

TRANSAXLE

08

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AUTOMATIC TRANSAXLE

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GENERAL INFORMATION

Description

The DPO 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, 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.

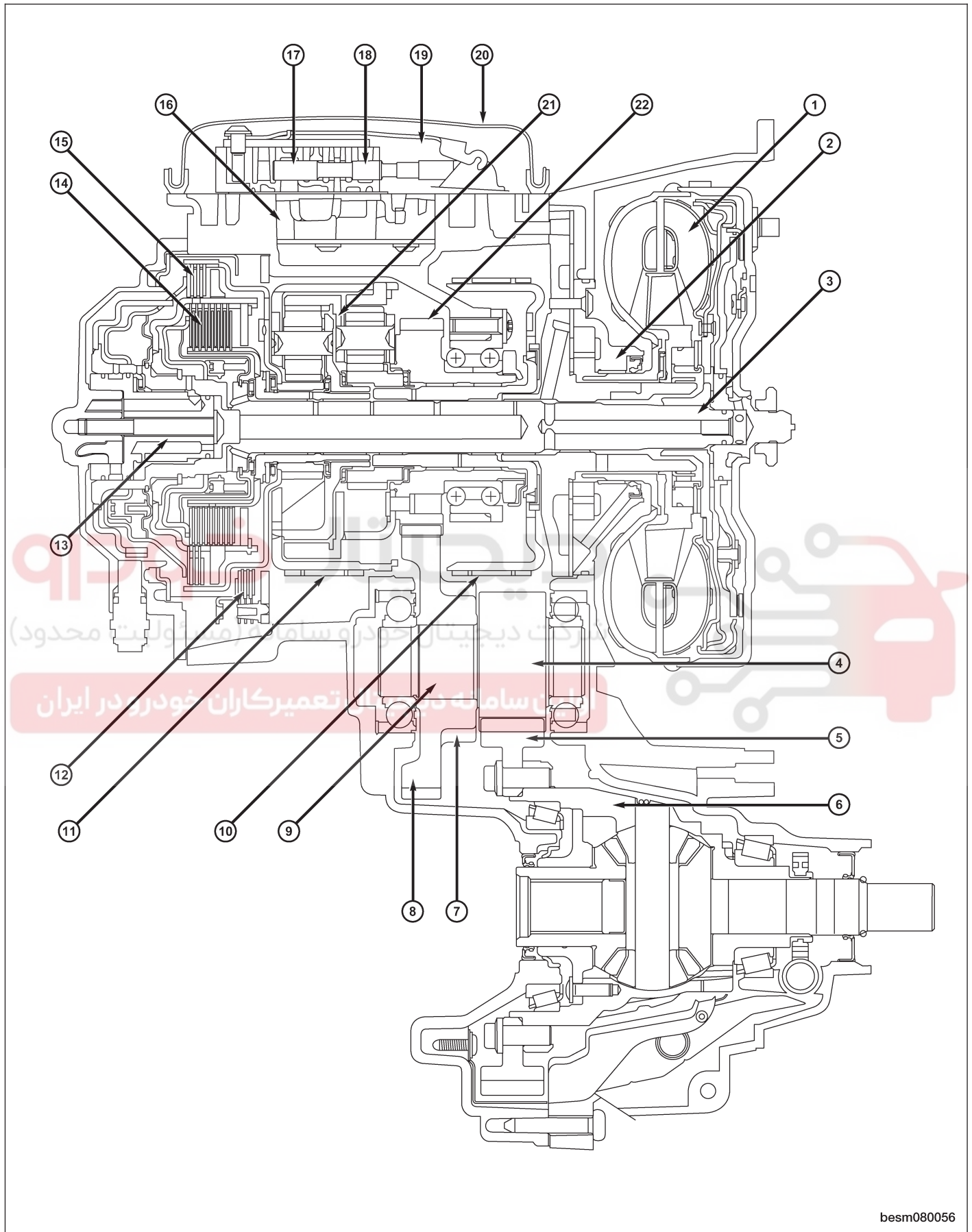
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GENERAL INFORMATION



besm080056

GENERAL INFORMATION

1 – Torque Converter
2 – Oil Pump Assembly
3 – Input Shaft
4 – Secondary Differential Driven Gear
5 – Differential Ring Gear
6 – Differential Case
7 – Parking Gear
8 – Primary Differential Driven Gear
9 – Transfer Shaft
10 – Brake F3 (1st, 2nd Gear)
11 – Brake F2 (Reserve Gear)

12 – Brake F1 (4th Gear)
13 – Oil Line, Supply
14 – Clutch E2 (2nd, 3rd, 4th Gear)
15 – Clutch E1 (Reserve, 1st Gear)
16 – Accumulator
17 – Manual Valve
18 – Accumulator
19 – Ratchet Gear Plate
20 – Accumulator Cover
21 – Planet Gear
22 – Primary Differential Drive Gear

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 oil supply to the hydraulic elements, such as the torque converter, the shift elements and the hydraulic transaxle control, is provided by way of an oil 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.

08

Specifications

Torque Specifications

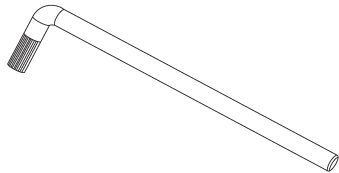
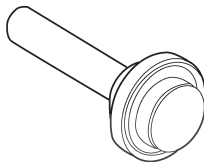
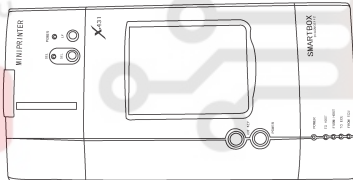
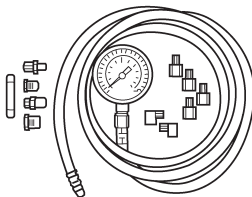
DESCRIPTION	TORQUE (N·m)
Drain Plug	33
Engine To Transaxle Bolts	80
Side Sill To Vehicle Body Bolts	120
Front Mount Bolts	60
Rear Mount Bolts	40
Oil Pan Bolts	50
Transaxle Mount Nuts	120
Transaxle Mount Bolts	40
Drive Plate Bolts (automatic transaxle)	75

Gear Ratio Specifications

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

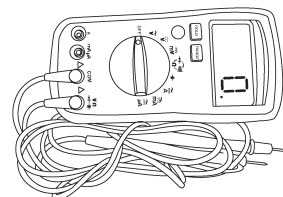
GENERAL INFORMATION

Special Tools

Spline SpannerCH-30001	 besm080042
Differential Seal InstallerCH-30002	 besm080043
Diagnostic Scan ToolX-431	 besm030001
Automatic Transaxle Pressure Gauge	 besm080059

GENERAL INFORMATION

Digital Multimeter Fluke 15B & 17B



besm030002

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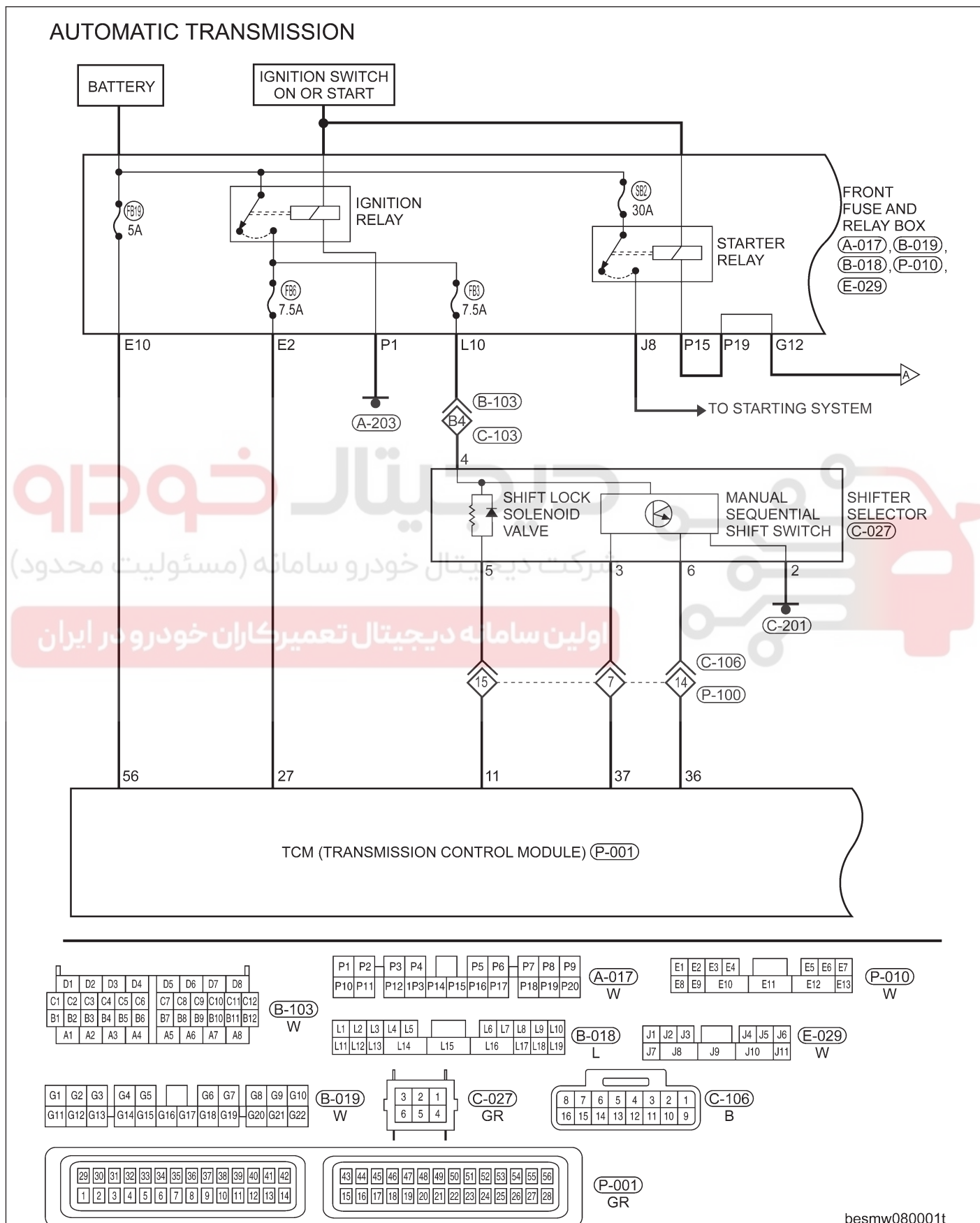
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GENERAL INFORMATION

Electrical Schematics

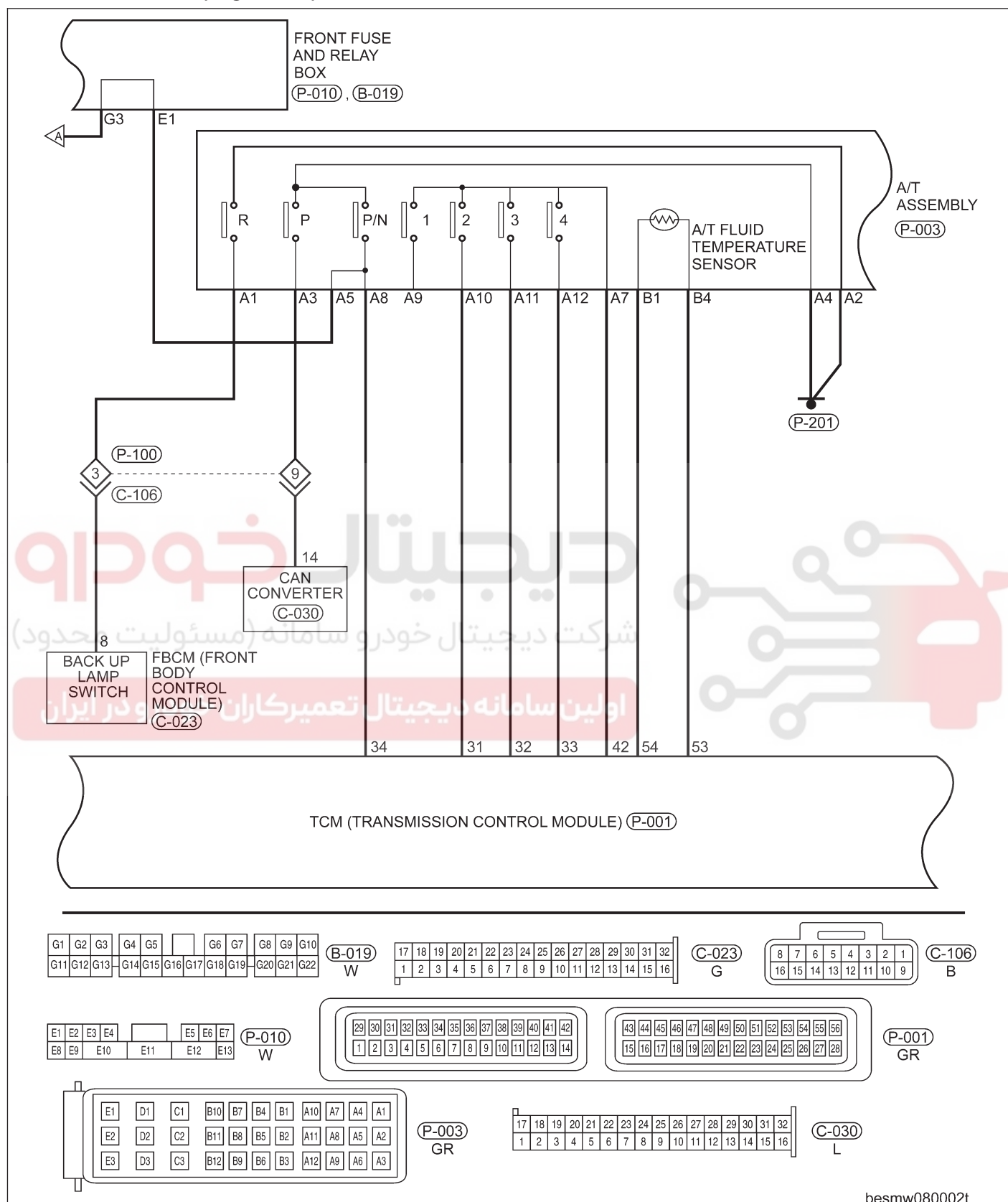
Automatic Transaxle (Page 1 of 5)



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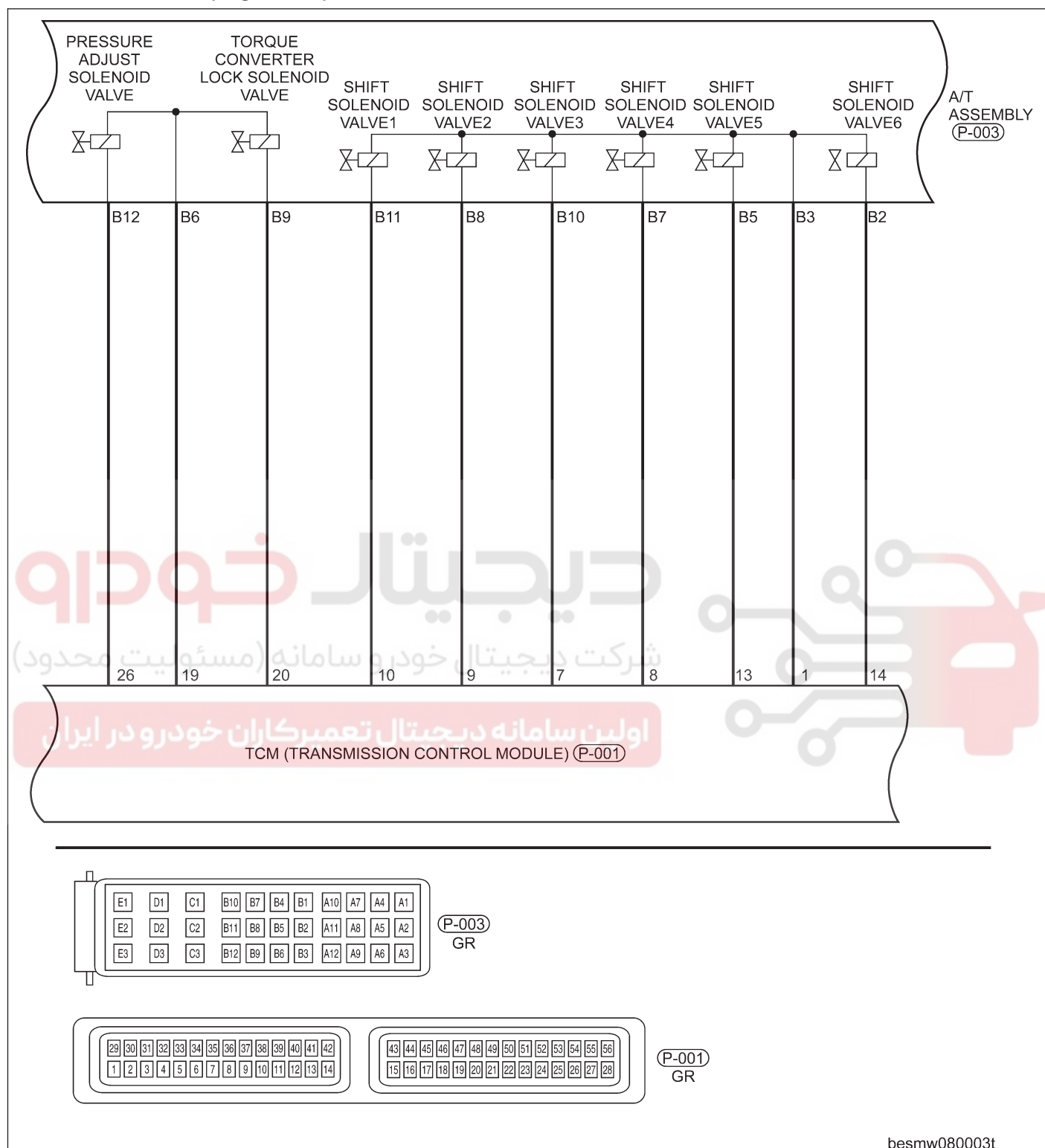
GENERAL INFORMATION

Automatic Transaxle (Page 2 of 5)



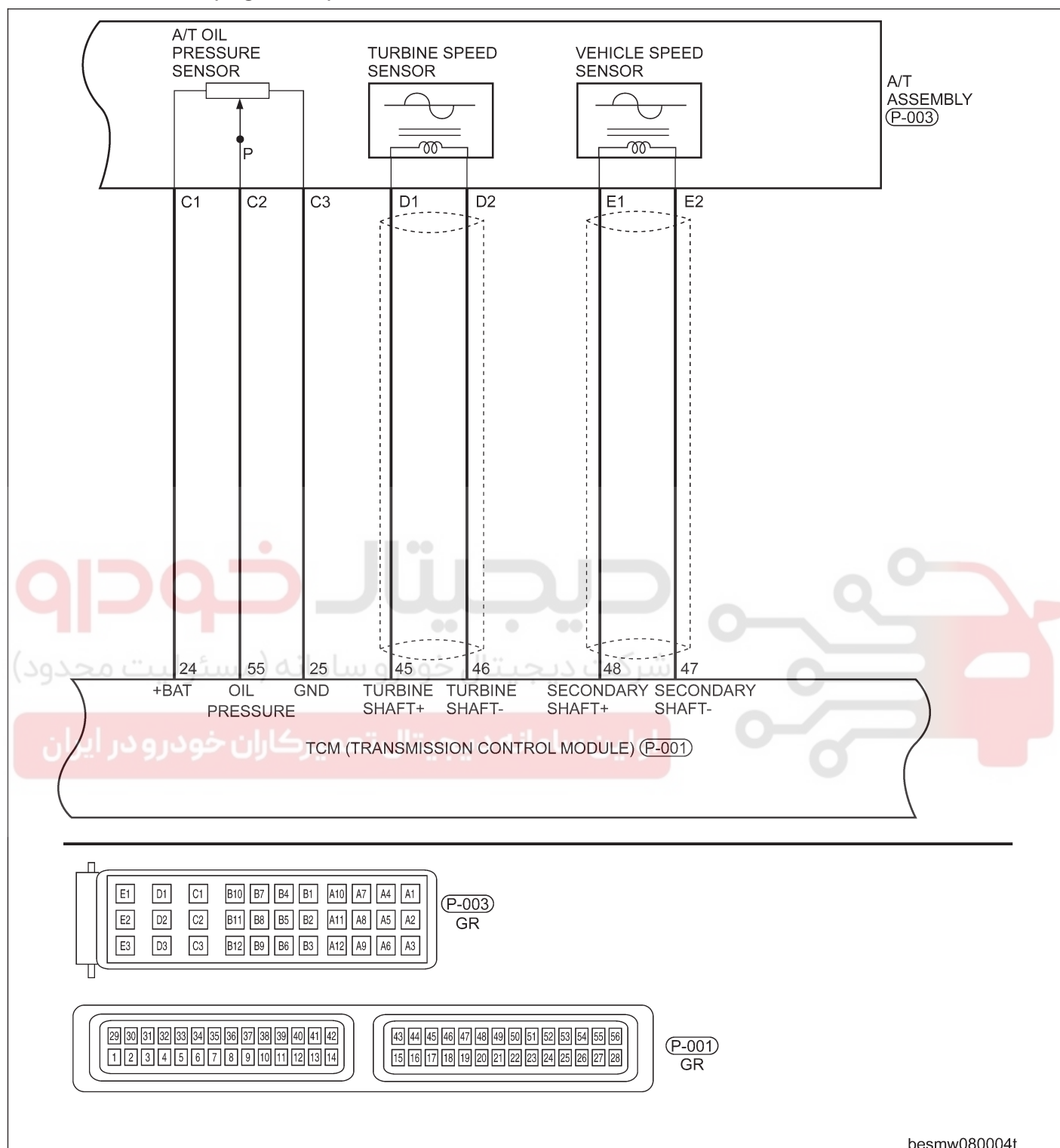
GENERAL INFORMATION

Automatic Transaxle (Page 3 of 5)



GENERAL INFORMATION

Automatic Transaxle (Page 4 of 5)



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TCM (TRANSMISSION CONTROL MODULE) (P-001)

2 12 40 43 16 38 39 28

12 10 11 5 6

P-100
C-106

TO CAN SYSTEM

30 29

UNIFIED METER CONTROL UNIT (C-001)

INSTRUMENT CLUSTER (C-001)

WINTER MODE SWITCH (C-028)

OFF ON

1 4

G-201

BRAKE SWITCH (C-005)

1 3

P-201

OIL COOLER FLOW CONTROL SOLENOID VALVE (P-004)

2 1

8 7 6 5 4 3 2 1
16 15 14 13 12 11 10 9

C-106
B

29 30 31 32 33 34 35 36 37 38 39 40 41 42
1 2 3 4 5 6 7 8 9 10 11 12 13 14

43 44 45 46 47 48 49 50 51 52 53 54 55 56
15 16 17 18 19 20 21 22 23 24 25 26 27 28

P-001
GR

1 2

P-004
B

6 5 4 3 2 1

C-028
B

17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

C-001
L

3
2 1 4
1

C-005
Y

besmw080005t

DIAGNOSIS & TESTING

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 only a digital multimeter to perform voltage readings on the transaxle electronic system.
4. The following shows the circuit explanation of many DTCs:
 - Circuit Low - Circuit shorted to ground
 - Circuit High - Circuit shorted to voltage
 - Circuit Failure - Circuit open or multi-circuit malfunction
5. The scan tool connects to the Data Link Connector (DLC) and communicates with the Transaxle Control Module (TCM) over the CAN data circuit.
6. 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.
7. 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 and inspect the system again.

Diagnostic Tools

Diagnostic Scan Tool X-431

Perform the following when connecting the X-431 scan tool:

- Connect the scan tool to the data link electrical 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 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.

Transaxle Control Module (TCM) Connector Pin-Out Table

TCM PIN-OUT TABLE

PIN	CIRCUIT IDENTIFICATION	PIN	CIRCUIT IDENTIFICATION
1	+ EVS	29	—
2	Supply Oil Cooler Flow Control	30	—
3	—	31	SIGN Switch S2
4	—	32	SIGN Switch S3
5	—	33	SIGN Switch S4
6	—	34	SIGN Switch PN

DIAGNOSIS & TESTING

PIN	CIRCUIT IDENTIFICATION	PIN	CIRCUIT IDENTIFICATION
7	Shift Solenoid Valve 3	35	—
8	Shift Solenoid Valve 4	36	Sequential Command -
9	Shift Solenoid Valve 2	37	Sequential Command +
10	Shift Solenoid Valve 1	38	CAN H
11	Shift Lock Command	39	CAN L
12	Oil Cooler Flow Control	40	SGN_DMGR_FBL_ADR
13	Shift Solenoid Valve 5	41	—
14	Shift Solenoid Valve 6	42	MFS Switch Ground
15	—	43	Brake Switch Normally Open
16	Brake Switch Normally Close	44	—
17	—	45	+ Turbine Shaft SIGN
18	—	46	- Turbine Shaft SIGN
19	Pressure Adjust Solenoid Valve PTG	47	Secondary Shaft Speed -
20	Pressure Adjust Solenoid Valve PRSN	48	Secondary Shaft Speed +
21	—	49	—
22	—	50	—
23	—	51	—
24	Supply Oil Pressure Sensor	52	—
25	Ground Oil Pressure Sensor	53	Oil Temp Sensor
26	Pressure Adjust Solenoid Valve Supply	54	—
27	KL15	55	SIGN Oil Pressure Sensor
28	Ground	56	KL30

Diagnostic Trouble Code (DTC) List**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

DIAGNOSIS & TESTING

DTC	DTC DEFINITION
P0710	Oil 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
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

DIAGNOSIS & TESTING

Diagnostic Trouble Code (DTC) Tests

P0603: Internal Control Module Memory

- **When Monitored:** One time after the ignition is turned to the ON position.
- **Set Condition:** The Transaxle Control Module (TCM) read value does not match the written value in any internal location.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, view the TCM DTCs and delete all the TCM DTCs.

Turn the ignition switch off.

Cycle the ignition switch from off to on.

With the X-431 scan tool, view the TCM DTCs.

Is DTC P0603 still present?

Yes >> • Replace and program the TCM.

No >> • The conditions that caused this code to set are not present at this time.
• Using the electrical schematics as a guide, check the TCM electrical connector terminals for corrosion, damage, or terminal push out.

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DIAGNOSIS & TESTING

P0604: RAM

- **When Monitored:** One time after the ignition is turned to the ON position.
- **Set Condition:** The Transaxle Control Module (TCM) read value does not match the written value in any internal location.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, view the TCM DTCs and delete all the TCM DTCs.

Turn the ignition switch off.

Cycle the ignition switch from off to on.

With the X-431 scan tool, view the TCM DTCs.

Is DTC P0604 still present?

Yes >> • Replace and program the TCM.

No >> • The conditions that caused this code to set are not present at this time.
• Using the electrical schematics as a guide, check the TCM electrical connector terminals for corrosion, damage, or terminal push out.

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DIAGNOSIS & TESTING

P0605: Checksum Error

- **When Monitored:** One time after the ignition is turned to the ON position.
- **Set Condition:** The Transaxle Control Module (TCM) read value does not match the written value in any internal location.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, view the TCM DTCs and delete all the TCM DTCs.

Turn the ignition switch off.

Cycle the ignition switch from off to on.

With the X-431 scan tool, view the TCM DTCs.

Is DTC P0605 present?

Yes >> • Replace and program the TCM.

No >> • The conditions that caused this code to set are not present at this time.
• Using the electrical schematics as a guide, check the TCM electrical connector terminals for corrosion, damage, or terminal push out.

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DIAGNOSIS & TESTING

P0641: Sensor Feed

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the voltage is out of the acceptable range.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, select view DTCs.

NOTE :

If DTCs P0840 and P0712 are present, diagnose and repair them before continuing with this test.

Is DTC P0641 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Turn the ignition switch on.

Measure the voltage of the ATF pressure sensor and ATF temperature sensor circuit for a short to voltage between the TCM electrical connector pin 24 and pin 54, harness side and ground.

Is there any voltage present?

Yes >> • Go to the next step.

No >> • Go to step 6.

Step 4.

Turn the ignition switch off.

Disconnect the transaxle assembly electrical connector P-003.

Turn the ignition switch on.

Measure the voltage of the ATF pressure sensor and ATF temperature sensor circuit for a short to voltage between the TCM electrical connector pin 24 and pin 54, harness side and ground.

Is there any voltage still present?

Yes >> • Repair the circuits between the TCM and the transaxle assembly electrical connector for short to voltage as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Measure the voltage of the ATF pressure sensor and ATF temperature sensor circuit for a short to voltage between the transaxle assembly electrical connector pin B1, pin C1, C2 and C3, terminal side and ground.

Is there any voltage present?

Yes >> • Repair or replace the ATF pressure sensor or temperature sensor circuits for a short to voltage or the transaxle assembly electrical connector as necessary.

No >> • Go to the next step.

Step 6.

Turn the ignition switch off.

Connect the TCM electrical connector.

Turn the ignition switch on.

Check the 5 volt reference voltage of the ATF pressure sensor between the transaxle assembly electrical connector pin C1 and pin C3. Check the 5 volt reference voltage of the ATF temperature sensor between the transaxle assembly electrical connector pin B1 and pin B4.

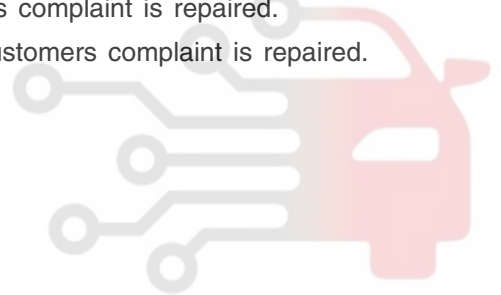
Is the reference voltage above 4.5 volts?

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

No >> • Replace and program the TCM and road test to verify the customers complaint is repaired.

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DIAGNOSIS & TESTING

P0657: Solenoid Power Supply Circuit Shorted To Voltage

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects if the solenoid circuits are shorted to voltage.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0657 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).
• Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Turn the ignition switch off.

Disconnect the transaxle assembly electrical connector P-003.

Check the shift solenoid supply circuits and other circuits for a short together between the transaxle assembly electrical connector pins.

SOLENOID SUPPLY AND CONTROL CIRCUIT CONDITION								
Solenoid	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6	EVM	EVLU
Connector Terminal	B11	B8	B10	B7	B5	B2	B6	B9
B3/B12	Open	Open	Open	Open	Open	Open	Open	Open

Do the circuits check OK?

Yes >> • Go to the next step.

No >> • Repair the shorted circuits as necessary.

DIAGNOSIS & TESTING

Step 4.

Connect the TCM electrical connector.

Turn the ignition switch on.

Start the engine, operate the vehicle over 60 km/h.

Stop the vehicle.

Connect the X-431 scan tool to the DLC.

With the X-431 scan tool, select view the TCM DTCs.

Is the DTC P0657 reset?

Yes >> • Go to next step.

No >> • No problem found at this time. Erase all codes before returning the vehicle to the customer.

Step 5.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Again, inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.



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DIAGNOSIS & TESTING

P0657: Solenoid Feed Circuit Open

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the solenoid circuits are shorted to ground or open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0657 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).
• Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Turn the ignition switch off.

Disconnect the transaxle assembly electrical connector P-003.

Check the solenoid supply circuit and control circuits for a short together between the transaxle assembly electrical connector pins.

SOLENOID SUPPLY AND CONTROL CIRCUIT CONDITION								
Solenoid	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6	EVM	EVLU
Connector Terminal	B11	B8	B10	B7	B5	B2	B6	B9
B3/B12	Open	Open	Open	Open	Open	Open	Open	Open

Do the circuits check OK?

Yes >> • Go to the next step.

No >> • Repair the shorted circuits as necessary.

DIAGNOSIS & TESTING

Step 4.

Check the resistance of the circuits between the transaxle assembly electrical connector pins and ground

SOLENOID SUPPLY AND CONTROL CIRCUIT CONDITION										
Solenoid	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6	EVM	EVLU	Shift Solenoid Supply	EVM, EVLU Solenoid Supply
Connector Terminal	B11	B8	B10	B7	B5	B2	B6	B9	B3	B12
Ground	Below 10,000 Ohms	Below 10,000 Ohms	Below 10,000 Ohms	Below 10,000 Ohms	Below 10,000 Ohms	Below 10,000 Ohms	Below 10,000 Ohms	Below 10,000 Ohms	Below 10,000 Ohms	Below 10,000 Ohms

Do the circuits check OK?

Yes >> • Go to the next step.

No >> • Repair the circuits for a short to ground.

Step 5.

Disconnect the TCM electrical connector.

Turn the ignition switch off.

Check the resistance of the solenoid supply circuits between the TCM electrical connector pin 1 and transaxle assembly electrical connector pin B3, and check the resistance of the solenoid supply circuits between the TCM electrical connector pin 26 and transaxle assembly electrical connector pin B12.

Is the resistance below 5.0 ohms?

Yes >> • Replace and program the TCM.

No >> • Repair the solenoid supply circuits for an open.

DIAGNOSIS & TESTING

P0705: Multi-Function Switch: Prohibited Position

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** 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.

Step 1.

Turn the ignition switch on.

With the scan tool, select view DTCs, and select view CMF data stream.

TRANSMISSION RANGE SWITCH (CMF) CONDITION				
	CMF			
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 conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).
• Erase all codes and test drive the vehicle to verify the repair is complete.

DIAGNOSIS & TESTING

Step 2.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector.

Move the shift lever 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.

Step 3.

Turn the 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	∞	∞

DIAGNOSIS & TESTING

CHECK TRANSMISSION 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	∞	∞	∞

Do the circuits check OK?

- Yes** >> • If the test results for TCM electrical connector is normal, and the test results for transaxle assembly is not normal, repair the circuits between the TCM electrical connector and transaxle shift range switch.
- No** >> • If the test results for 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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DIAGNOSIS & TESTING

P0709: Multi-Function Switch: Affected by Interference

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects the voltage is out of range when moving the shift lever from the "P" position to the "D" position.

Step 1.

Turn the ignition switch on.

With the scan tool, select view DTCs, and select view CMF data stream.

TRANSMISSION RANGE SWITCH (CMF) CONDITION				
Shift Lever Position	CMF			
	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

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 conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

DIAGNOSIS & TESTING

Step 2.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector.

Move the shift lever 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 switch is normal.
• Reassemble the vehicle and road test to verify the customers complaint is repaired.

No >> • Go to the next step.

Step 3.

Turn the 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	∞	∞

DIAGNOSIS & TESTING

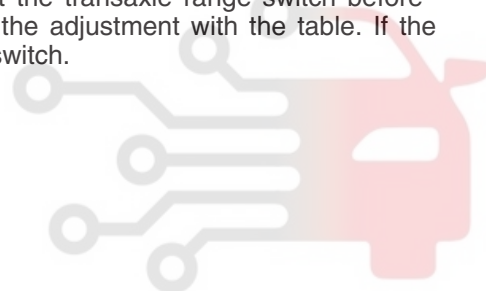
CHECK TRANSMISSION ASSEMBLY CONNECTOR SHIFT RANGE SWITCH ON OR OFF CONDITION					
Terminal	S2	S3	S4	R	P/N
Position	A10-A7	A11-A7	A12-A7	A1-A2	A8-A4
P	0	∞	∞	∞	0
R	0	0	0	0	∞
N	∞	0	∞	∞	0
D	∞	∞	0	∞	∞
3	∞	0	0	∞	∞
2	0	0	∞	∞	∞

Do the circuits check OK?

- Yes** >> • If the test results for TCM electrical connector is normal, and the test results for transaxle assembly is not normal, repair the circuits between the TCM electrical connector and transaxle shift range switch.
- No** >> • If the test results for 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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DIAGNOSIS & TESTING

P0710: Oil Temperature Sensor

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** 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.

Step 1.

With the X-431 scan tool, check for DTCs.

Is DTC P0710 present?

- Yes** >> • Go to the next step.
- No** >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Disconnect the TFT sensor electrical connector.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the resistance of the TFT sensor circuits for an open between the sensor electrical connector pin B1 and TCM electrical connector pin 54.
- Check the resistance of the TFT sensor circuits for an open between the sensor electrical connector pin B4 and TCM electrical connector pin 53.

Is the resistance below 5 ohms?

Yes >> • Go to next step.

No >> • Repair the circuit for an open as necessary.

Step 4.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the resistance of the TFT sensor circuits between the sensor electrical connector pin B1 and ground.
- Check the resistance of the TFT sensor circuits between the sensor electrical connector pin B4 and ground.
- Check the resistance of the sensor 5 voltage reference circuit and ground circuit for a short together between the sensor electrical connector pin B1 and B4.

Are there any problems found?

Yes >> • Repair as necessary.

No >> • Go to next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch on.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the voltage of the TFT sensor circuits between electrical connector pin 1, pin 2, terminal side and ground.

Is there any voltage present?

Yes >> • Repair as necessary.

No >> • Go to next step.

Step 6.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the resistance of the TFT sensor circuits between TCM electrical connector pin 53 and pin 54.

TFT TEMPERATURE	
Condition	TFT Sensor
Pin	Pins 53-54
20°C	2360-2660 Ohms
80°C	290-327 Ohms

Do the circuits check OK?

Yes >> • Go to the next step.

No >> • Replace the TFT sensor.

Step 7.

Disconnect the TCM electrical harness test tool.

Connect the TCM electrical connector.

Turn the ignition switch on.

Check the voltage of the TFT sensor reference voltage between the sensor electrical connector pin B1 and ground.

Is the 5 volt reference voltage present?

Yes >> • The system is normal.

- Reassemble the vehicle and road test to verify the customers complaint is repaired.

No >> • Replace and program the TCM.

DIAGNOSIS & TESTING**P0715: Turbine Speed Sensor Affected By Interference**

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) will set this DTC when the turbine speed signal is not present.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs and view the turbine speed sensor signal.

Start the engine.

Is DTC P0715 present and no turbine speed present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Disconnect the transaxle assembly electrical connector.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the voltage of the turbine speed sensor reference voltage circuit between the transaxle assembly electrical connector pin 45 and pin 46.
- Check the turbine speed sensor reference voltage between the TCM electrical connector pin 45 and ground.

Is 2 volts present at each electrical connector pin?

Yes >> • Go to step 5.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Check the resistance of the turbine speed sensor ground circuit for an open between the turbine speed sensor electrical connector pin D2 and TCM electrical connector pin 46.

Check the resistance of the turbine speed sensor reference circuit between the turbine speed sensor electrical connector pin D1 and TCM electrical connector pin 45.

Check the turbine speed sensor reference circuit and ground circuit for a short together.

Check the turbine speed sensor reference circuit for a short to ground or a short to voltage.

Check the turbine speed sensor ground circuit for a short to voltage.

Are there any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

Step 5.

Check the resistance of the turbine speed sensor between the turbine speed sensor electrical connector pin D1 and D2.

TURBINE SPEED SENSOR RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Terminal	Resistance
D1-D2	260-340 Ohms

Do the circuits check OK?

Yes >> • Go to the next step.

No >> • Replace the turbine speed sensor.

Step 6.

Connect the TCM electrical connector.

Drive the vehicle, with the X-431 scan tool.

View the turbine speed data stream:

- When the engine speed is low, the engine speed is close to the turbine speed.
- When the engine speed is high, the TCC solenoid is applied, and the turbine and pump wheel are locked, the turbine speed is equal to the engine speed.

Is the turbine speed correct?

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

No >> • Replace and program the TCM.

DIAGNOSIS & TESTING

P0730: Cylinder Slip

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** 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.

Step 1.

Start the engine and allow it to reach normal operating temperature.

Check the ATF level and quality.

- Check to see if the ATF color is dark brown and if the ATF smells burnt.
- Check if the ATF level is normal.
- Check if the ATF is leaking.

Were any ATF problems found?

Yes >> • If the fluid level is low, locate and repair any leaks and fill the transaxle to the proper fluid level.

No >> • Go to the next step.

Step 2.

With the X-431 scan tool, read the Engine Control Module (ECM) DTCs.

Were any ECM DTCs present?

Yes >> • See Diagnosis and Testing in Section 03 Electronic Engine Controls and perform to the appropriate diagnostic procedure(s) before proceeding.

No >> • Go to the next step.

Step 3.

Turn the ignition switch on.

With the X-431 scan tool, select view DTCs.

NOTE :

If the DTCs P0715 and P0720 are present, diagnose and repair them before continuing with this test.

Is DTC P0730 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 4.

Turn the ignition switch off.

Connect the ATF pressure gauge to the AT pressure test connector.

Turn the ignition switch on.

Start the engine.

Check the ATF pressure.

Is the pressure 31 Bar?

Yes >> • Go to the next step.

No >> • Repair the pressure modulation system fault as necessary.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Disassemble the automatic transaxle and inspect the following:

- Check the filter for damage.
- Disassemble and check the valve body assembly.
- Disassemble and check the servo piston seal for damage or missing.
- Disassemble and check the servo piston for damage or locked in the servo cover.
- Disassemble and check servo piston cushion spring or leaf spring retainer for damage or missing.
- Disassembly and check the servo assembly for wear or burned.

Were there any problems found?

Yes >> • Repair or replace the faulty component as necessary.

No >> • Go to step 6.

Step 6.

Turn the ignition switch on.

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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.



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DIAGNOSIS & TESTING

P0740: Lock-Up

- **When Monitored:** With the Torque Converter Clutch (TCC) activated, engine temperature greater than the specified value, transaxle input speed greater than engine speed, TPS less than the specified value, and brake not applied.
- **Set Condition:** The TCC is modulated by controlling the duty cycle of the TCC solenoid until the difference between the engine RPM and the transaxle input speed RPM or duty cycle is within a desired range.

Step 1.

Start the engine and allow it to reach normal operating temperature.

Check the ATF level and quality.

- Check to see if the ATF color is dark brown and if the ATF smells burnt.
- Check if the ATF level is normal.
- Check if the ATF is leaking.

Were any ATF problems found?

Yes >> • If the fluid level is low, locate and repair any leaks and fill the transaxle to the proper fluid level.

No >> • Go to the next step.

Step 2.**NOTE :**

If DTCs P0641, P0840, P0218, P0715 are set, they must be diagnosed and repaired before continuing this test. Turn the ignition switch on.

With the X-431 scan tool, clear the DTCs in the TCM.

Monitor the scan tool for at least two minutes.

Cycle the ignition key off and on several times, leaving the ignition on for at least 10 seconds at a time.

Start the engine and allow it to reach normal operating temperature.

Drive the vehicle up to 80 km/h.

With the scan tool, select View DTCs.

Is DTC P0740 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time.

- Using the electrical schematics as a guide, check the TCM electrical connector terminals for corrosion, damage, or terminal push out.
- If no problems are found, replace and program the TCM.

Step 3.

Drive the vehicle at 72 km/h.

Actuate the TCC PWM solenoid.

Check the turbine speed and engine input speed, and compare the difference between the two speed sensors.

Do the speed sensors operate in the specific range?

Yes >> • Go to the Diagnostic Help.

No >> • Go to the next step.

Step 4.**WARNING!**

Ensure the parking brake is firmly set when testing the transaxle position pressures.

DIAGNOSIS & TESTING

Set the parking brake.

Connect the ATF pressure gauge.

Start the engine.

Raise the engine RPM to the desired speed.

Check the ATF pressure.

ATF PRESSURE			
Condition	Position	Position	Position
RPM	P or N	R	D
2000 RPM	2.06-3.2 Bar	4 Bar	7 Bar

Is the pressure check OK?

Yes >> • Go to the Diagnostic Help.

No >> • Go to the next step.

Step 5.

Disassemble the transaxle and check the following:

- Check if the cooling system is jammed.
- Check if the TCC control valve was holding.
- Check if the TCC regulator valve was holding.
- Check the pressure regulator valve.
- Check if the TCC PWM solenoid is holding, and if the O-ring seal is leaking.
- Check if the TCC PWM discharge valve or the spring is damaged.
- Check if the lining is leaking or worn.
- Check if the turbine shaft seal is leaking.
- Check the TCC.

Were any problems found?

Yes >> • Repair or replace the damaged components as necessary.

No >> • Go to the next step.

Step 6.

Perform the following to verify the repair.

Drive the vehicle under the following conditions.

- Drive the vehicle under "D2", "D3", or "D4" to make the TCC apply.
- The throttle open within about 5-90%.
- The TCC speed difference approximately 20-50 RPM.

Is DTC P0740 present?

Yes >> • Go to the next step.

No >> • The system is normal.
• Reassemble the vehicle and road test to verify the customers complaint is repaired.

DIAGNOSIS & TESTING**Step 7.**

Turn the ignition switch on.

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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0753: EVS1 Circuit Open or Shorted To Ground

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EVS1 solenoid circuit is shorted to ground, or open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0753 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVS1 solenoid.

Using the appropriate TCM electrical harness 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 EVS1 solenoid control circuit between TCM pin 1 and ground.

Is 5 volt supply voltage present during EVS1 solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the resistance of the EVS1 solenoid control circuit for an open between the transaxle assembly electrical connector pin B11 and the TCM electrical connector pin 10.
- Check the resistance of the EVS1 control circuit between the EVS1 control circuit and ground.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS1 solenoid between the transaxle assembly electrical connector pin B3 and B11.

EVS1 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS1 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every shift position.

Check the voltage of the EVS1 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B12.

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SEQUENCE SOLENOID (EVS) CONDITION						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0753: EVS1 Circuit Shorted To Voltage

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects if the EVS1 solenoid circuit is shorted to voltage.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0753 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the transaxle assembly electrical connector.

Turn the ignition switch on.

Using the appropriate TCM electrical harness test tool and a 12-volt test light perform the following:

- Using a 12-volt test light connected to ground, probe EVS1 solenoid control circuit in the transaxle assembly electrical connector terminal B11.

Is any voltage present?

Yes >> • Go to the next step.

No >> • Go to step 5.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the EVS1 control circuit for a short to other supply circuits.
- Check the EVS1 supply circuit for a short to control circuits.
- Check the EVS1 control circuit for a short to voltage.

Are there any problems found?

Yes >> • Repair the circuit problems as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS1 solenoid between the transaxle assembly electrical connector pin B3 and B11.

EVS1 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS1 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every shift position.

Check the voltage of the EVS1 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B12.

SEQUENCE SOLENOID (EVS) CONDITION						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0758: EVS2 Circuit Open or Shorted To Ground

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EVS2 solenoid circuit is shorted to ground, or open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0758 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVS2 solenoid.

Using the appropriate TCM electrical harness 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 EVS2 solenoid control circuit between TCM pin 1 and ground.

Is 5 volt supply voltage present during EVS2 solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the resistance of the EVS2 solenoid control circuit for an open between the transaxle assembly electrical connector pin B8 and the TCM electrical connector pin 9.
- Check the resistance of the EVS2 control circuit between the EVS2 control circuit and ground.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS2 solenoid between the transaxle assembly electrical connector pin B3 and B11.

EVS2 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS2 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every shift position.

Check the voltage of the EVS2 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B8.

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SEQUENCE SOLENOID (EVS) CONDITION						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING**P0758: EVS2 Circuit Shorted To Voltage**

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects if the EVS2 solenoid circuit is shorted to voltage.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0758 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the transaxle assembly electrical connector.

Turn the ignition switch on.

Using the appropriate TCM electrical harness test tool and a 12-volt test light perform the following:

- Using a 12-volt test light connected to ground, probe EVS2 solenoid control circuit in the transaxle assembly electrical connector terminal B8.

Is any voltage present?

Yes >> • Go to the next step.

No >> • Go to step 5.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the EVS2 control circuit for a short to other supply circuits.
- Check the EVS2 supply circuit for a short to control circuits.
- Check the EVS2 control circuit for a short to voltage.

Are there any problems found?

Yes >> • Repair the circuit problems as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS2 solenoid between the transaxle assembly electrical connector pin B3 and B8.

EVS2 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS2 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every 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						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0763: EVS3 Circuit Open or Shorted To Ground

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EVS3 solenoid circuit is shorted to ground, or open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0763 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVS3 solenoid.

Using the appropriate TCM electrical harness 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 EVS3 solenoid control circuit between TCM pin 1 and ground.

Is 5 volt supply voltage present during EVS3 solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the resistance of the EVS3 solenoid control circuit for an open between the transaxle assembly electrical connector pin B10 and the TCM electrical connector pin 9.
- Check the resistance of the EVS3 control circuit between the EVS3 control circuit and ground.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS3 solenoid between the transaxle assembly electrical connector pin B3 and B10.

EVS3 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS3 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every 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						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING**P0763: EVS3 Circuit Shorted To Voltage**

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects if the EVS3 solenoid circuit is shorted to voltage.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0763 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the transaxle assembly electrical connector.

Turn the ignition switch on.

Using the appropriate TCM electrical harness test tool and a 12-volt test light perform the following:

- Using a 12-volt test light connected to ground, probe EVS3 solenoid control circuit in the transaxle assembly electrical connector terminal B10.

Is any voltage present?

Yes >> • Go to the next step.

No >> • Go to step 5.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the EVS3 control circuit for a short to other supply circuits.
- Check the EVS3 supply circuit for a short to control circuits.
- Check the EVS3 control circuit for a short to voltage circuits.

Are there any problems found?

Yes >> • Repair the circuit problems as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS3 solenoid between the transaxle assembly electrical connector pin B3 and B10.

EVS3 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS3 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every 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						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0768: EVS4 Circuit Open or Shorted To Ground

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EVS4 solenoid circuit is shorted to ground, or open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0768 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVS4 solenoid.

Using the appropriate TCM electrical harness 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 EVS4 solenoid control circuit between TCM pin 1 and ground.

Is 5 volt supply voltage present during EVS4 solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the resistance of the EVS4 solenoid control circuit for an open between the transaxle assembly electrical connector pin B7 and the TCM electrical connector pin 8.
- Check the resistance of the EVS4 control circuit between the EVS4 control circuit and ground.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS4 solenoid between the transaxle assembly electrical connector pin B3 and B7.

EVS4 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS4 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every shift position.

Check the voltage of the EVS4 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B7.

08

SEQUENCE SOLENOID (EVS) CONDITION						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0768: EVS4 Circuit Shorted To Voltage

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects if the EVS4 solenoid circuit is shorted to voltage.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0768 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).
• Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the transaxle assembly electrical connector.

Turn the ignition switch on.

Using the appropriate TCM electrical harness test tool and a 12-volt test light perform the following:

- Using a 12-volt test light connected to ground, probe EVS4 solenoid control circuit in the transaxle assembly electrical connector terminal B7.

Was any voltage present?

Yes >> • Go to the next step.

No >> • Go to step 5.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the EVS4 control circuit for a short to other supply circuits.
- Check the EVS4 supply circuit for a short to control circuits.
- Check the EVS4 control circuit for a short to voltage.

Are there any problems found?

Yes >> • Repair the circuit problems as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS4 solenoid between the transaxle assembly electrical connector pin B3 and B7.

EVS4 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS4 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every 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						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0773: EVS5 Circuit Open or Shorted To Ground

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EVS5 solenoid circuit is shorted to ground, or open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0773 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVS5 solenoid.

Using the appropriate TCM electrical harness 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 EVS5 solenoid control circuit between TCM pin 1 and ground.

Is the 5 volt supply voltage present during EVS5 solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the resistance of the EVS5 solenoid control circuit for an open between the transaxle assembly electrical connector pin B5 and the TCM electrical connector pin 13.
- Check the resistance of the EVS5 control circuit between the EVS5 control circuit and ground.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS5 solenoid between the transaxle assembly electrical connector pin B3 and B5.

EVS5 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS5 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every shift position.

Check the voltage of the EVS5 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B5.

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SEQUENCE SOLENOID (EVS) CONDITION						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0773: EVS5 Circuit Shorted To Voltage

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects if the EVS5 solenoid circuit is shorted to voltage.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P0773 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the transaxle assembly electrical connector.

Turn the ignition switch on.

Using the appropriate TCM electrical harness test tool and a 12-volt test light perform the following:

- Using a 12-volt test light connected to ground, probe EVS5 solenoid control circuit in the transaxle assembly electrical connector terminal B5.

Was any voltage present?

Yes >> • Go to the next step.

No >> • Go to step 5.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the EVS5 control circuit for a short to other supply circuits.
- Check the EVS5 supply circuit for a short to control circuits.
- Check the EVS5 control circuit for a short to voltage circuits.

Are there any problems found?

Yes >> • Repair the circuit problems as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS5 solenoid between the transaxle assembly electrical connector pin B3 and B7.

EVS5 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS5 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every 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						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0775: EVM Circuit Open

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** 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.

Step 1.

With the X-431 scan tool, check for DTCs.

Is DTC P0775 present?

- Yes** >> • Go to the next step.
- No** >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

- Yes** >> • Go to the next step.
- No** >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVM valve.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the EVM valve supply voltage between TCM pin 19 and TCM pin 26.

Is the 12 volt supply voltage present during EVM valve activation, and not present during deactivation?

- Yes** >> • Go to step 5.
- No** >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the resistance of the EVM valve control circuit for an open between the transaxle assembly electrical connector pin B6 and TCM electrical connector pin 19.
- Check the resistance of the EVM valve control circuit between the EVM valve control circuit and ground or between the EVM valve control circuit and other circuits for a short to ground.

Were any problems found?

- Yes** >> • Repair the circuit as necessary.
- No** >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVM valve between the transaxle assembly electrical connector pin B3 and B12.

EVM VALVE RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVM valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical 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 volts with the engine running and the transaxle in the "N" position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

Connect the ATF pressure gauge.

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

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

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

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

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

Step 8.

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

DIAGNOSIS & TESTING

P0775: EVM Circuit Shorted To Voltage

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The EVM valve is modulated by controlling the duty cycle of the Solenoid. The DTC is set after the TCM detect that the duty cycle of the control current is out of the acceptable range.

Step 1.

With the X-431 scan tool, check for DTCs.

Is DTC P0775 present?

- Yes** >> • Go to the next step.
- No** >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

- Yes** >> • Go to the next step.
- No** >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVM valve.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the EVM valve supply voltage between TCM pin 19 and TCM pin 26.

Is the 12 volt supply voltage present during EVM valve activation, and not present during deactivation?

- Yes** >> • Go to step 5.
- No** >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector and perform the following:

- Check the EVM valve supply and control circuits for a short together.
- Check the EVM valve control circuit for a short to other circuits.
- Check the EVM valve control circuit for a short to voltage.

Were any problems found?

- Yes** >> • Repair the circuit as necessary.
- No** >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Disconnect the transaxle assembly electrical connector.

Check the resistance of the EVM valve between the transaxle assembly electrical connector pin B6 and B12.

EVM VALVE RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	0.8-1.2 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVM valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical 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 volts with the engine running and the transaxle in the "N" position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

Connect the ATF pressure gauge.

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

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

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

Yes >> • The system is normal.

• Reassemble the vehicle and road test to verify the customers complaint is repaired.

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

Step 8.

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

DIAGNOSIS & TESTING

P0795: EVLU Circuit Open or Shorted To Ground

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EVLU circuit shorted to ground or open.

Step 1.

With the X-431 scan tool, check for DTCs.

Is DTC P0795 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the transaxle assembly electrical connector.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVLU valve.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the EVLU valve supply voltage between TCM pin 19 and TCM pin 20.

Is the 12 volt supply voltage present during EVLU valve activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector and perform the following:

- Check the resistance of the EVLU valve control circuit for an open between the transaxle assembly electrical connector pin B9 and TCM electrical connector pin 20.
- Check the resistance of the EVLU valve control circuit between the EVLU valve control circuit and ground or between the EVLU valve control circuit and other circuits for a short to ground.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVLU valve between the transaxle assembly electrical connector pin B6 and B9.

EVLU VALVE RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVLU valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

With the engine running, move the shifter to "N" position, check the voltage of the EVLU valve between the TCM pin 20 and pin 19.

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

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the EVLU valve condition.

Drive the vehicle until it is fully warmed up to at least 50°. 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 EVLU valve for a mechanical problem.

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P0795: EVLU Circuit Shorted To Voltage

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EVLU solenoid circuit is shorted to voltage.

Step 1.

With the X-431 scan tool, check for DTCs.

Is DTC P0795 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Disconnect the transaxle assembly electrical connector.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVLU valve.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the EVLU valve supply voltage between transaxle assembly pin B6 and pin B9.

Is the 12 volt supply voltage present during EVLU valve activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector and perform the following:

- Check the EVLU valve supply and control circuits for a short together.
- Check the EVLU valve control circuit for a short to other circuits.
- Check the EVLU valve control circuit for a short to voltage.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Disconnect the transaxle assembly electrical connector.

Check the resistance of the EVLU valve between the transaxle assembly electrical connector pin B6 and B9.

EVLU VALVE RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	0.8-1.2 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVLU valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

With the engine running, move the shifter to "N" position, check the voltage of the EVLU valve between the TCM pin 20 and pin 19.

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

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the EVLU valve condition.

Drive the vehicle until it is fully warmed up to at least 50°. 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 EVLU valve for a mechanical problem.

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING**P0840: Pressure Sensor**

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects this DTC after the specified engine speed has been reached for the specified time and there is a fault with the pressure sensor circuit.

Step 1.

Turn the ignition switch on.

Move the shift lever into the "P" or "N" position.

Start the engine and allow the ATF temperature to reach above 15°, and allow the ATF pressure to reach 250 kPa. With the X-431 scan tool, check for DTCs.

Is DTC P0840 present current?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).
• Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVLU valve.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the voltage of the ATF pressure sensor reference voltage between the TCM electrical connector pin 24 and pin 25.

Is the voltage above 4.5 volts?

Yes >> • Go to the next step.

No >> • Replace and program the TCM.

Step 4.

Disconnect the transaxle assembly electrical connector.

Check the resistance of the ATF pressure sensor between the TCM electrical connector pin 24, pin 25, pin 55 and transaxle assembly electrical connector pin C1, pin C3 pin C5.

Is the resistance below 5 ohms?

Yes >> • Go to the next step.

No >> • Repair the circuits for an open as necessary.

DIAGNOSIS & TESTING**Step 5.**

Check the resistance of the ATF pressure sensor circuits between the transaxle assembly electrical connector pin C1, C2, C3 and ground.

Check the resistance of the ATF pressure sensor circuits between the transaxle assembly electrical connector pin C1 and C2, pin C1 and C3, pin C2 and C3.

Is the resistance below 10,000 ohms?

Yes >> • Go to the next step.

No >> • Repair the short circuits as necessary.

Step 6.

Check the voltage of the ATF pressure sensor signal voltage between the TCM electrical connector pin 25 and 55.

Is the voltage 1.4 volts?

Yes >> • Replace and program the TCM.

No >> • Replace the ATF pressure sensor.

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DIAGNOSIS & TESTING

P1928: Shift Lock Solenoid Valve Circuit Open or Shorted To Ground

- **When Monitored:** With the ignition switch on and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the shift lever lock solenoid circuit shorted to ground or open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P1928 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the shift lever lock solenoid.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the shift lever lock solenoid supply voltage between the shift lever lock solenoid electrical connector pin 4 and pin 5.

Is the 12 volt supply voltage present during shift lever lock solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the shifter selector electrical connector.

Check and verify the lock solenoid supply fuse FB3 is good.

Check the ignition relay and the associated circuits. Perform the following:

- Check the resistance of the shift lever lock solenoid control circuit for an open between the lock solenoid electrical connector pin 5 and TCM electrical connector pin 11.
- Check the resistance of the lock solenoid supply circuit between the lock solenoid electrical connector pin 4 and fuse FB3 in the front fuse and relay box.
- Check the shift lever lock solenoid supply circuit for a short to ground.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

Step 5.

Turn the ignition switch off.

Check the resistance of the shift lock solenoid between the shifter selector electrical connector pin 4 and pin 5.

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

08

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the shift lock solenoid.

Step 6.

Connect the TCM electrical connector.

Turn the ignition switch on.

Check the shift lock solenoid control signal. Check the voltage of the shift lock solenoid when pressing the brake pedal.

Check the voltage of the shift lock solenoid between the shift lock solenoid electrical connector pin 4 and pin 5.

SHIFT LOCK SOLENOID CONDITION	
Condition	Shift Lock Solenoid
Terminal	Pin 4-5
Brake Pedal ON	0 (Volt)
Brake Pedal OFF	12 (Volt)

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

Yes >> • Go to the next step.

No >> • Go to step 8.

DIAGNOSIS & TESTING

Step 7.

With the X-431 scan tool, monitor the shift lock solenoid condition.

Watch, listen and verify if the shift lock solenoid works correctly when pressing the brake pedal.

Does the shift lock solenoid work correctly?

- Yes** >> • The system is normal.
• Reassemble the vehicle and road test to verify the customers complaint is repaired.
- No** >> • Replace the shift lock solenoid for a mechanical problem.

Step 8.

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

- Yes** >> • Repair as necessary.
- No** >> • Replace and program the TCM.



DIAGNOSIS & TESTING

P1928: Shift Lock Solenoid Valve Circuit Shorted To Voltage

- **When Monitored:** With the ignition switch on and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the shift lever lock solenoid circuit is shorted to voltage.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P1928 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the shifter selector C-027.

Turn the ignition switch on.

Using a 12-volt test light connected to ground, probe shifter selector C-027-5.

Is 12 volt supply voltage present?

Yes >> • Go to the next step.

No >> • Go to step 5.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector and perform the following:

- Check the shift lock solenoid valve control circuit for a short together to other supply circuits in the shifter selector C-027 pins.
- Check the shift lock solenoid valve supply circuit and control circuit for a short together.
- Check the shift lock solenoid valve control circuit for a short to voltage.

Are there any problems found?

Yes >> • Repair the circuit problems as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the shift lock solenoid between the shifter selector electrical connector pin 4 and 5.

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

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the shift lock solenoid.

Step 6.

Connect the TCM electrical connector.

Turn the ignition switch on.

Check the shift lock solenoid control signal. Check the voltage of the shift lock solenoid when pressing the brake pedal.

Check the voltage of the shift lock solenoid between the shift lock solenoid electrical connector pin 4 and pin 5.

SHIFT LOCK SOLENOID CONDITION	
Condition	Shift Lock Solenoid
Terminal	Pin 4-5
Brake Pedal ON	0 (Volt)
Brake Pedal OFF	12 (Volt)

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

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, monitor the shift lock solenoid condition.

Watch, listen and verify if the shift lock solenoid works correctly when pressing the brake pedal.

Does the shift lock solenoid work correctly?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P2709: EVS6 Circuit Open or Shorted To Ground

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EVS6 solenoid circuit is shorted to ground, or open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P2709 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EVS6 solenoid.

Using the appropriate TCM electrical harness 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 EVS6 solenoid control circuit between TCM pin 1 and ground.

Is the 5 volt supply voltage present during EVS6 solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the resistance of the EVS6 solenoid control circuit for an open between the transaxle assembly electrical connector pin B2 and the TCM electrical connector pin 13.
- Check the resistance of the EVS6 control circuit between the EVS6 control circuit and ground.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS6 solenoid between the transaxle assembly electrical connector pin B3 and B2.

EVS6 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS6 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every shift position.

Check the voltage of the EVS6 solenoid supply circuit between the transaxle assembly electrical connector pin B3 and pin B2.

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SEQUENCE SOLENOID (EVS) CONDITION						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P2709: EVS6 Circuit Shorted To Voltage

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects if the EVS6 solenoid circuit is shorted to voltage.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P2709 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the transaxle assembly electrical connector.

Turn the ignition switch on.

Using the appropriate TCM electrical harness test tool and a 12-volt test light perform the following:

- Using a 12-volt test light connected to ground, probe EVS6 solenoid control circuit in the transaxle assembly electrical connector terminal B2.

Was any voltage present?

Yes >> • Go to the next step.

No >> • Go to step 5.

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the transaxle assembly electrical connector and perform the following:

- Check the EVS6 control circuit for a short to other supply circuits.
- Check the EVS6 supply circuit for a short to control circuits.
- Check the EVS6 control circuit for a short to voltage.

Are there any problems found?

Yes >> • Repair the circuit problems as necessary.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 5.

Turn the ignition switch off.

Check the resistance of the EVS6 solenoid between the transaxle assembly electrical connector pin B3 and B7.

EVS6 SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	38-42 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EVS6 solenoid valve.

Step 6.

Connect the TCM electrical connector.

Connect the transaxle assembly electrical connector.

Turn the ignition switch on.

Check the shift solenoid control signal. Check the voltage of the shift solenoid under every 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						
Terminal	EVS1	EVS2	EVS3	EVS4	EVS5	EVS6
Lever Position	1-10	1-9	1-7	1-8	1-13	1-14
R	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
N/P	0 Volts	0 Volts	+5 Volts	0 Volts	0 Volts	0 Volts
1	0 Volts	0 Volts	+5 Volts	+5 Volts	0 Volts	0 Volts
2	0 Volts	+5 Volts	0 Volts	+5 Volts	0 Volts	0 Volts
3	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts	0 Volts
4	+5 Volts	+5 Volts	0 Volts	0 Volts	0 Volts	0 Volts

Do the circuits check OK when moving the shift lever to every position?

Yes >> • Go to the next step.

No >> • Go to step 8.

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the shift solenoid condition.

Verify that the shift solenoid sequence is correct and the vehicle speed increases with each up-shift.

Is the shift solenoid sequence correct?

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

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

DIAGNOSIS & TESTING**Step 8.**

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

Yes >> • Repair as necessary.

No >> • Replace and program the TCM.

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DIAGNOSIS & TESTING

P2753: EPDE Circuit Open

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EPDE solenoid circuit is open.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P2753 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the EPDE electrical connector.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EPDE solenoid.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the voltage of the EPDE solenoid supply circuit between the EPDE solenoid electrical connector pin E1 and pin E2.
- Check the EPDE solenoid supply voltage between the TCM electrical connector pin 2 and ground.

Is the 12 volt supply voltage present during EPDE solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector and perform the following:

- Check the resistance of the EPDE solenoid control circuit for an open between the EPDE electrical connector pin E1 and TCM electrical connector pin 12.
- Check the resistance of the EPDE solenoid supply circuit between the EPDE electrical connector pin E2 and TCM electrical connector pin 2.
- Check the EPDE supply circuit short to ground.
- Check the EPDE control circuit short to ground.

Are there any problems found?

Yes >> • Repair the circuit problems as necessary.

No >> • Go to the next step.

Step 5.

Check the resistance of the EPDE solenoid between the EPDE electrical connector pin E1 and E2.

EPDE SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	36-44 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EPDE solenoid valve.

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Connect the TCM electrical connector.

Drive the vehicle, when the ATF temperature is above 60 ° and the engine speed is over 2000 RPM, the voltage between the electrical connector pin 12 and pin 2 is 12 volts, and when the ATF temperature is below 60 ° and the engine speed is below 2000 RPM, the voltage between the electrical connector pin 12 and pin 2 is 0 volts.

EPDE RANGE CONDITION		
EPDE Pin	12-2	12-2
Condition	Temperature > 60°C RPM < 2000	Temperature < 60°C RPM < 2000
Value (Volt)	12 (Volt)	0 (Volt)

Is the test value normal?

Yes >> • Go to the next step.

No >> • Replace and program the TCM.

DIAGNOSIS & TESTING

Step 7.

With the X-431 scan tool, drive the vehicle, monitor the EPDE solenoid operation.

Verify the EPDE solenoid opens and closes correctly and the ATF temperature is not over normal range.

Does the EPDE solenoid work correctly?

- Yes** >> • The system is normal.
• Reassemble the vehicle and road test to verify the customers complaint is repaired.
- No** >> • Replace the solenoid for a mechanical problem.

Step 8.

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

- Yes** >> • Repair as necessary.
- No** >> • Replace and program the TCM.



DIAGNOSIS & TESTING**P2753: EPDE Circuit Shorted To Ground**

- **When Monitored:** With the engine running and battery voltage greater than 12 volts.
- **Set Condition:** The Transaxle Control Module (TCM) detects that the EPDE solenoid circuit is shorted to ground when the ATF temperature is over the specified value, and the engine speed is above the specified value.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, check for DTCs.

Is DTC P2753 present?

Yes >> • Go to the next step.

No >> • Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

Step 2.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Are the electrical connector pins OK?

Yes >> • Go to the next step.

No >> • Repair as necessary.

Step 3.

Connect the appropriate TCM electrical harness test tool to the TCM electrical connector and the TCM.

Disconnect the EPDE electrical connector.

Turn the ignition switch on.

With the X-431 scan tool, actuate the EPDE solenoid.

Using the appropriate TCM electrical harness test tool and a digital multimeter perform the following:

- Check the voltage of the EPDE solenoid supply circuit between the EPDE solenoid electrical connector pin E1 and pin E2.
- Check the EPDE solenoid supply voltage between the TCM electrical connector pin 2 and ground.

Is the 12 volts supply voltage present during EPDE solenoid activation, and not present during deactivation?

Yes >> • Go to step 5.

No >> • Go to the next step.

DIAGNOSIS & TESTING

Step 4.

Turn the ignition switch off.

Disconnect the TCM electrical connector.

Disconnect the TCM electrical connector and perform the following:

- Check the EPDE supply and control circuits for a short together.
- Check the EPDE supply circuit for a short to ground.
- Check the EPDE control circuit for a short to voltage.

Were any problems found?

Yes >> • Repair the circuit as necessary.

No >> • Go to the next step.

Step 5.

Check the resistance of the EPDE solenoid between the EPDE electrical connector pin E1 and E2.

EPDE SOLENOID RESISTANCE BASED ON TRANSAXLE TEMPERATURE	
Temperature	Resistance
23°C	36-44 Ohms

Does the circuit check OK?

Yes >> • Go to the next step.

No >> • Replace the EPDE solenoid valve.

Step 6.

Connect the TCM electrical connector.

Drive the vehicle, when the ATF temperature is above 60 ° and the engine speed is over 2000 RPM, the voltage between the electrical connector pin 12 and pin 2 is 12 volts, and when the ATF temperature is below 60 ° and the engine speed is below 2000 RPM, the voltage between the electrical connector pin 12 and pin 2 is 0 volts.

EPDE RANGE CONDITION		
EPDE Pin	12-2	12-2
Condition	Temperature > 60°C RPM < 2000	Temperature < 60°C RPM < 2000
Value (Volt)	12 (Volt)	0 (Volt)

Is the test value normal?

Yes >> • Go to the next step.

No >> • Replace and program the TCM.

DIAGNOSIS & TESTING**Step 7.**

With the X-431 scan tool, drive the vehicle, monitor the EPDE solenoid operation.

Verify the EPDE solenoid opens and closes correctly and the ATF temperature is not over normal range.

Does the EPDE solenoid work correctly?

- Yes** >> • The system is normal.
• Reassemble the vehicle and road test to verify the customers complaint is repaired.
- No** >> • Replace the solenoid for a mechanical problem.

Step 8.

Turn the ignition switch on.

Monitor the X-431 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.
- Using the wiring schematic as a guide, inspect the wiring and connectors of the TCM.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals.
- Verify that there is good pin to terminal contact in the related connectors.

Were any problems found?

- Yes** >> • Repair as necessary.
- No** >> • Replace and program the TCM.



DIAGNOSIS & TESTING

U0001: CAN Communication Error

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Transaxle Control Module (TCM) lost communication over the CAN BUS circuit. The circuit is continuously monitored.

Step 1.

Turn the ignition switch on.

With the X-431 scan tool, delete all the TCM DTCs.

Cycle the ignition switch from ON to OFF 3 times.

With the X-431 scan tool, view the TCM DTCs.

Is DTC U0001 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time. Using the electrical schematics as a guide, check and ensure that the wiring harness is routed properly, and there are no parts interfering with the TCM wiring harness (See Diagnostic Help in Section 08 Transaxle).

- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

With the X-431 scan tool, attempt to enter all the other CAN communication modules ABS module, ECM, IC module and front BCM.

Read the CAN DTCs.

Were DTCs from other modules 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.

Step 3.

Check for a short to voltage between the diagnostic electrical connector DLC pin 14 (-), pin 6 (+) and ground with a multimeter.

Is there any voltage present?

Yes >> • Go to the next step.

No >> • Go to step 5.

Step 4.

Turn the ignition switch off.

Disconnect the ABS module, ECM, IC module, front BCM and TCM electrical connectors.

Turn the ignition on.

Check for a short to voltage between the diagnostic electrical connector DLC pin 14 (-), pin 6 (+) and ground with a multimeter.

Is there any voltage present when the modules are disconnected?

Yes >> • Go to the next step.

No >> • Replace the corresponding module.

DIAGNOSIS & TESTING**Step 5.**

Connect all the disconnected modules.

Check for a short to ground between the diagnostic electrical connector DLC pin 14 (-), pin 6 (+) and ground with a multimeter.

Is the resistance below 10,000 ohms?

Yes >> • Go to the next step.

No >> • Go to step 7.

Step 6.

Turn the ignition switch off.

Disconnect the ABS module, ECM, IC module, front BCM and TCM harness connectors.

Check for a short to ground between the diagnostic electrical connector DLC pin 14 (-), pin 6 (+) and ground with a multimeter.

Is the resistance below 10,000 ohms with all modules disconnected?

Yes >> • Check and repair the CAN communication circuits high (+) and low (-) for a short to ground as necessary.

No >> • Replace the corresponding module.

Step 7.

Turn the ignition switch off.

Disconnect the ABS module, ECM, IC module, front BCM and TCM harness electrical connectors.

Check the resistance between the CAN high (+) and CAN LOW (-) for a short together.

Is the resistance below 10,000 ohms?

Yes >> • Repair the CAN circuits for a short together as necessary.

No >> • Go to the next step.

Step 8.

Inspect the TCM electrical connector pins for proper fit or any chafed, pierced, pinched, or partially broken wires.

Is there any problems present?

Yes >> • Repair as necessary.

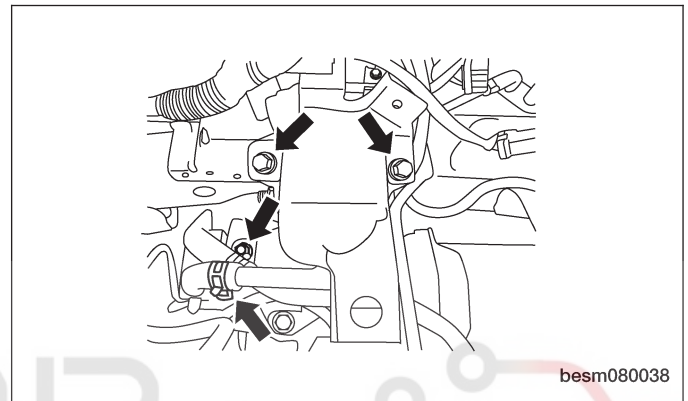
No >> • Replace and program the TCM.

ON-VEHICLE SERVICE

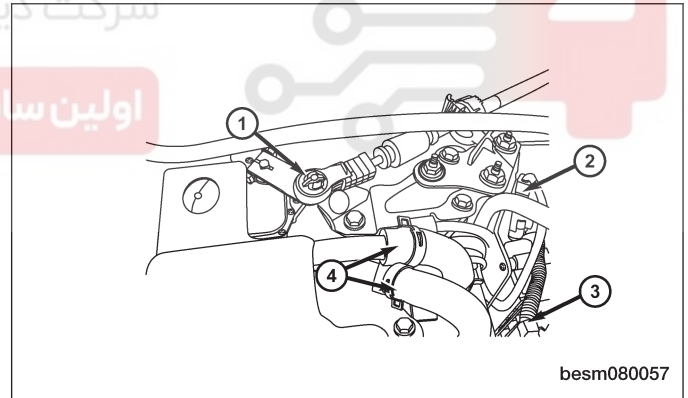
Automatic Transaxle Assembly

Removal & Installation

1. Raise and support the vehicle.
2. Remove both front axle shafts (See Front Axle Shaft Removal & Installation in Section 09 Axle).
3. Remove the engine cover.
4. Remove the battery and battery tray (See Battery Removal & Installation in Section 05 Starting & Charging).
5. Remove the air cleaner and air duct.
6. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
7. Remove the base mounting of the air cleaner assembly.



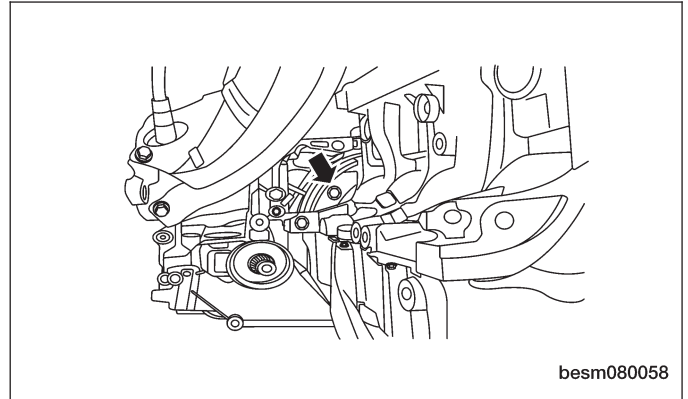
8. Remove the transaxle ground cable.
9. Disconnect and remove the electrical connectors for the following components:
 - Vehicle speed sensor (2)
 - Crankshaft position sensor
 - Automatic transaxle assembly (3)
10. Disconnect the transaxle oil coolant lines (4) using a suitable tool.
11. Remove the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



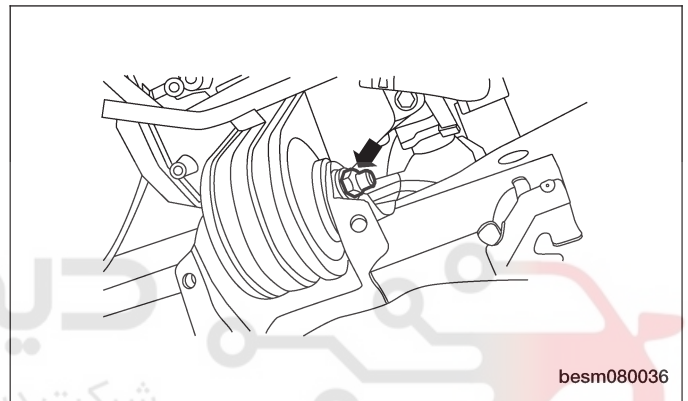
12. Remove the bolts attaching the transaxle cooling lines to the transaxle.
13. Remove the starter motor (See Starter Removal & Installation in Section 05 Starting & Charging).

ON-VEHICLE SERVICE

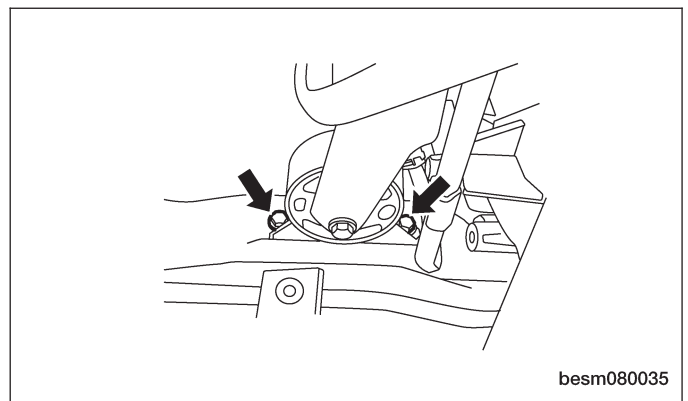
14. Remove the bolts attaching the drive plate to the torque converter.
(Tighten: Drive plate bolts to 75 N·m)



15. Remove the engine to transaxle upper bolts.
(Tighten: Engine to transaxle upper bolts to 80 N·m)
16. Remove transaxle mount nuts.
(Tighten: Transaxle mount nut to 120 N·m)

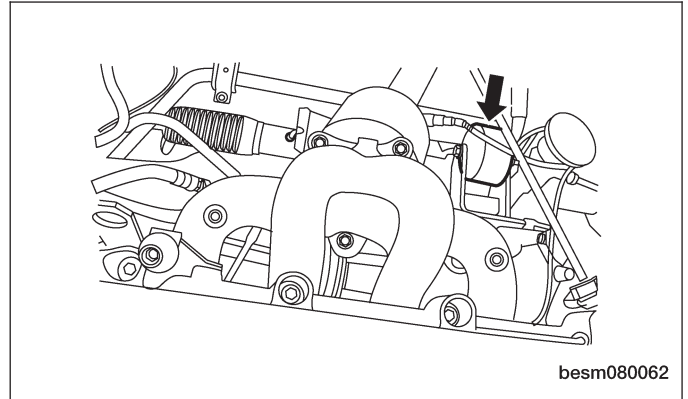


17. Raise the vehicle.
18. Drain the transaxle oil.
19. Remove the engine undercover and splash shields.
20. Support the engine using an engine support fixture or suitable jack.
21. Remove the engine to transaxle lower bolts.
(Tighten: Engine to transaxle lower bolts to 80 N·m)
22. Remove the bolts that mount the side sill to vehicle body.
(Tighten: Side sill to vehicle body bolts to 120 N·m)
23. Remove the front engine mount bolts.
(Tighten: Front mount bolts to 60 N·m)



ON-VEHICLE SERVICE

24. Remove the rear engine mount bolts.
(Tighten: Rear mount bolts to 40 N·m)



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

WARNING!

Use a suitable jack to support the transaxle during removal.

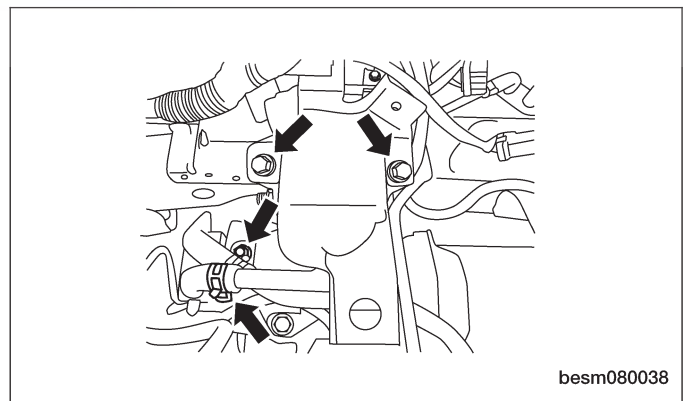
27. Installation is in the reverse order of removal.

Installation Notes:

- After installation, check for any oil leakage and verify the transaxle oil level is correct.

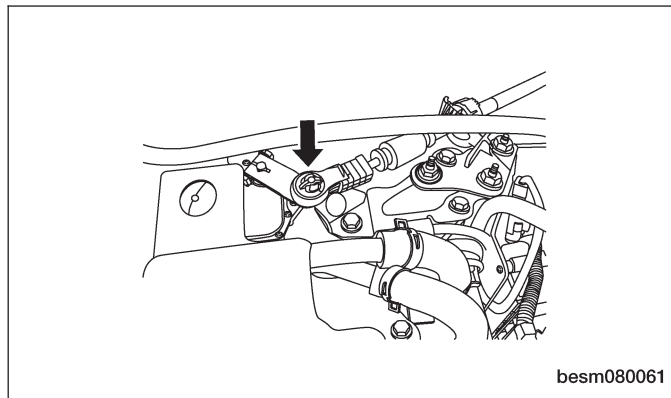
Automatic Shifter Selector**Removal & Installation**

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 assembly.

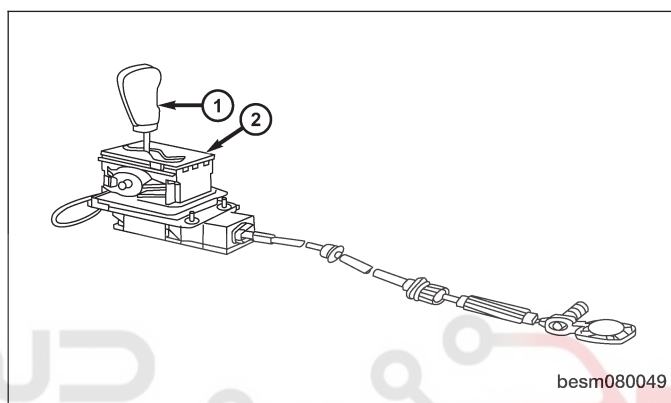


ON-VEHICLE SERVICE

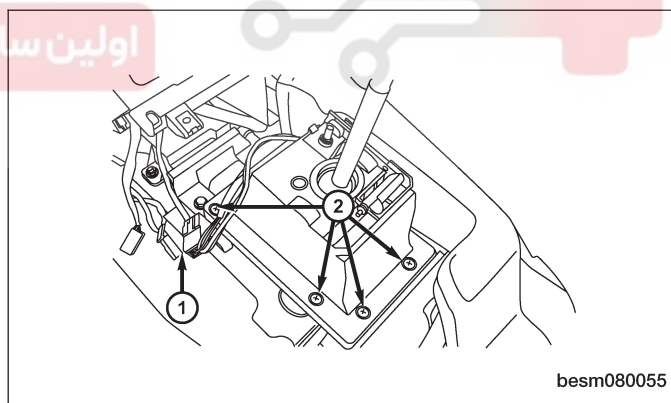
5. Remove the shift cable from the transaxle.



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

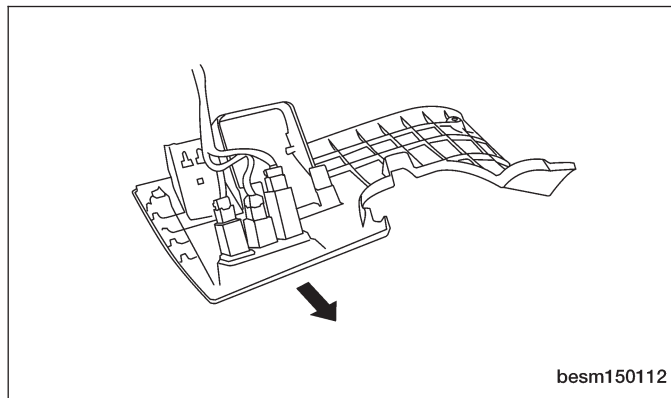


8. Apply the parking brake (apply parking brake handle to clear lower console upon removal).
9. Remove the lower console (See Lower Console Removal & Installation in Section 15 Body).
10. Disconnect the gearshift mechanism connectors (1).
11. Remove the shift cable from the gearshift mechanism.
12. Remove the four bolts (2) and then remove the gearshift mechanism from the bracket.
13. Installation is in the reverse order of removal.

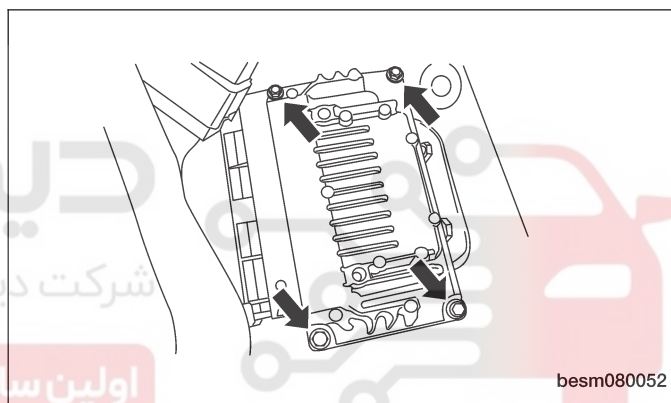


ON-VEHICLE SERVICE**Transaxle Control Module (TCM)****Removal & Installation**

1. Disconnect the negative battery cable.
2. Remove the instrument panel lower shroud.
3. Disconnect the TCM electrical connectors.



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



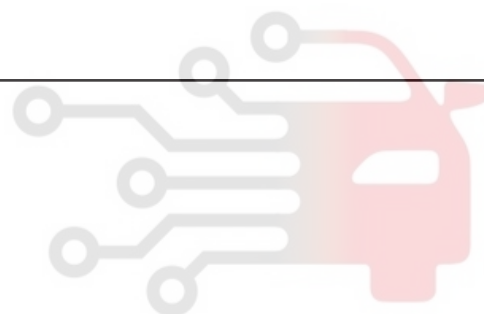
MANUAL TRANSAXLE

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دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



GENERAL INFORMATION

Description

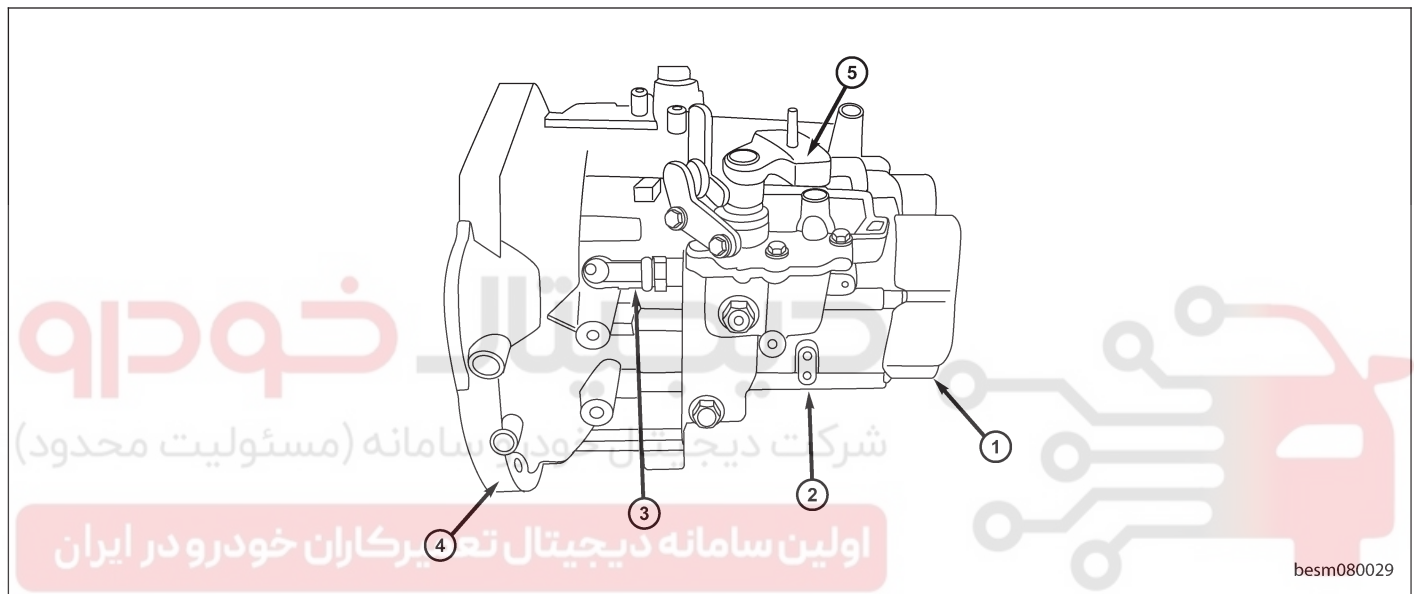
The QR519MH five-speed transaxle is a constant-mesh manual transaxle that is synchronized in all gear ranges, including reverse.

The transaxle consists of three major sub-assemblies:

- Input shaft
- Output shaft
- Differential assembly

The transaxle shift system consists of the following components:

- Mechanical shift cover
- Shift rails
- Shift forks
- Shift cables



besm080029

1 – End Cover-Rear

2 – Transaxle Housing Assembly

3 – Clutch Slave Cylinder

4 – Clutch Housing Assembly

5 – Gearshift Mechanism

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 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, fixing the gear to the output shaft, and allowing power to transmit through the output shaft to the differential.

GENERAL INFORMATION

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, fixing 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, fixing 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, fixing the gear to the input shaft, and allowing power to transmit through the output shaft to the differential.

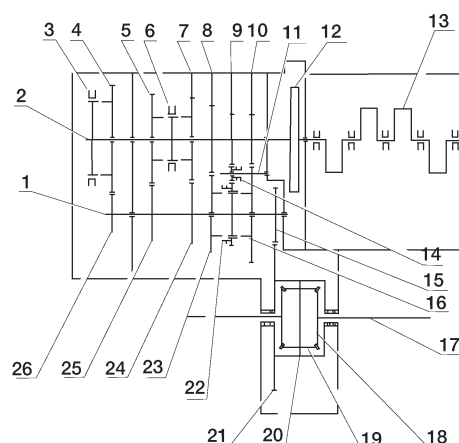
5th Gear

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, fixing 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 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, fixing the gear to the output shaft, and allowing power to transmit through the output shaft to the differential.

GENERAL INFORMATION



besm080033

1 – Output Shaft
2 – Input Shaft
3 – 5th Gear Synchronizer
4 – 5th Driving Gear
5 – 4th Driving Gear
6 – 3rd & 4th Gear Synchronizer
7 – 3rd Driving Gear
8 – 2nd Driving Gear
9 – Reverse Driving Gear
10 – 1st Driving Gear
11 – Idler Gear Shaft
12 – Clutch
13 – Crankshaft

14 – Idler Gear
15 – Differential Driving Gear
16 – 1st Driven Gear
17 – Axle Shaft
18 – Differential Side Gear
19 – Pinion Gear
20 – Differential Case
21 – Differential Driven Gear
22 – 1st & 2nd Gear Synchronizer
23 – 2nd Driven Gear
24 – 3rd Driven Gear
25 – 4th Driven Gear
26 – 5th Driven Gear

Transaxle Identification-Number

The transaxle serial number can be found on a metal tag fastened to the transaxle case on the clutch housing. The third row data is transaxle serial number.

Specifications

Torque Specifications

DESCRIPTION	TORQUE (N.m)
Differential Driven Gear Bolt	120 - 130
Drain Plug	30 - 35
Transaxle External Housing-to-Case Bolts	22 - 26
Fork Shaft Seat	45 - 50
End Cover Bolt	18 - 23
Reverse Idler Shaft-to-Case Bolt	45 - 50
Reverse Fork Mechanism Bolt	22 - 26
Reverse Lamp Switch Assembly	18 - 23

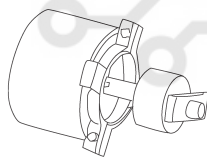
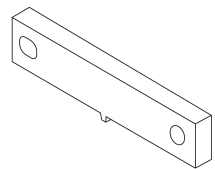
GENERAL INFORMATION

DESCRIPTION	TORQUE (N.m)
Bearing Retainer Screw	15 - 20
5th Gear-to-Input Shaft Bolt	140 - 150
Release Bearing-to-Case Bolt	22 - 26
Gear Shift Mechanism Assembly Bolt	22 - 26
Reverse Lock Mechanism Bolt	15 - 22
Engine To Transaxle Bolts	78 - 80

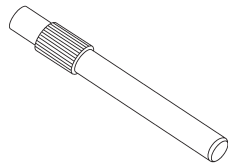
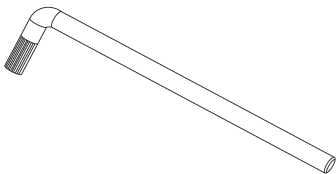
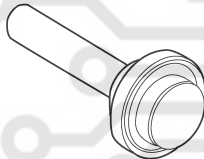
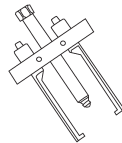
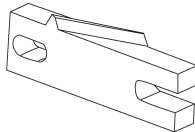
Gear Ratio Specifications

GEAR	RATIO
1st	3.546
2nd	2.048
3rd	1.346
4th	0.972
5th	0.816
Reverse	3.333
Final Drive Ratio	4.2

Special Tools

شرکت دیجیتال خودرو (مسئولیت محدود) اولین سامانه دیجیتال تعمیرکاران خودرو در ایران Bearing RemoverCH-10001	 besm080039
Flywheel FixtureCH-20009	 besm080040

GENERAL INFORMATION

Clutch Pressure Plate InstallerCH-20014	 besm080041
Spline SpannerCH-30001	 besm080042
Different Seal InstallerCH-30002	 besm080043
Gear RemoverCH-30003	 besm080044
Gear FixtureCH-30004	 besm080045

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 for 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 assembly of the transaxle could also cause 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 oil 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:

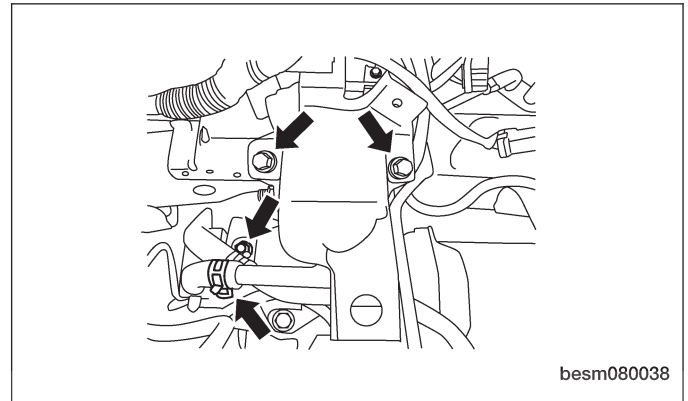
- Insufficient lubrication
- Incorrect lubricant
- Improperly assembled or damaged internal components

ON-VEHICLE SERVICE

Manual Transaxle

Removal & Installation

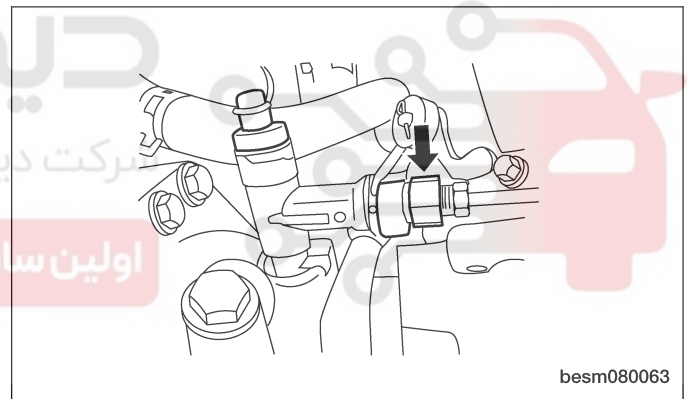
1. Raise and support the vehicle.
2. Remove the battery and battery tray (See Battery Removal & Installation in Section 05 Starting & Charging).
3. Remove the air cleaner and air duct assembly.
4. Remove the air cleaner base assembly.



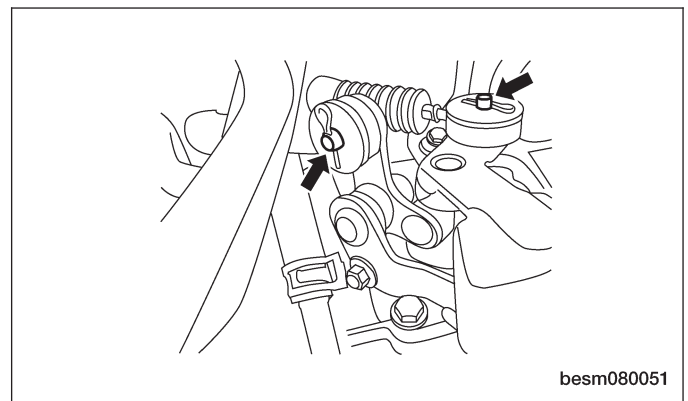
5. Disconnect the hydraulic line from the hydraulic clutch cylinder and position it aside.

CAUTION:

While hoses are disconnected, plug all openings to prevent foreign material from entering them.



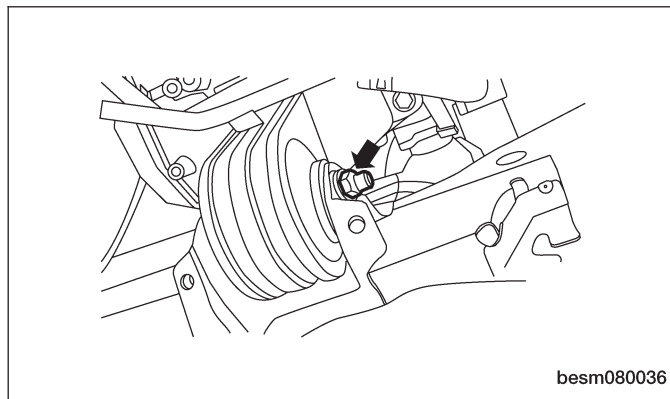
6. Remove the two shift cables from the transaxle.



7. Disconnect the electrical connectors for the reverse lamp switch and remove the ground straps.
8. Remove starter motor (See Starter Removal & Installation in Section 05 Starting & Charging).
9. Remove both front axle shafts (See Front Axle Shaft Removal & Installation in Section 09 Axle).
10. Raise the vehicle.
11. Remove the engine undercover and splash shields.

ON-VEHICLE SERVICE

12. Support the engine using an engine support fixture or suitable jack.
13. Disconnect the transaxle mounting insulator.
14. Remove the engine to transaxle bolts.
(Tighten: Engine to transaxle bolts to 80 N·m)



15. Separate the transaxle from the engine and remove the transaxle from the vehicle.

WARNING!

Support the transaxle while removing it using suitable jack.

16. Installation is in the reverse order of removal.

Installation Notes:

- When installing the transaxle, be careful to avoid interference between the transaxle input shaft and the clutch.
- After installation, check for oil leakage and proper oil level.

08

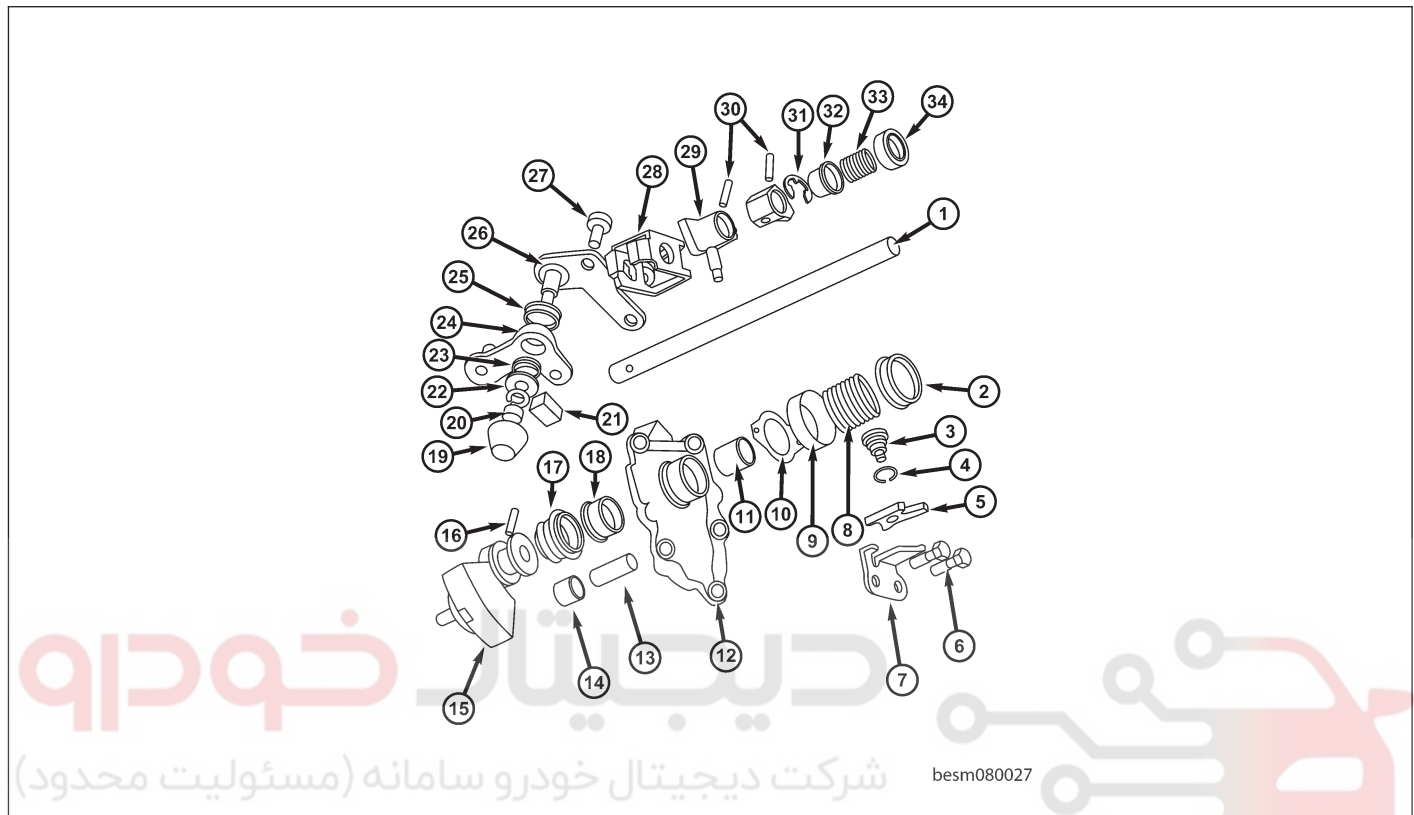
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

ON-VEHICLE SERVICE

Gear Selector & Shifter Assembly

Removal & Installation



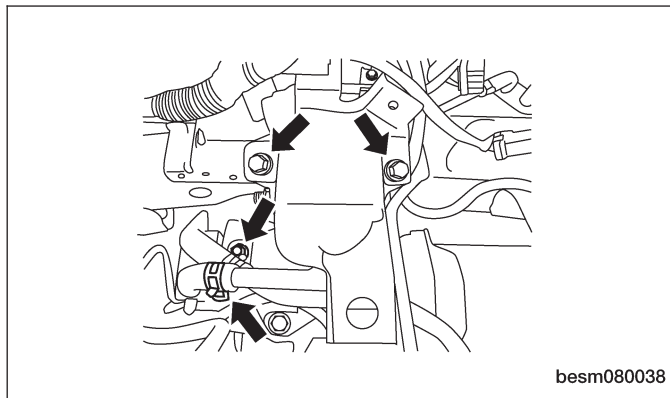
1 – Gear Selection & Shift Shaft
2 – Top Base For 5th-Reverse Return Spring
3 – Pin Shaft – Reverse Lock Mechanism
4 – Torsion Spring – Reverse Lock Mechanism
5 – Reverse Lock Plate
6 – Bolts Reverse Lock Mechanism
7 – Reverse Lock Plate Bracket
8 – 5th-Reverse Return Spring
9 – Bottom Base For 5th-Reverse Return Spring
10 – 5th-Reverse Return Spring Retainer
11 – Linear Bearing
12 – Gear Selection & Shift Mechanism Housing
13 – Air Duct
14 – Air Duct Cap
15 – Selector Lever Assembly
16 – Spring Pin
17 – Boot Gear Selection & Shift Shaft

18 – Oil Seal Gear Selection & Shift Shaft
19 – Sleeve – Selector Lever Nut
20 – Nut
21 – Slide Block – Selector Lever
22 – Large Gasket – Selector Lever
23 – Small Gasket – Selector Lever
24 – Selector Lever Assembly
25 – Boot Selector Lever
26 – Selector Lever Bracket Assembly
27 – Selector Lever Bracket Bolt
28 – Interlock Plate
29 – Shift Finger
30 – Spring Pins
31 – Split Baffle Ring 1st-2nd Return Spring Assembly
32 – Bottom Base For 1st-2nd Return Spring
33 – 1st-2nd Return Spring
34 – Top Base For 1st-2nd Return Spring

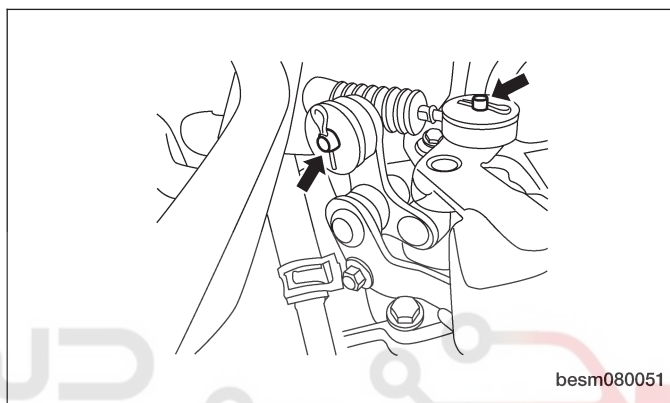
1. Raise and support the vehicle.
2. Disconnect the negative battery cable.
3. Remove the air cleaner and air duct assembly.

ON-VEHICLE SERVICE

4. Remove the air cleaner assembly base.

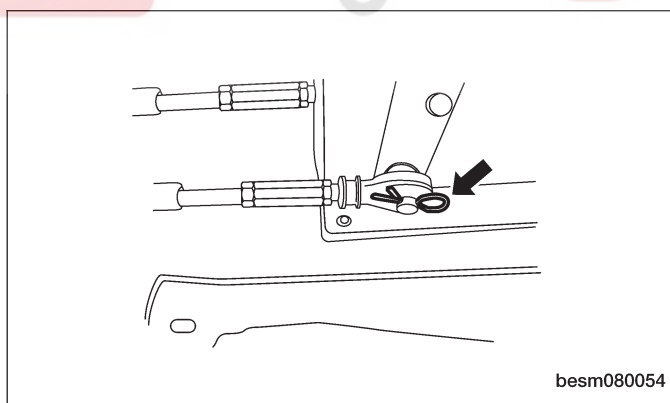


5. Remove the two shift cables from the transaxle.



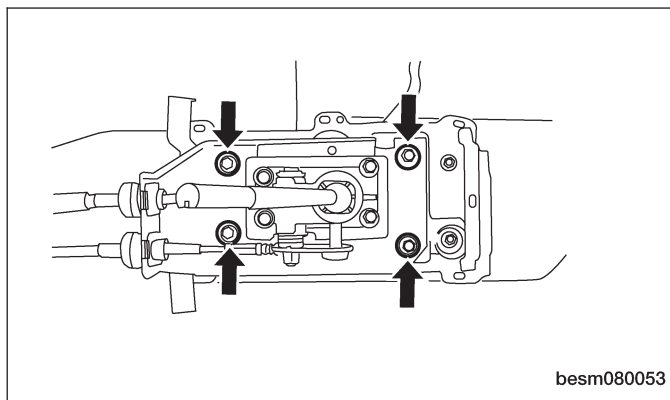
08

6. Remove the gearshift knob.
7. Remove the gearshift boot from the lower console.
8. Apply the parking brake (apply parking brake handle to clear lower console upon removal).
9. Remove the Lower Console (See Lower Console Removal & Installation in Section 15 Body).
10. Remove the crossover cable and the selector cable from the gearshift mechanism.



ON-VEHICLE SERVICE

11. Remove the four bolts and then remove the gear-shift mechanism from the bracket.



12. Installation is in the reverse order of removal.

دیجیتال خودرو

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TRANSAXLE UNIT REPAIR

Transaxle

Specifications

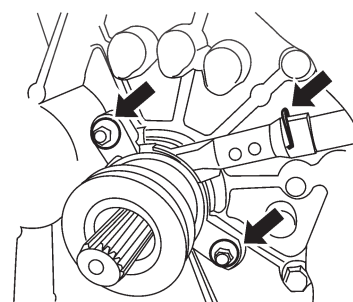
Torque Specifications

DESCRIPTION	TORQUE (N·m)
Differential Driven Gear Bolt	120 - 130
Drain Plug	30 - 35
Fork Shaft Seat	45 - 50
End Cover Bolt	18 - 23
Reverse Idler Shaft-to-Case Bolt	45 - 50
Reverse Fork Mechanism Bolt	22 - 26
Reverse Lamp Switch Assembly	18 - 23
Bearing Retainer Screw	15 - 20
5th Gear-to-Input Shaft Bolt	140 - 150
Release Bearing-to-Case Bolt	22 - 26
Gear Shift Mechanism Assembly Bolts	22 - 26
Reverse Lock Mechanism Bolt	15 - 22

08

Disassemble

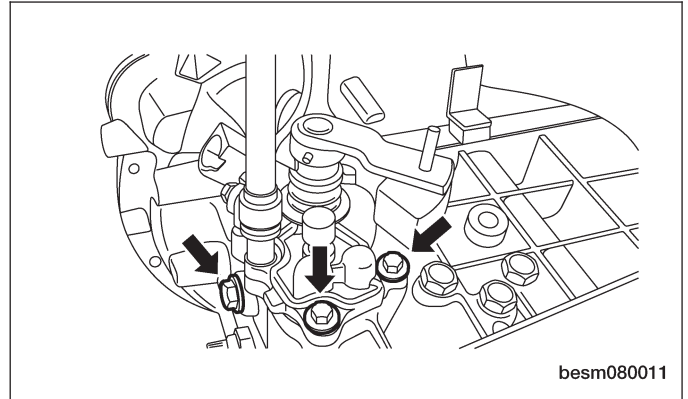
1. Place the transaxle on a work bench.
2. Remove the oil drain plug and drain the transaxle oil.
(Tighten: Drain Plug to 30 - 35 N·m)
3. Remove the clip from pipe.
4. Disconnect the hydraulic release bearing seat and the quick coupler for release bearing.
5. Remove 2 release bearing bolts and then the release bearing.
(Tighten: Release bearing bolts to 22 - 26 N·m)



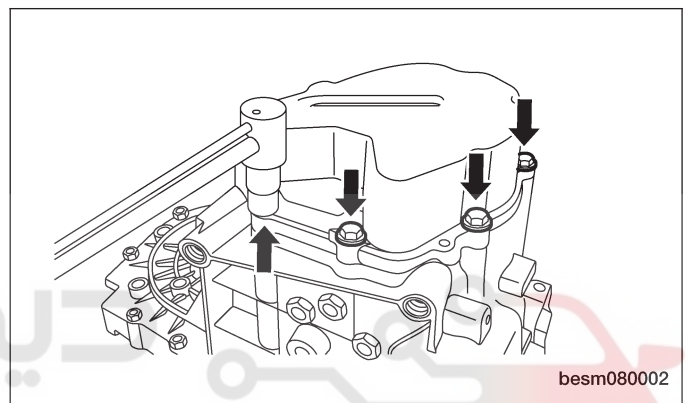
besm080001

TRANSAXLE UNIT REPAIR

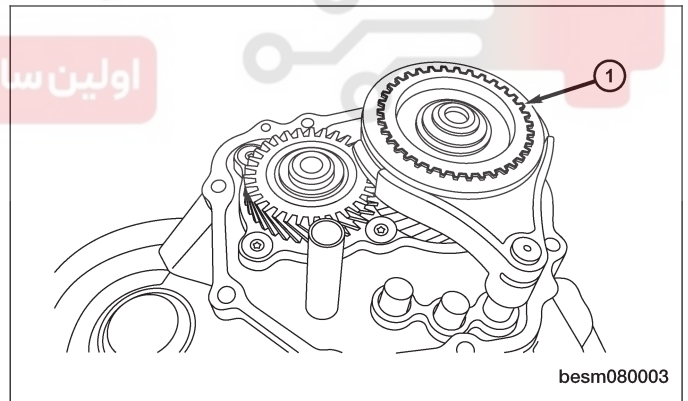
6. Remove the gearshift mechanism assembly bolts.
(Tighten: Gearshift mechanism assembly bolts to 22 - 26 N·m)



7. Remove the shift finger locating base.
8. Remove eight end cover retaining bolts and then the rear cover.
(Tighten: End cover retaining bolts to 18 - 23 N·m)

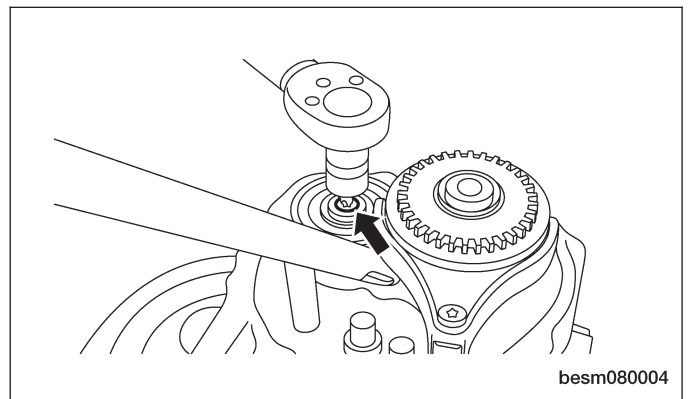


9. Remove the reverse synchronizer ring (1).



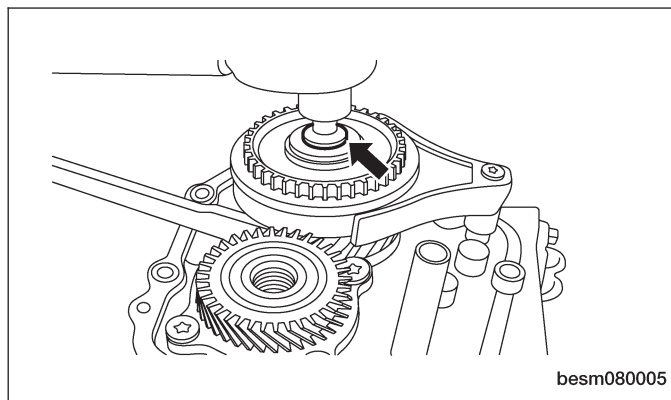
10. Place the shift fork in the 5th position and remove the 5th driven gear retaining bolt.

NOTE: Engage the 5th gear and put a thin copper bar (or any other low-hardness metal bar) between the 5th driving and driven gears, and then use a torque wrench to remove the nut for the 5th driven gear.

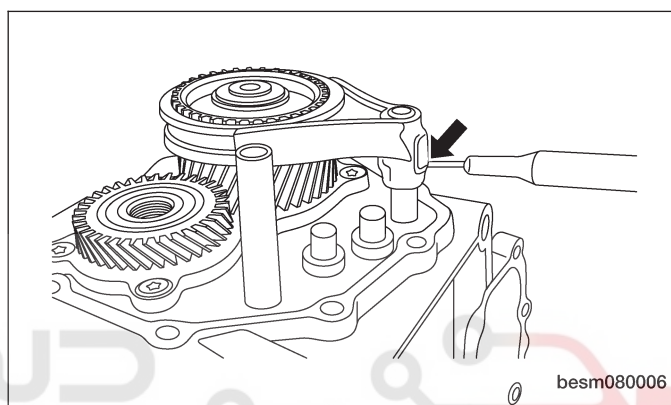


TRANSAXLE UNIT REPAIR

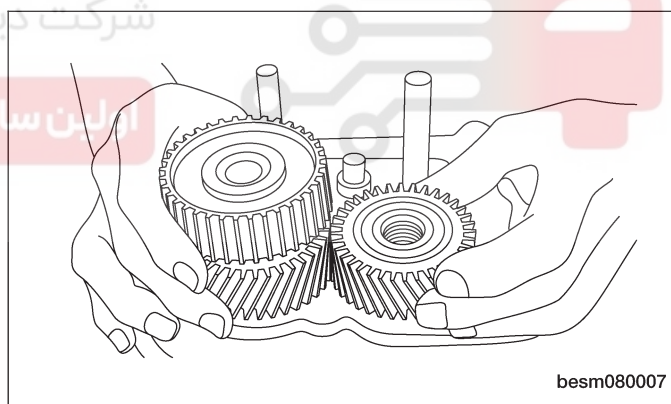
11. Remove the 5th driving gear retaining bolt.



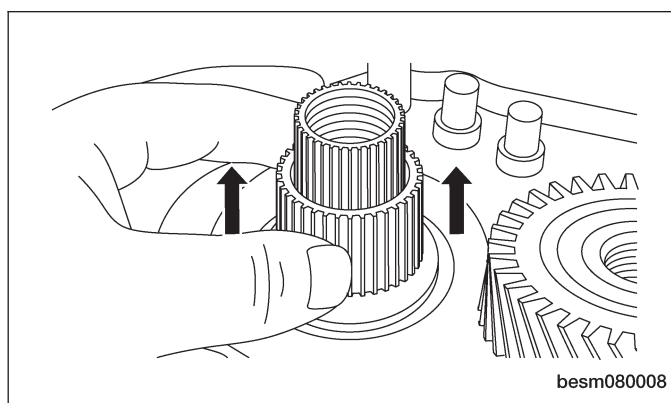
12. Remove the elastic lock pin with the punch and then take out the 5th & reverse shift fork.



13. Remove the 5th driving and driven gears.

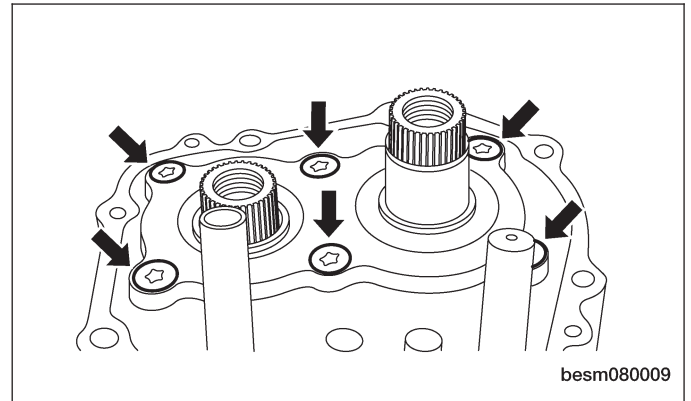


14. Remove the needle roller bearing.

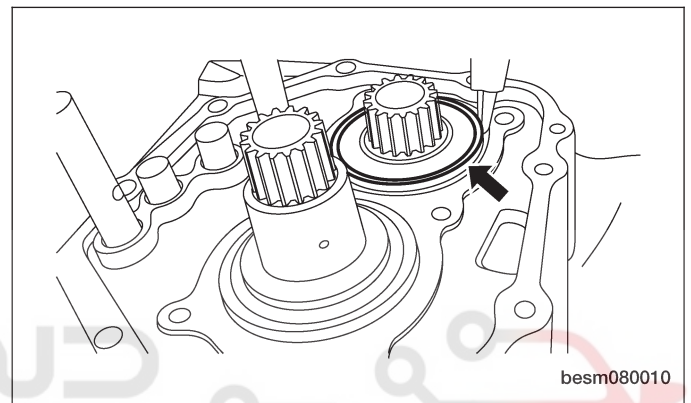


TRANSAXLE UNIT REPAIR

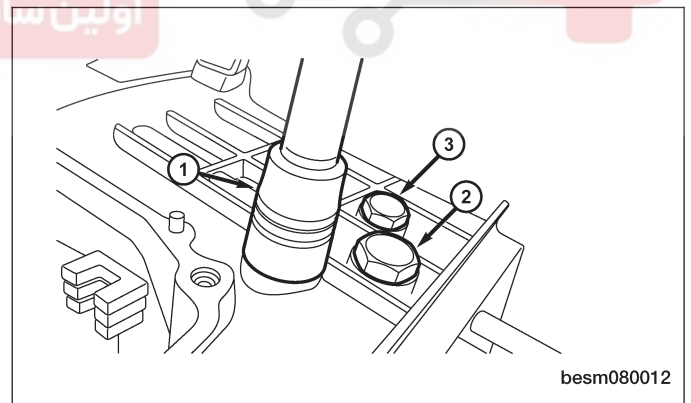
15. Remove the bearing retainer bolts and then remove the bearing retainer.



16. Remove the spring lock for the rear output shaft bearing by using a caliper.



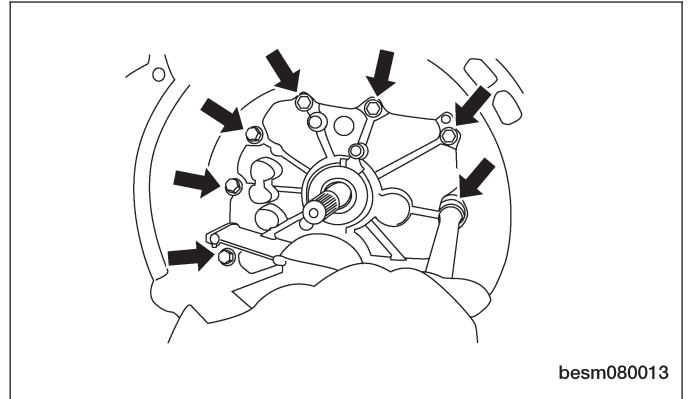
17. Remove the spring lock for the rear input shaft bearing.
18. Remove the backup lamp switch and then pull the control mechanism assembly out of the transaxle housing directly.
19. Remove the three retaining bolts as shown:
- (1) 5th/reverse shift fork locating base
 - (2) 1st/2nd shift fork locating base
 - (3) 3rd/4th shift fork locating base



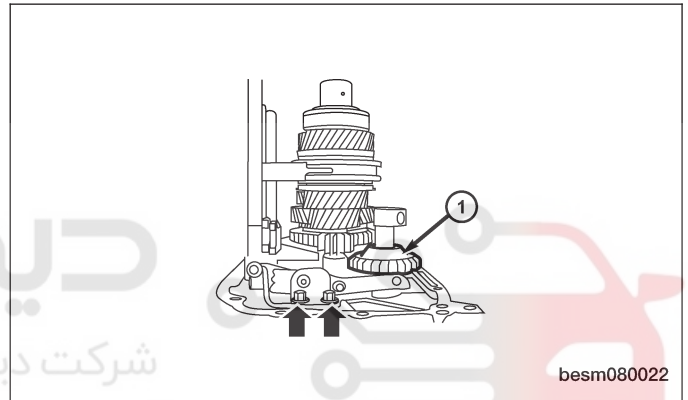
20. Remove the idler gear shaft retaining bolt.
21. Remove the transaxle housing bolts.

TRANSAXLE UNIT REPAIR

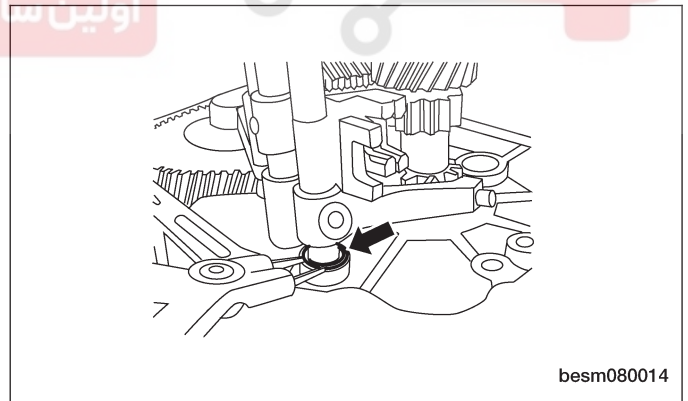
22. Remove the clutch housing bolts.



23. Use the copper bar to tap the input and output shafts and then remove the transaxle housing along with the 5th collar.
24. Remove the reverse idler gear assembly (1).
25. Remove the reverse shift fork mechanism assembly bolts and remove the reverse shift fork.



26. Remove the retainer ring with a caliper.



27. Grasp the input shaft assembly, output shaft assembly, 1st-2nd shift fork, 3rd-4th shift fork and 5th-reverse fork shaft together with hands and remove.
28. Remove the differential assembly.

Assemble

1. Assemble in the reverse order of disassembly.

TRANSAXLE UNIT REPAIR

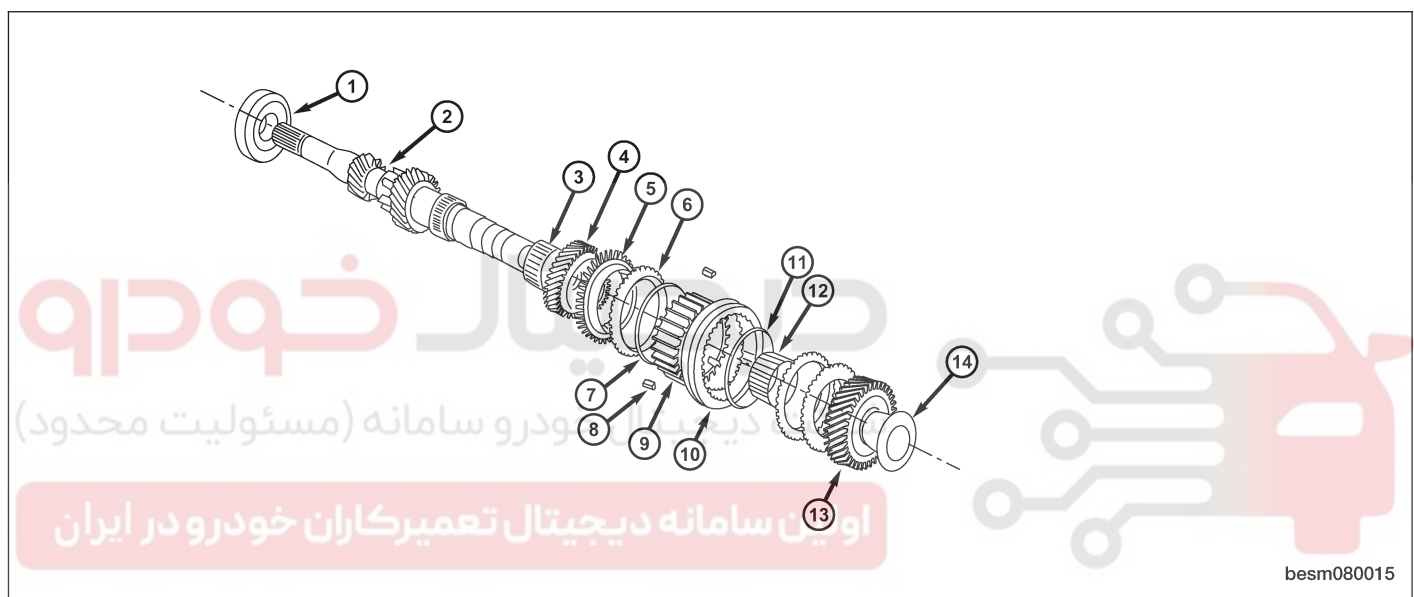
Input Shaft

Specifications

Clearance Specifications

SYNCHRONIZER RING	VALUE OF A	WEARING LIMIT
1st-2nd gear	1.10-1.17 mm	0.05 mm
3rd-4th gear	1.35-1.90 mm	0.05 mm
5th gear	1.10-1.17 mm	0.05 mm

Disassemble



1 – Front Input Shaft Bearing
2 – Input Shaft
3 – 3rd-5th Needle Roller Bearing
4 – 3rd Driving Gear
5 – 3rd-4th Synchronizer Cone
6 – Synchronizer Ring- 3rd-4th Synchronizer
7 – Steel Ring Spring For 3rd-4th Synchronizer

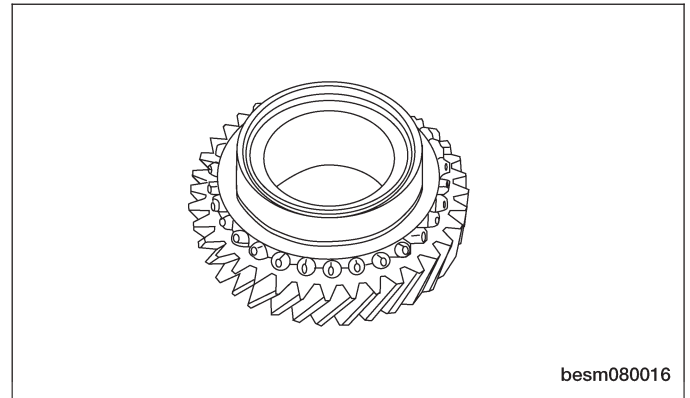
8 – Guide Block For 3rd-4th Synchronizer
9 – Gear Hub For 3rd-4th Synchronizer
10 – Gear Sleeve For 3rd-4th Synchronizer
11 – Steel Ring Spring For 3rd-4th Synchronizer
12 – 4th Gear Needle Roller Bearing
13 – 4th Driving Gear
14 – 3rd-4th Synchronizer Cone

1. Remove the 4th-collar using special tool.
2. Remove the 4th driving gear using special tool.
3. Remove 4th gear needle roller bearing.
4. Remove 3rd-4th synchronizer assembly.
5. Remove the 3rd driving gear using special tool.
6. Remove the input shaft bearing from the front end of input shaft.

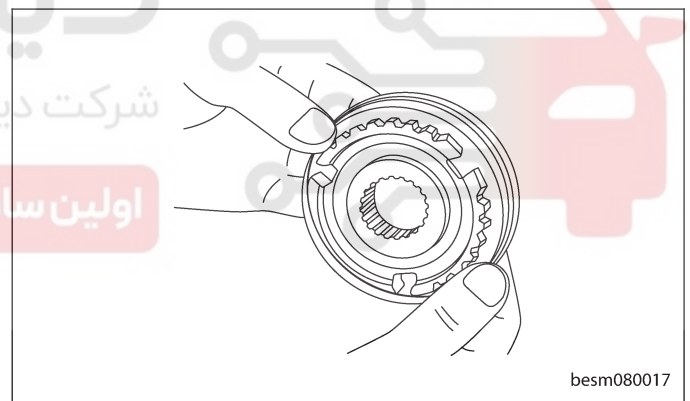
TRANSAXLE UNIT REPAIR

Inspection

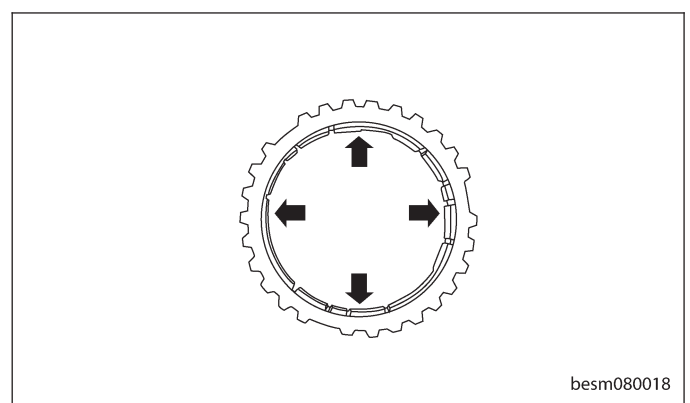
1. Clean all components.
2. Inspect the input shaft for the following:
 - Any damage, abnormal wear or lockup of the needle roller bearings.
 - Any damage or wear of the spline.
 - Correct gears for the transaxle assembly.
 - Smooth rotation of gears.
 - Any part looseness or noise.
3. Inspect the 3rd and 4th driving gears for the following:
 - Any damage or wear on tooth surfaces of helical gear and clutch gear.
 - Any damage, wear or coarsening on the synchronizer's conical surface.
 - Any damage or wear on the inner-diameter, front and rear surfaces.



4. Inspect the gear sleeve and gear hub of the 3rd-4th synchronizer:
 - Assemble the gear sleeve and gear hub together and check whether they can slide smoothly or whether they are locked up as shown.

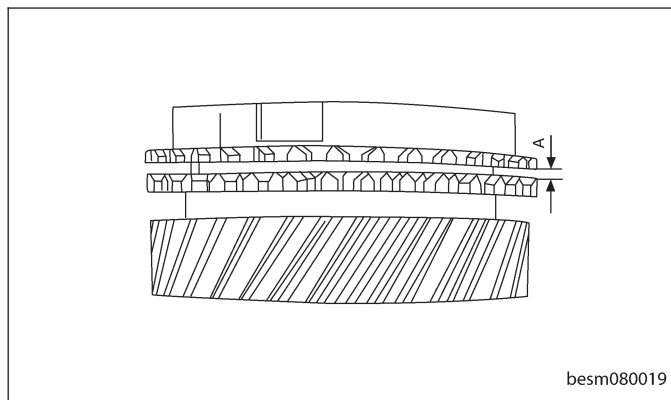


5. Disassemble the gear sleeve:
 - Inspect for any damage in the front and rear of the gear sleeve's inner surface.



TRANSAXLE UNIT REPAIR

6. Inspect for any damage or wear on the gear tooth surfaces of the synchronizer ring, whether there is any damage or wear on the inner-diameter surface of the synchronizer's conical portion, and whether the screw thread is damaged due to crushing.
7. Press the synchronizer rings onto their respective gears' conical surfaces and check the values of clearance "A". The standard values of "A" are as shown in the following table:



besm080019

SYNCHRONIZER RING CLEARANCE		
Synchronizer Ring	Value of "A"	Wearing Limit
1st-2nd gear	1.10-1.17 mm	0.05 mm
3rd-4th gear	1.35-1.90 mm	0.05 mm
5th gear	1.10-1.17 mm	0.05 mm

Assemble

1. Assemble in the reverse order of disassembly.

دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

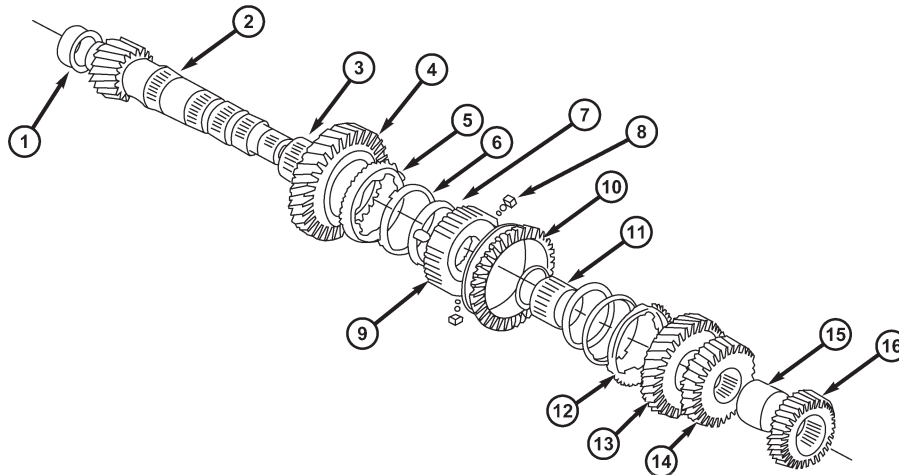
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



TRANSAXLE UNIT REPAIR

Output Shaft

Disassemble



besm080020

1 – Front Bearing Inner Race for Output Shaft

2 – Output Shaft

3 – 1st-2nd Needle Roller Bearing

4 – 1st Driven Gear

5 – 1st-2nd Synchronizer Cone Ring

6 – 1st-2nd Synchronizer Ring (Outer)

7 – 1st-2nd Synchronizer Ring (Inner)

8 – Guide Block for 1st-2nd Synchronizer

9 – Gear Hub - 1st-2nd Synchronizer

10 – Gear Sleeve - 1st-2nd Synchronizer

11 – 1st-2nd Needle Roller Bearing

12 – 1st-2nd Synchronizer Cone Ring

13 – 2nd Driven Gear

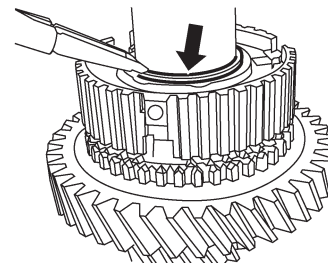
14 – 3rd Driven Gear

15 – 3rd-4th Driven Shaft Sleeve

16 – 4th Driven Gear

08

1. Use a puller to remove the rear output shaft bearing and the 4th driven gear.
2. Remove the 3rd-4th driven collar.
3. Remove the 3rd driven gear, 2nd driven gear, 1st/2nd synchronizer cone ring, out synchronizer ring, inner synchronizer ring and 2nd needle roller bearing.
4. Use snap-ring pliers to remove the snap ring for 1st-2nd synchronizer gear hub as shown.



besm080021

5. Remove the 1st-2nd synchronizer assembly and remove the 1st driven gear and 1st needle roller bearing.
6. Remove the front output shaft inner bearing from the front end of output shaft.

TRANSAXLE UNIT REPAIR

Inspection

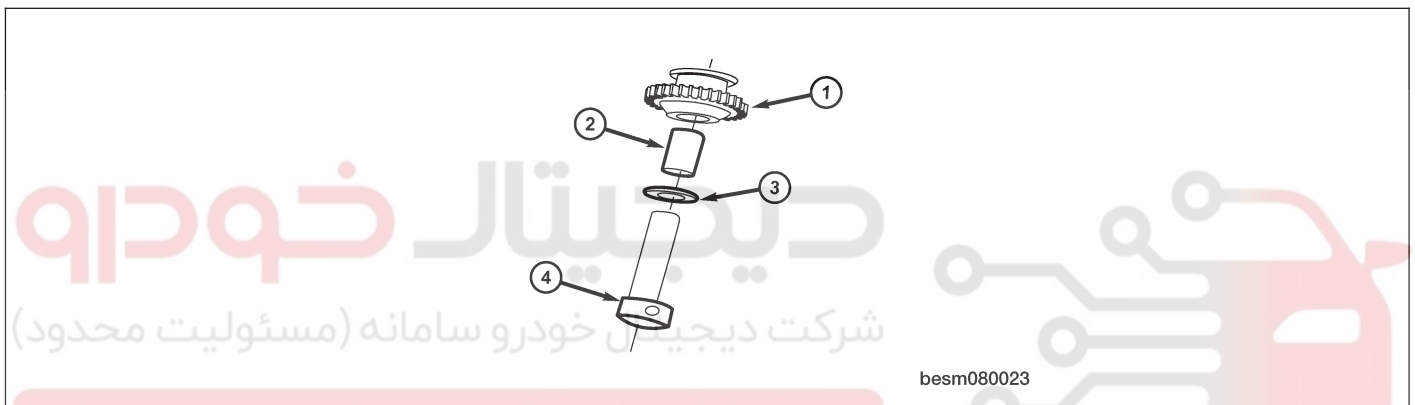
1. Clean all components.
2. Inspect the following components for wear:
 - Output shaft
 - Needle roller bearing
 - 1st driven gear
 - 2nd driven gear
 - 1st-2nd synchronizer gear sleeve and hub
 - Outer synchronizer ring, inner synchronizer ring and synchronizer cone ring
 - Damage on the tooth surfaces and conical surfaces

Assemble

1. Assemble in the reverse order of disassembly.

Idler Gear

Disassemble



1 – Reverse Idler Gear

2 – Idler Gear Gasket

3 – Bushing - Reverse Idler Gear

4 – Idler Gear Shaft

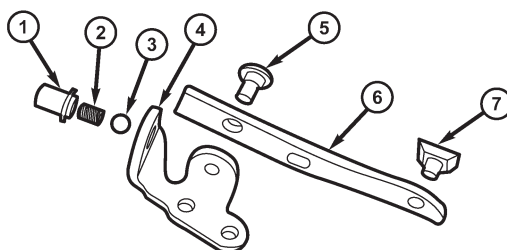
Assemble

1. Assemble in the reverse order of disassembly.

TRANSAXLE UNIT REPAIR

Reverse Shift Fork

Disassemble



besm080024

1 – Housing for Reverse Locating Base

2 – Spring for Reverse Locating Base

3 – Ball for Reverse Locating Base

4 – Reverse Shift Arm Bracket

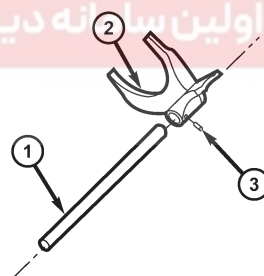
5 – Pin Shaft - Reverse Shift Arm Bracket

6 – Reverse Shift Arm

7 – Drive Pin - Idler Gear

1st-2nd Shift Fork

Disassemble



besm080025

1 – 1st-2nd Shift Fork

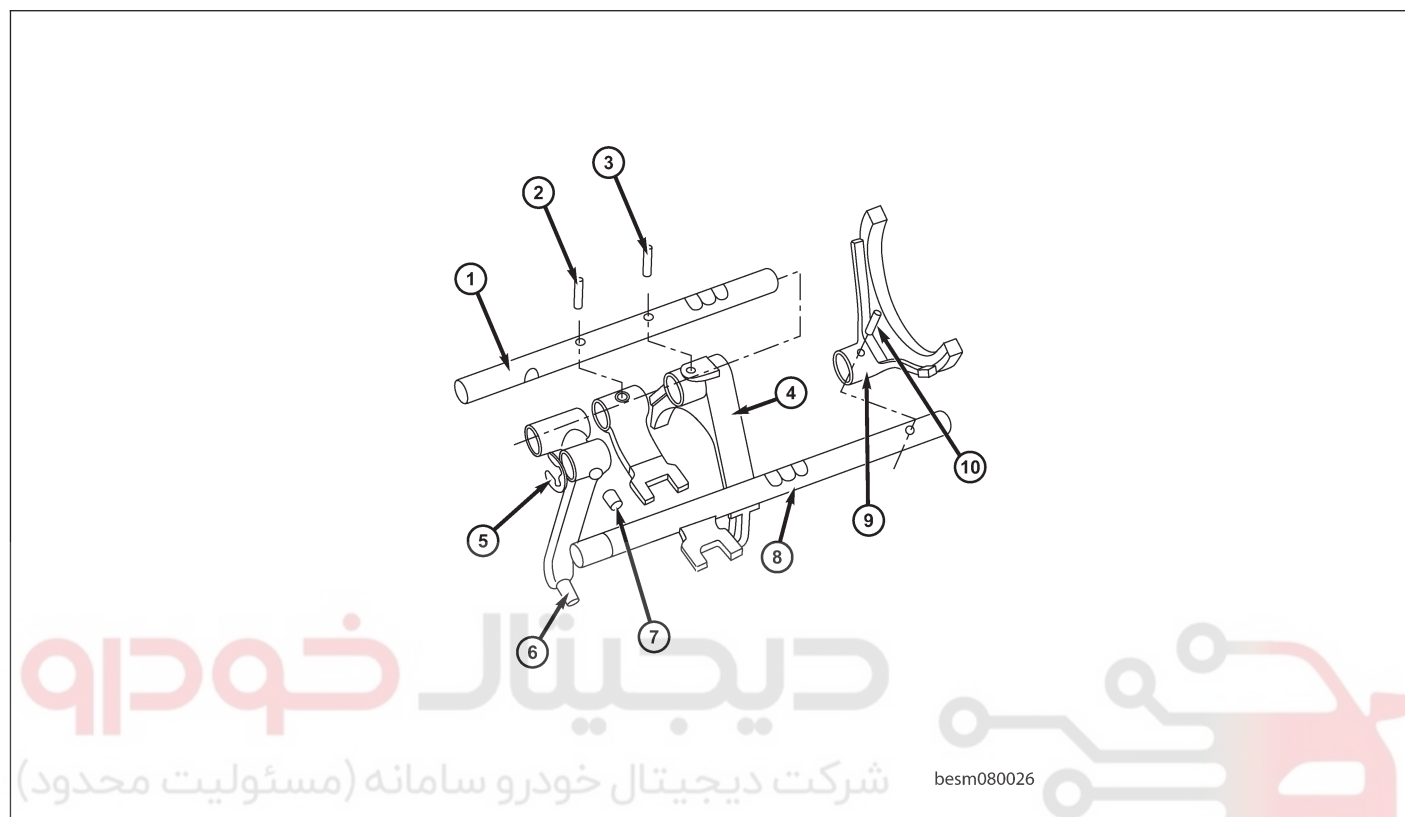
2 – 1st-2nd Fork Shaft

3 – Spring Pin

TRANSAXLE UNIT REPAIR

3rd, 4th, 5th & Reverse Fork Shaft

Disassemble



1 – 3rd-4th Fork Shaft	6 – Reverse Pin
2 – Spring Pin	7 – Interlock Pin
3 – Spring Pin	8 – 5th-Reverse Fork Shaft
4 – 3rd-4th Shift Fork	9 – 5th-Reverse Shift Fork
5 – Split Baffle Ring	10 – Spring Pin for Fork Shaft

DIFFERENTIAL

GENERAL INFORMATION

Description
Operation
Specifications
Special Tools

08-132
08-132
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08-133

DIFFERENTIAL UNIT REPAIR

Differential Carrier

Removal & Installation
Disassemble
Inspection
Assemble

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08-134
08-134
08-134
08-134
08-135

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



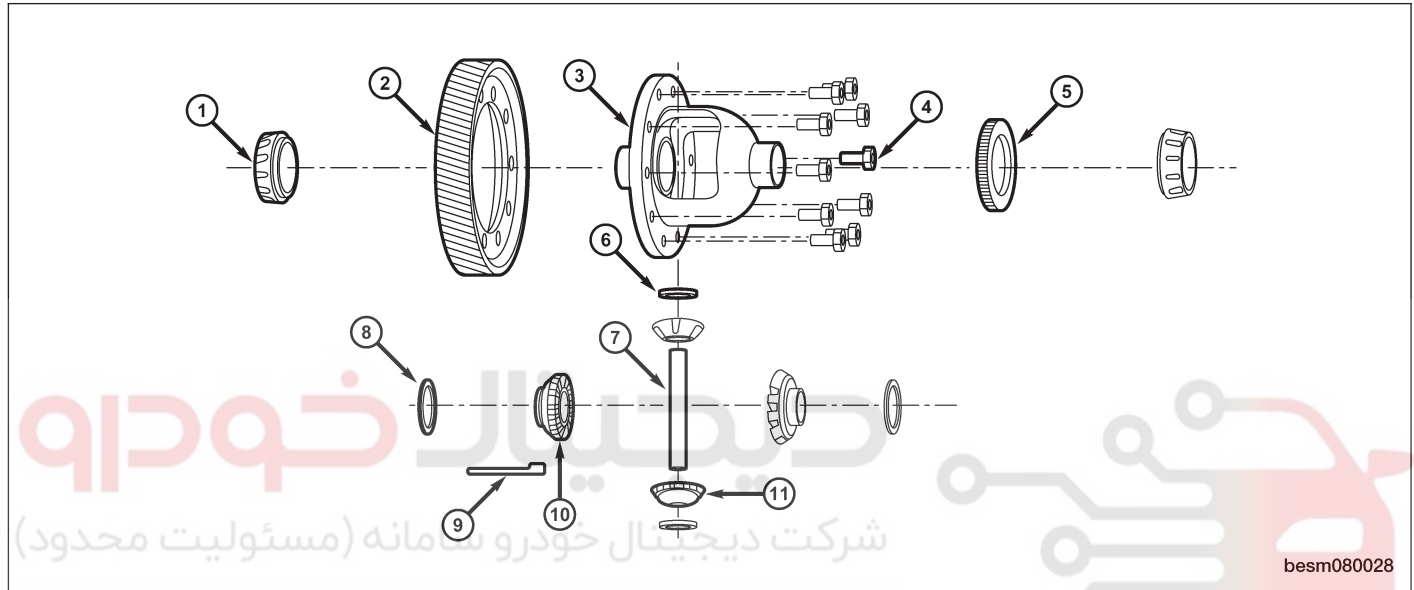
GENERAL INFORMATION

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 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 halfshafts



besm080028

1 – Front/Rear Differential Bearing	7 – Planetary Gear Shaft
2 – Final Drive Driven Gear	8 – Adjusting Washer - Side Gear
3 – Differential Housing	9 – Fixing Pin - Planetary Gear
4 – Bolts - Final Drive Driven Gear and Differential Housing	10 – Side Gear
5 – Driving Gear - Odometer	11 – Planetary Gear
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

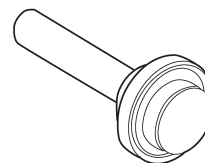
Clearance Specifications

Clearance between side gear and planetary gear	0.025 - 0.150 mm
Adjusting washer	0.93 - 1.00 mm

GENERAL INFORMATION

Special Tools

Differential Seal InstallerCH-30002



besm080043

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



08

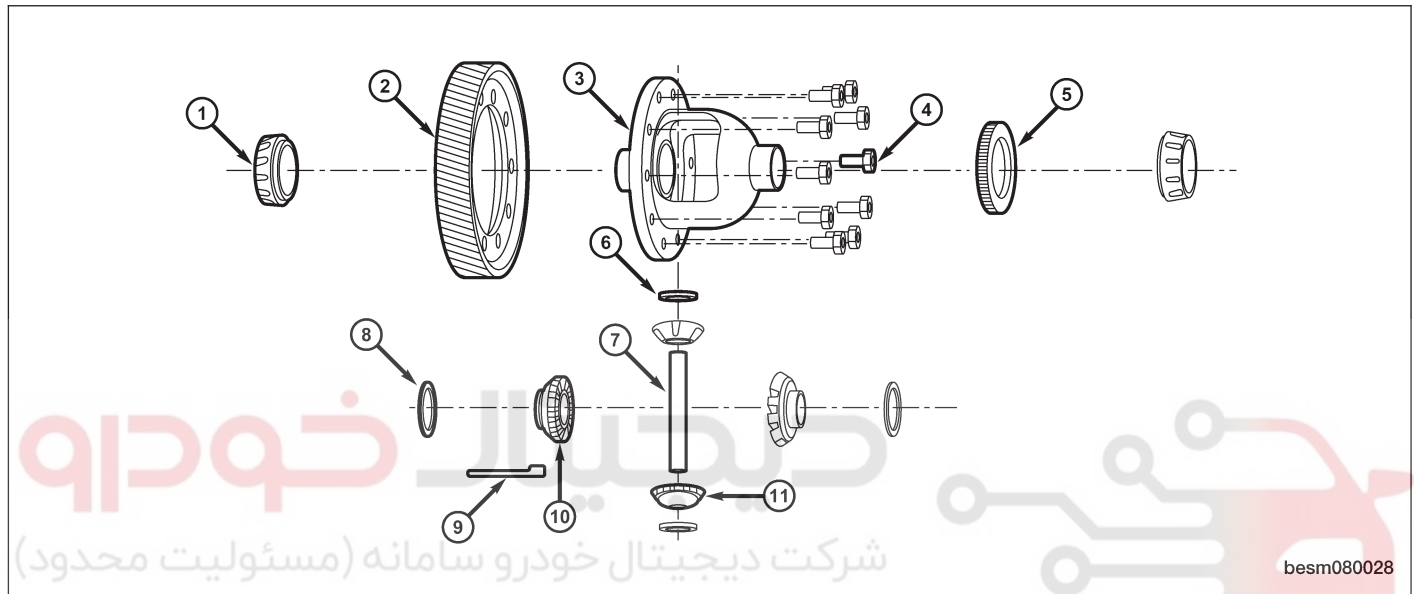
DIFFERENTIAL UNIT REPAIR

Differential Carrier

Removal & Installation

1. Remove the input shaft assembly, 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 differential assembly.

Disassemble



besm080028

1 – Front/Rear Differential Bearing

2 – Final Drive Driven Gear

3 – Differential Housing

4 – Bolts - Final Drive Driven Gear and Differential Housing

5 – Driving Gear - Odometer

6 – Spherical Washer Planetary Gear

7 – Planetary Gear Shaft

8 – Adjusting Washer - Side Gear

9 – Fixing Pin - Planetary Gear

10 – Side Gear

11 – Planetary Gear

1. Remove the drive gear bolts.
2. Tap the drive gear off the differential case assembly using a suitable tool.
3. Remove the pinion mate shaft.
4. 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

DIFFERENTIAL UNIT REPAIR

Assemble

Installation of the adjusting washers, side gears, spherical washers, planetary gears and the planetary gear shaft:

- Install the adjusting washers respectively on the backs of the side gears and put the side gears in place within the differential.

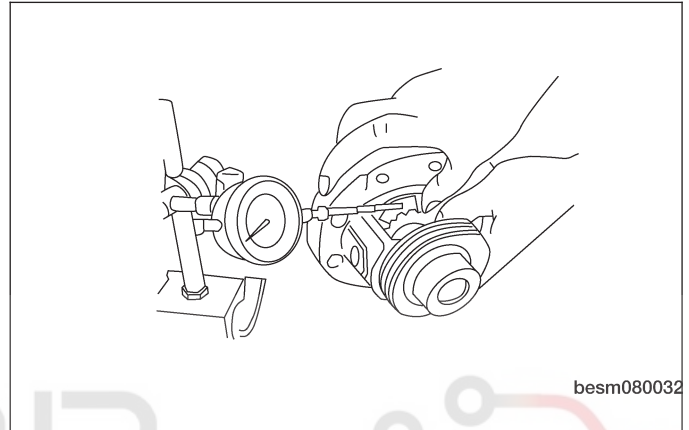
NOTE :

The adjusting washer for any new side gear should be the appropriate thickness (0.93-1.00 mm).

- Engage two planetary gears with side gears behind the spherical washers on the backs of the planetary gears (rotate the gears for proper alignment).
- Insert the planetary gear shaft.
- Measure the clearances between side gear and planetary gear.

NOTE :

Standard value: 0.025-0.150 mm



08

DIFFERENTIAL SIDE GEAR CLEARANCE	
Standard	0.025-0.150 mm
Adjusting Washer	0.93 - 1.00 mm

- If any measured clearance is not within specifications, select and install the appropriate adjusting washer(s) and then measure the clearances again.

NOTE :

Adjust the side clearance equally on both sides.

CLUTCH SYSTEM

GENERAL INFORMATION

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CLUTCH ASSEMBLY SERVICE

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دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

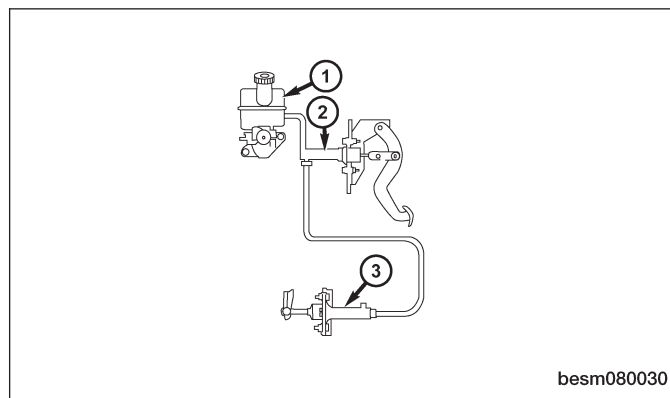
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



GENERAL INFORMATION

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 via the clutch master cylinder reservoir (1).



Operation

The clutch hydraulic 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)
Slave Cylinder Bolts	14 - 19
Clutch Pressure Plate Bolts	25
Flywheel Bolts (manual transaxle)	75

Special Tools

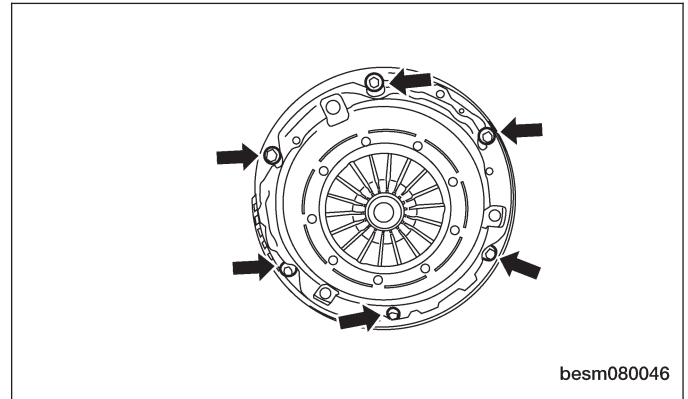
Clutch Pressure Plate InstallerCH-20014	besm080041
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CLUTCH ASSEMBLY SERVICE

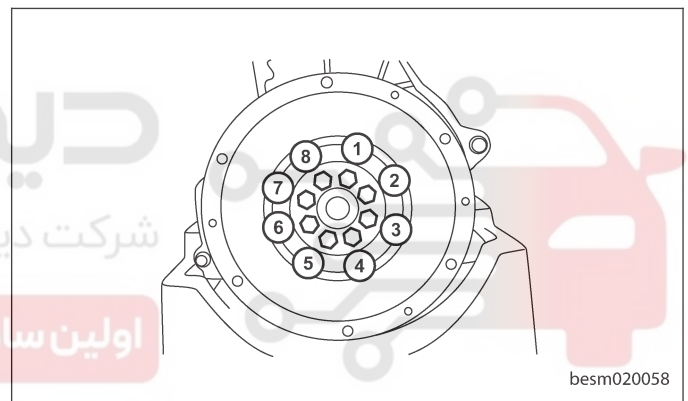
Clutch and Pressure Plate

Removal & Installation

1. Remove the transaxle assembly (See Transaxle Assembly Removal & Installation in Section 08 Transaxle).
2. Remove the clutch pressure plate bolts.
(Tighten: Clutch pressure plate bolts to 25 N·m)
3. Remove the modular clutch assembly.



4. Remove the flywheel-to-crankshaft bolts (1)-(8) and remove flywheel assembly (if necessary for resurfacing).
(Tighten: Flywheel-to-crankshaft bolts to 75 N·m)

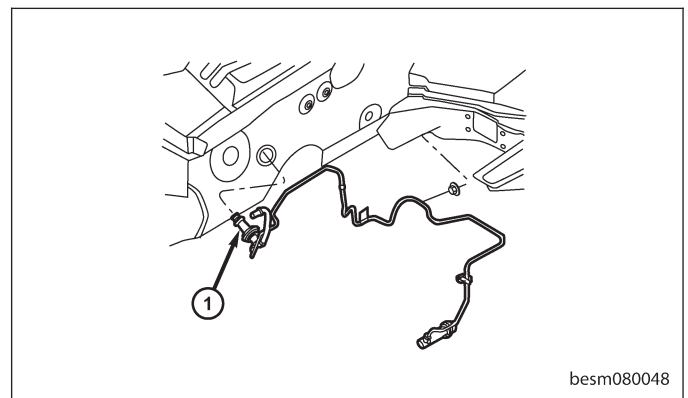


5. Installation is in the reverse order of removal.

Clutch Master Cylinder – RHD

Description

The clutch master cylinder (1) mounts to the clutch pedal and consists of a piston and cylinder housing, an actuating push rod, and an interconnecting hydraulic tube.



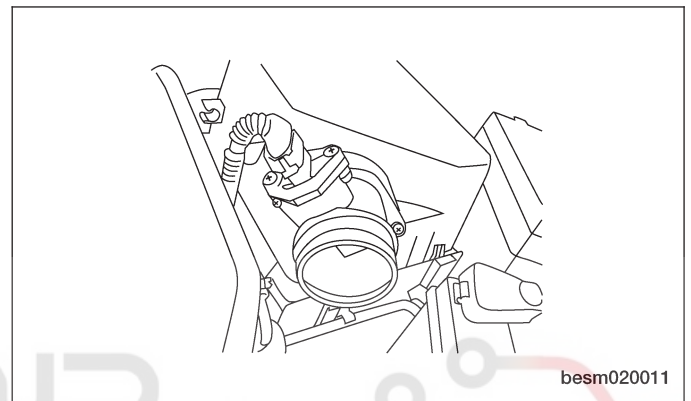
CLUTCH ASSEMBLY SERVICE

Operation

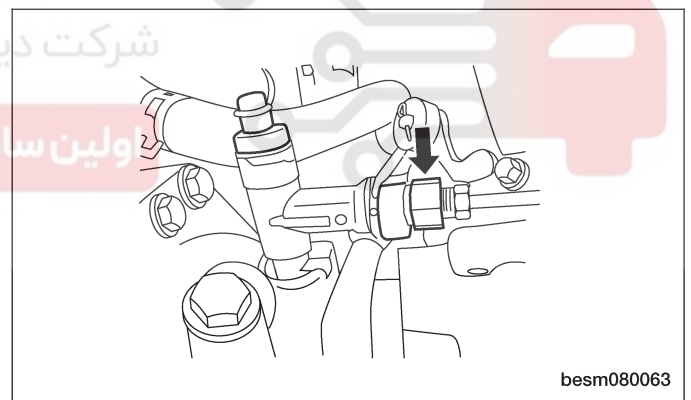
When the clutch pedal is depressed, the push rod moves the piston in the master cylinder, displacing fluid through the hydraulic line and into the release bearing. As the release bearing extends, it is forced into the fingers of the clutch diaphragm springs. As the fingers move, they release the clamping 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.

Removal & Installation

1. Remove the engine cover.
2. Remove air cleaner assembly.



3. Disconnect the hydraulic tube and drain the fluid into a suitable container.



4. Remove the instrument panel bezel.
5. Disconnect the clutch master cylinder push-rod from the clutch pedal.
6. Remove the hydraulic tube from the rail retainer.
7. Release the master cylinder by rotating to disengage from the pedal bracket assembly.

CAUTION:

Use care when removing the clutch master cylinder from the engine compartment. Aggressive handling can result in a damaged hydraulic tube 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.

8. Remove the master cylinder assembly from the mounting position and carefully maneuver the hydraulic pipe from the engine compartment.

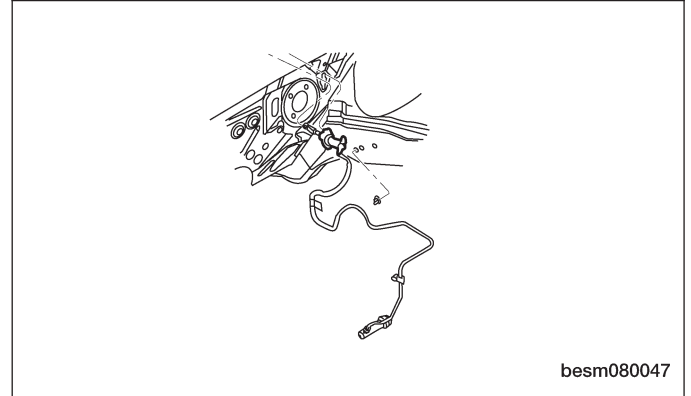
CLUTCH ASSEMBLY SERVICE

9. Installation is in the reverse order of removal.

Clutch Master Cylinder – LHD

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 tube. Fluid is supplied to the clutch master cylinder via the brake fluid reservoir.

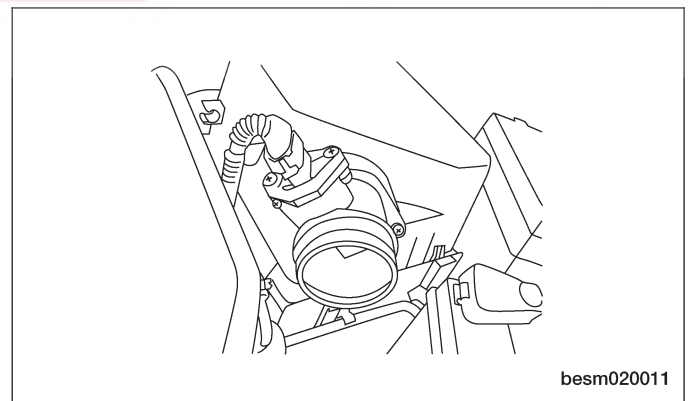


Operation

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. As the release bearing extends it is forced into the fingers of the clutch diaphragm springs. 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

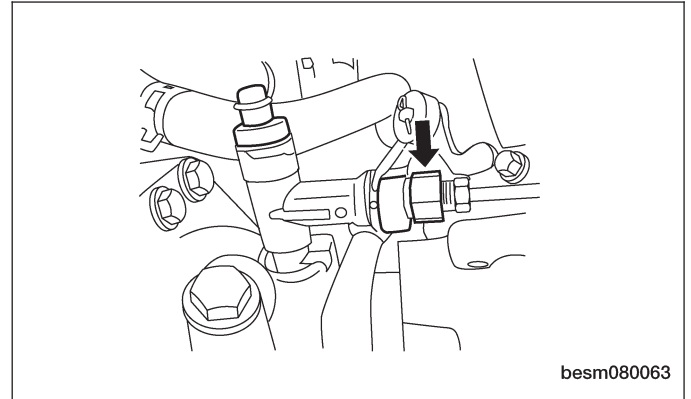
1. Remove the engine cover.
2. Remove air cleaner assembly.



3. Disconnect hydraulic supply tube to clutch master cylinder. To completely drain clutch master cylinder and tubing.

CLUTCH ASSEMBLY SERVICE

4. Disconnect hydraulic tube and drain fluid into suitable container.



5. Remove instrument panel bezel.
6. Disconnect clutch master cylinder push-rod from clutch pedal.
7. Remove hydraulic tube from rail retainer.
8. 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 tube 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.

9. Remove the master cylinder assembly from the mounting position and carefully maneuver the hydraulic pipe from the engine compartment.
10. Installation is in the reverse order of removal.

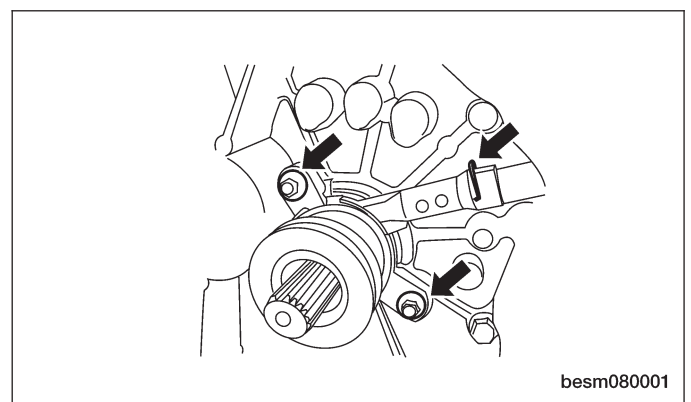
Clutch Slave Cylinder

Removal & Installation

NOTE :

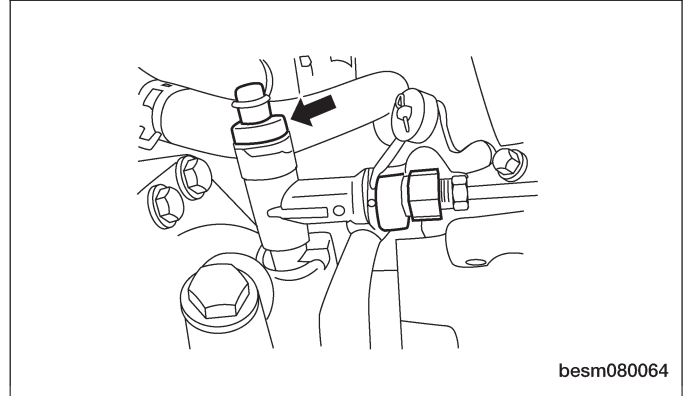
To prevent the drainage of the clutch master cylinder assembly when replacing the slave cylinder, it is necessary to make sure the brake master cylinder fluid level is full and the reservoir cap is installed tightly.

1. Remove the transaxle assembly (See Transaxle Assembly Removal & Installation in Section 08 Transaxle).
2. Remove the slave cylinder-to-clutch housing bolts and remove the slave cylinder from the transaxle.
3. Installation is in the reverse order of removal.



CLUTCH ASSEMBLY SERVICE**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 (4) to monitor and divert fluid into a suitable container.
4. Open the bleed circuit by turning the thumb screw counter clockwise this will start the air purge and fluid fill process.



5. Lower the vehicle, but only enough to gain access to and fill the brake master cylinder.

NOTE :

Do not allow clutch master cylinder to on dry while fluid exits bleed port.

6. Top off the brake master cylinder fluid level while air is purged and fluid drains from the bleed port. Continue this until no air bubbles are seen and a solid column of fluid exists.
7. Close the hydraulic bleed circuit, remove the drain hose and replace the dust cap on bleed port.
8. From the driver's seat, actuate the clutch pedal 60-100 times.
9. Apply the parking brake. Start the engine and verify the clutch operation and pedal feel. If the pedal feels fine and the clutch operates as designed, stop here. If the pedal still feels spongy or the clutch does not fully dis-engage, excessive air is still trapped within the system, most likely at the master cylinder.
10. Top off the brake master cylinder fluid level with DOT 4 brake fluid as necessary.