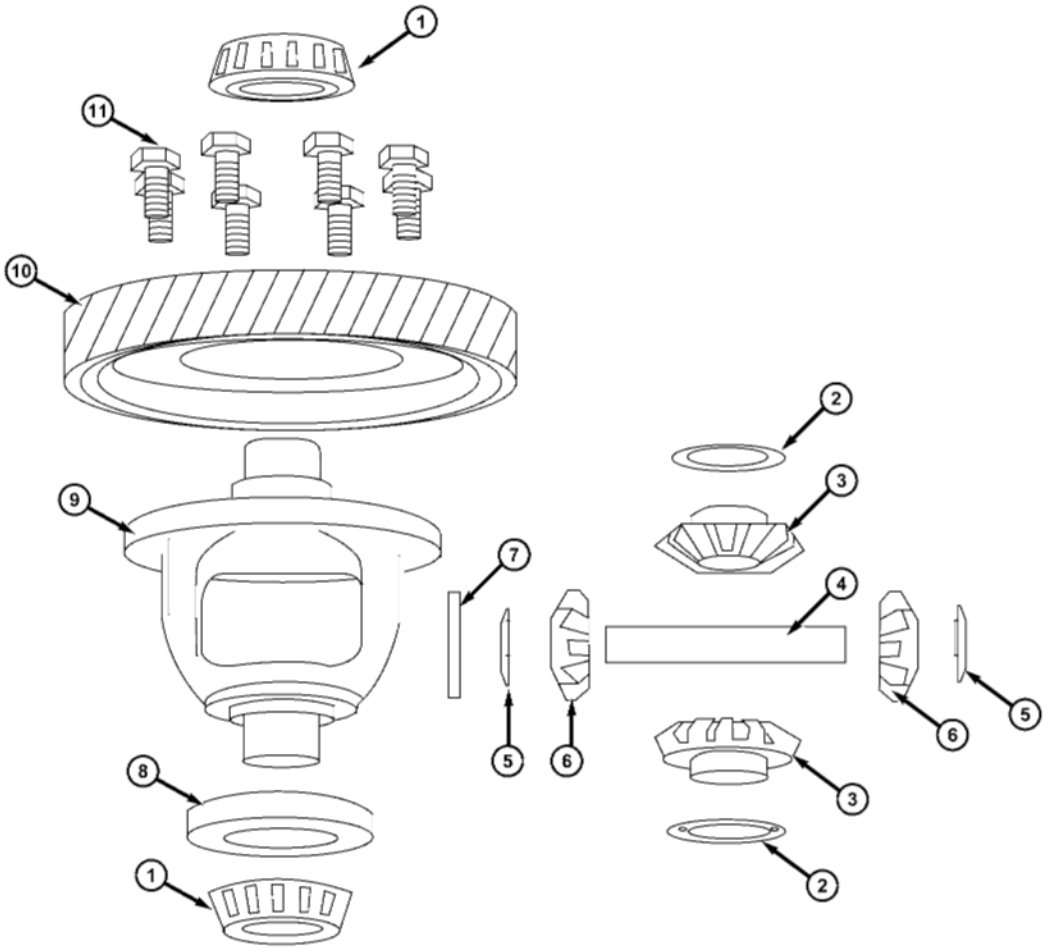
Description

The differential includes the differential side gears and the shaft mounted differential pinion gears. Direct contact between the gears and the differential case is prevented by the differential side gear thrust washers installed under the gears. The differential pinion shaft is held in position by a differential pinion shaft lock pin that extends through the end of the differential pinion shaft and the differential case.

The differential transaxle assembly consists of the following components:

- Differential case (part of the final drive carrier)
- 2 pinion gears supported by a pinion shaft
- 2 side gears supported by the differential case and half-shafts

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1 - Front/Rear Bearing Of Differential	7 - Anchor Pin-Planetary Gear Shaft
2 - Adjustment Gasket-Axle Shaft Gear	8 - The Driving Gear-Speedometer
3 - Axle Shaft Gear	9 - Differential Housing
4 - Planetary Gear Shaft	10 - The Driven Gear Of Main Reducing Gear
5 - Thrust Washer	11 - Bolt-The Driven Gear Of Main Reducing Gear And The Differential Housing
6 - Spherical Washer-Planetary Gear	

Operation

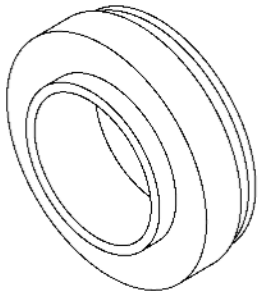
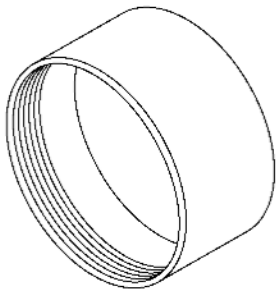
The differential operates through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts through the pinion mate and side gears. The side gears are connected to the axle shafts.

Specifications

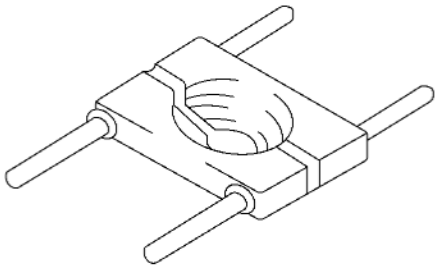
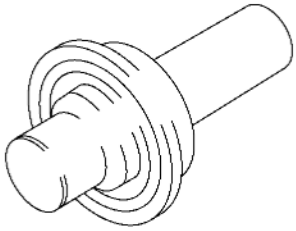
Clearance Specifications

Clearance Between Side Gear And Planetary Gear	0.028 - 0.150 mm
Adjusting Washer	0.93 - 1.00 mm

Special Tools

Installer Connector (40 mm) MD-998819	 ltsm080013
Installer Cap MD-998812	 ltsm080007

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Bearing Remover MD-998801	 ltsm080006
Fluid Installer MD-998325	 ltsm080004

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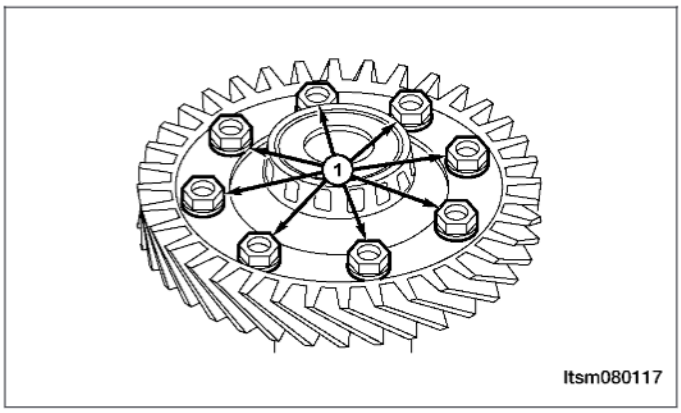
DIFFERENTIAL UNIT REPAIR

Differential Carrier

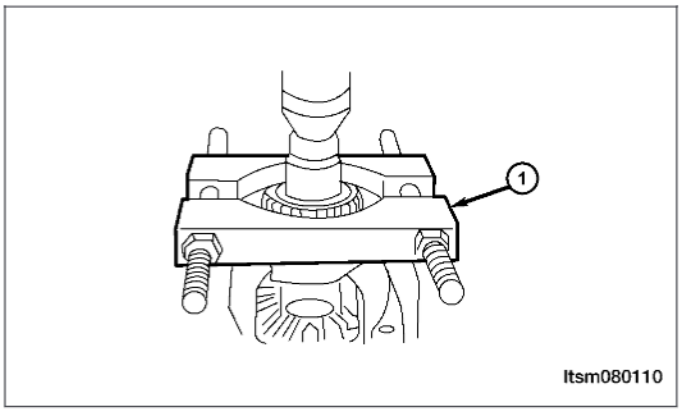
Removal & Installation

NOTE :
The following special tools are required to perform the repair procedure:
- MD-998801 - Bearing Remover

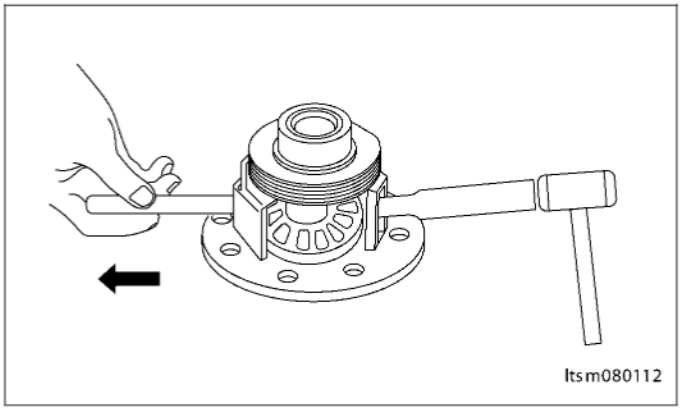
1. Remove the transaxle input shaft assembly, transaxle output shaft assembly, 1st-2nd shift fork, 3rd-4th shift fork and 5th-reverse fork shaft together as a unit (See Transaxle Assembly Unit Repair in Section 08 Transaxle).
2. Remove the transaxle differential assembly.
3. Mount the differential in a vice.
4. Remove the drive gear bolts (1).



5. Using special tool MD-998801 (1), disassemble the differential-front/rear shaft bearing.



6. Tap the drive gear off the differential case assembly using a suitable tool.
7. Remove the pinion mate shaft use a suitable tool.



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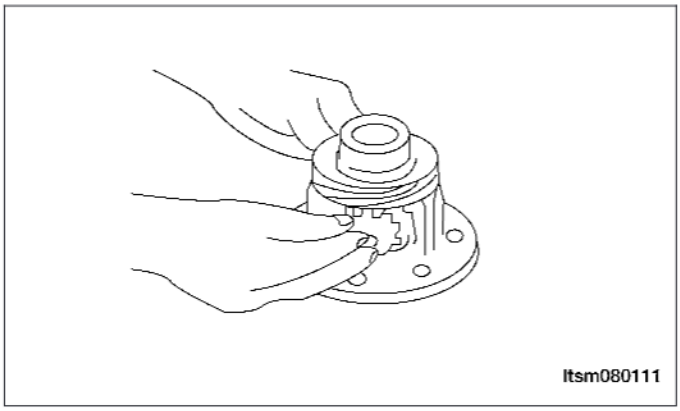
8. Turn the pinion mate gear, then remove the pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from the differential case.

Inspection

1. Clean all components.
2. Inspect the following components for wear:
   - Ring gear
   - Adjusting washers
   - Side gears
   - Spherical washers
   - Planetary gears
   - Planetary gear shaft

Assembly

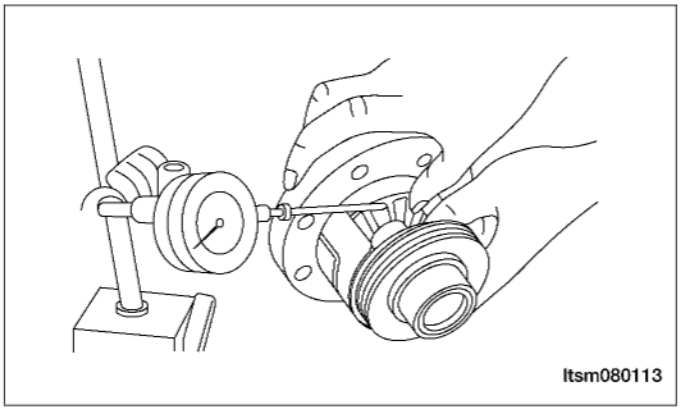
1. Install the adjustment shim-axle shaft gear/axle shaft gear/spherical washer-planetary gear/planetary gear/planetary gear shaft.
2. Assemble the spherical washer on the back of axle shaft gear, and then install the axle shaft gear on the differential.



NOTE :
The adjustment shim with intermediate thickness (0.93 to 1.00 mm) shall be assembled when a new axle shaft gear is installed.

3. Place the spherical washer on the back of any planetary gear to make two planetary gears engage simultaneously with the axle shaft gear. Turn these gears, and at the same time, install them in their proper positions.
4. Insert and install the planetary gear shaft.
5. Measure the gear clearance between the axle shaft gear and the planetary gear.
   (Standard value: 0.08 to 0.15 mm)
6. If the measured gear clearance doesn't conform to the standard value, select and install the adjustment shim, and then measure the gear clearance again.

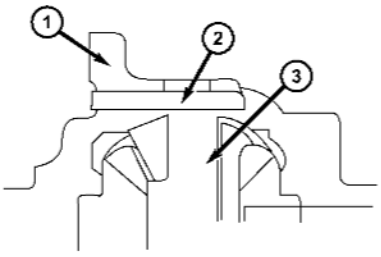
NOTE :
Adjust the gear clearance until the gear clearance of both sides is the same as each other.



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7. Install the lock pin (2).
8. Install the lock pin in the position shown in the figure.

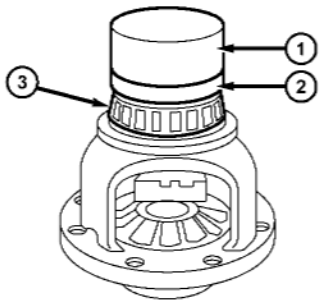
CAUTION:
After the lock pin is taped in, the axle shaft gear and the planetary gear should operate normally.



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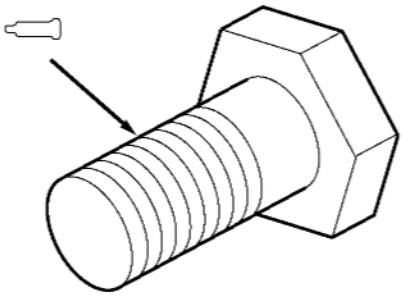
1 - Differential Housing
2 - Lock Pin
3 - Pinion Shaft

9. Using special tools MD-998812 (1) and MB-998819 (2), install the differential front/rear bearing (3).



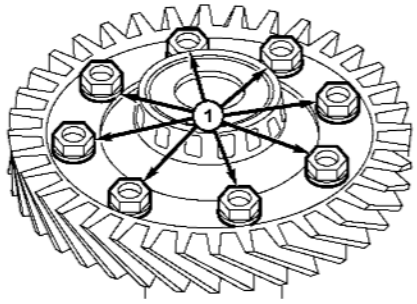
ltsm080115

10. Install the driven gear of main reducing gear.
11. Apply thread sealant to the threads of all bolts.


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12. Tighten the ring gear bolts (1) in the sequence shown in the figure.
    (Tighten: Ring gear bolts to 132 N·m)



ltsm080117

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CLUTCH SYSTEM

GENERAL INFORMATION 08-317
- Description 08-317
- Operation 08-317
- Specifications 08-317
- Special Tools 08-318

CLUTCH ASSEMBLY SERVICE 08-319

Clutch and Pressure Plate 08-319
- Removal & Installation 08-319
- Clutch Pedal Height 08-321
- Clutch Pedal Free Travel 08-321

Clutch Master Cylinder 08-322
- Description 08-322
- Operation 08-322
- Removal & Installation 08-322

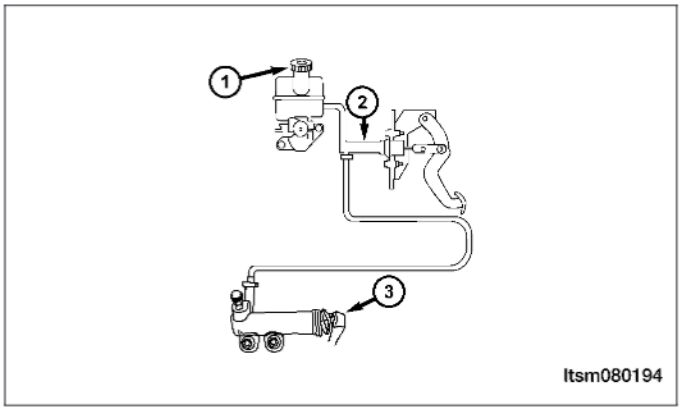
Clutch Slave Cylinder 08-324
- Removal & Installation 08-324

Bleeding Hydraulic Clutch 08-325
- Operation 08-325

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Description

The hydraulic clutch system consists of a clutch master cylinder (2), slave cylinder (3), and an interconnecting hydraulic fluid line. Hydraulic fluid is supplied by the clutch system from the clutch master cylinder reservoir (1).



Operation

The hydraulic clutch system is responsible for engaging and disengaging the clutch. Depressing the clutch pedal develops fluid pressure in the clutch master cylinder. This pressure is transmitted to the integral release bearing which is in contact with the pressure plate diaphragm spring. As additional force is applied, the bearing depresses the diaphragm spring fingers inward on the fulcrums. The action moves the pressure plate rearward, relieving clamping force on the clutch disc.

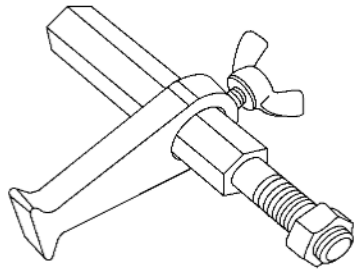
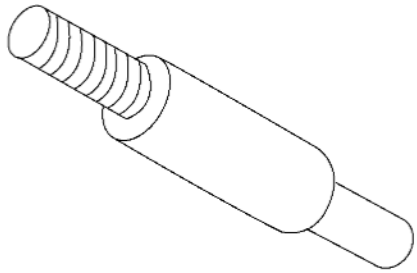
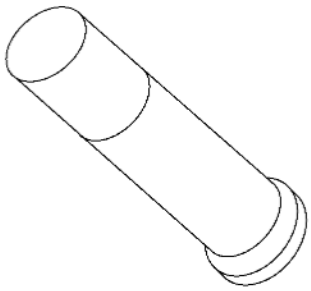
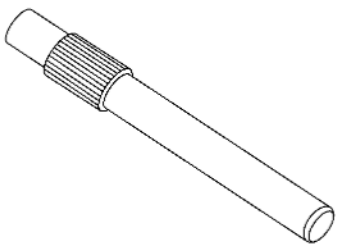
Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
Transaxle Mounting Bolts	6.9
Clutch Housing Mounting Bolts	44
Clutch Release Bearing Seat Retainer Mounting Bolts	9.8
Gear Shift Mechanism Assembly Mounting Bolts	18
Shift Gear Control Cable Bracket Mounting Bolts	18
Speedometer Gear Mounting Bolts	3.9
Final Drive Driven Gear Mounting Bolts	132
Back Up Lamp Switch	32
Idler Gear Assembly Mounting Bolt	48
Clutch Slave Cylinder Mounting Bolts	11 ± 1

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Special Tools

Flywheel Fixture 09924 - 17810	 ltsm020211
Bearing Extractor 09917 - 58010	 ltsm020212
Input Shaft Bearing Mounting Device 09925 -98210	 ltsm020213
Clutch Pressure Plate Installer CH-20014	 besm080041

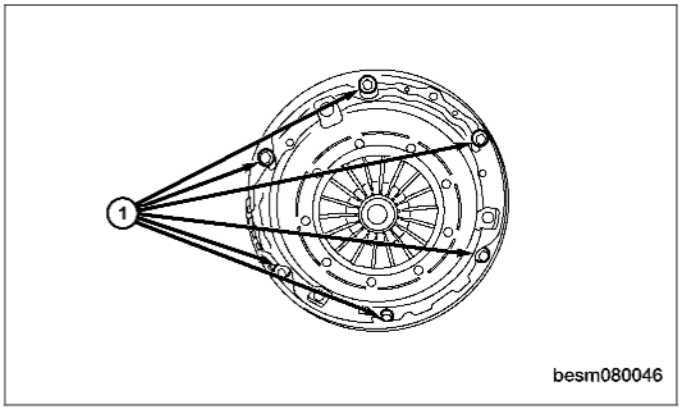
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CLUTCH ASSEMBLY SERVICE

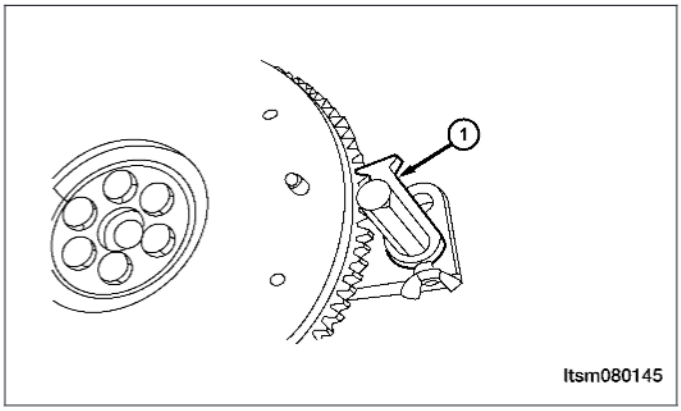
Clutch and Pressure Plate

Removal & Installation

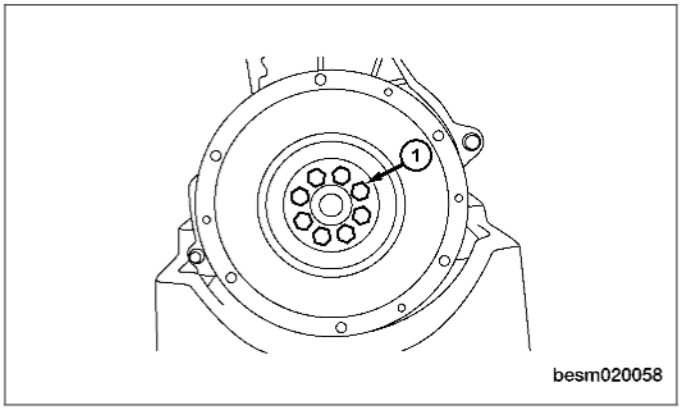
1. Remove the transaxle assembly (See Transaxle Assembly Removal & Installation in Section 08 Transaxle).
2. Remove the clutch pressure plate bolts (1).
   (Tighten: Clutch pressure plate bolts to 25 N·m)
3. Remove the modular clutch assembly.



4. Using special tool CH-20043 (1), hold the flywheel.

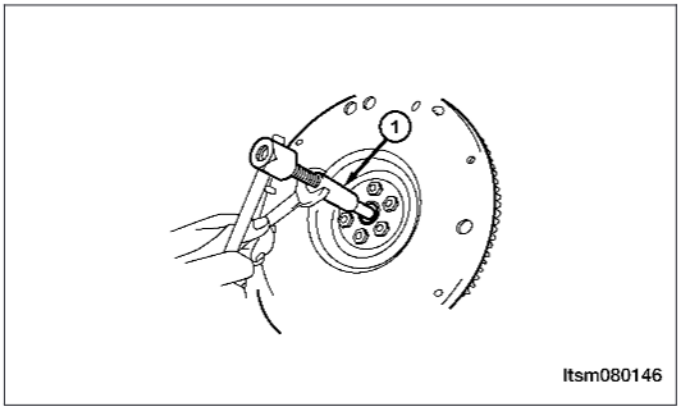


5. Remove the flywheel-to-crankshaft bolts (1) and remove flywheel assembly (if necessary for resurfacing).
   (Tighten: Flywheel-to-crankshaft bolts to 75 N·m)



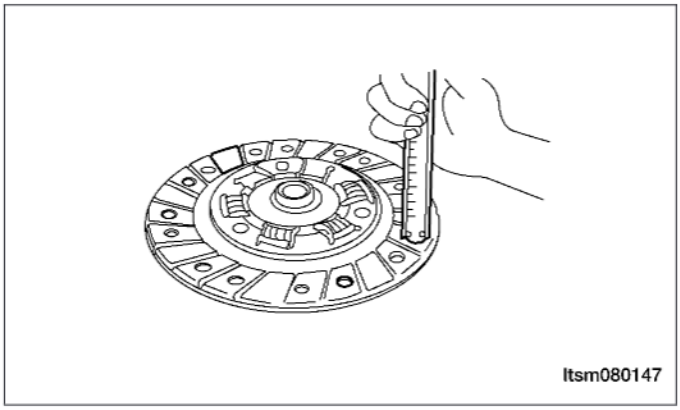
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6. Remove the input shaft bearing using special tool 09917-58010 (1) and spanner, as shown in the figure.



Inspect

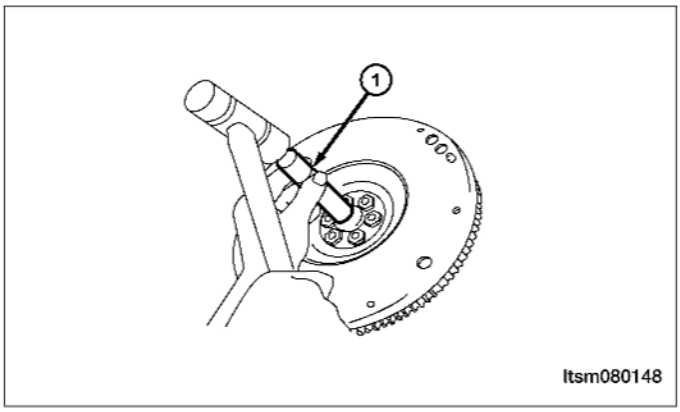
- Check the input shaft bearing to ensure it is able to rotate freely, replace the bearing if necessary.
- Measure the depth of the recesses of the clutch friction lining rivet head, i.e., the distance between rivet head and friction lining surface (as shown in the figure).
  If the depth of any hole comes to the limit, replace friction lining assembly.
  - Standard: 1.2 mm
  - Limit: 0.5 mm



- Check clutch pressure plate diaphragm spring for irregular wear or damage.
- Check clutch pressure plate for wear or hot spots.
- If found abnormal, replace the clutch plate assembly. Never separate the clutch plate assembly into the diaphragm spring and clutch plate.
- Check the contact surface of the flywheel and friction lining for irregular wear or hot spots. Repair or replace if necessary.

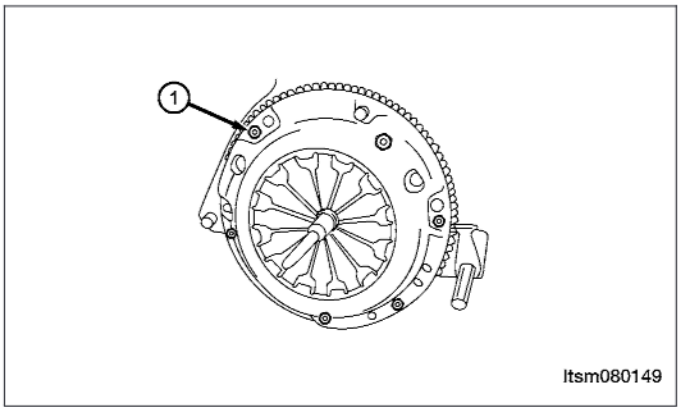
Installation

- Prior to assembling, check the flywheel surface and clutch plate surface to ensure they are clean and dry.
- Using special tools CH-30028 (1), install the input shaft bearing to the crankshaft (as shown in the figure). Align the clutch friction lining assembly and flywheel center using special tools (as shown in the figure), and then install the clutch plate assembly and bolts, Tighten the bolts to the specified torque. (Tighten: Clutch pressure plate bolts to 25 N·m)



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NOTE :
When tightening the clutch pressure plate bolts (1), tighten by hand until the friction lining assembly is properly aligned.

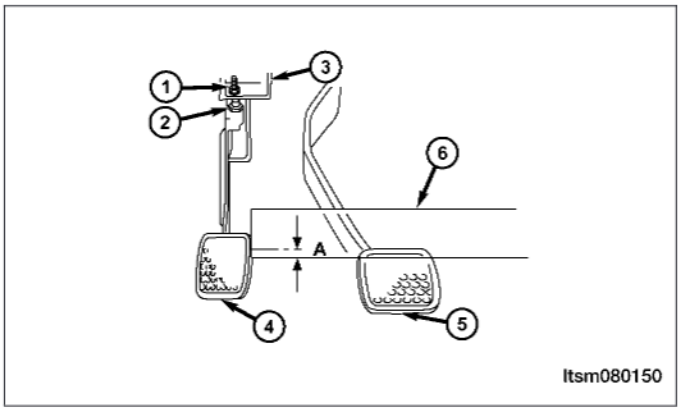


- Apply a thin layer of grease to the input shaft, and then assemble the transaxle and engine.

  NOTE: Turn the splines when installing the transaxle input shaft into the clutch friction lining assembly until the splines are engaged.

Clutch Pedal Height

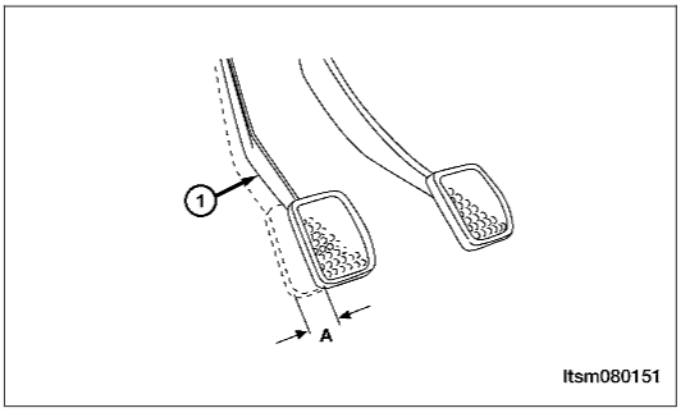
Adjust the clutch pedal height using the adjusting bolts (1) on the pedal bracket (3) in accordance with the following requirements. When the clutch pedal (4) is approximately 8 mm higher than the brake pedal (5), the clutch pedal height is normal.



Clutch Pedal Free Travel

Depress the clutch pedal (1) until the clutch resistance can be felt. Stop accordingly and measure the distance (clutch pedal free travel A). The free travel should be within 15 - 25 mm.

After checking clutch pedal free travel, check the clutch to ensure it is in normal working condition while the engine is running.

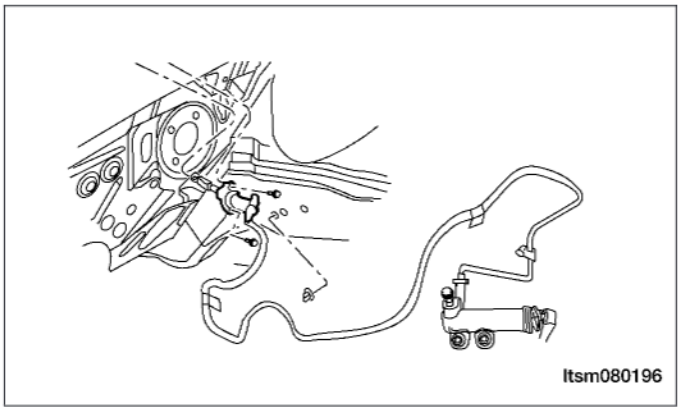


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Clutch Master Cylinder

Description

The clutch master cylinder mounts to the clutch pedal and consists of a piston and cylinder housing, an actuating push rod, and an interconnecting hydraulic line. Fluid is supplied to the clutch master cylinder via the brake fluid reservoir.

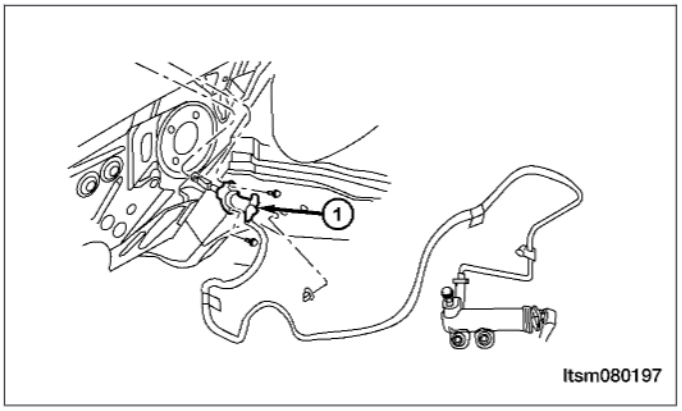


Operation

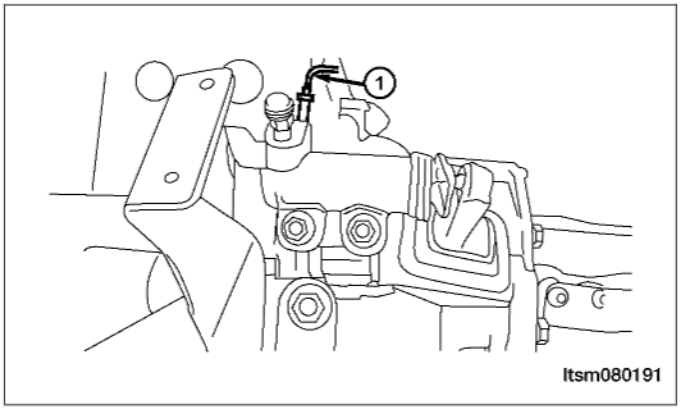
When the clutch pedal is depressed, the push rod moves the piston in the master cylinder, displacing fluid through the hydraulic line and into the release bearing. The release bearing is extended and forces the fingers of the clutch diaphragm springs to move. As the fingers move, they release the clamping pressure on the clutch disc between the clutch pressure plate and the flywheel. The clutch becomes disengaged as this pressure is released. When the clutch pedal is released, the system hydraulic pressure is released. This allows the force of the clutch diaphragm springs to return themselves to their original position, re-clamping the clutch disc between the flywheel and the clutch pressure plate. Also, the release bearing is forced to return, which reverses the movement of the hydraulic system and returns the pedal to its original position against the up stop.

Removal & Installation

1. Disconnect hydraulic supply line to clutch master cylinder (1) to completely drain clutch master cylinder and tubing.

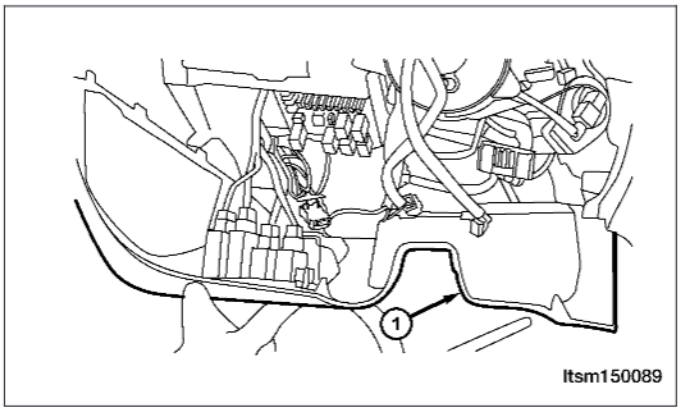


2. Disconnect hydraulic line (1) and drain fluid into suitable container.

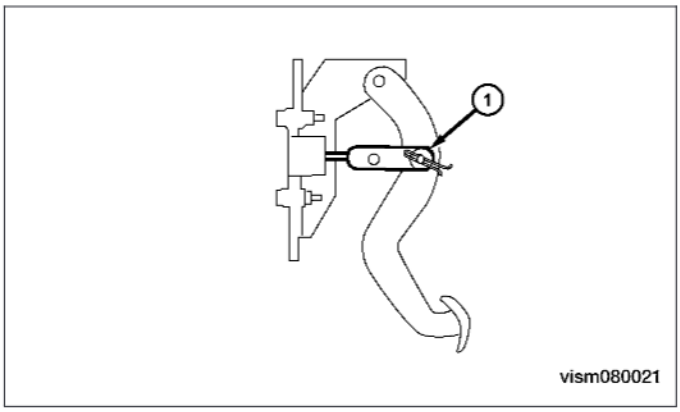


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3. Remove instrument panel lower trim panel (1) (See Instrument Panel Removal & Installation in Section 15 Body & Accessories).



4. Disconnect clutch master cylinder push-rod (1) from clutch pedal.

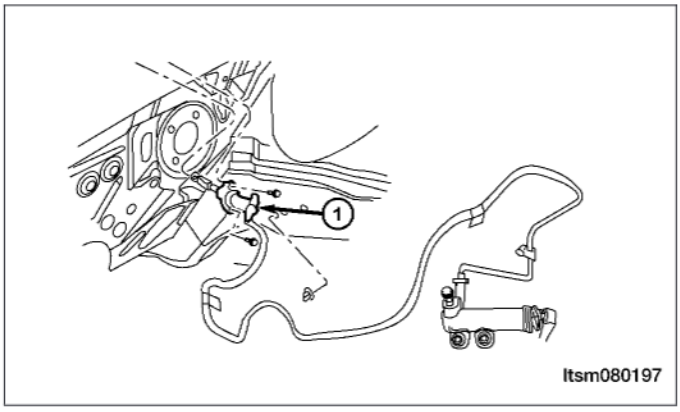


5. Remove hydraulic line from rail retainer.
6. Release master cylinder by rotating to disengage from pedal bracket assembly.

CAUTION:
Use care when removing clutch master cylinder from engine compartment. Aggressive handling can result in a damaged hydraulic line and improper clutch release operation upon reassembly.

CAUTION:
Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surfaces, wash it off immediately with water.

7. Remove the master cylinder assembly (1) from the mounting position and carefully maneuver the hydraulic pipe from the engine compartment.



8. Installation is in the reverse order of removal.

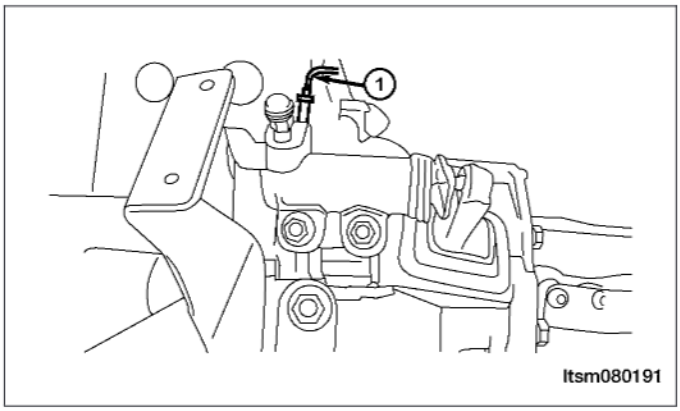
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Clutch Slave Cylinder

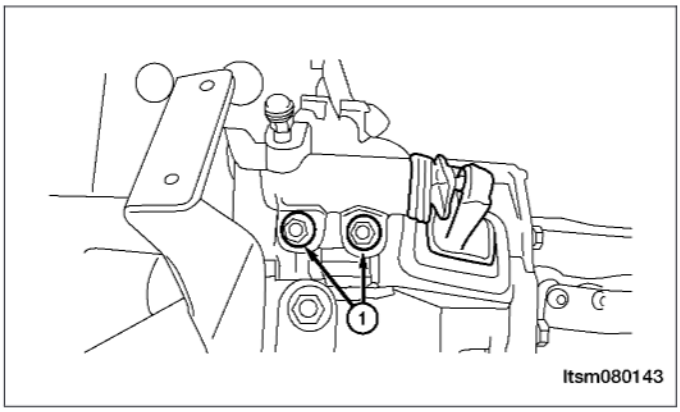
Removal & Installation

NOTE :
After replacing the slave cylinder, it is necessary to make sure brake master cylinder fluid level is full and the reservoir cap is installed tightly.

1. Remove the clutch master cylinder outlet pipe (1) from the clutch slave cylinder.
   (Tighten: Outlet pipe bolt to 17 ± 1 N·m)



2. Remove the clutch slave cylinder bolts (1) from the transaxle housing.
   (Tighten: Clutch slave cylinder bolts to 11 ± 1 N·m)



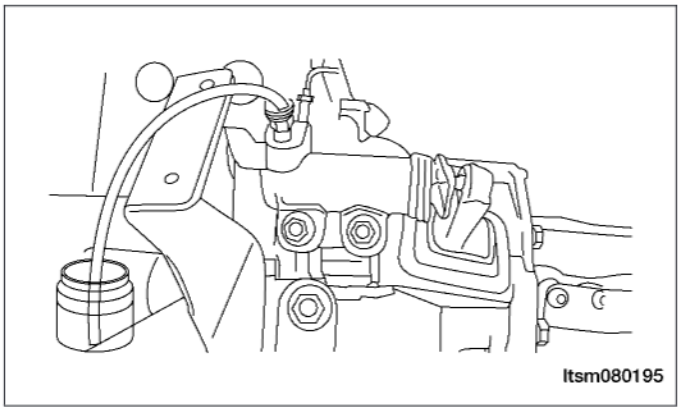
3. Installation is in the reverse order of removal.
4. Bleed the hydraulic clutch (See Bleeding Hydraulic Clutch in Section 08 Transaxle).
   NOTE: Check pipes for leakage of brake fluid.

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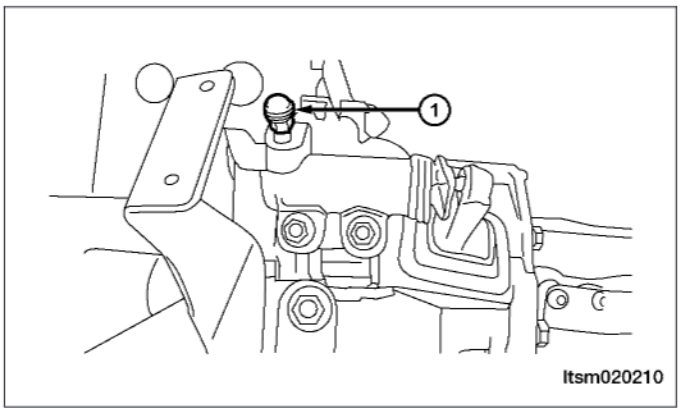
Bleeding Hydraulic Clutch

Operation

1. Verify fluid level in brake master cylinder. Top off with DOT 4 brake fluid as necessary. Leave cap off.



2. Raise the vehicle on hoist.
3. Remove the bleed port protective cap and install a suitable size and length of clear hose to monitor and divert fluid into a suitable container.
4. Loosen the bleed port (1).



5. Actuate the clutch pedal until the brake master cylinder fluid drains from the bleed port.
6. Depress the clutch pedal, tighten the bleed port.
7. From driver's seat, actuate the clutch pedal until the hydraulic clutch system has pressure.
8. Depress the clutch pedal, loosen the bleed port and bleed the brake master cylinder fluid.
9. Repeat steps 6 to 8 several times until there is no air in the hydraulic clutch system.

NOTE :
Do not allow clutch master cylinder to run dry while fluid exits bleed port.

10. Close the hydraulic bleed port, remove the drain hose and replace the dust cap on the bleed port.
11. Top off the brake master cylinder fluid level with DOT 4 brake fluid as necessary.

CAUTION:
During the bleeding process, make sure the brake master cylinder fluid is always full.

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TRANSFER CASE (4X4)

GENERAL INFORMATION 08-327
Description 08-327
Operation 08-327

ON-VEHICLE SERVICE 08-328

Transfer Case 08-328
Removal & Installation 08-328

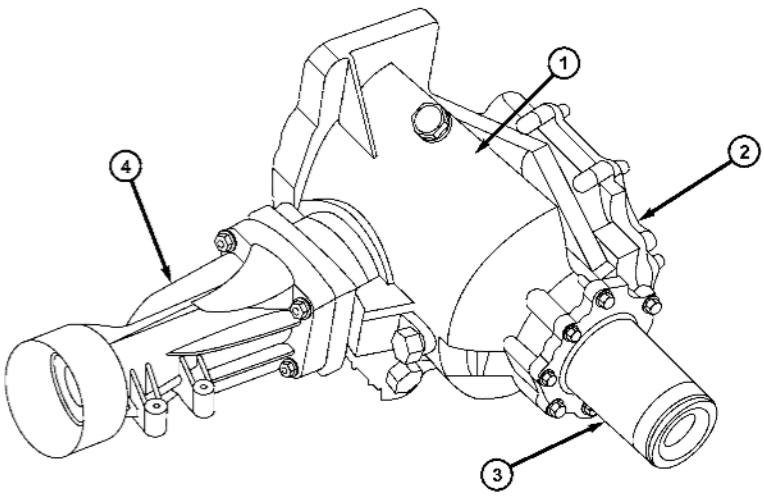
TRANSFER CASE UNIT REPAIR 08-329

Transfer Case 08-329
Disassembly 08-329
Assembly 08-331

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Description

Transfer case is attached to the transaxle housing.



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1 - Transaxle Housing	3 - Axle Shaft Guide
2 - Rear Transaxle Cover	4 - Front Different Housing

Operation

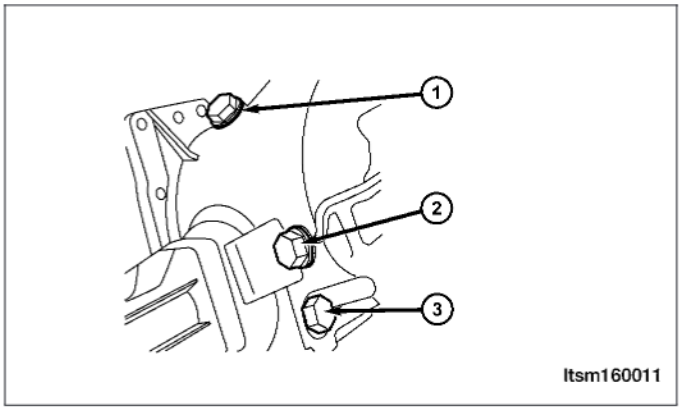
The transfer case transfers the torque output from the transaxle to the ITM controller.

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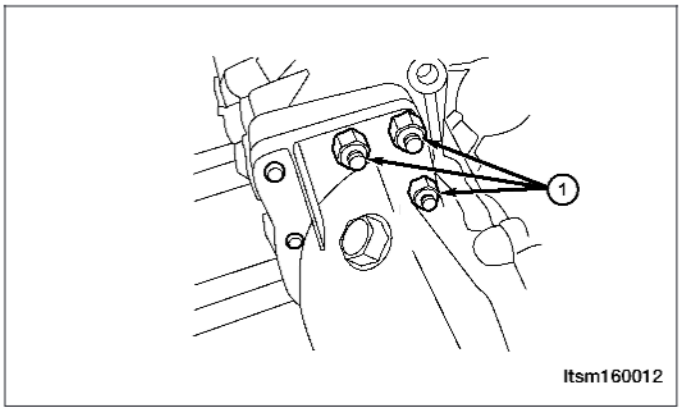
Transfer Case

Removal & Installation

1. Drain the gear fluid from the transfer case.
   - Fluid-filling plug (1)
   - Fluid-limiting plug (2)
   - Fluid-drain plug (3)



2. Remove the front intermediate drive shaft assembly.
3. Remove the sub-frame assembly.
4. Remove the left and right front axle shaft mounting bolts (1).



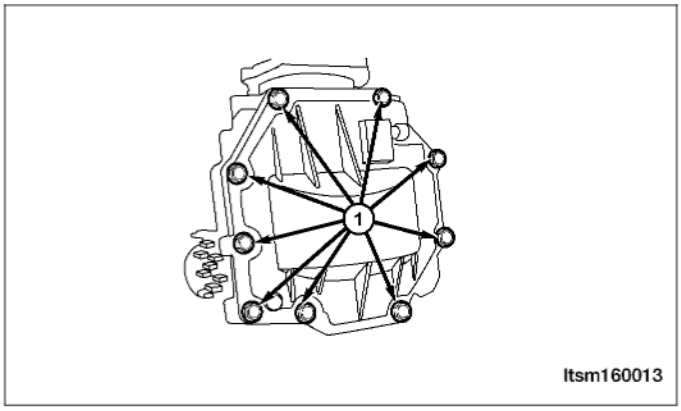
5. Remove the transaxle and transfer case assembly (See Transaxle Assembly Removal & Installation in Section 08 Transaxle).
6. Remove the transfer case from the transaxle (8 bolts).
   (Tighten: Transaxle and transfer case bolts to 80 N·m)
7. Installation is in the reverse order of removal.

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Transfer Case

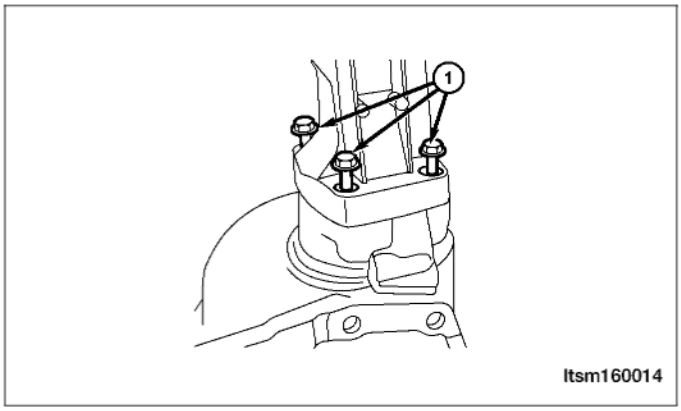
Disassembly

1. Remove the front housing. Loosen 9 bolts (1) of the housing, then remove the housing.
   (Tighten: Transfer case front housing bolts to 35 N·m)



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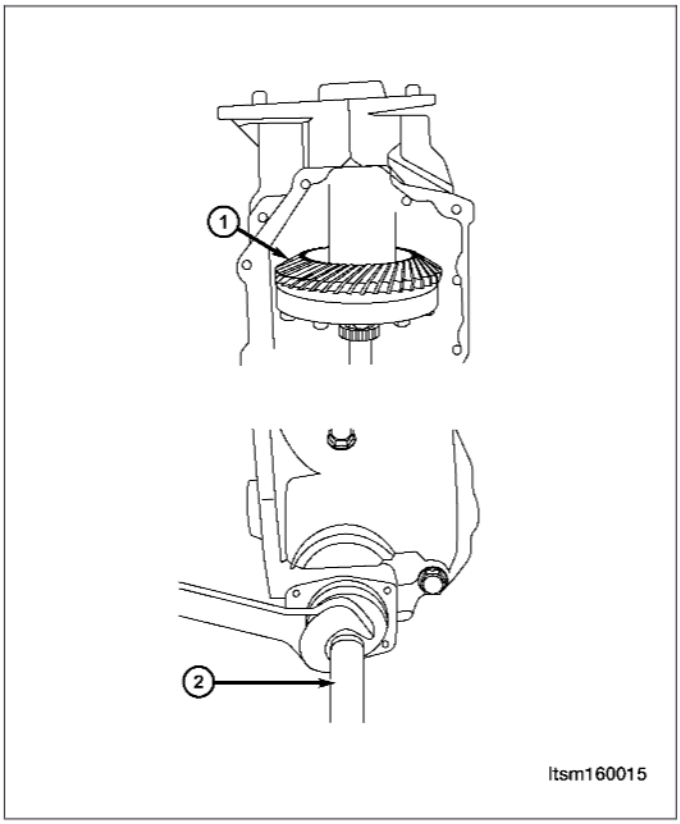
2. Remove the small rear housing components. Loosen the 4 bolts (1) and remove the rear housing components.
   (Tighten: Rear intermediate shaft and rear differential bolts to 65 ± 6 N·m)



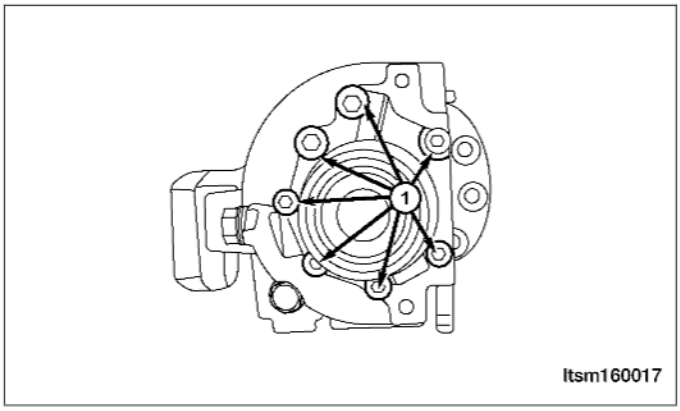
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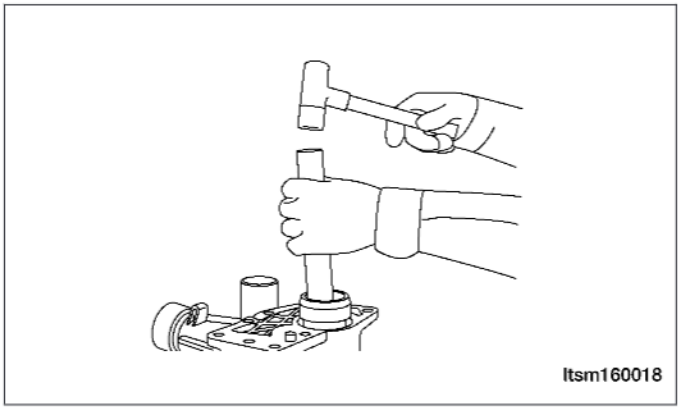
3. Lock up the drive gear (1) and loosen the driven gear axle (2) locking nut.



4. Loosen the 7 bolts (1) and remove the right bearing support components.
(Tighten: Transfer case right bearing support bolts to 35 N·m)

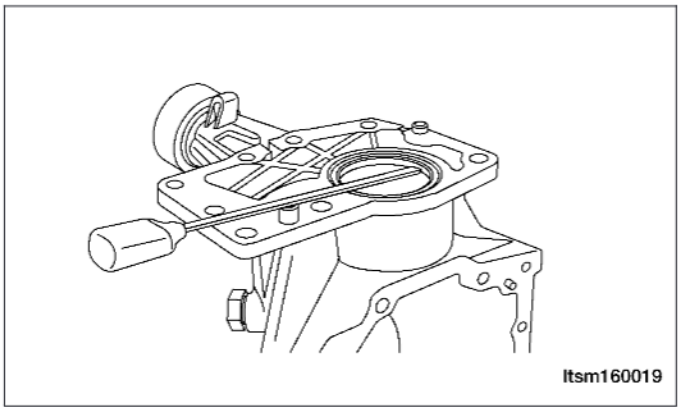


5. Remove the input clutch and the drive gear.
Remove the retainer ring of the input clutch with snap-ring pliers; punch the output end out of the input clutch with a copper punch, and remove the input clutch and the drive gear.



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6. Remove the fluid seal of the input clutch.
   Pry out the fluid seal with a slotted screwdriver.



Assembly

1. Put a standard-sized 1.4 mm adjusting shim from the front bearing driven gear axle into the transfer case housing. Press in the front outer bearing race of the driven gear axle, then the rear outer bearing race, and press the front bearing of the driven gear axle into the driven gear axle; then put it into the collar and press in the rear inner bearing race. Attach the locknut, and adjust the tightening torque of the driven gear by adjusting the locknut until the driven gear axle can be driven with a torque of 1.0-1.5 N·m.
2. Assemble the flange axle.
   Link the drive gear ring of the transfer case to the flange axle with a mounting bolt, tighten the bolt to 110 N·m. Install the bearing to the left of the flange axle and the bearing to the left of the right bearing seat.
3. Choose the 2.4 mm standard-sized adjusting shim for the left bearing for the flange axle. Put the adjusting shim for the right bearing for the flange axle, the outer bearing race to the left of the flange axle and the flange axle into the transfer case.
   Measure the distance (A) from the contact surface of the right bearing seat and the transfer case to the right bearing seat and the left bearing's right end surface.
   Measure the distance (B) from the contact surface of the right bearing seat and the transfer case to the place where the right and left bearings on the right bearing seat.
4. Calculate the thickness value of the adjusting gasket S = A - B.
5. Select the adjusting gasket: S + (0.05 - 0.10) mm.
6. Assembly of the right bearing seat.
   Assemble the right bearing to the right bearing seat, install the retainer ring of the right bearing to the right bearing seat, install the fluid seals to the left and right of the right bearing seat, install the O-ring and link the right bearing seat to the transfer case housing with the bolt. Tighten the bolt to 35 N·m. The subassembly should be able to rotate with 3.0-5.0 N·m torque.
7. Adjust the hypoid gear engagement: first, spread red lead powder on the teeth of the driven bevel gear so that there will appear red prints on both working sides of the gear teeth of the driving bevel gear when turning it by hand. If the gear pattern prints on both engaging sides of the drive gear ring is higher than the center of the gear height near to the small end and occupy over 60% of the gear tooth width, then the pattern is correct; and the backlash between various gear teeth should fall between 0.13 mm and 0.18 mm.
   A: If the clearance between one lateral side of a tooth and that of the adjacent tooth are not correct, choose bearing shims to the left and right of the flange axle, repeat procedures 3, 4 and 5 to measure the clearance between one lateral side of a tooth and that of the adjacent tooth on the hypoid gear until the adjustment is correct.
   B: If the gear pattern print leans to the tooth tip, replace the adjusting shim from the front bearing of the driven gear to a thicker 1 mm; If the gear pattern print leans to the tooth root, then get the adjusting shim of the front bearing of driven gear axle needs to be subtracted by 1 mm. Examine the gear pattern print, repeat procedures 3, 4, 5, 6, and 7 until the gear pattern is correct.
8. Assemble the transfer case front shell, and tighten to 35 N·m.
9. Assemble the transfer case small rear housing onto the transfer case, and tighten to 35 N·m.
10. Assemble the input clutch fluid seal, O-ring, retainer ring and the input clutch; install the transfer case onto the transaxle and tighten to 80 N·m.

    NOTE: When assembling bearings and fluid seals, it is necessary to apply lubricating grease. The sealing surface of the housing must have sealant applied.

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