QR025CHC

GENERAL INFORMATION

Description

Introduction

Continuously Variable Transmission (CVT) is widely used in mid-class to high-class vehicles all over the world due to its good shifting performance. CVT can not only realize the best matching between the drive train and engine operating condition within a fairly wide speed ratio range, but also improve the fuel economy of vehicle. At the same time, it also improves the combustion process and reduces exhaust emissions. CVT has adopted a large number of new technologies to further realize energy conservation and emission reduction:

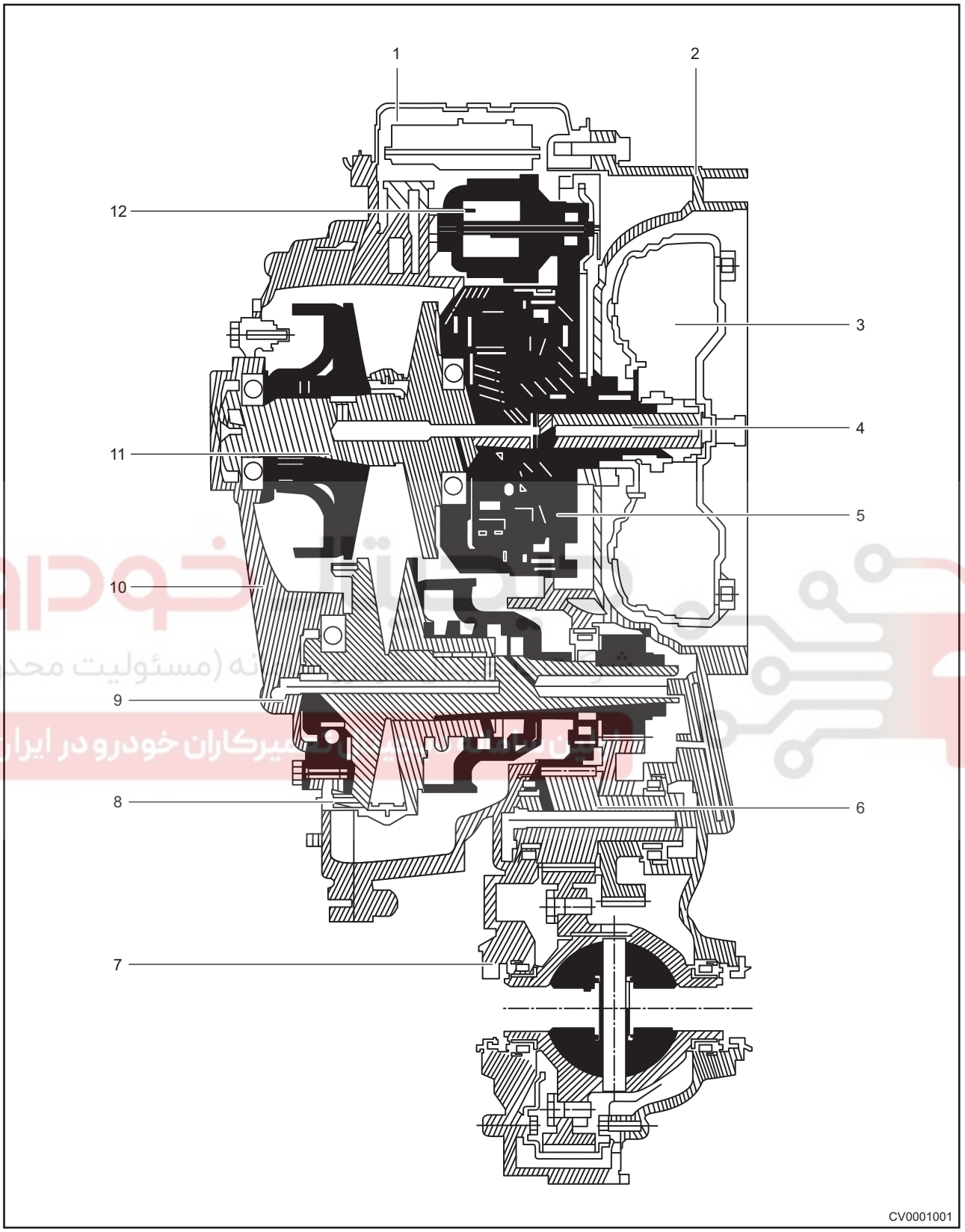
1. It adapts advanced double-acting vane pump with high volumetric efficiency and low leakage, which is built in flow control valve, reducing power loss
2. Independent hydraulic circuit control is adopted to provide accurate operating pressure for each system, greatly improving system efficiency.
3. Latest imported steel belt is adopted to further increase the speed ratio range and improve transmission efficiency. Especially work efficiency at OD speed ratio and LOW speed ratio is significantly improved.
4. Hydraulic torque converter adopts high heat capacity lockup clutch with low-speed slip differential lock function and integrates high-performance shock absorbers, which can realize good performance for low-speed power and economy.

Basic Principle

CVT realizes stepless speed change by continuously changing the contact diameter between the drive and driven conical pressure plates and the steel belt. Operation is as follows:

1. Transmission Control Unit (TCU) sends command signals to the five solenoid valves in hydraulic system according to the requirements under the vehicle driving conditions (vehicle speed, load, engine speed, etc.).
2. The solenoid valve continuously adjusts the operating state according to the commands from TCU. The combination of five solenoid valves in different operating states enables the flow direction and pressure of the hydraulic oil to be adjusted and changed in time, and precisely controls the action of hydraulic actuators (e.g. cylinders, pistons, Spool Valves, etc.).
3. When the piston cavity pressure of hydraulic drive and driven conical pressure plate is continuously changed, the conical pressure plate generates corresponding axial movement according to the pressure changes, thereby changing the rotating radius of the steel belt, realizing continuous change of the transmission speed ratio and achieving the purpose of stepless speed change.

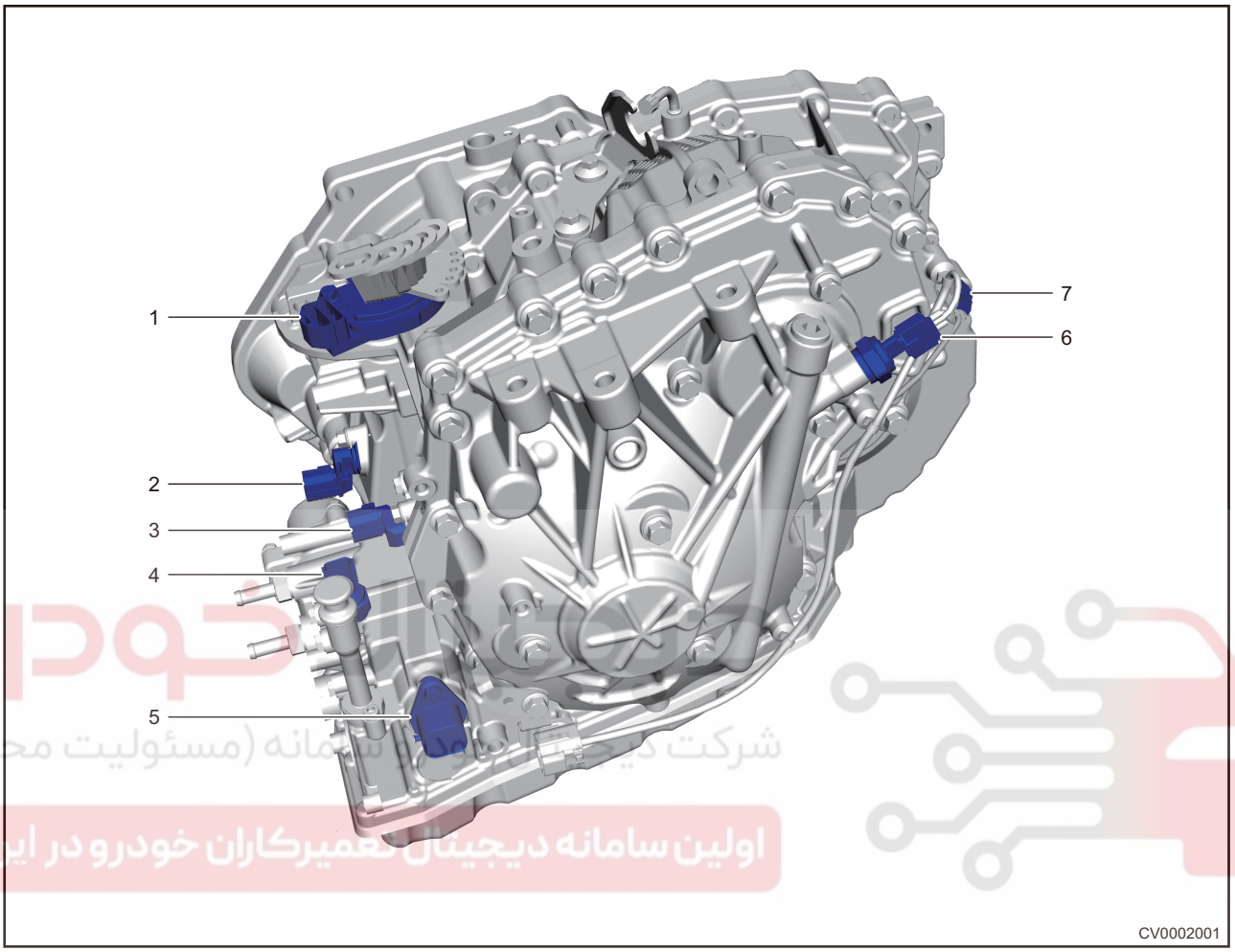
Transmission Internal Construction



1 - Transmission Case Assembly	2 - Torque Converter Case Assembly
3 - Hydraulic Torque Converter Assembly	4 - Input Shaft Assembly
5 - Forward Clutch Assembly	6 - Output Shaft Assembly
7 - Differential Assembly	8 - Steel Belt

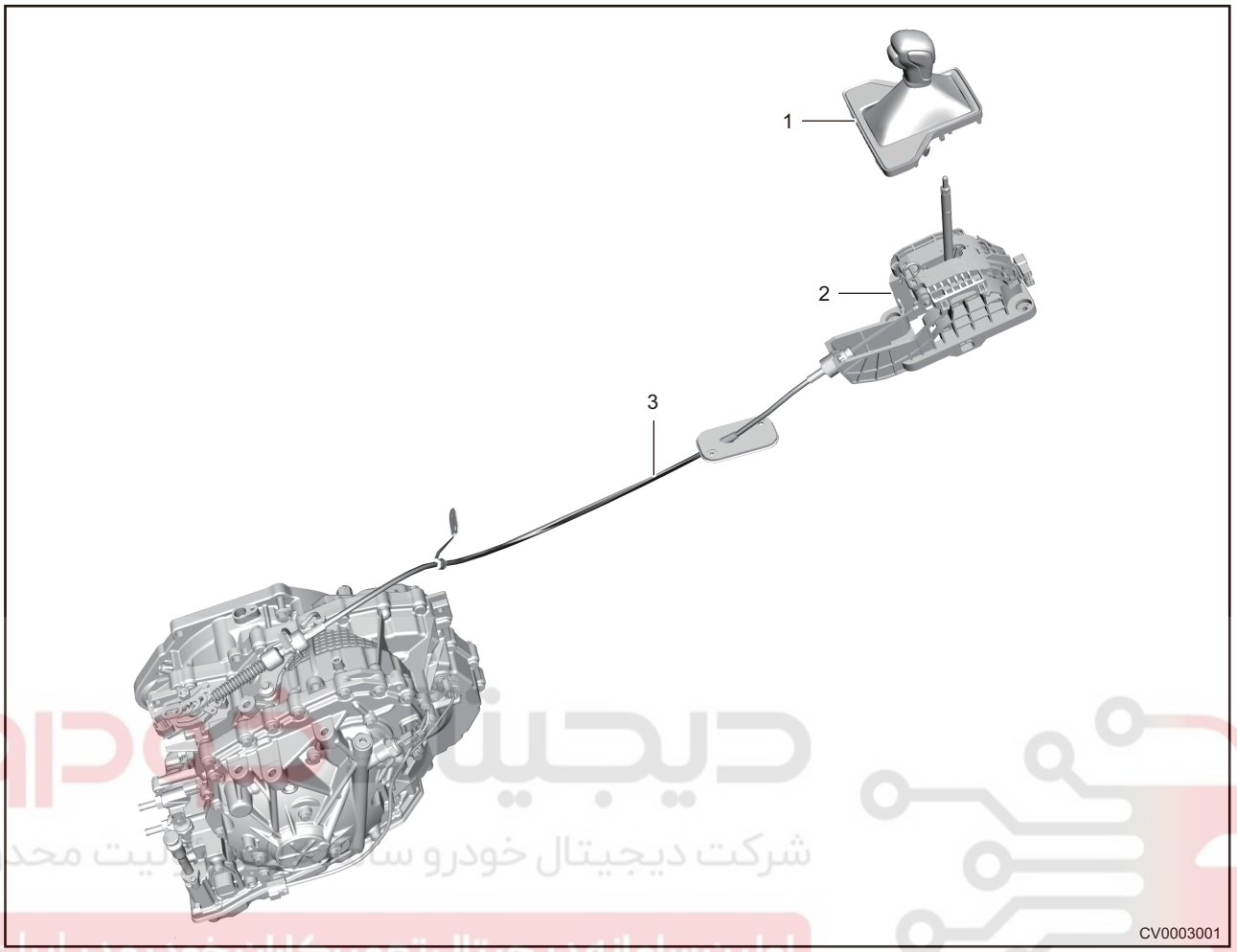
9 - Output Pulley Shaft Assembly	10 - Rear Case Assembly
11 - Input Pulley Shaft Assembly	12 - Oil Pump Assembly

Electronic Components



1 - Gear Switch	2 - Speed Sensor (Input Shaft)
3 - Speed Sensor (Input Pulley Shaft)	4 - Oil Pressure Sensor (1st Shaft)
5 - Wire Harness Connector	6 - Oil Pressure Sensor (2nd Shaft)
7 - Speed Sensor (Output Shaft)	

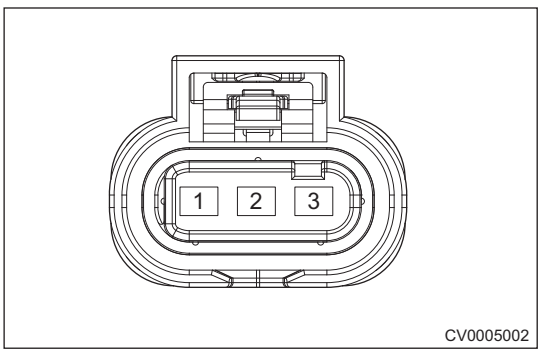
Shift Control Mechanism



1 - Automatic Shift Lever and Boot Assembly	2 - Shift Control Mechanism
3 - Shift Cable	

Speed Sensor

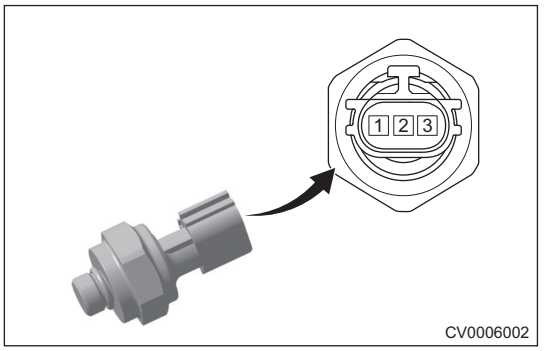
PIN	Definition
1	Ground
2	Signal
3	Power Supply



The speed sensor of CVT25 continuously variable transmission uses two models, a total of three speed sensors.

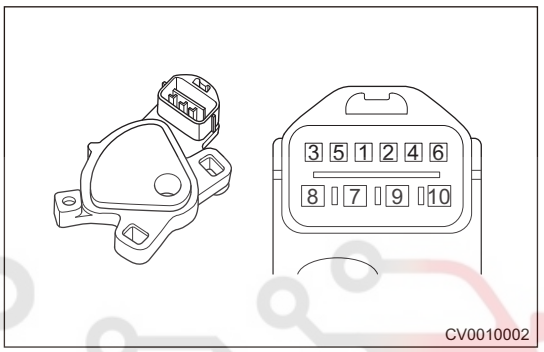
Oil Pressure Sensor

PIN	Definition
1	Ground
2	Signal
3	Power Supply

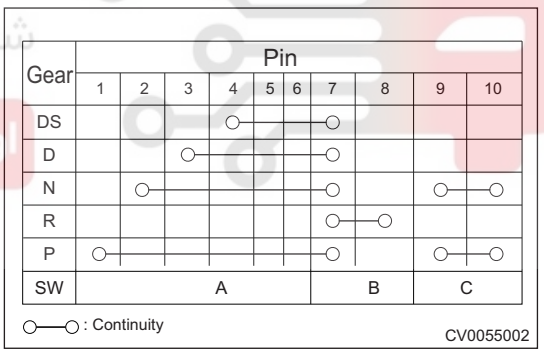


CVT25 continuously variable transmission uses two oil pressure sensors (input shaft, output shaft); at 20 °C, measure pin 2 and pin 3 and the resistance should be 10 KΩ.

Gear switch



The gear switch sends the gear switch signal to TCU, and the TCU combines with other signals for shift control.



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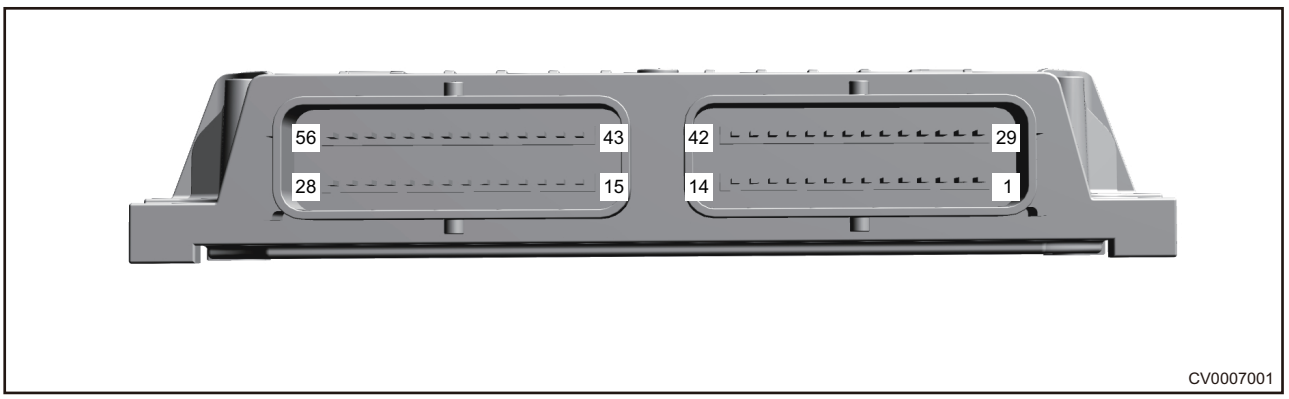
Transmission Control Module PIN

Transmission Control Unit (TCU) receives the input signals from switches and sensors, primarily controls the operation of shift and lock solenoids. The drive gear is regulated by an electronic shifting system. The TCU processes the input signal and adjusts the transmission hydraulic system by using received information.



PIN	Definition	PIN	Definition
1	Hydraulic Torque Converter/Clutch Control Valve Low Side Control	29	Main Oil Pressure/P Position Lock Control Valve Low Side Control
2	Input Pulley Shaft Pressure Control Valve Low Side Control	30	Output Pulley Shaft Pressure Control Valve Low Side Control
3	Clutch Control Valve High Side Control	31	P Position Lock Control Valve High Side Control
4	Hydraulic Torque Converter Control Valve High Side Control	32	Main Oil Pressure Control Valve High Side Control
5	Null	33	Null
6	Output Pulley Shaft Pressure Control Valve High Side Control	34	Input Pulley Shaft Pressure Control Valve High Side Control
7	Null	35	Null
8	All Vehicle CAN Low	36	All Vehicle CAN High
9	Turbo/Output Pulley Shaft Speed Sensor Ground	37	Input/Output Pulley Shaft Oil Pressure Sensor Ground
10	Input Pulley Shaft Speed Sensor Signal	38	Turbine Speed Sensor Signal
11	Input Pulley Shaft Speed Sensor Ground	39	Output Pulley Shaft Speed Sensor Signal
12	Transmission Oil Temperature Sensor Ground	40	Null
13	Transmission Oil Temperature Sensor Signal	41	Gear Position Monitoring Signal
14	Input Pulley Shaft Oil Pressure Sensor Signal	42	Null
15	Output Pulley Shaft Oil Pressure Sensor Signal	43	Null
16	Null	44	Null
17	P Gear	45	ECO Mode
18	R Gear	46	Downshift
19	N Gear	47	Upshift
20	D Gear	48	WINTER Mode
21	Input Pulley Shaft Speed Sensor Power Supply	49	DS Gear (Low Speed Gear)
22	Turbo/Output Pulley Shaft Speed Sensor Power Supply	50	Null
23	Manual Mode	51	KL30
24	Null	52	KL30
25	SPORT Mode	53	KL30
26	Output Pulley Shaft Oil Pressure Sensor Power Supply	54	Input Pulley Shaft Oil Pressure Sensor Power Supply
27	Power Supply Ground 1	55	Power Supply Ground 2
28	KL15	56	Power Supply Ground 3

Note: KL15 is switch, KL30 is battery, SPORT mode is sport mode, WINTER mode is snow mode.

Proper Use and Maintenance for Transmission

Correct Operation for Transmission

1. Before changing the transmission from parking gear to drive gear (D or R), the engine must be at idle speed, brake pedal must be depressed and hand brake must be pulled. After gear switching, release brake pedal and parking brake, and the vehicle will start to move.
2. When the engine speed exceeds idle speed, do not change the transmission from parking gear (N or P) to drive gear (D or R).
3. After the vehicle stops completely, shift the shift lever to P, pull hand brake and turn off engine.
4. If accelerator pedal is hard depressed at start-up, the transmission will delay upshifting so that it runs in high speed range, ensuring high power output.
5. If accelerator pedal is depressed suddenly during driving, the transmission will quickly drop to low gear, engine speed and power will increase.
6. Vehicles equipped with automatic transmission cannot be started by traction (or push). If the battery is depleted, it is necessary to use a jumper cable to charge the battery to start the vehicle.
7. In the following situations, the transmission needs to perform self-learning, otherwise the shifting and starting will not be smooth:
   (a) First time driving for new vehicle
   (b) Replace TCU with a new one
   (c) Overhaul transmission assembly
8. Specific operation of self-learning is as follows:
   (a) Shift the transmission to P or N gear
   (b) Start engine
   (c) Let stand for 2 min
   (d) Self-learning is completed

Caution:
In order to achieve a good driving effect under various operating conditions, it is necessary to perform self-learning under high temperature, low temperature and normal temperature.

9. Gear Position Introduction
   (a) P (Parking) gear: The transmission output shaft is locked to prevent driving wheel from rotating and cooperate with the hand brake when the vehicle stops for a long time.
      (1) When the transmission is in P (or N) gear, the engine can be started, and cannot be started in other gears.
      (2) The shift mechanism is provided with a parking lock. To shift the shift lever from P, the brake pedal must be depressed and the vehicle is in KEY ON state.
      Caution:
      If the shift lever cannot be shifted from P, it can be unlocked by mechanical unlocking. For details, please refer to the technical guidance document issued by shift mechanism design department.
      (3) It is forbidden to shift the shift lever to P before the vehicle is completely stopped. Otherwise, the vehicle may be out of control.
      (4) Do not use P gear instead of hand brake, and only after the vehicle is completely stopped, pull the hand brake first and then shift to P gear.
      (5) Do not park on a large slope. The safe parking slope is not more than 30 %.
   (b) R (Reverse) gear: Use this gear to drive backwards
      (1) Before shifting the shift lever to or out from R, it is necessary to confirm that the vehicle is completely stopped. Otherwise, the transmission may be damaged.
   (c) N (Neutral) gear: When shifting to N, both the driving wheel and the transmission are in free and idle state, which is suitable for short-term parking of vehicle at roadside.
      (1) When the transmission is in N (or P) gear, the engine can be started, and cannot be started in other gears.

(2) If the hand brake is not pulled or the brake pedal is not depressed in N gear, the vehicle can roll on slope, possibly causing an accident.
(3) It is forbidden to shift to N gear while vehicle is running at high speed, otherwise the transmission may be damaged.
(4) It is forbidden to slide in N gear after the engine is shut down, otherwise the transmission may be damaged easily.

(d) D (Driving) gear: In the normal forward mode of transmission, stepless speed change can be realized, and in this gear, the transmission will automatically select the appropriate speed ratio according to the driver's intention.
(1) Confirm that the vehicle is completely stopped before shifting to D.
(2) Before reversing, you need to confirm the surrounding environment and personnel safety.

(e) M (Manual Mode) gear: There are two positions "+" and "-" on the upper and lower sides of M gear on shift mechanism surface, also called "M+" and "M-".
(1) M+: Push the shift lever to M+ once to increase the transmission by one gear.
(2) M-: Push the shift lever to M- once to decrease the transmission by one gear.
(3) The CVT transmission has 9 forward gears, which can be switched between M and D gears by pushing the shift lever regardless of whether the vehicle is stationary or driving. Unlike the manual transmission, the CVT transmission allows shifting when the accelerator pedal is depressed.
Caution:
- In manual mode, the driver must perform shifting action under appropriate working conditions to avoid the engine speed approaching the red line, high load and long-term running.
- Shifting in manual mode requires certain throttle conditions and speed conditions. If the conditions are not met, even if the shift lever is pushed, the transmission will not shift.

(f) L (Low Speed) gear: In this gear, the transmission will be fixed in low-speed gear, engine braking can be used when driving downhill or on long-distance slopes.

(g) Snow mode: Press the snow mode button and TCU selects snow mode program, which is suitable for driving on low adhesion roads. Press the mode button again to exit snow mode.
(1) In snow mode, TCU controls the transmission to start in second gear to prevent the vehicle from slipping.
(2) When the vehicle matches ESP, do not turn on snow mode of transmission and TCS function in ESP at the same time, because they will conflict with each other and weaken each other.

(h) Sport mode: Press the sport mode button and TCU selects sport mode program. Press the mode button again to exit sport mode.

(i) ECO mode: Press the ECO mode button and TCU selects ECO mode program. Press the mode button again to exit ECO mode.

Transmission Oil Standard

1. Transmission oil selection standard

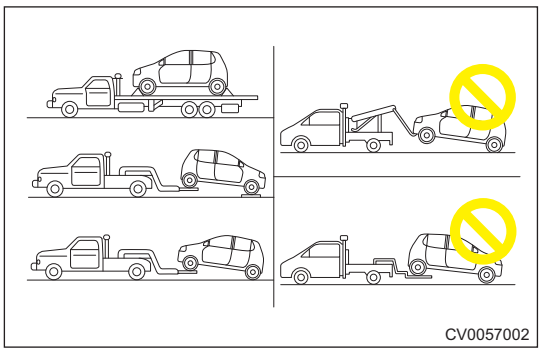
Transmission Oil Type	Standard Capacity
CVTF WCF-1	7.3 L

Caution:
Do not use other oil instead. Damage caused by using other oil is not covered by the warranty.

Vehicle Towing

1. Towing in the right way can avoid unnecessary secondary damage to the vehicle
(a) Use a flatbed truck or a large flatbed cart to fully lift the vehicle and then haul it.
(b) Use a hard traction to lift the non-drive wheel while using a small flatbed (ground wheel) to lift the drive wheel and haul it.

(c) Use a hard traction to lift the drive wheel and haul it.

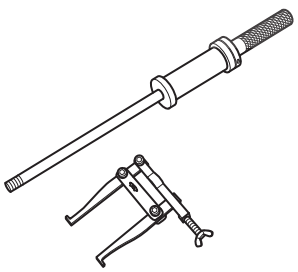
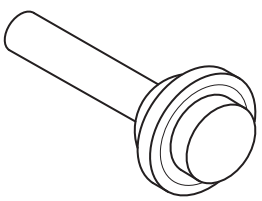


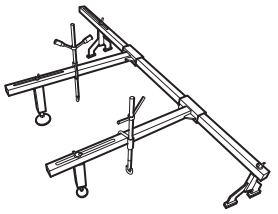
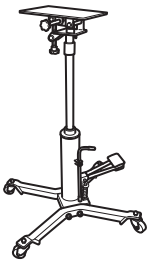
Basic Parameters

Item	Parameter	
Model	025CHA	
Type	Continuously Variable Transmission (CVT)	
Layout	Transverse front-drive	
Start Clutch	Hydraulic torque converter	
Control Method	Electronic hydraulic control	
Dimensions (L × W × H)	365 mm × 440 mm × 550 mm	
Weight (w/o cooling oil)	85 kg	
Center Distance	197 mm	
Maximum Allowable Input Torque	250 N·m	
Final Drive Ratio	5.4	6.08
Pulley Speed Ratio Range	0.38 - 2.69	
Oil Type	CVTF WCF-1 (CVTF for short)	
Total Transmission Oil	7.3 ± 0.2 L	

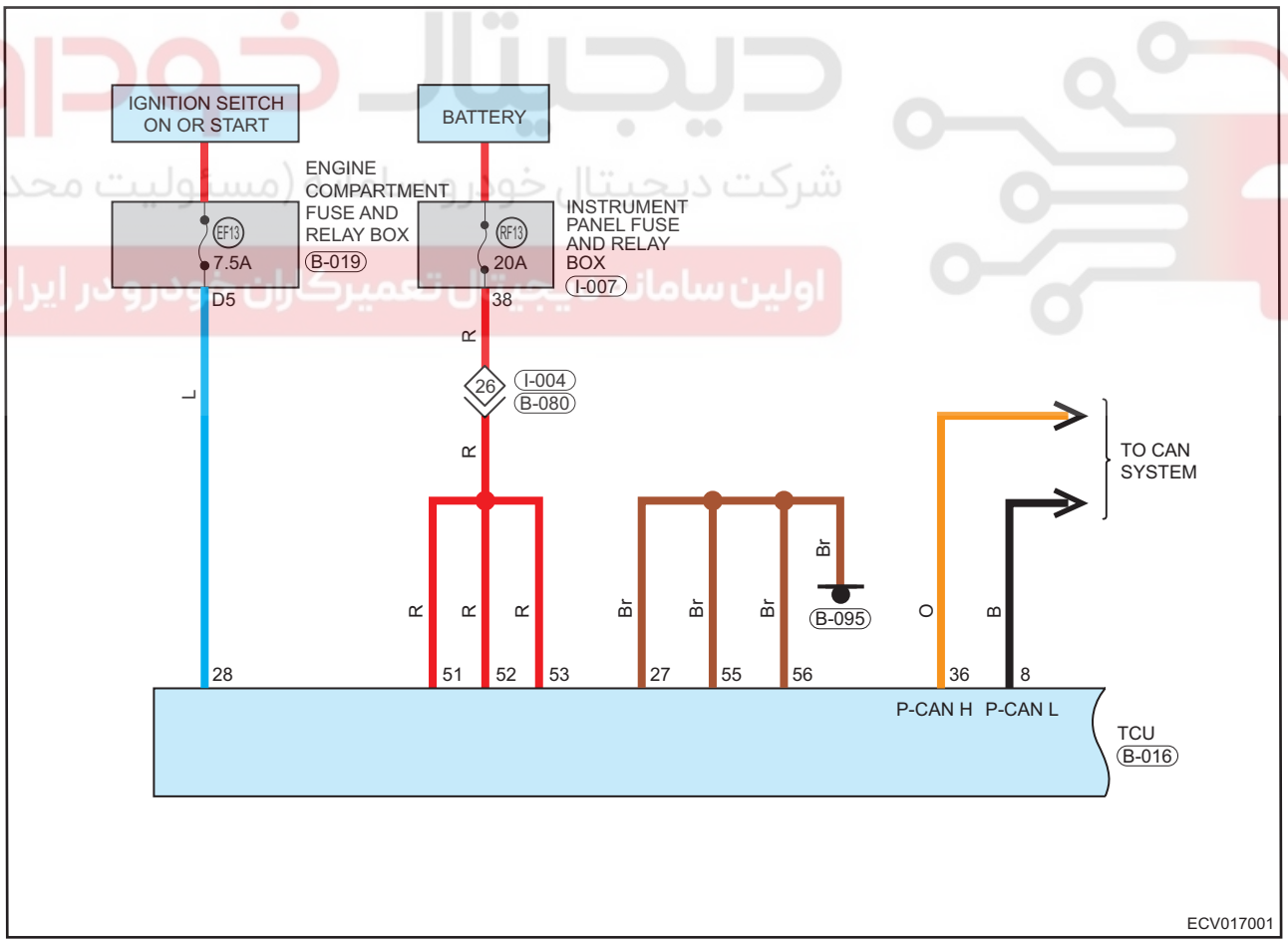
Tools

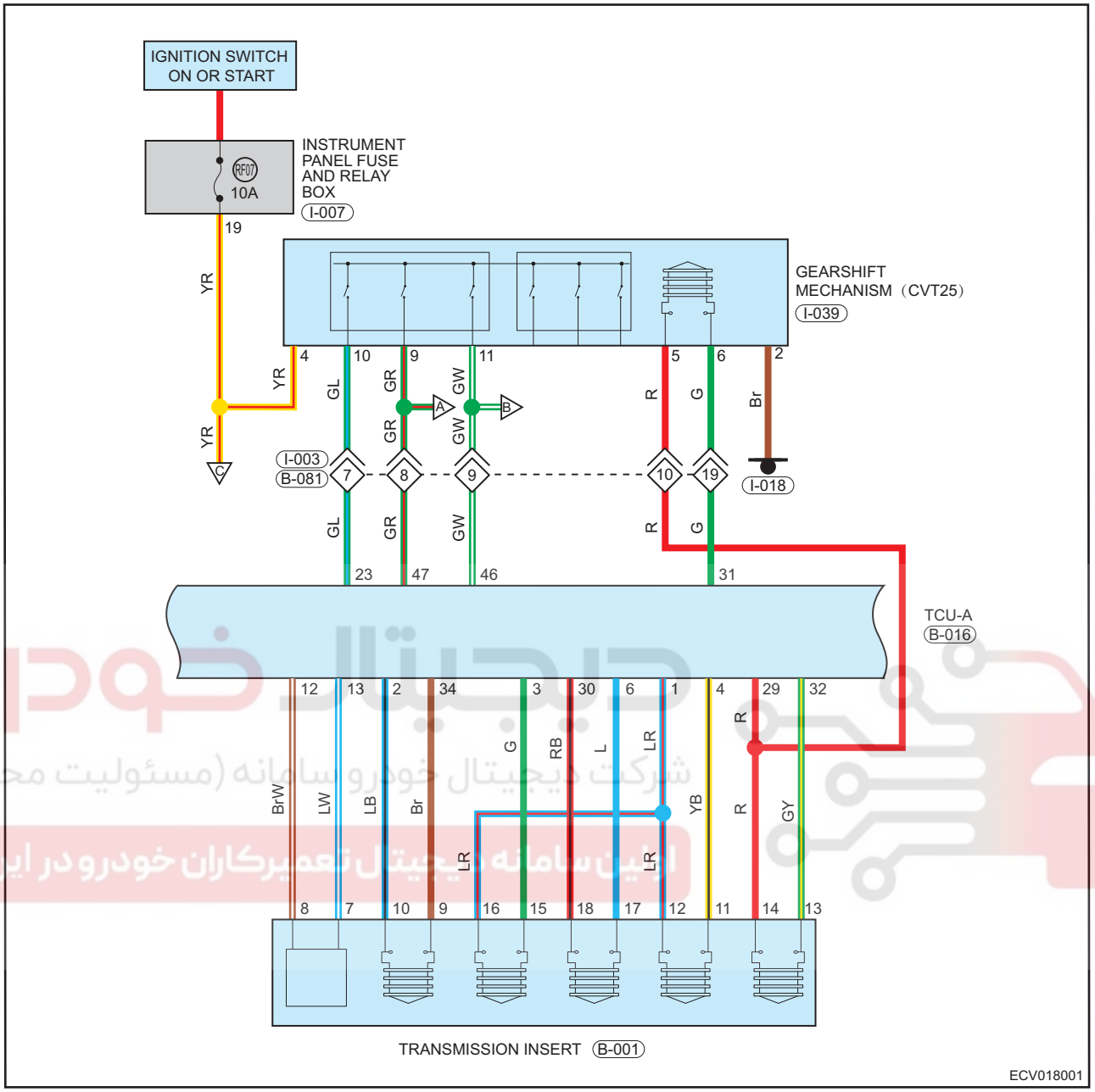
Special Tools

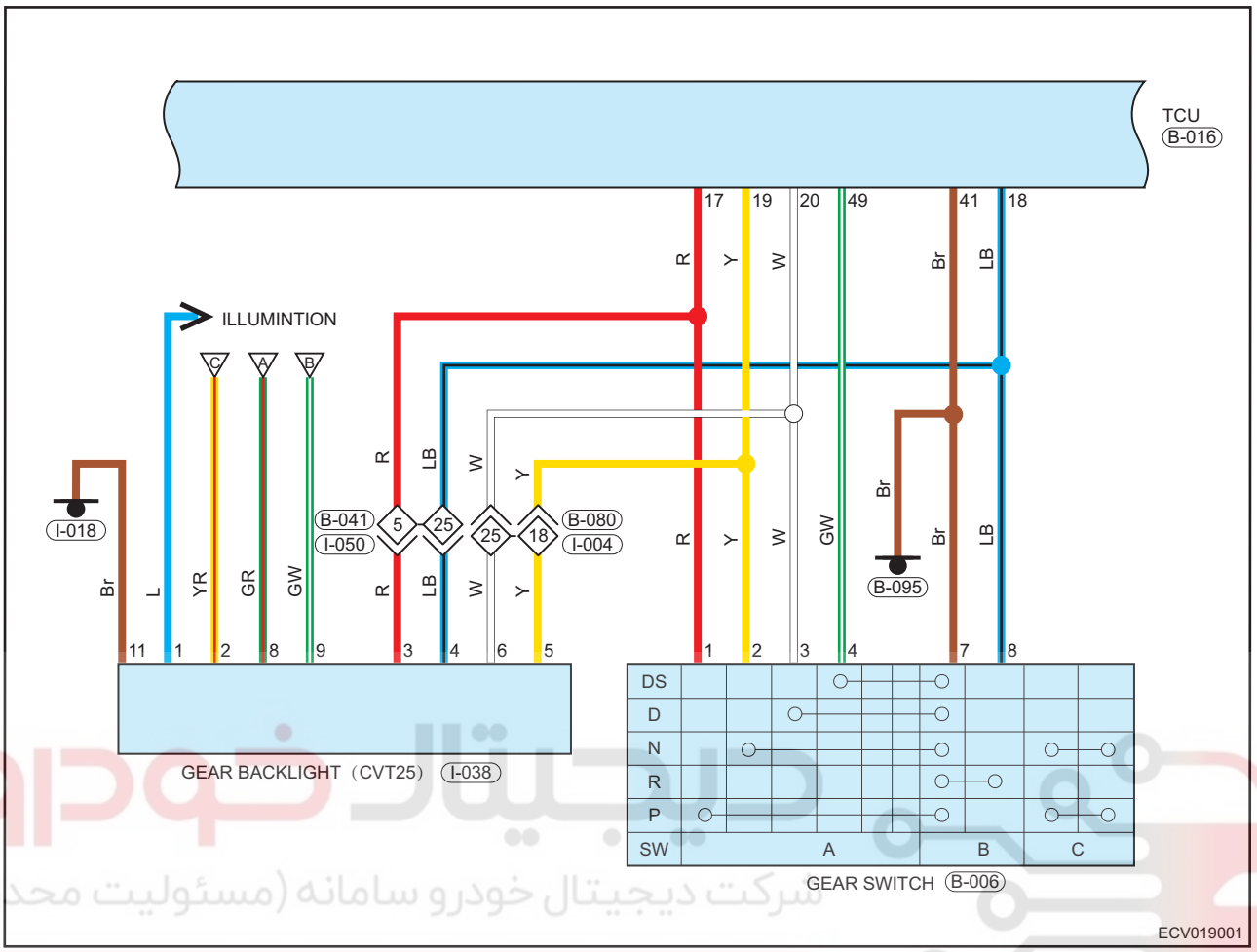
Bearing Puller	 059
Differential Oil Seal Installer	 009

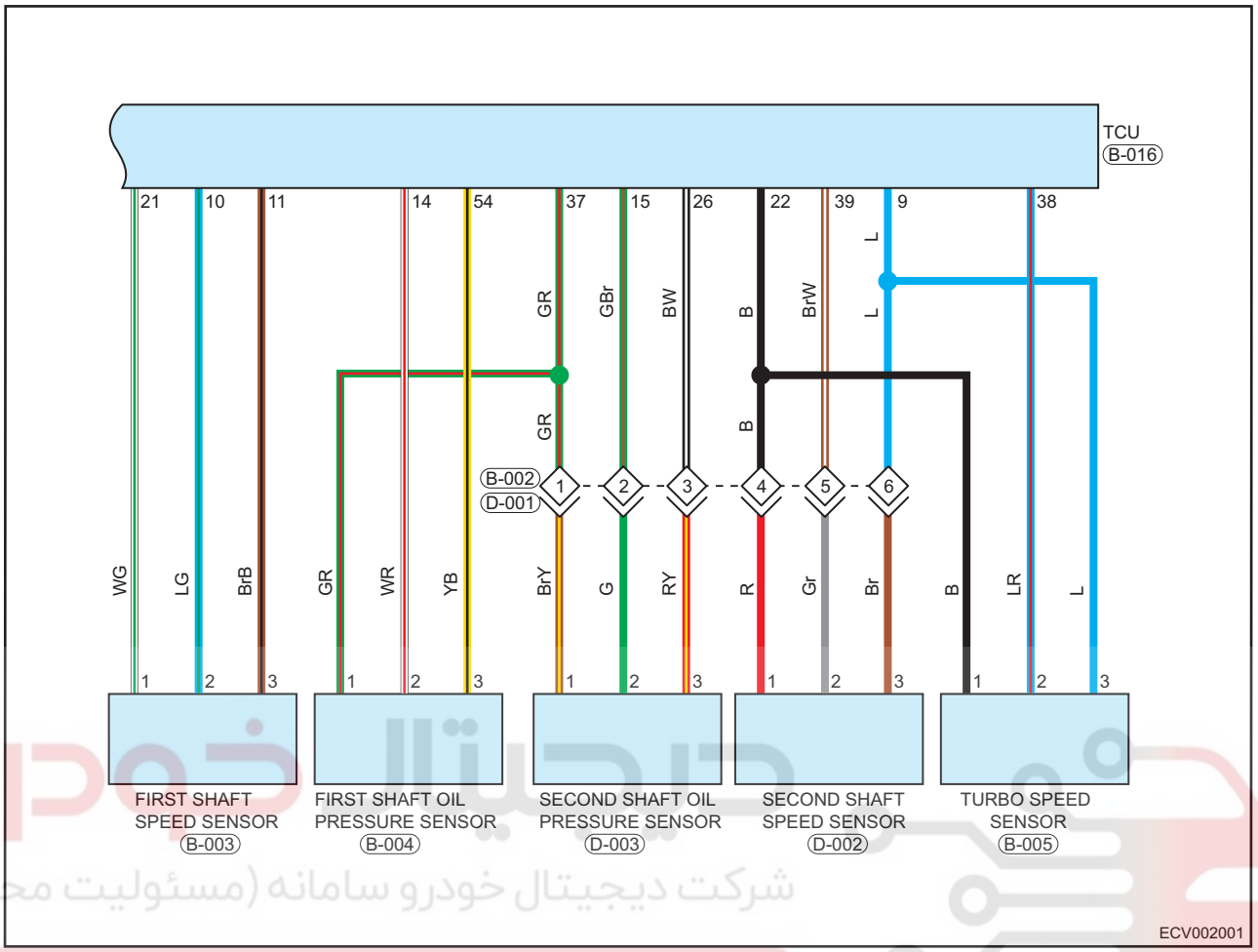
Engine Hoist	 026
Transmission Carrier	 005

Circuit Diagram









DIAGNOSIS & TESTING

DIAGNOSIS & TESTING

DTC Check and Clear

Hint:

- IG is in OFF position.
- Connect the diagnostic tester.
- IG is in ON position.
- Using diagnostic tester, check DTCs.
- Read DTCs and follow the DTC Diagnostics to perform the troubleshooting steps.
- Clear DTCs.
- Disconnect the diagnostic tester.

Problem Symptoms Table

P1700	Unexpected Interrupt
P0700	Transmission Control System (MIL Request)
P0701	Transmission Control System Performance
P0702	Transmission Control System Electrical
P0706	Transmission Range Sensor A Circuit Range (PRNDL Input)
P0707	Transmission Range Sensor A Circuit Voltage Low (PRNDL Input)
P0708	Transmission Range Sensor A Circuit Voltage High (PRNDL Input)
P0709	Transmission Range Sensor A Circuit Intermittent Fault (PRNDL Input)
P0717	Input/Turbine Speed Sensor Circuit No Signal
P0718	Input/Turbine Speed Sensor Circuit Intermittent Fault
P0719	Brake Switch B Circuit Voltage Low
P071A	Transmission Sport Mode Switch Circuit Fault
P071B	Transmission Sport Mode Switch Circuit Voltage Low
P071C	Transmission Sport Mode Switch Circuit Voltage High
P071D	Transmission Winter Mode Switch Circuit Fault
P071E	Transmission Winter Mode Switch Circuit Voltage Low
P071F	Transmission Winter Mode Switch Circuit Voltage High
P0721	Output Speed Sensor Circuit Range/Performance Poor
P0722	Output Speed Sensor Circuit No Signal
P0723	Output Speed Sensor Circuit Intermittent Fault
P0724	Brake Switch B Circuit Voltage High
P0726	Engine Speed Input Circuit Range/Performance Poor
P0727	Engine Speed Input Circuit No Signal
P0728	Engine Speed Input Circuit Intermittent Fault
P0740	Torque Converter Clutch Circuit Open
P0741	Torque Converter Clutch Circuit Performance Poor
P0742	Torque Converter Clutch Circuit Stuck On
P0743	Torque Converter Clutch Circuit Electrical Fault
P0744	Torque Converter Clutch Circuit Intermittent Fault
P0745	Pressure Control Solenoid Valve A
P0746	Pressure Control Solenoid Valve A Stuck Off
P0747	Pressure Control Solenoid Valve A Stuck On
P0748	Pressure Control Solenoid Valve A Electrical Fault
P0749	Pressure Control Solenoid Valve A Intermittent Fault
P0775	Pressure Control Solenoid Valve B

P1700	Unexpected Interrupt
P0776	Pressure Control Solenoid Valve B Stuck Off
P0777	Pressure Control Solenoid Valve B Stuck On
P0778	Pressure Control Solenoid Valve B Electrical Fault
P0779	Pressure Control Solenoid Valve B Intermittent Fault
P0793	Intermediate Shaft Speed Sensor A Circuit No Signal
P0794	Intermediate Shaft Speed Sensor A Circuit Intermittent Fault
P0814	Transmission Range Display Circuit Fault
P0815	Upshift Switch Circuit Fault
P0816	Downshift Switch Circuit Fault
P0817	Starter Disable Circuit Open
P081A	Starter Disable Circuit Voltage Low
P081B	Starter Disable Circuit Voltage High
P081C	Park Input Circuit Fault
P081D	Neutral Input Circuit Fault
P0826	Up and Down Shift Switch Circuit Fault
P0827	Up and Down Shift Switch Circuit Voltage Low
P0828	Up and Down Shift Switch Circuit Voltage High
P1811	Continuous Clutch Slippage
P0840	Transmission Fluid Pressure Sensor A Circuit Fault
P0841	Transmission Fluid Pressure Sensor A Circuit Range
P0844	Transmission Fluid Pressure Sensor A Circuit Intermittent Fault
P0845	Transmission Fluid Pressure Sensor B Circuit Fault
P0846	Transmission Fluid Pressure Sensor B Circuit Range/Performance Poor
P0849	Transmission Fluid Pressure Sensor B Circuit Intermittent Fault
P0850	Park/Neutral Switch Input Circuit Fault
P0851	Park/Neutral Switch Input Circuit Voltage Low
P0852	Park/Neutral Switch Input Circuit Voltage High
P0853	Drive Switch Input Circuit Fault
P0854	Drive Switch Input Circuit Voltage Low
P0855	Drive Switch Input Circuit Voltage High
P0864	TCM Communication Circuit Range
P0865	TCM Communication Circuit Voltage Low
P0866	TCM Communication Circuit Voltage High
P0867	Transmission Fluid Pressure
P0868	Transmission Fluid Pressure Low
P0869	Transmission Fluid Pressure High
P0880	TCM Power Input Signal
P0881	TCM Power Input Signal Range
P0882	TCM Power Input Signal Low
P0883	TCM Power Input Signal High
P0884	TCM Power Input Signal Intermittent Fault
P0885	TCM Power Relay Control Circuit Open
P0886	TCM Power Relay Control Circuit Voltage Low
P0887	TCM Power Relay Control Circuit Voltage High
P0888	TCM Power Relay Sense Circuit Fault
P0889	TCM Power Relay Sense Circuit Range/Performance Poor
P0892	TCM Power Relay Sense Circuit Intermittent Fault
P0897	Transmission Fluid Deteriorated

P1700	Unexpected Interrupt
P0901	Clutch Actuator Circuit Range
P0929	Gear Shift Lock Solenoid Valve Control Circuit Range
P0932	Hydraulic Sensor Circuit Fault
P0933	Hydraulic Sensor Circuit Range
P0934	Hydraulic Sensor Circuit Voltage Low
P0935	Hydraulic Sensor Circuit Voltage High
P0936	Hydraulic Sensor Circuit Intermittent Fault
P0937	Hydraulic Oil Temperature Sensor Circuit Fault
P0941	Hydraulic Oil Temperature Sensor Circuit Intermittent Fault
P0955	Auto Shift Manual Mode Circuit Fault
P0956	Auto Shift Manual Mode Circuit Range/Performance Poor
P0957	Auto Shift Manual Mode Circuit Voltage Low
P0958	Auto Shift Manual Mode Circuit Voltage High
P0959	Auto Shift Manual Mode Circuit Intermittent Fault
P0961	Pressure Control Solenoid Valve A Control Circuit Range
P0965	Pressure Control Solenoid Valve B Control Circuit Range
P1900	Clutch Solenoid Valve Control Circuit Fault
P1928	Shift-Lock Solenoid Valve Control Circuit Fault
P1785	Power Relay Drive Circuit Fault
U0155	Lost Communication With ICM
P0703	Brake Signal Abnormal
P0705	Transmission Gear Signal Abnormal
P0715	Turbine Speed Signal Fluctuation Abnormal
P0716	Turbine Speed Signal Range Abnormal
P0720	Output Pulley Speed Signal Fluctuation Abnormal
P0725	Engine Speed Signal Fluctuation Abnormal
P0730	Gear Ratio Abnormal
P0791	Input Pulley Shaft Speed Signal Fluctuation Abnormal
P0792	Input Pulley Shaft Speed Signal Range Abnormal
P0811	Drive Clutch Slippage
P081E	Reverse Clutch Slippage
P0842	Pressure Sensor A Circuit(Input Pulley Shaft) Short or Open
P0843	Pressure Sensor A Circuit(Input Pulley Shaft) Short to Power Supply
P0847	Pressure Sensor B Circuit(Input Pulley Shaft) Short or Open
P0848	Pressure Sensor B Circuit(Input Pulley Shaft) Short to Power Supply
P0863	CAN Communication Circuit
P0890	TCM Main Relay Control Circuit Short or Open
P0891	TCM Main Relay Control Circuit Short to Power Supply
P0894	Hydraulic Torque Converter Clutch Slippage
P0900	Clutch Solenoid Valve Control Circuit Open
P0902	Clutch Solenoid Valve Control Circuit Short to Ground
P0903	Clutch Solenoid Valve Control Circuit Short to Power Supply
P0928	Gear Shift Lock Solenoid Valve Control Circuit Open
P0930	Shift Lock Solenoid Valve Short to GND
P0931	Shift Lock Solenoid Valve Short To BAT
P0938	Transmission Oil Temperature High
P0939	Transmission Oil Temperature Sensor Circuit Short to GND
P0940	Transmission Oil Temperature Sensor Circuit Short to BAT or Open

P1700	Unexpected Interrupt
P0960	Pressure Control Solenoid Valve A (Input Pulley) Control Circuit Open
P0962	Pressure Control Solenoid A (Input Pulley) Control Circuit Short
P0963	Pressure Control Solenoid A (Input Pulley) Control Circuit Short to BAT
P0964	Pressure Control Solenoid B (Input Pulley) Control Circuit Open
P0966	Pressure Control Solenoid B (Input Pulley) Control Circuit Short
P0967	Pressure Control Solenoid B (Input Pulley) Control Circuit Short to BAT
P0968	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Open
P0970	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Short
P0971	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Short
P1706	Steel Belt Slippage
P1719	PEPS Function Not Configured
P1720	PEPS Authentication Fails
P1745	Output Pulley Shaft Speed Signal Range Abnormal
P2797	Input Pulley Shaft Pressure Control Abnormal
P2798	Output Pulley Shaft Pressure Control Abnormal
C0031	Left Front Wheel Speed Sensor Fault
C0034	Right Front Wheel Speed Sensor Fault
C0037	Left Rear Wheel Speed Sensor Fault
C003A	Right Rear Wheel Speed Sensor Fault
U0100	ECM Communication Fault
U0121	ABS Communication Fault
U0401	ECM Data Received Abnormal

Diagnosis Procedure

HINT

Use following procedures to troubleshoot the transmission control system.

1	**Vehicle brought to workshop**

Result

Proceed to
NEXT

NEXT

2	**Check battery voltage**

Check if battery voltage is normal.

OK

Standard Voltage: Not less than 12 V

Result

Result
OK
NG

NG → **Replace the battery**

OK

3	Customer problem analysis

Result

Proceed to
NEXT

NEXT

4	Read DTCs

Result

Result
No DTC
Current DTC
History DTC

History DTC

5	Problem Repair (No DTC)

Result

Proceed to
NEXT

15

NEXT → Go to step 7

6	Troubleshoot according to Diagnostic Trouble Code (DTC) chart

Result

Proceed to
NEXT

NEXT → Go to step 7

7	Troubleshoot according to Problem Symptoms Table

Result

Proceed to
NEXT

NEXT

8	Conduct test and confirm malfunction has been repaired

Result

Proceed to
NEXT

NEXT	End

DTC Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to OFF.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggle test.
- Check for broken, bent, protruded or corroded terminals.
- Inspect sensors and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Use data recorder and/or oscilloscope to help diagnose intermittent malfunctions.
- Remove the Transmission Control Unit (TCU) from malfunctioning vehicle and install it to a new vehicle to perform a test. If DTC cannot be cleared, TCU is malfunctioning. If DTC can be cleared, reinstall TCU to original vehicle.

Ground Inspection

15

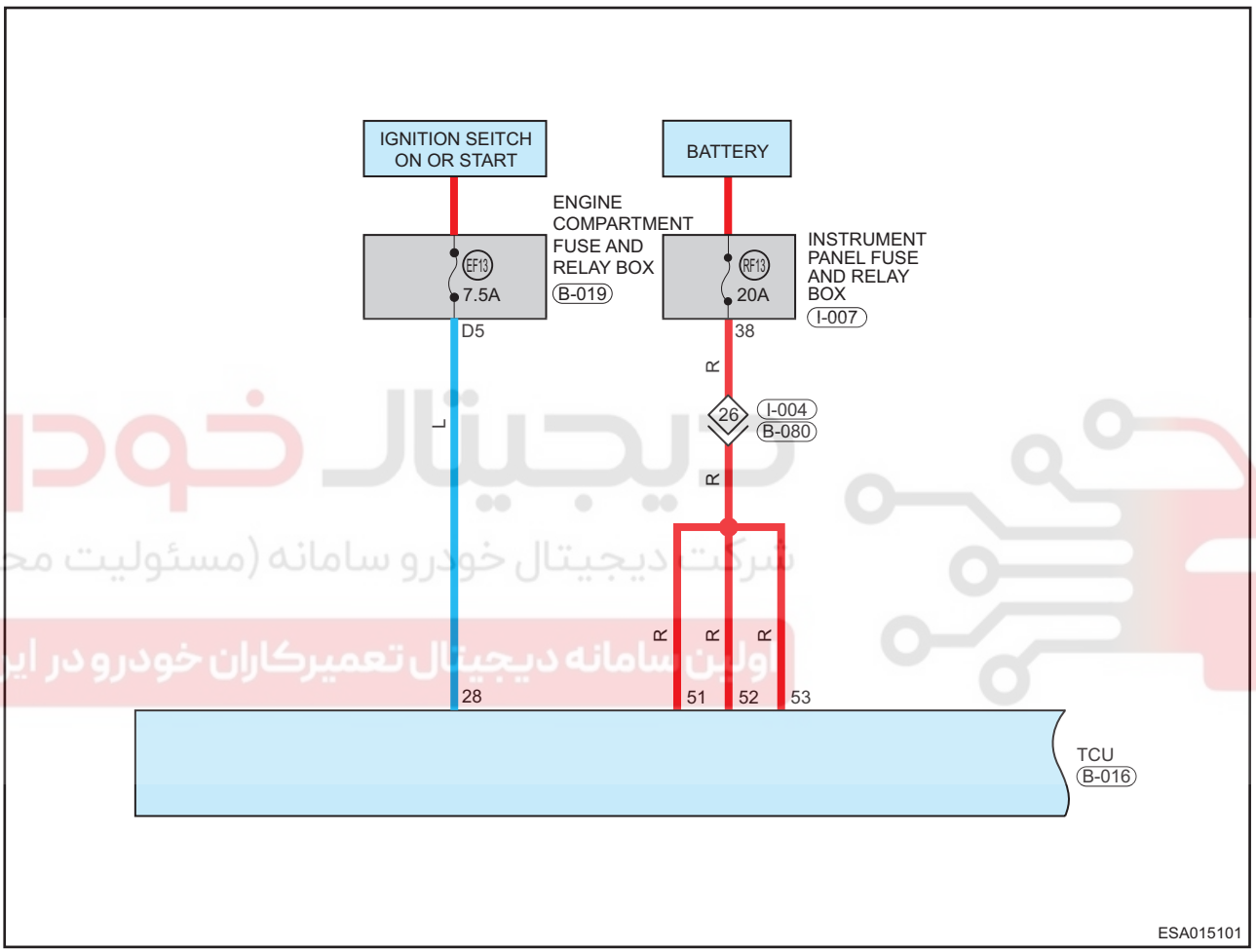
Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit works. Circuits are very sensitive to proper grounding. A loose or corroded ground can affect the control circuit. Check the ground points as follows:

1. Remove ground bolt or nut.
2. Check all contact surfaces for tarnish, dirt and rust, etc.
3. Clean as necessary to ensure that contacting is in good condition.
4. Reinstall ground bolt or nut securely.
5. Check if add-on accessories interfere with ground circuit.
6. If several wire harnesses are crimped into one ground terminal, check for proper crimps. Make sure that all wire harnesses are clean and securely fastened while providing a good ground path.

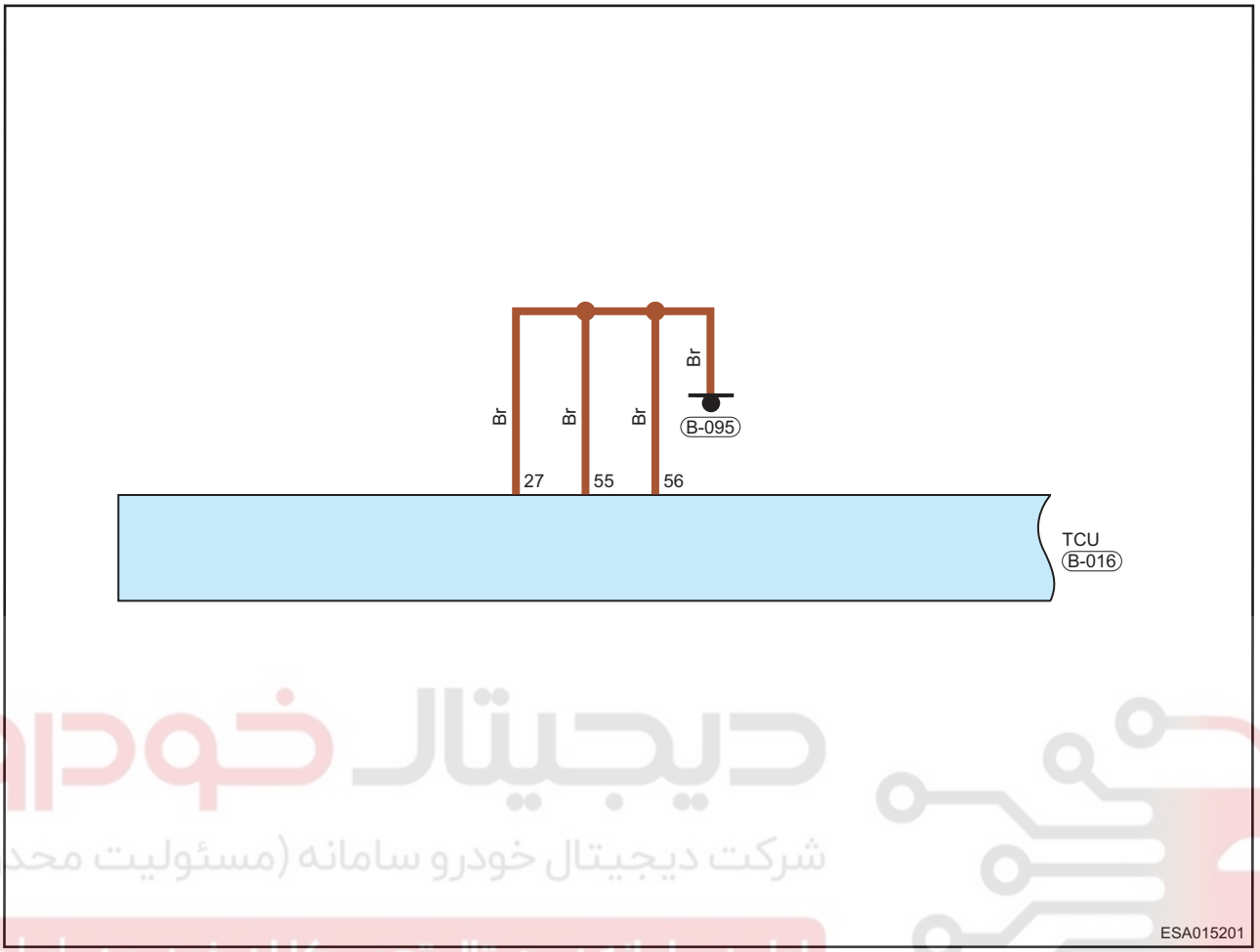
DTC	P0886	TCM (Transmission Control Module) Power Supply Relay Control Circuit Voltage Low

DTC	P0887	TCM (Transmission Control Module) Power Supply Relay Control Circuit Voltage High

Circuit Diagram
Power Supply Circuit



Ground Circuit



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0886	TCM (Transmission Control Module) Power Supply Relay Control Circuit Voltage Low	• Overvoltage: Circuit voltage > 16 V	• TCU reset • Solenoid valve operates abnormally • Sensor operates abnormally • CAN bus abnormal	1. Check wire harness and connector 2. Check the battery 3. Replace the battery 4. Replace TCU
P0887	TCM (Transmission Control Module) Power Supply Relay Control Circuit Voltage High	• Low voltage: Circuit voltage < 9 V		

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:
- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check TCU fuse RF12 and EF43.**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find TCU fuses EF13(7.5A) and RF13(20A) from engine compartment fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance
Less than 1 Ω

OK
Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace TCU fuse**

OK ↓

2	**Check the battery**

(a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive battery terminal and negative battery terminal.

OK
Voltage between positive battery terminal and negative battery terminal is normal.

Result

Proceed to
OK
NG

NG → **Replace the battery**

OK ↓

3	**Check TCU power supply circuit voltage**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the TCU connector B-016.
Voltage inspection (using a digital multimeter)

Multimeter Connection	Condition	Specified Condition
B-016 (51, 52, 53) - Body ground	Always	Not less than 12 V

OK

Voltage between terminal of TCU connector B-016 and body ground is normal.

Result

Proceed to
OK
NG

NG → **Go to step 3**

OK →

4 Check TCU power supply circuit (IGN power supply)

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the TCU connector B-016.

Check voltage between terminal of TCU connector B-016-28 and body ground (using digital multimeter or 21W test lamp).

Voltage Inspection

Multimeter Connection	Condition	Specified Condition
B-016 (28) - Body ground	Always	Not less than 12 V

OK

Voltage between terminal of TCU connector B-016 and body ground is normal.

Result

Proceed to
OK
NG

NG → **Go to step 6**

OK →

5 Check wire harness and connector (TCU - instrument panel fuse box and body ground)

(a) Check wire harness between connector terminals on wire harness side and instrument panel fuse and relay box terminal.

Check for Open

Multimeter Connection	Specified Condition
B-016 (28) - Instrument panel fuse and relay box (24)	Resistance ⩽ 1 Ω

Check for Short

Multimeter Connection	Specified Condition
B-016 (28) or instrument panel fuse and relay box (24) - Body ground	Resistance ∞
B-016 (28) or instrument panel fuse and relay box (24) - Battery positive	Resistance ∞

OK

Wire harness between connector terminals on wire harness side is normal.

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

6 Check ground circuit

(a) Check TCU ground point
(b) Check the TCU ground wire harness.
Check for Open

Multimeter Connection	Specified Condition
B-016 (27, 55, 56) - Body ground	Resistance ⩽ 1 Ω

OK
Ground point and ground wire harness are normal.

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

7 Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTCs.
(c) Start the engine.
(d) Check if the same DTCs are still output.

OK
Same DTCs are not output.

Result

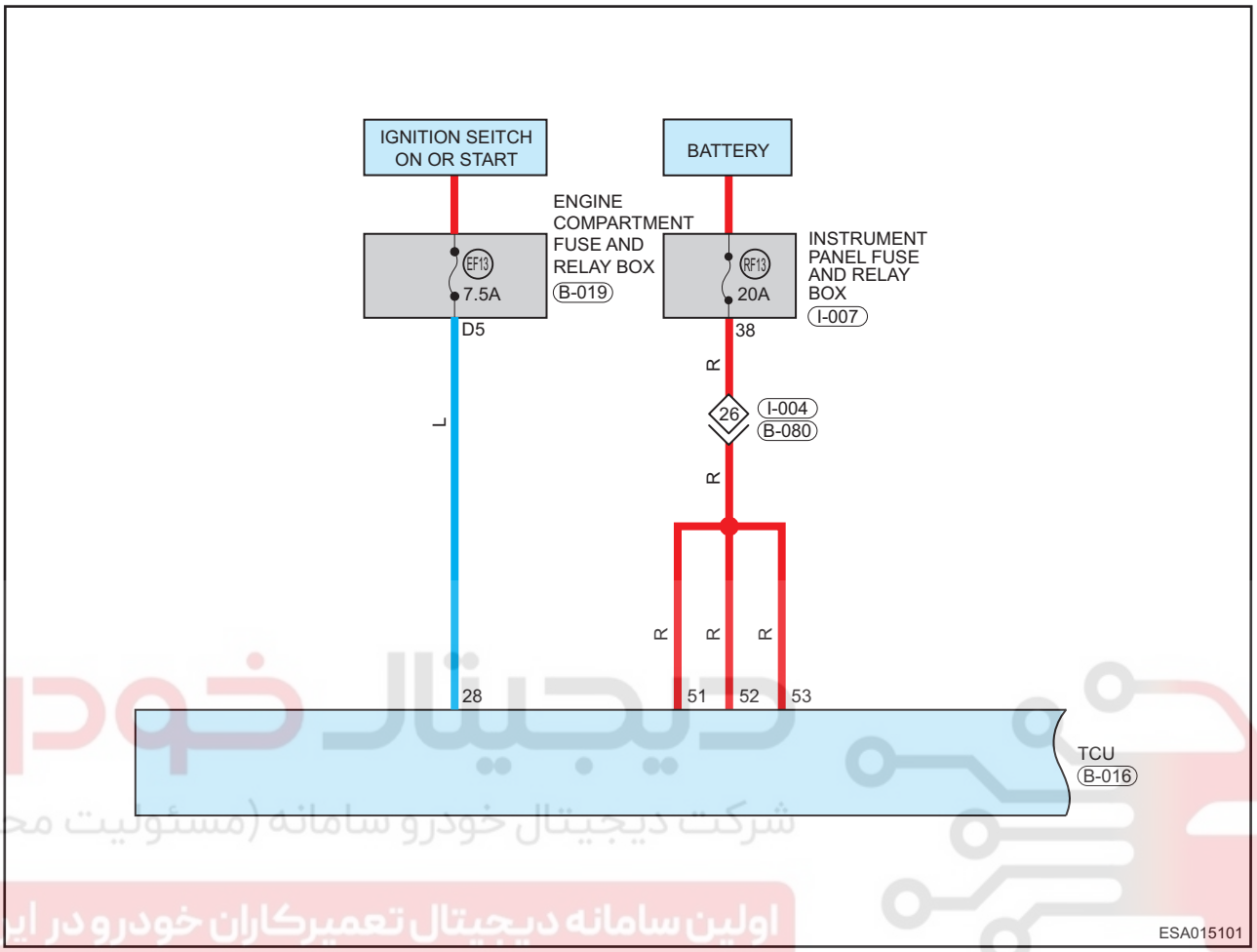
Proceed to
OK
NG

OK → **System operates normally**

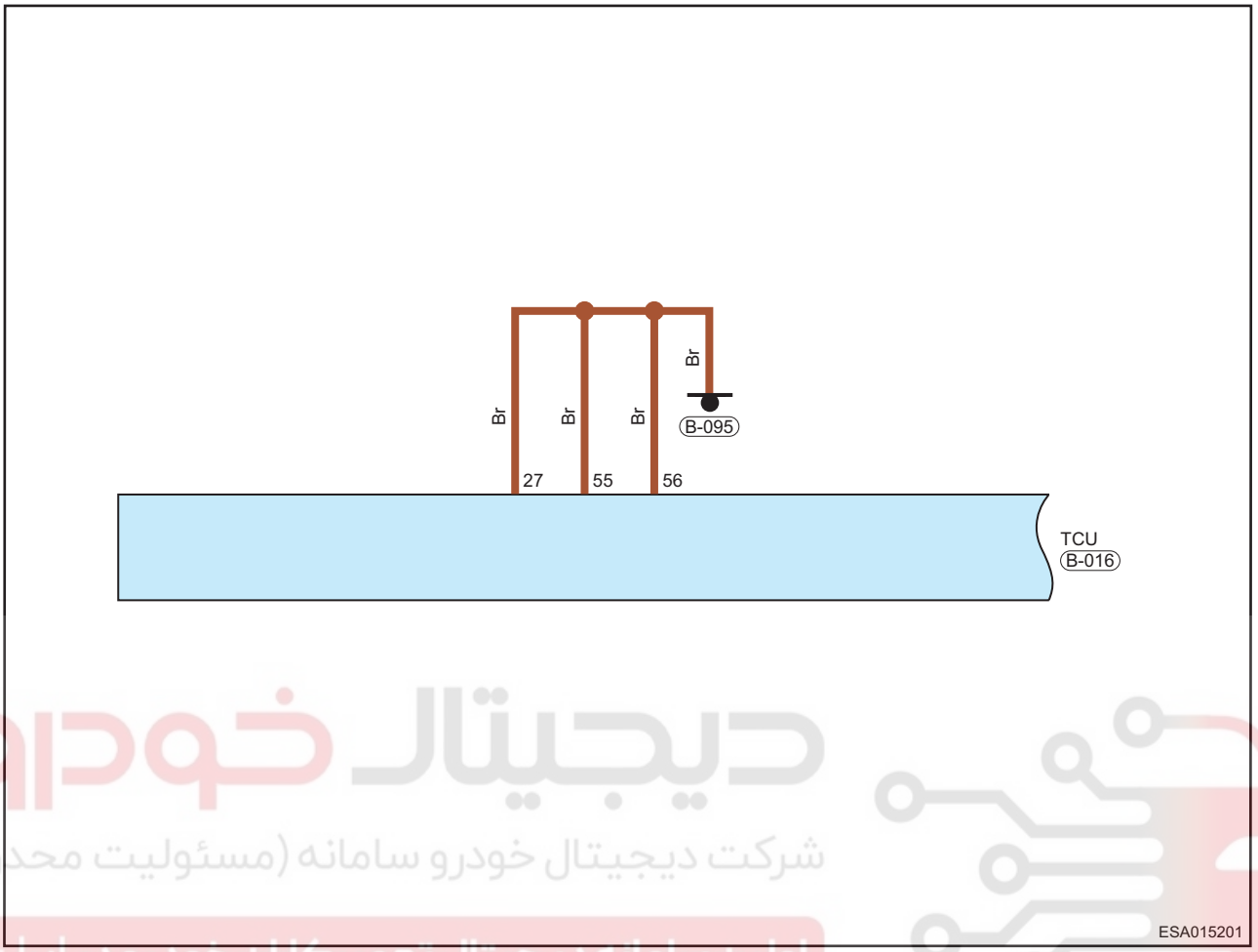
NG → **Replace TCU control module assembly**

DTC	P0880	TCM Power Input Signal
DTC	P0881	TCM Power Input Signal Range
DTC	P0882	TCM Power Input Signal Low
DTC	P0883	TCM Power Input Signal High
DTC	P0884	TCM Power Input Signal Intermittent Fault
DTC	P0888	TCM Power Relay Sense Circuit Fault
DTC	P0889	TCM Power Relay Sense Circuit Range/ Performance Poor
DTC	P0892	TCM Power Relay Sense Circuit Intermittent Fault
DTC	P0890	TCM Main Relay Control Circuit Short or Open
DTC	P0891	TCM Main Relay Control Circuit Short to Power Supply
DTC	P1719	PEPS Function Not Configured
DTC	P1720	PEPS Authentication Fails

Circuit Diagram
Power Supply Circuit



Ground Circuit



15

Description

DTC	DTC Definition	Possible Effects of Malfunction	Repair Recommendation
P0880	TCM Power Input Signal	• TCU cannot work properly • Transmission warning light turns on	1. Check wire harness and connector 2. Replace TCU
P0881	TCM Power Input Signal Range		
P0882	TCM Power Input Signal Low		
P0883	TCM Power Input Signal High		
P0884	TCM Power Input Signal Intermittent Fault		
P0888	TCM Power Relay Sense Circuit Fault		
P0889	TCM Power Relay Sense Circuit Range/Performance Poor		
P0892	TCM Power Relay Sense Circuit Intermittent Fault		
P0890	TCM Main Relay Control Circuit Short or Open		
P0891	TCM Main Relay Control Circuit Short to Power Supply		
P1719	PEPS Function Not Configured		
P1720	PEPS Authentication Fails		

Caution:
When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to OFF.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	Check TCU connector

(a) Check TCU connector B-016 and engine compartment fuse and relay box for poor connection, damage, cracks or poor installation.

Result

Proceed to
OK
NG

NG → **Repair or replace connector**

OK →

2	Check TCU ground point

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check TCU ground point B-095.

OK

Ground point is normal

Result

Proceed to
OK
NG

NG → **Repair or replace ground wire harness or ground point**

OK

3	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTCs.
(c) Start the engine.
(d) Check if the same DTCs are still output.

OK

Same DTCs are not output.

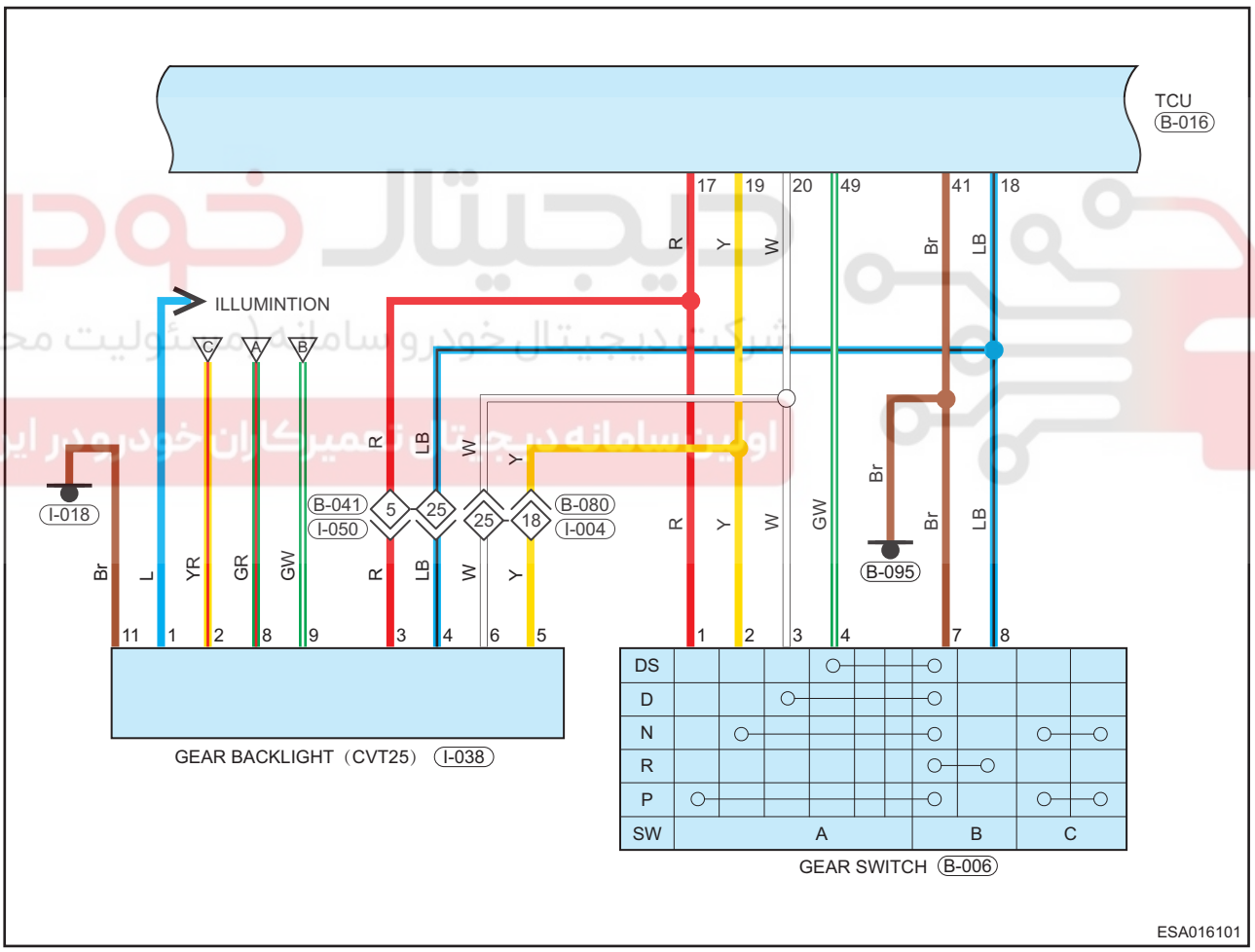
Result

Proceed to
OK
NG

OK	**System operates normally**
NG	**Replace TCU control module assembly**

DTC	P0706	Transmission Range Sensor A Circuit Range (PRNDL Input)
DTC	P0707	Transmission Range Sensor A Circuit Voltage Low (PRNDL Input)
DTC	P0708	Transmission Range Sensor A Circuit Voltage High (PRNDL Input)
DTC	P0709	Transmission Range Sensor A Circuit Intermittent Fault (PRNDL Input)

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0706	Transmission Range Sensor 'A' Circuit Range (PRNDL Input)	• While reading P/R/N/D/L gear signal, if there are multiple signals at the same time or no gear signals, the malfunction is confirmed.	• Vehicle cannot be started • Shift shock is large • Transmission warning light turns on	1. Adjust shift cable position 2. Check wire harness, connector or terminal for abnormality 3. Replace gear switch 4. Replace TCU
P0707	Transmission Range Sensor A Circuit Voltage Low (PRNDL Input)			
P0708	Transmission Range Sensor A Circuit Voltage High (PRNDL Input)			
P0709	Transmission Range Sensor A Circuit Intermittent Fault (PRNDL Input)			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

15

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box.**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse RF07 (10A) in engine compartment fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG	**Replace fuse**

OK

2	Check shift cable

(a) Check whether the connector is loose, the connection is poor, or the appearance is damaged, etc.
(b) Remove the shift cable and manually move the gear switch to confirm whether the instrument shows that whole vehicle is functioning properly.

Result

Proceed to
OK
NG

NG → **Reinstall shift cable**

OK

3	Check gear switch

(a) Turn ENGINE START STOP switch to OFF.
(b) Measure gear switch connector B-088.
Perform inspection (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-006(1)-B-006(7)	Shift lever in P	Continuity
B-006(7)-B-006(8)	Shift lever in R	Continuity
B-006(2)-B-006(7)	Shift lever in N Continuity	Continuity
B-006(3)-B-006(7)	Shift lever in D Continuity	Continuity
B-006(4)-B-006(7)	Shift lever in DS Continuity	Continuity

Result

Proceed to
OK
NG

NG → **Replace gear switch**

OK

4	Check the wire harness.

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the TCU connector B-007.
Inspection

Multimeter Connection	Condition	Specified Condition
B-016 (41) - Battery negative	Always	Continuity
B-016 (17) - B-016 (41)	Shift lever in P	Continuity
B-016 (18) - B-016 (41)	Shift lever in R	Continuity
B-016 (19) - B-016 (41)	Shift lever in N Continuity	Continuity

Multimeter Connection	Condition	Specified Condition
B-016 (20) - B-016 (41)	Shift lever in D Continuity	Continuity
B-016 (49) - B-016 (41)	Continuity as Shift lever in L	Continuity

OK

Wire harness between connector terminals on wire harness side is normal.

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

5	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTCs.
(c) Start the engine.
(d) Check if the same DTCs are still output.

OK

Same DTCs are not output.

Result

Proceed to
OK
NG

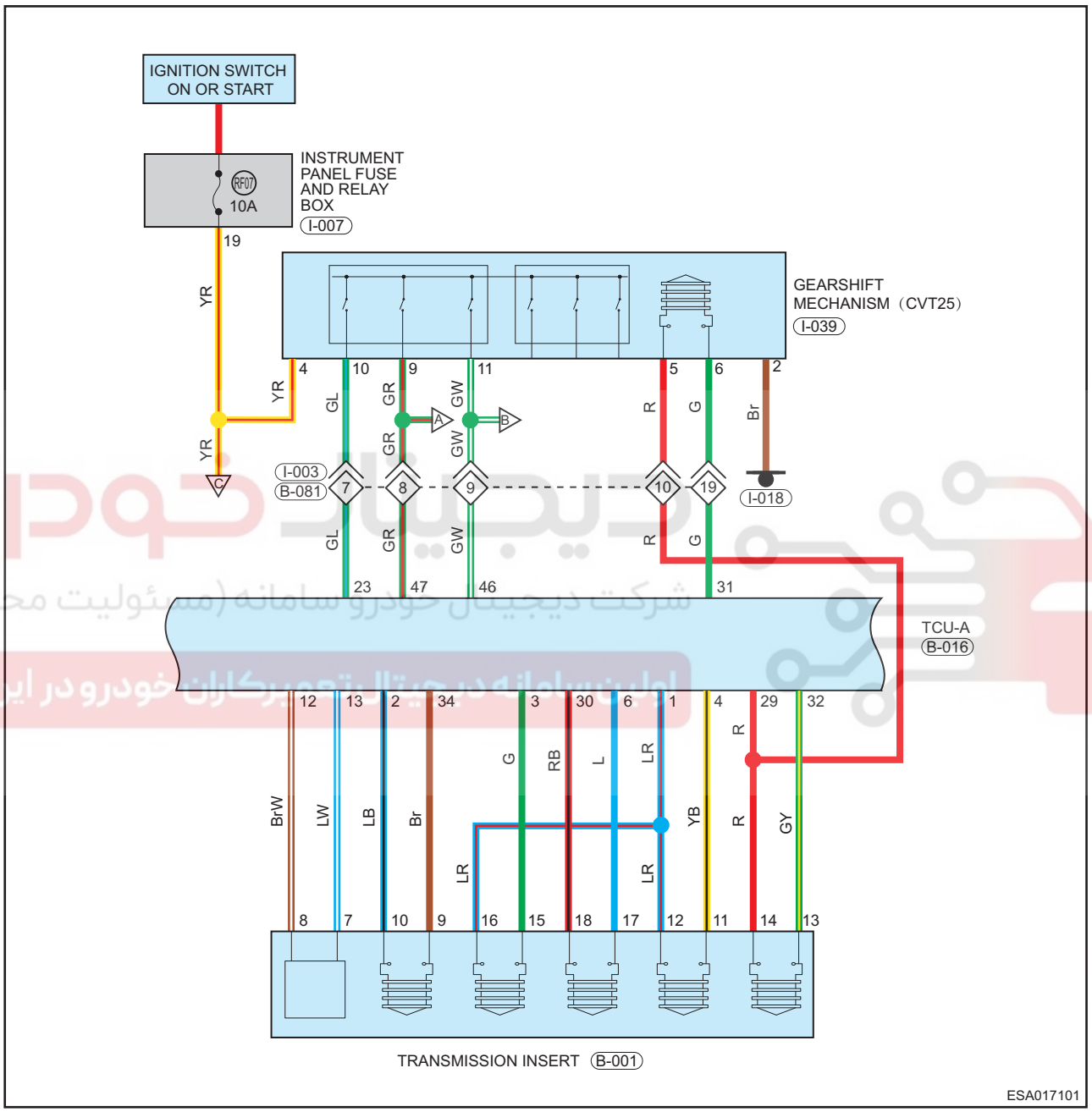
OK → **System operates normally**

NG → **Replace TCU control module assembly**

DTC	P0815	Upshift Switch Circuit Fault

DTC	P0816	Downshift Switch Circuit Fault

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0815	Upshift Switch Circuit Fault	• While reading manual mode signal, if M/M+/M- is detected when there are three (M,M+,M-), two (M+, M-), or in non-D gear, malfunction is confirmed.	• Vehicle cannot be started • Shift shock is large • Transmission warning light turns on • Manual mode does not respond	1. Check wire harness, connector or terminal for abnormality 2. Replace gear shift mechanism 3. Replace TCU
P0816	Downshift Switch Circuit Fault			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse RF07(10A) in engine compartment fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK

2	Check wire harness connector

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the gear shift mechanism connector I-039.

Multimeter Connection	Condition	Specified Condition
I-039(2) - Body ground	Always	Continuity
I-039(4) - Body ground	Always	Voltage always > 12 V

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Check gear shift mechanism

(a) Turn ENGINE START STOP switch to OFF.
(b) Check the continuity of gear shift mechanism connector B-020 with a digital multimeter.

Multimeter Connection	Condition	Specified Condition
B-016 (23, 46, 47) - Body ground	Shift lever in P	No continuity
B-016 (23, 46, 47) - Body ground	Shift lever in R	No continuity
B-016 (23, 46, 47) - Body ground	Shift lever in N Continuity	No continuity
B-016 (23, 46, 47) - Body ground	Shift lever in L Continuity	No continuity
B-016 (20, 23) - Body ground	Shift lever in M Continuity	Continuity
B-016 (20, 23, 47) - Body ground	Shift lever in M+ Continuity	Continuity
B-016 (20, 23, 46) - Body ground	Shift lever in M- Continuity	Continuity

Result

Proceed to
OK
NG

NG → **Replace the gear shift mechanism.**

OK

4	Reconfirm DTCs

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.
(c) Start the engine.
(d) Check if the same DTCs are still output.

OK

Same DTCs are not output.

Result

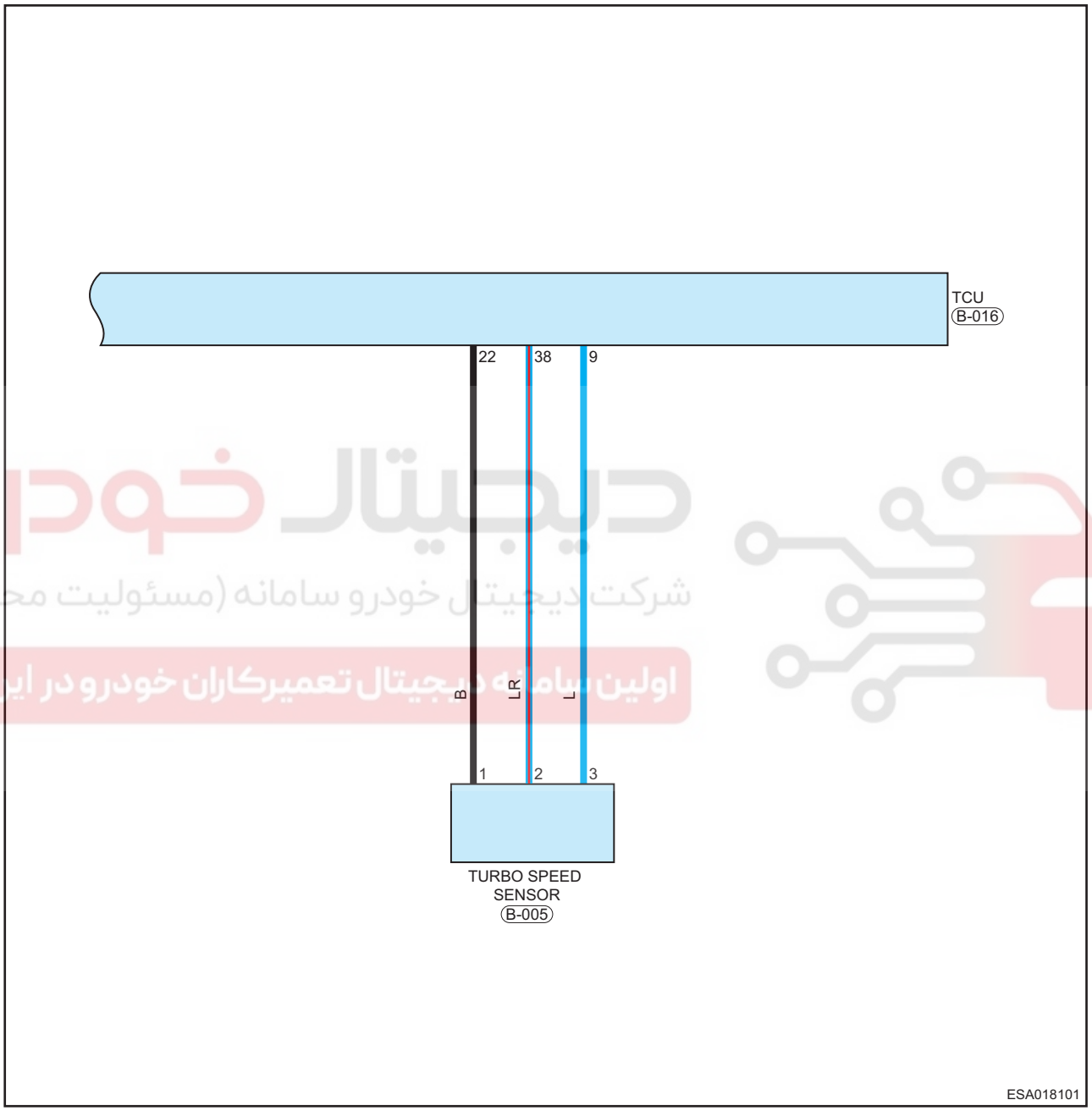
Proceed to
OK
NG

OK	**System operates normally**
NG	**Replace TCU control module assembly**

DTC	P0715	Turbine Speed Signal Fluctuation Abnormal

DTC	P0716	Turbine Speed Signal Range Abnormal

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0715	Turbine Speed Signal Fluctuation Abnormal	• When the turbine speed is equal to 0 during driving, malfunction is confirmed.	• Shift shock is large • Transmission warning light turns on • Vehicle is unable to accelerate	1. Check wire harness, connector or terminal for abnormality 2. Replace turbo speed sensor 3. Replace TCU
P0716	Turbine Speed Signal Range Abnormal			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the turbo speed sensor connector B-089.

Multimeter Connection	Condition	Specified Condition
B-005 (1) - B-016 (22)	Always	Continuity
B-005 (2) - B-016 (38)	Always	Continuity
B-005 (3) - B-016 (9)	Always	Continuity

Result

Proceed to
OK

Proceed to
NG

NG → Repair or replace wire harness and connector

OK

3	Replace turbo speed sensor

(a) Replace turbo speed sensor.

Result

Proceed to
OK
NG

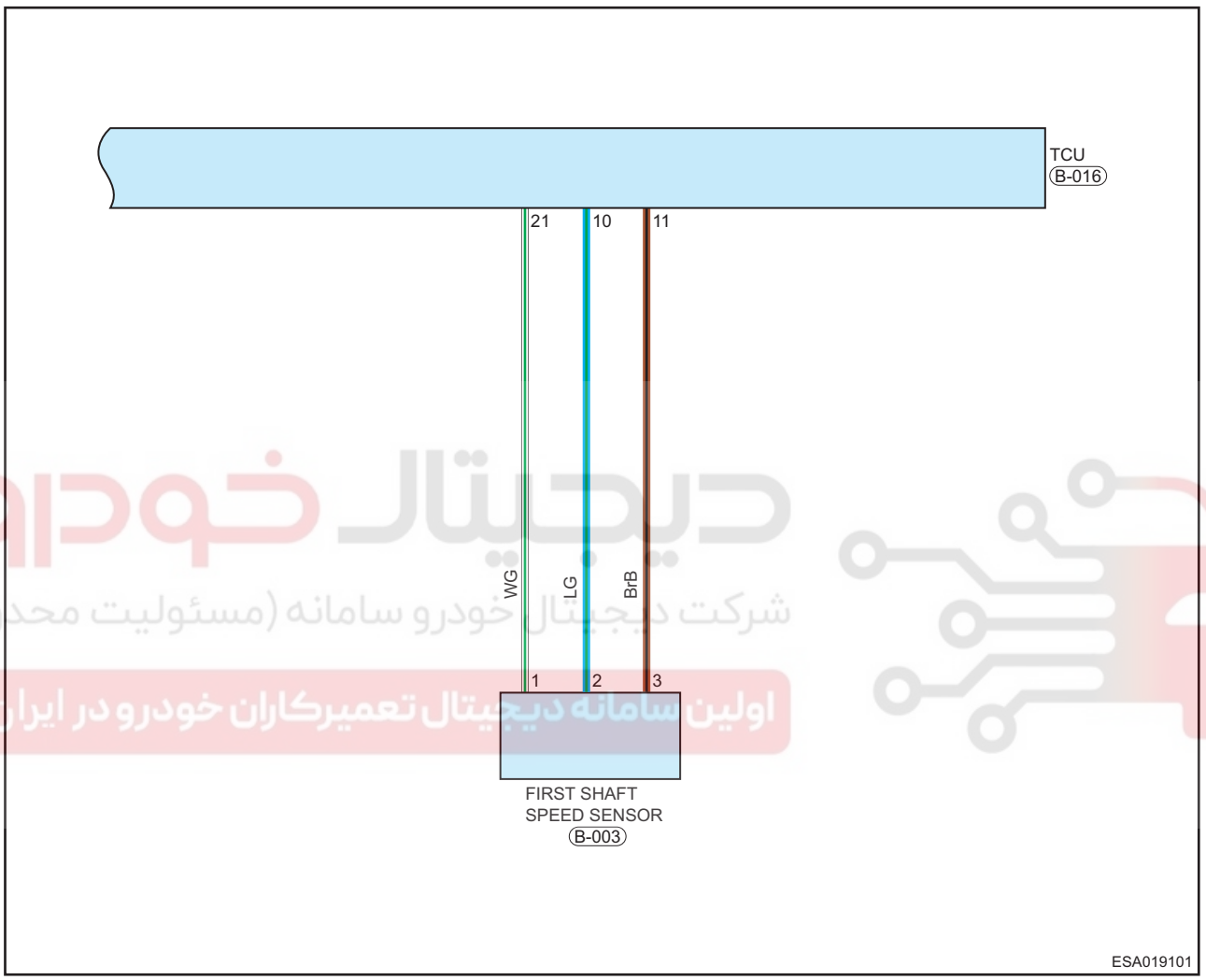
OK → System operates normally

NG → Replace TCU control module assembly

DTC	P0791	Input Pulley Shaft Speed Signal Fluctuation Abnormal

DTC	P0792	Input Pulley Shaft Speed Signal Range Abnormal

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0791	Input Pulley Shaft Speed Signal Fluctuation Abnormal	• When the input speed is equal to 0 during driving, malfunction is confirmed.	• Clutch and hydraulic torque converter slippage • Transmission warning light turns on • Vehicle is unable to accelerate	1. Check wire harness, connector or terminal for abnormality 2. Replace input pulley shaft speed sensor 3. Replace TCU
P0792	Input Pulley Shaft Speed Signal Range Abnormal			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.

5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the primary shaft speed sensor connector B-003.

Multimeter Connection	Condition	Specified Condition
B-003 (1) - B-016 (21)	Always	Continuity
B-003 (2) - B-016 (10)	Always	Continuity
B-003 (3) - B-016 (11)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Replace primary shaft speed sensor

(a) Replace the primary shaft speed sensor.

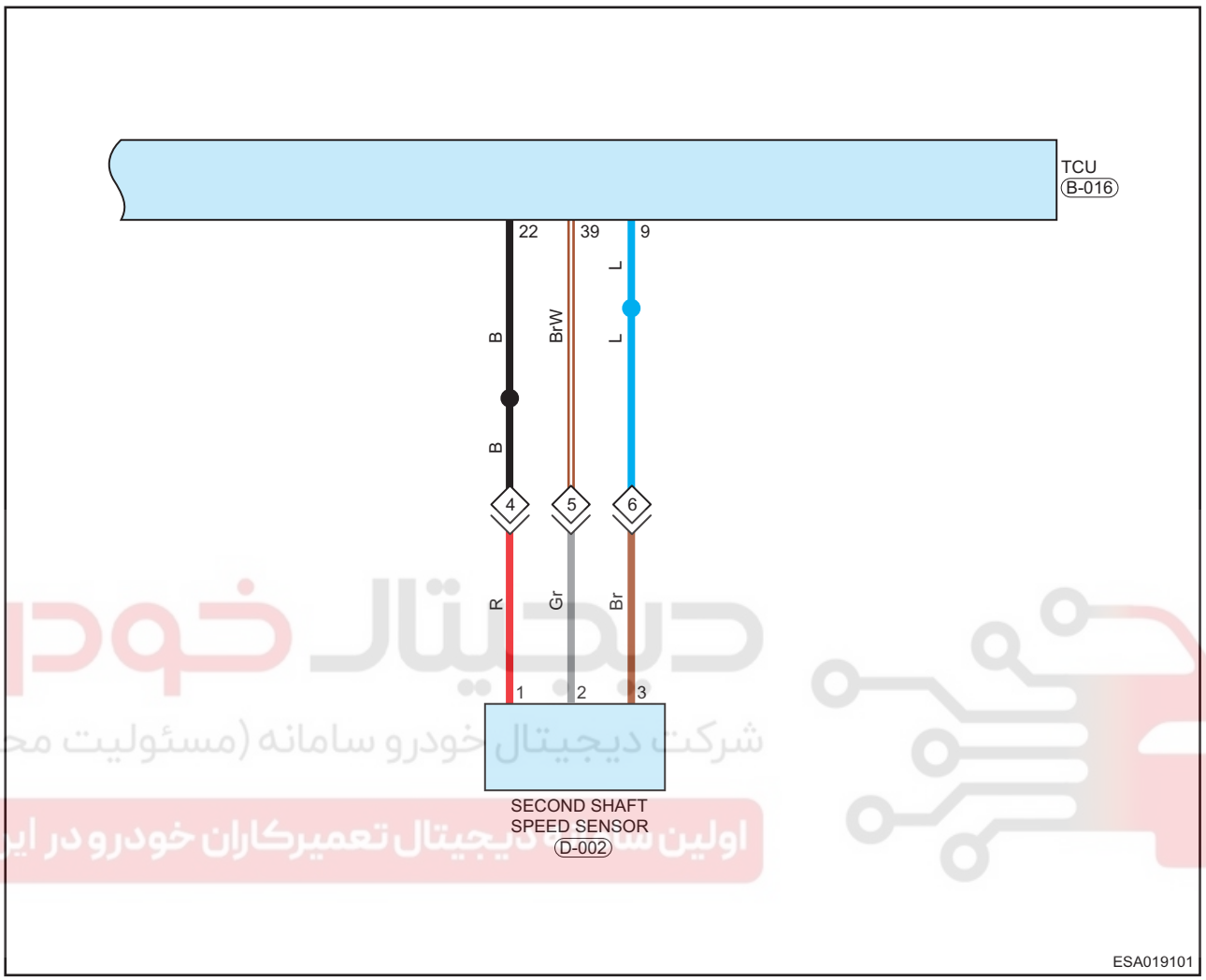
Result

Proceed to
OK
NG

OK	System operates normally
NG	Replace TCU control module assembly

DTC	P0720	Output Pulley Speed Signal Fluctuation Abnormal

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0720	Output Pulley Speed Signal Fluctuation Abnormal	• When the output speed is equal to 0 during driving, malfunction is confirmed.	• Transmission warning light turns on • Vehicle is unable to accelerate	1. Check wire harness, connector or terminal for abnormality 2. Replace output pulley shaft speed sensor 3. Replace TCU

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.

9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF12 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF10(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the second shaft speed sensor connector D-002.

Multimeter Connection	Condition	Specified Condition
D-002 (3) - B-016 (9)	Always	Continuity
D-002 (2) - B-016 (39)	Always	Continuity
D-002 (1) - B-016 (22)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK →

3	Replace second shaft speed sensor

(a) Replace the second shaft speed sensor.

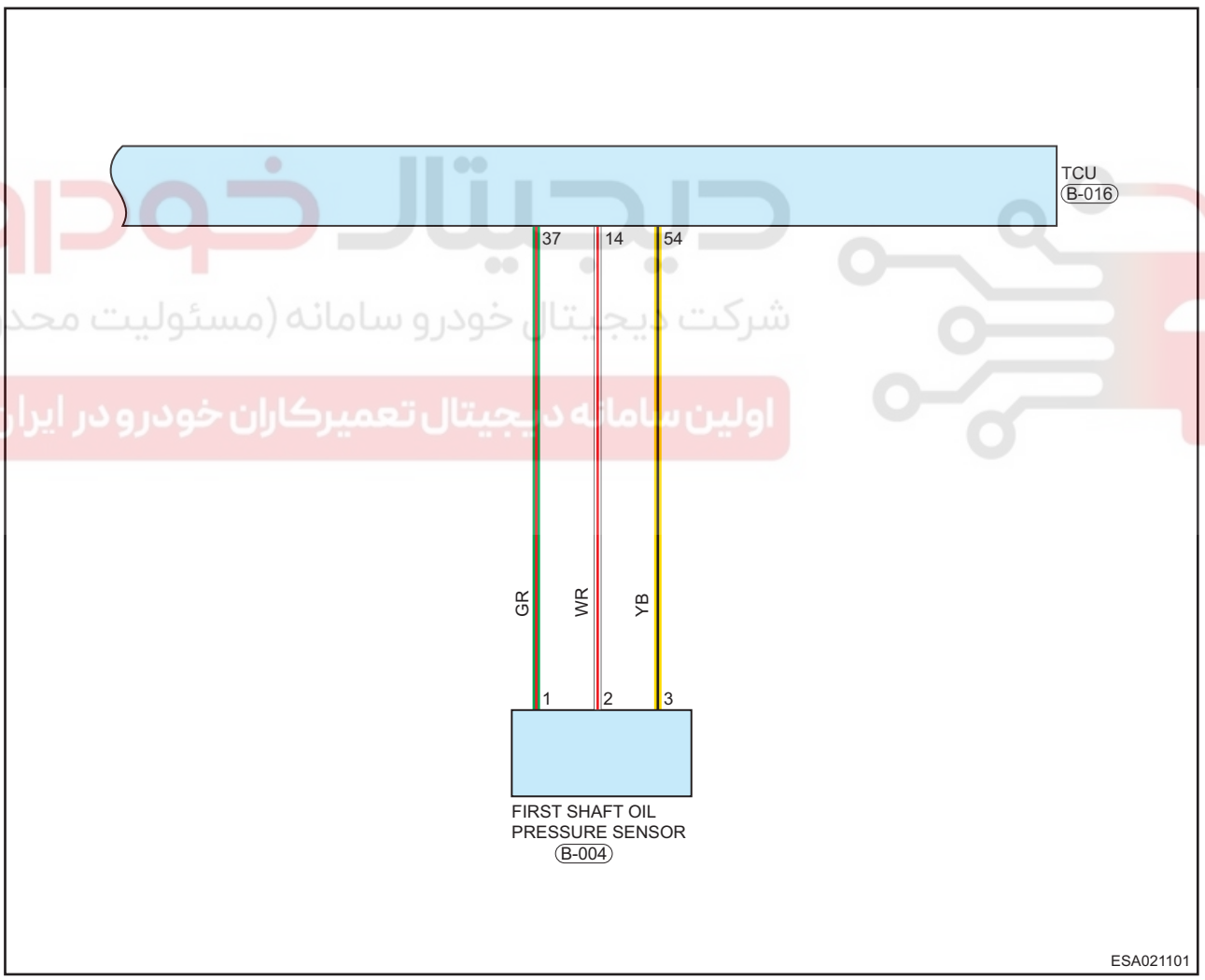
Result

Proceed to
OK
NG

OK	System operates normally
NG	Replace TCU control module assembly

DTC	P0844	Transmission Fluid Pressure Sensor A Circuit Intermittent Fault
DTC	P0845	Transmission Fluid Pressure Sensor B Circuit Fault
DTC	P0846	Transmission Fluid Pressure Sensor B Circuit Range/Performance Poor
DTC	P0849	Transmission Fluid Pressure Sensor B Circuit Intermittent Fault

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0844	Transmission Fluid Pressure Sensor A Circuit Intermittent Fault	• When the transmission pressure sensor voltage is less than or greater than the set threshold, malfunction is confirmed.	• Transmission warning light turns on • Vehicle is unable to accelerate	1. Check wire harness, connector or terminal for abnormality 2. Replace oil pressure sensor 3. Replace TCU
P0845	Transmission Fluid Pressure Sensor B Circuit Fault			
P0846	Transmission Fluid Pressure Sensor B Circuit Range/ Performance Poor	When the transmission input pulley shaft pressure sensor oil pressure is less than or greater than the set threshold, malfunction is confirmed.		
P0849	Transmission Fluid Pressure Sensor B Circuit Intermittent Fault			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

15

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK

2	Check wire harness connector

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the primary shaft oil pressure sensor connector B-004.

Multimeter Connection	Condition	Specified Condition
B-004 (3) - B-016 (54)	Always	Continuity
B-004 (2) - B-016 (14)	Always	Continuity
B-004 (1) - B-016 (37)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Replace primary shaft oil pressure sensor

(a) Replace the primary shaft oil pressure sensor.

Result

Proceed to
OK
NG

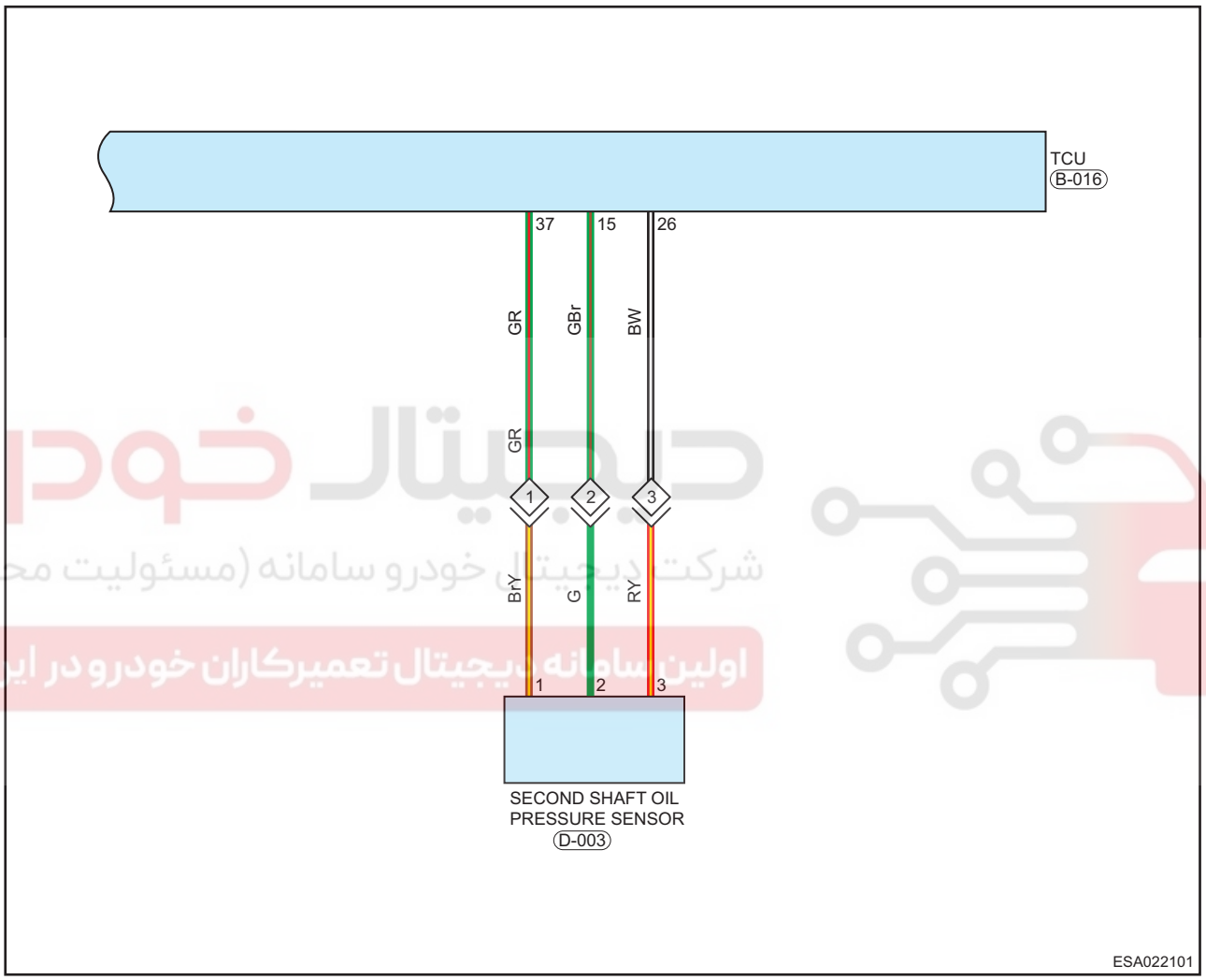
OK → **System operates normally**

NG → **Replace TCU control module assembly**

DTC	P0845	Transmission Fluid Pressure Sensor B Circuit Fault

DTC	P0846	Transmission Fluid Pressure Sensor B Circuit Range/Performance Poor

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0845	Transmission Fluid Pressure Sensor B Circuit Fault	• When the transmission output pulley shaft sensor oil pressure is less than or greater than the set threshold, malfunction is confirmed.	• Transmission warning light turns on • Vehicle is unable to accelerate	1. Check wire harness, connector or terminal for abnormality 2. Replace oil pressure sensor 3. Replace TCU
P0846	Transmission Fluid Pressure Sensor B Circuit Range/ Performance Poor			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.

2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance
Less than 1 Ω

OK
Fuse is not burned out

Result

Proceed to
OK
NG

15

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the second shaft oil pressure sensor connector D-003 and TCU connector B-016.

Multimeter Connection	Condition	Specified Condition
D-003 (3) - B-016 (26)	Always	Continuity
D-003 (2) - B-016 (15)	Always	Continuity
D-003 (1) - B-016 (37)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Replace second shaft oil pressure sensor

(a) Replace the second shaft oil pressure sensor.

Result

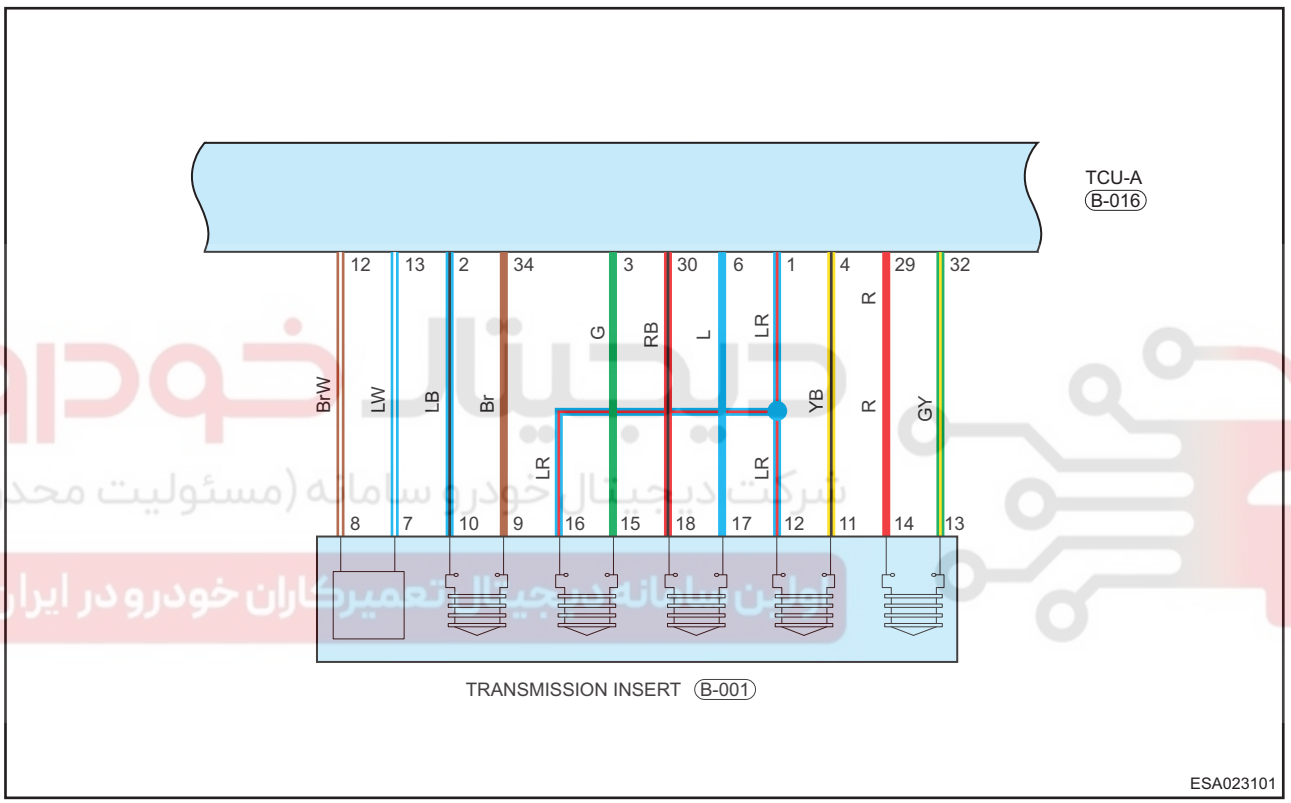
Proceed to
OK
NG

OK → **System operates normally**

NG → **Replace TCU control module assembly**

DTC	P0746	Pressure Control Solenoid Valve A Stuck Off
DTC	P0747	Pressure Control Solenoid Valve A Stuck On
DTC	P0748	Pressure Control Solenoid Valve A Electrical Fault
DTC	P0749	Pressure Control Solenoid Valve A Intermittent Fault

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0746	Pressure Control Solenoid Valve A Stuck Off	• TCU detects that the solenoid valve is short to power supply, short to ground or open circuit, malfunction is confirmed.	• Vehicle does not move when shifting • Transmission warning light turns on • Vehicle is unable to accelerate	1. Check wire harness, connector or terminal for abnormality 2. Replace transmission
P0747	Pressure Control Solenoid Valve A Stuck On			
P0748	Pressure Control Solenoid Valve A Electrical Fault			
P0749	Pressure Control Solenoid Valve A Intermittent Fault			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.

2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect TCU connector B-007 and transmission connector B-001.

Multimeter Connection	Condition	Specified Condition
B-001 (13) - B-016 (32)	Always	Continuity
B-001 (14) - B-016 (29)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Check solenoid valve

(a) Connect transmission connector B-090

Multimeter Connection	Condition	Specified Condition
B-001 (29) - B-001 (32)	Always	Resistance is 5.3 ± 0.3 Ω

Result

Proceed to
OK
NG

OK → **System operates normally**

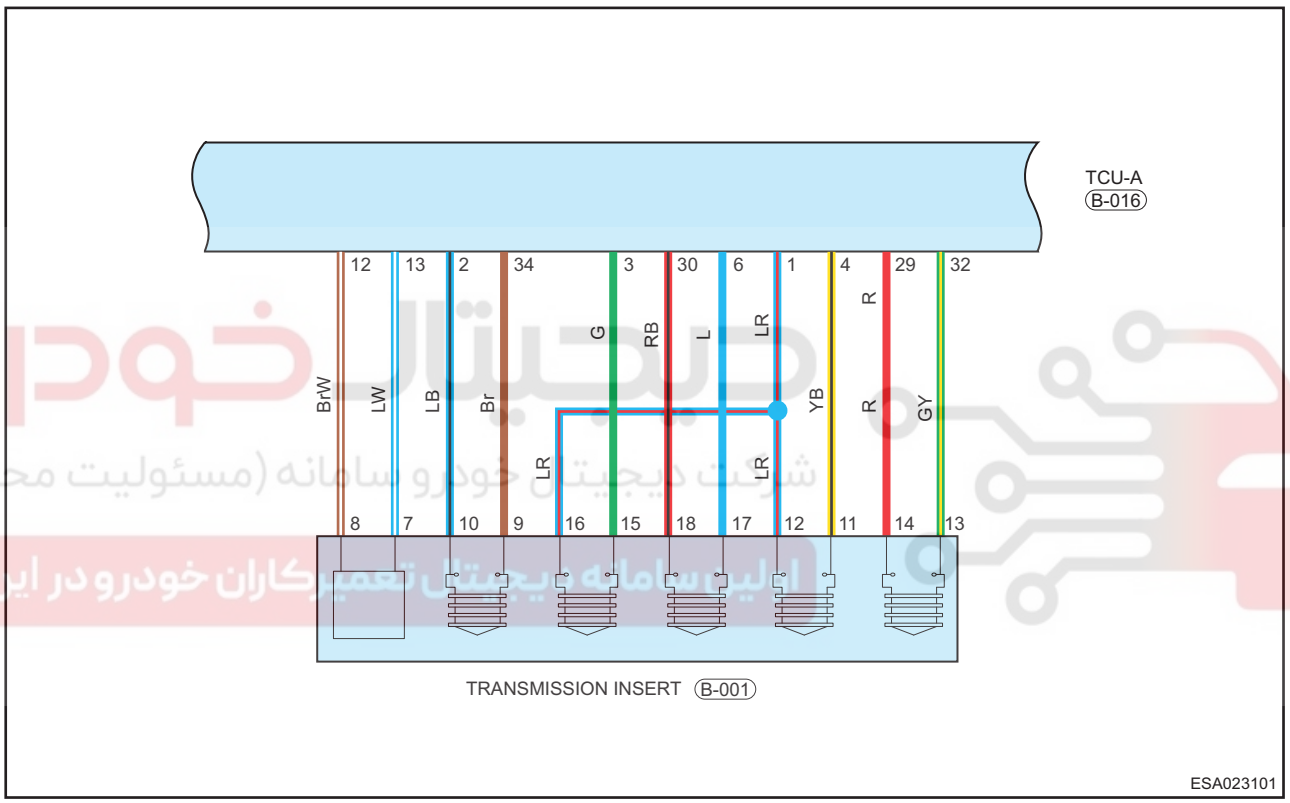
NG → **Replace transmission assembly**

DTC	P0960	Pressure Control Solenoid Valve A (Input Pulley) Control Circuit Open

DTC	P0962	Pressure Control Solenoid A (Input Pulley) Control Circuit Short

DTC	P0963	Pressure Control Solenoid A (Input Pulley) Control Circuit Short to BAT

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0960	Pressure Control Solenoid Valve A (Input Pulley) Control Circuit Open	• TCU detects that the solenoid valve is short to power supply, short to ground or open circuit, malfunction is confirmed.	• Vehicle does not move when shifting • Transmission warning light turns on • Vehicle is unable to accelerate	1. Check wire harness, connector or terminal for abnormality 2. Replace transmission
P0962	Pressure Control Solenoid A (Input Pulley) Control Circuit Short			
P0963	Pressure Control Solenoid A (Input Pulley) Control Circuit Short to BAT			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.

2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance
Less than 1 Ω

OK
Fuse is not burned out

Result

Proceed to
OK
NG

15

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect TCU connector B-016 and transmission connector B-001.

Multimeter Connection	Condition	Specified Condition
B-001 (9) - B-016 (34)	Always	Continuity
B-001 (10) - B-016 (2)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Check solenoid valve

(a) Connect transmission connector B-001

Multimeter Connection	Condition	Specified Condition
B-016 (2) - B-016 (34)	Always	Resistance is 5.3 ± 0.3 Ω

Result

Proceed to
OK
NG

OK → **System operates normally**

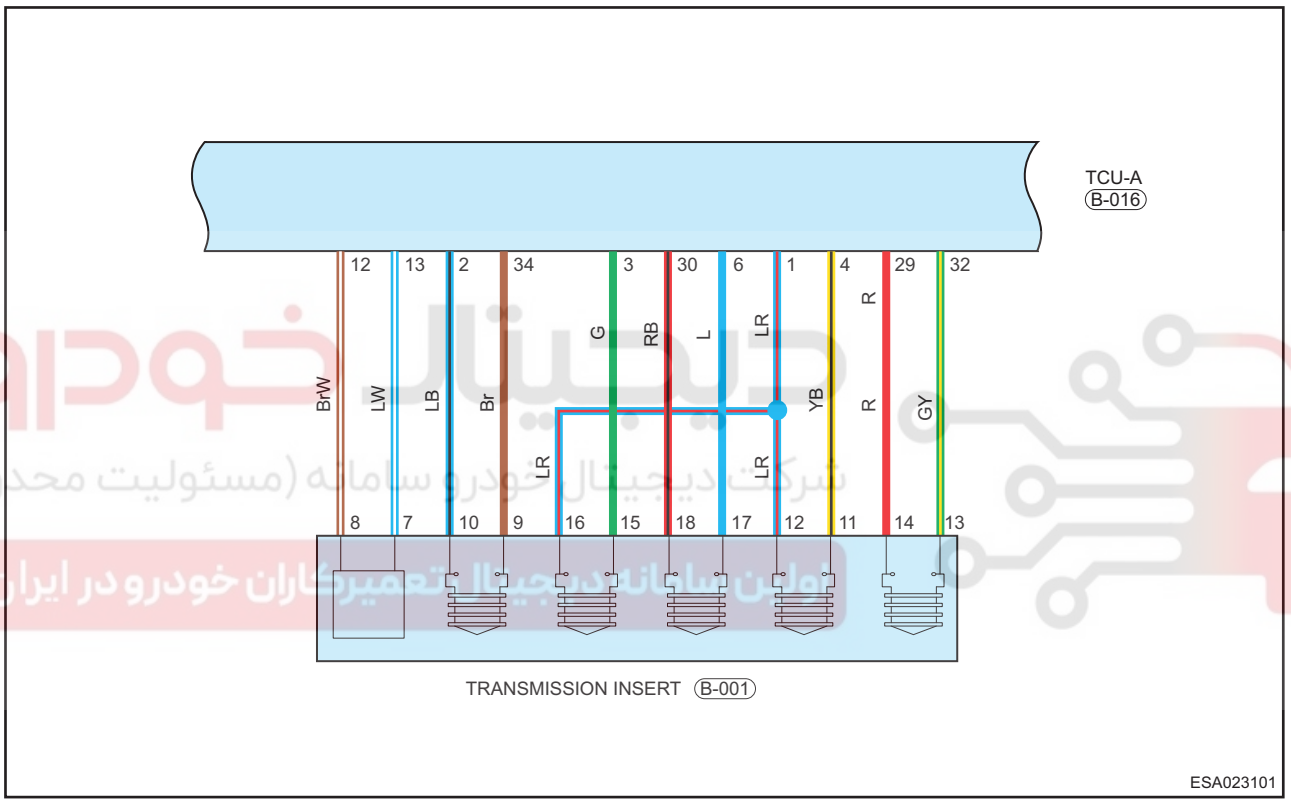
NG → **Replace transmission assembly**

DTC	P0964	Pressure Control Solenoid B (Input Pulley) Control Circuit Open

DTC	P0966	Pressure Control Solenoid B (Input Pulley) Control Circuit Short

DTC	P0967	Pressure Control Solenoid B (Input Pulley) Control Circuit Short to BAT

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0964	Pressure Control Solenoid B (Input Pulley) Control Circuit Open	• TCU detects that the solenoid valve is short to power supply, short to ground or open circuit, malfunction is confirmed.	• Vehicle does not move when shifting • Transmission warning light turns on • Vehicle is unable to accelerate	1. Check wire harness, connector or terminal for abnormality 2. Replace transmission
P0966	Pressure Control Solenoid B (Input Pulley) Control Circuit Short			
P0967	Pressure Control Solenoid B (Input Pulley) Control Circuit Short to BAT			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.

2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the TCU connector B-016 and transmission connector B-001.

Multimeter Connection	Condition	Specified Condition
B-001 (17) - B-016 (6)	Always	Continuity
B-001 (18) - B-016 (30)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Check solenoid valve

(a) Connect transmission connector B-090

Multimeter Connection	Condition	Specified Condition
B-016 (30) - B-016 (6)	Always	Resistance is 5.3 ± 0.3 Ω

Result

Proceed to
OK
NG

OK → **System operates normally**

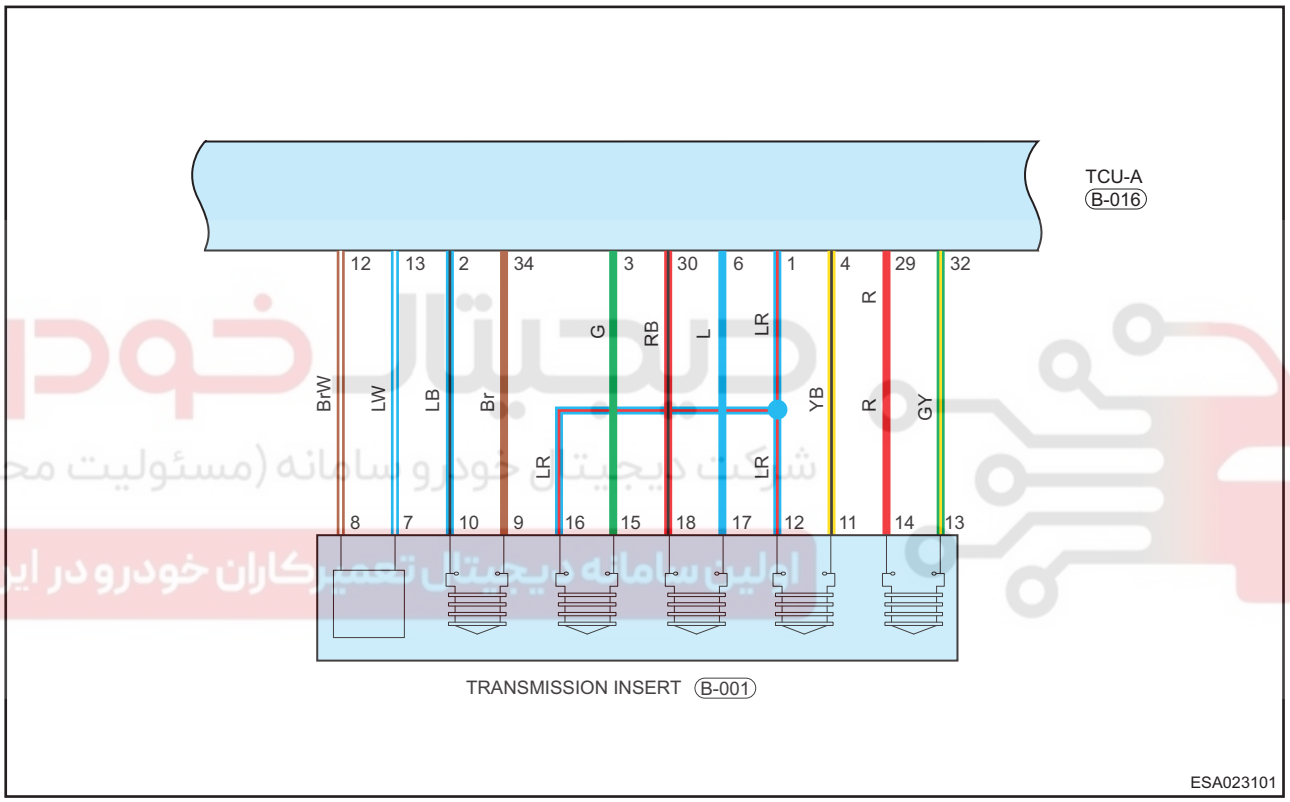
NG → **Replace transmission assembly**

DTC	P0968	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Open

DTC	P0970	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Short

DTC	P0971	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Short

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0968	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Open	• TCU detects that the solenoid valve is short to power supply, short to ground or open circuit, malfunction is confirmed.	• Hydraulic torque converter and clutch slippage • Transmission warning light turns on	1. Check wire harness, connector or terminal for abnormality 2. Replace transmission
P0970	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Short			
P0971	Pressure Control Solenoid C (Hydraulic Torque Converter) Control Circuit Short			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.

2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RE13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance
Less than 1 Ω

OK
Fuse is not burned out

Result

Proceed to
OK
NG

15

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the TCU connector B-016 and transmission connector B-001.

Multimeter Connection	Condition	Specified Condition
B-001 (11) - B-016 (4)	Always	Continuity
B-001 (12) - B-016 (1)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Check solenoid valve

(a) Connect transmission connector B-001

Multimeter Connection	Condition	Specified Condition
B-016 (1) - B-016 (4)	Always	Resistance is 5.3 ± 0.3 Ω

Result

Proceed to
OK
NG

OK → **System operates normally**

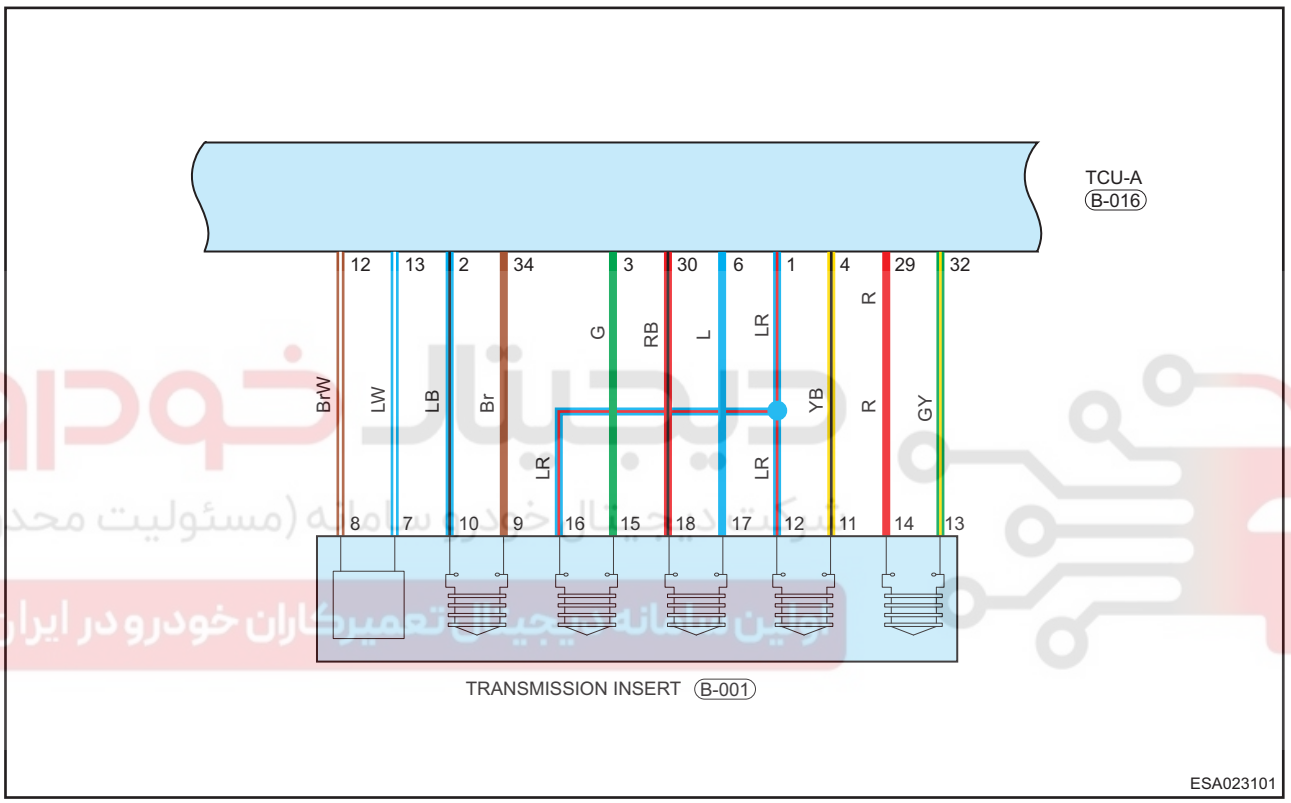
NG → **Replace transmission assembly**

DTC	P0900	Clutch Solenoid Valve Control Circuit Open

DTC	P0902	Clutch Solenoid Valve Control Circuit Short to Ground

DTC	P0903	Clutch Solenoid Valve Control Circuit Short to Power Supply

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0900	Clutch Solenoid Valve Control Circuit Open	• TCU detects that the solenoid valve is short to power supply, short to ground or open circuit, malfunction is confirmed.	• Shift shock is large • Transmission warning light turns on	1. Check wire harness, connector or terminal for abnormality 2. Replace transmission
P0902	Clutch Solenoid Valve Control Circuit Short to Ground			
P0903	Clutch Solenoid Valve Control Circuit Short to Power Supply			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.

6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the TCU connector B-016 and transmission connector B-001.

Multimeter Connection	Condition	Specified Condition
B-001 (15) - B-016 (3)	Always	Continuity
B-001 (16) - B-016 (1)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Check solenoid valve

(a) Connect transmission connector B-001

Multimeter Connection	Condition	Specified Condition
B-016 (1) - B-016 (3)	Always	Resistance is 5.3 ± 0.3 Ω

Result

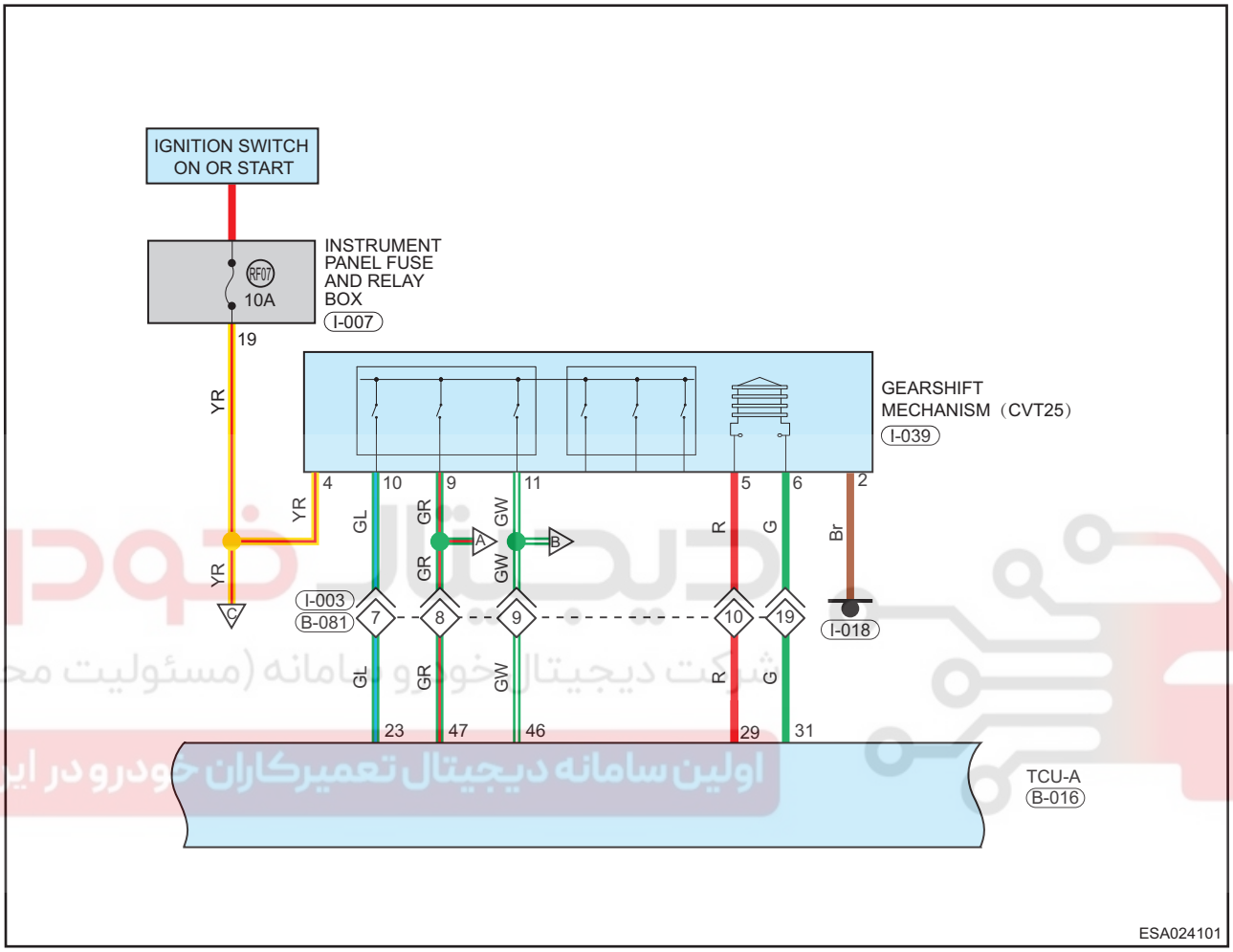
Proceed to
OK
NG

OK	System operates normally
NG	Replace transmission assembly

DTC	P1900	Clutch Solenoid Valve Control Circuit Fault

DTC	P1928	Shift-Lock Solenoid Valve Control Circuit Fault

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P1900	Clutch Solenoid Valve Control Circuit Fault	• When the feedback current of the P-lock solenoid valve is less than or greater than the set threshold, malfunction is confirmed.	• Shift lever cannot shift from P • Transmission warning light turns on	1. Check wire harness, connector or terminal for abnormality 2. Replace gear shift mechanism assembly
P1928	Shift-Lock Solenoid Valve Control Circuit Fault			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.

7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse RF07 in engine compartment fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse RF07(10A) in engine compartment fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance
Less than 1 Ω

OK
Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the TCU connector B-016.

Multimeter Connection	Condition	Specified Condition
I-039 (11) - B-016 (31)	Always	Continuity
I-039 (9) - B-016 (29)	Always	Continuity

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK →

3	Check solenoid valve

(a) Connect gear shift mechanism connector I-039

Multimeter Connection	Condition	Specified Condition
B-016 (29) - B-016 (31)	Always	Resistance is 10 - 32 Ω

Result

Proceed to
OK
NG

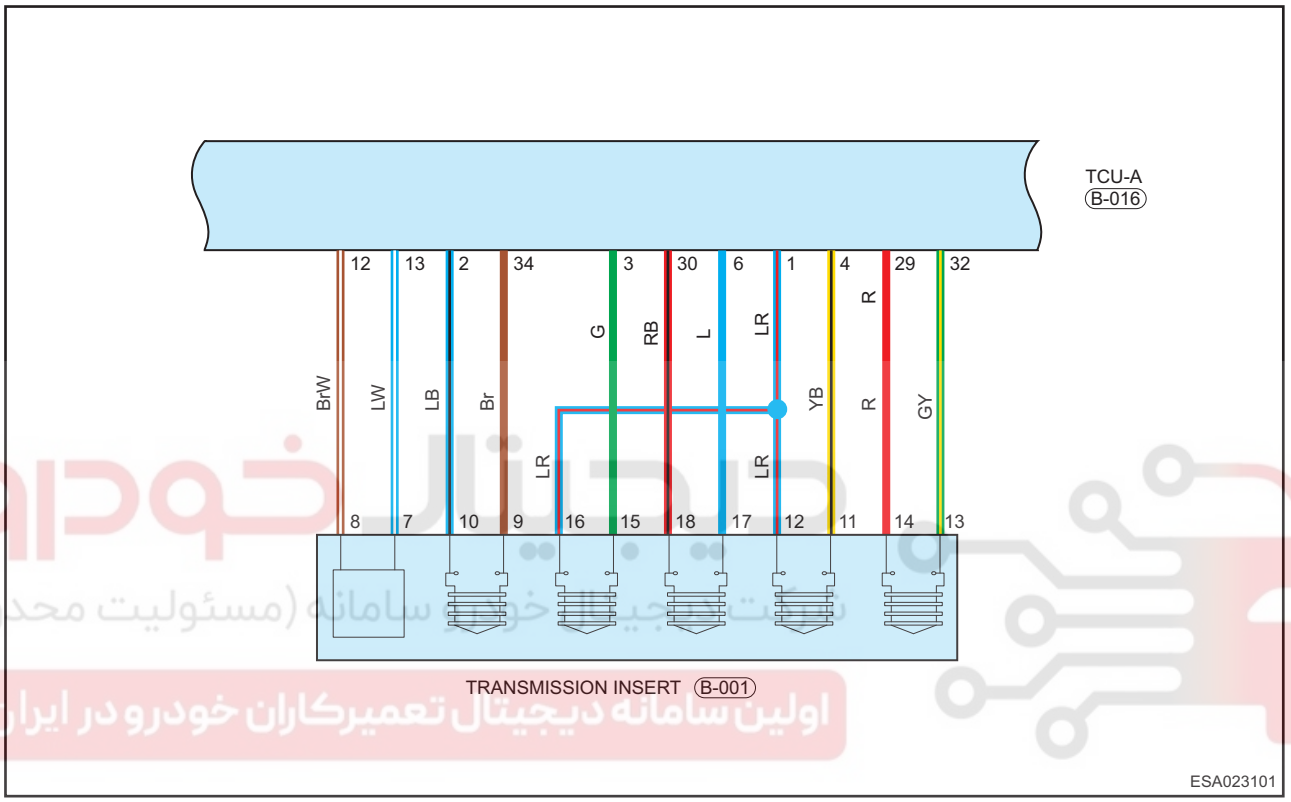
OK → **System operates normally**

NG → **Replace gear shift mechanism assembly**

DTC	P0939	Transmission Oil Temperature Sensor Circuit Short to GND

DTC	P0940	Transmission Oil Temperature Sensor Circuit Short to BAT or Open

Circuit Diagram



Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0939	Transmission Oil Temperature Sensor Circuit Short to GND	• When the CVT oil temperature sensor voltage exceeds the threshold, malfunction is confirmed.	• Vehicle is unable to accelerate • Transmission warning light turns on	1. Check wire harness, connector or terminal for abnormality 2. Replace transmission assembly
P0940	Transmission Oil Temperature Sensor Circuit Short to BAT or Open			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.

9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect TCU connector B-016 and measure the resistance between B-016 (12) and B-016 (13). For details, refer to the table below.

Temperature (°C)	Resistance (KΩ)
-40	120.3333
-30	66.7653
-20	38.6509
-10	23.2365
0	14.4494
10	9.2621
20	6.1021
30	4.1213
40	2.8472
50	2.008
60	1.4438
70	1.0559
80	0.7847
90	0.5919
100	0.4527

Temperature (°C)	Resistance (KΩ)
110	0.3509
120	0.2753

Hint:
Resistance error is around 10%

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness and connector**

OK

3	Check oil temperature sensor

(a) Pull out the oil temperature sensor wire harness connector and observe if the oil temperature sensor is normal.

Result

Proceed to
OK
NG

OK → **System operates normally**

NG → **Replace transmission assembly**

DTC	P0938	Transmission Oil Temperature High

Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
P0938	Transmission Oil Temperature High	• When the oil temperature is greater than 128°C or 135°C, malfunction is confirmed.	• Vehicle is unable to accelerate • Transmission warning light turns on	1. Replace transmission assembly

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	**Check fuse EF13 in engine compartment fuse and relay box and fuse RF13 in instrument panel fuse and relay box**

15

(a) Turn ENGINE START STOP switch to OFF
(b) Disconnect the negative battery cable.
(c) Find fuse EF13(7.5A) in engine compartment fuse and relay box.
Find fuse RF13(20A) in instrument panel fuse and relay box.
(d) Check resistance of fuse.

Standard Resistance
Less than 1 Ω

OK
Fuse is not burned out

Result

Proceed to
OK
NG

NG → **Replace fuse**

OK

2	Check wire harness connector

(a) Check whether the connector is loose, the connection is poor, the appearance is damaged, etc.
(b) Disconnect the TCU connector B-016 and measure the resistance between B-016 (12) and B-016 (13) as detailed in the table below.

Temperature (°C)	Resistance (KΩ)
-40	120.3333
-30	66.7653
-20	38.6509
-10	23.2365
0	14.4494
10	9.2621
20	6.1021
30	4.1213
40	2.8472
50	2.008
60	1.4438
70	1.0559
80	0.7847
90	0.5919
100	0.4527
110	0.3509
120	0.2753

Hint:
Resistance error is around 10%

Result

Proceed to
OK
NG

15

NG → **Repair or replace wire harness and connector**

OK

3	Check position and line of transmission oil cooler

(a) Check if position and line of transmission oil cooler are normal.
Check if vehicle fan is working properly.

Result

Proceed to
OK
NG

OK → **System operates normally**

NG → **Replace transmission assembly**

DTC	U0100	ECM Communication Fault

DTC	U0121	ABS Communication Fault

DTC	U0401	ECM Data Received Abnormal

Description

DTC	DTC Definition	Malfunction Condition	Possible Effects of Malfunction	Repair Recommendation
U0100	ECM Communication Fault	• The TCU cannot acquire or receive signals on the CAN network.	• Vehicle is unable to accelerate • Shift is abnormal • Apply parking brake and turn off vehicle • Vehicle LimpHome • Vehicle CAN network is abnormal • Abnormal TCU operation	1. Related controller sensor failure 2. Abnormal vehicle CAN network
U0121	ABS Communication Fault			
U0401	ECM Data Received Abnormal			

Confirmation Procedure

Confirm that battery voltage is no less than 12 V before performing following procedures.

1. Turn ENGINE START STOP switch to ON.
2. Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
3. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
4. If DTC cannot be deleted, malfunction is current.
5. Only use a digital multimeter to measure voltage of electronic system.
6. Refer to any Technical Bulletin that may apply to this malfunction.
7. Visually check the related wire harness.
8. Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
9. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Caution:

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	Check fuse

(a) Check resistance of corresponding fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Proceed to
OK
NG

NG	Replace fuse

OK

2	Check sensor

(a) Check if the corresponding sensor and wire harness are abnormal.

Result

Proceed to
OK
NG

NG → **Repair or replace wire harness or corresponding sensor**

OK

3	Check CAN network

(a) Check if the vehicle CAN network is abnormal.

Result

Proceed to
OK
NG

OK → **System operates normally**

NG → **Check and repair CAN network**

ON-VEHICLE SERVICE

Transmission Oil

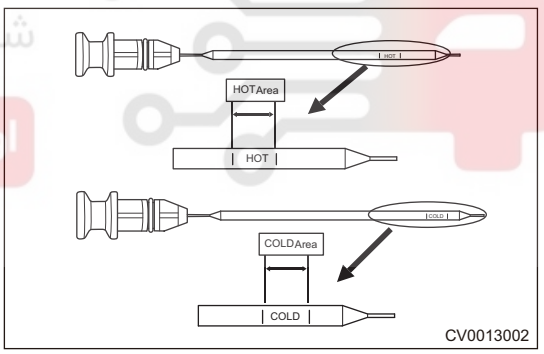
Automatic transmission oil is a very important component that provides hydraulic transmission, lubrication, cooling and other functions during the operation of automatic transmission.

Maintenance Period

1. In order to extend the service life of the transmission, it is required to replace the transmission oil once when the vehicle is traveling 40,000 km, and then it is not necessary to replace it.

Transmission Oil Level Inspection

1. After the vehicle has been running on the road for a period of time, the transmission oil temperature reaches 80 ± 5°C or 25 ± 5°C (it can be measured with a diagnostic tester).
2. Stop the vehicle on a level surface and pull up the parking brake handle.
3. When the engine is running at idle speed, depress the brake pedal, shift the gears in the order of R, N and D for three cycles (A reciprocating motion for each cycle), each gear is kept for 5 s, and finally shift the shift lever to "P" or "N" position.
4. Wipe off dust and oil stains around the oil dipstick
5. Pull out the oil dipstick from oil dipstick sleeve, wipe it with lint-free paper and insert it into the sleeve to prevent foreign matter from falling into the transmission
6. Pull out the oil dipstick and record the scale position



If the oil level is within the corresponding scale range, the oil level is normal.
If the oil level is not within corresponding scale range, refill or drain oil until oil level is in the middle of corresponding range to achieve best performance of the transmission.

7. Finally, insert the oil dipstick into the sleeve and ensure that it is installed in place.

Inspection of Oil Status

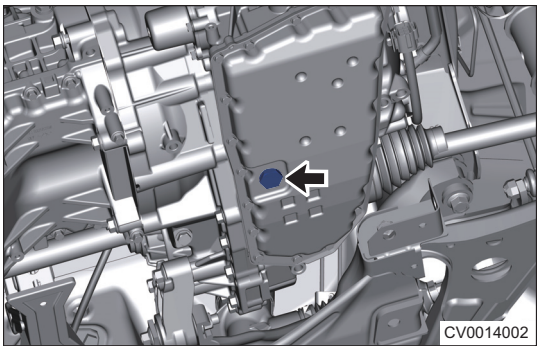
1. The new transmission oil should be light yellow, but light yellow is not the quality indicator of the oil. As the vehicle is used, the color of the oil will gradually deepen and eventually become light brown:
   - If the oil is dark brown with burnt smell, change it and check vehicle condition;
   - If the oil is milky white or turbid, It indicates that the water enters the oil; change the oil, check the leakage point and confirm whether the transmission is damaged.
   - If the oil is black and mixed with a large amount of powder, there is abnormal wear in CVT, and the transmission needs to be repaired.

Transmission Oil Draining/Refilling

Warning/Caution/Hint:

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing or inspecting the lifted vehicle.

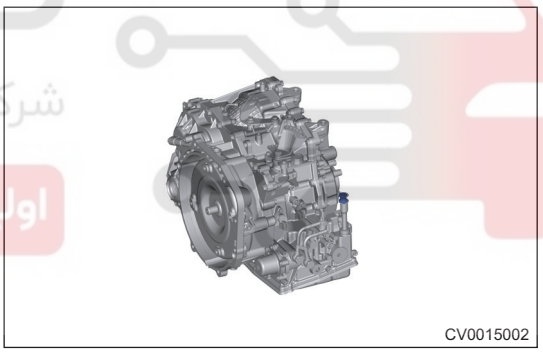
1. Raise vehicle with a lift.
2. Remove the transmission drain plug.



Caution:

- Drain plug and plug washer are non-reusable components, and replace them after removal.

3. Drain the transmission oil.
4. Then re-tighten the drain plug; do not miss the seal washer.
5. Pull out the oil dipstick assembly and fill the new transmission oil from mounting port.



Caution:

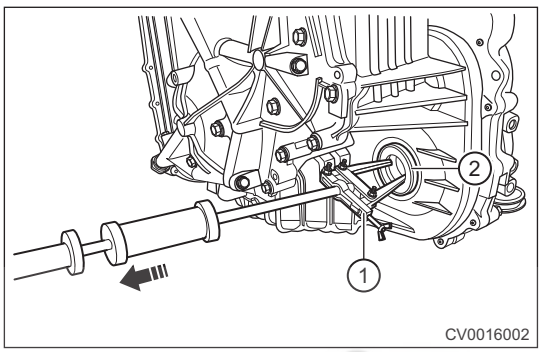
- When replacing, the filling amount is the drained transmission oil amount
- If the transmission is newly changed, it does not need to drain oil, and it can be directly added with 5.8 ± 0.1 L of oil.

Differential Oil Seal

Warning/Caution/Hint:
Caution:
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

Removal

1. Drain the transmission oil (See page 15-82).
2. Remove the front left wheel.
3. Remove the left drive shaft (See page 16-5).
4. Use a special tool to remove left drive shaft oil seal from transmission assembly.

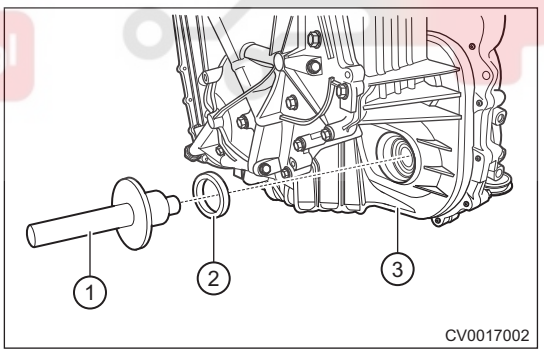


Caution:
- Drive shaft oil seal is a non-reusable component, and replace it after removal.

5. Removal is completed.

Installation

1. Installation is in the reversed order of removal



Caution:
- Apply a proper amount of MP grease to new oil seal lip.
- Use special tool and hammer to install left drive shaft oil seal to transmission assembly.
- Do not damage oil seal lip during installation.
- Drive shaft oil seal is a non-reusable component, and replace it after removal.
- Add specified transmission oil.

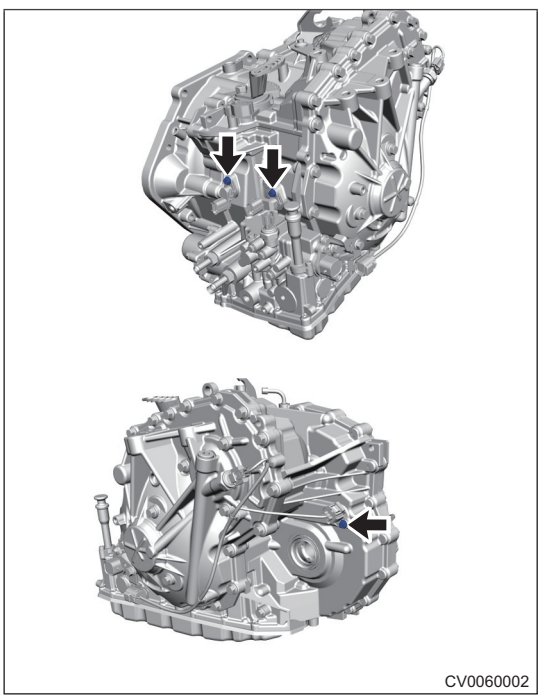
Speed Sensor

Removal

1. Turn off electrical equipments and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly (See page 08-9).
4. Remove the battery tray assembly (See page 14-10).
5. Disconnect the speed sensor connector.
6. Remove fixing bolt and speed sensor.

Installation

1. Install speed sensor and tighten bolts in place.



Tightening torque

8 - 10 N·m

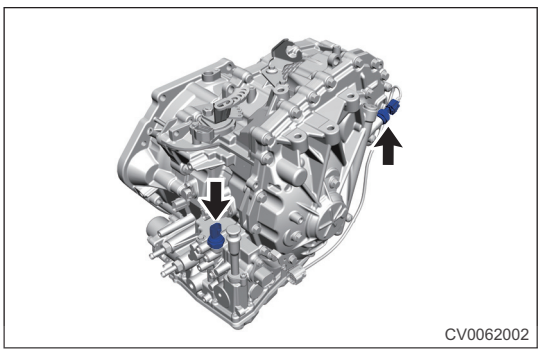
Caution:

- Apply proper amount of automatic transmission oil to sensor O-ring.

Oil Pressure Sensor

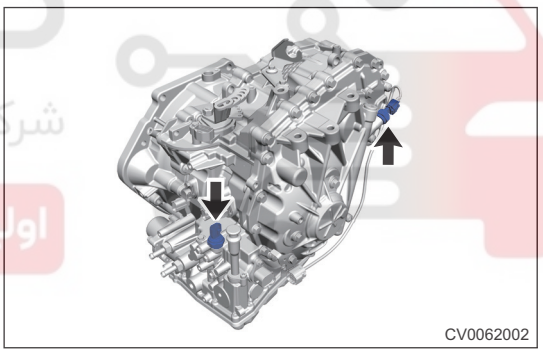
Removal

1. Turn off electrical equipments and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly (See page 08-9).
4. Remove the battery tray assembly (See page 14-10).
5. Disconnect the oil pressure sensor connector.
6. Remove the oil pressure sensor.



Installation

1. Install the oil pressure sensor and tighten it in place.



Tightening torque
15 - 22 N·m

Caution:

- Apply proper amount of automatic transmission oil to the sensor O-ring.

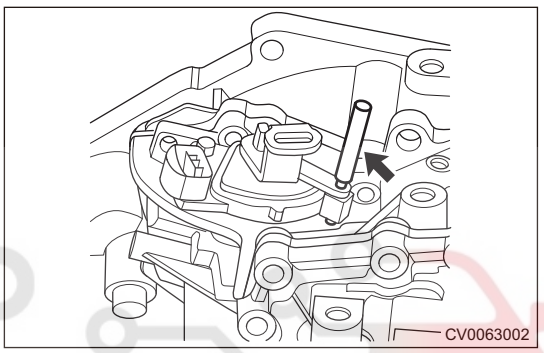
Shift Cable

Warning / Caution / Hint:

- When removing and installing the shift cable bracket, be sure to use the dowel pin correctly according to the requirements to avoid gear disorder and other faults.

Removal

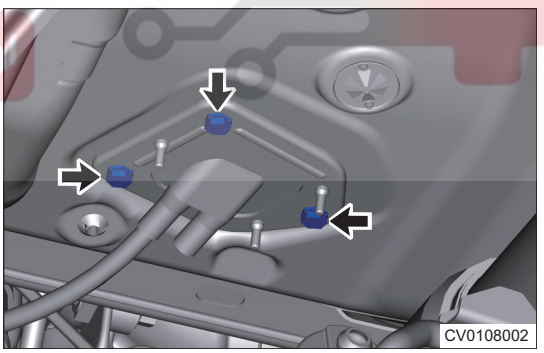
1. Shift the shift lever to N gear (transmission shift arm should be in N position correspondingly).
2. Turn off electrical equipments and ENGINE START STOP switch.
3. Disconnect the negative battery cable.
4. Remove the battery (See page 14-8).
5. Remove the battery tray (See page 14-10).
6. Remove the auxiliary fascia console assembly.
7. At this time, the positioning hole on the shift arm is aligned with the positioning hole on the gear switch and the dowel pin is inserted into it.



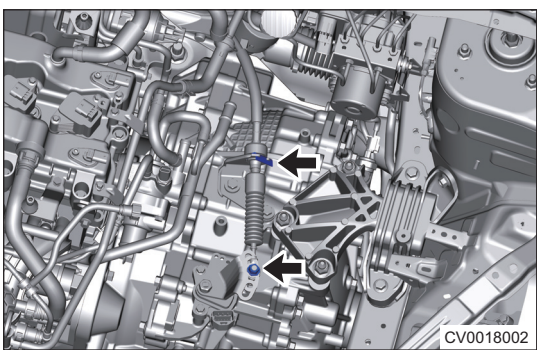
8. Disconnect shift cable from shift control mechanism.
9. Remove 2 fixing bolts (arrows) of shift cable dust boot from body.

Tightening torque

8 - 10 N·m



10. Remove fixing nut and clip from shift cable.



11. Remove 2 fixing bolts between shift cable and vehicle body.
12. Remove the shift cable.

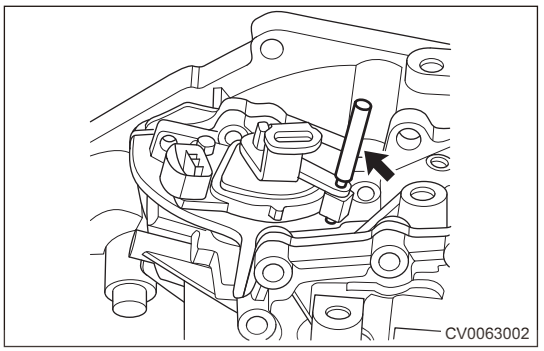
Installation

1. Installation is in the reversed order of removal.

Shift Arm, Gear Switch

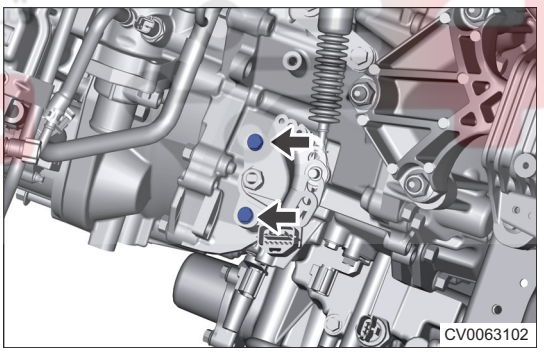
Removal

1. Turn off electrical equipments and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery assembly (See page 14-8).
4. Remove the battery tray assembly (See page 14-10).
5. The positioning hole on the shift arm is aligned with the positioning hole on gear switch and the dowel pin is inserted into it.



6. Remove fixing nut from shift arm.
7. Remove the spring washer.
8. Remove the dowel pin.
9. Remove the shift arm.
10. Remove 2 fixing bolts and gear switch.

Tightening torque
8 - 10 N·m



Caution:
- During removal and installation, the whole vehicle is in N gear.

Installation

1. Installation is in the reversed order of removal

Cooling Pipe Assembly

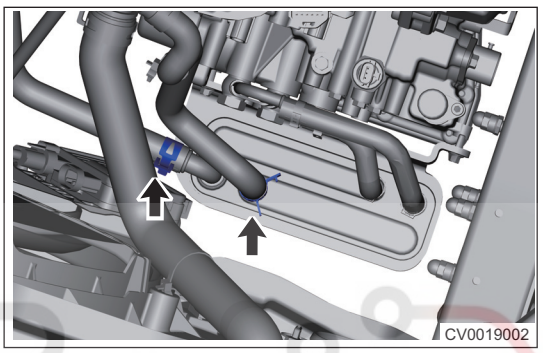
Warning/Caution/Hint:

- During removal and installation, do not operate violently to avoid damaging the transmission oil pipe assembly.
- Avoid foreign objects entering the transmission from the oil pipe assembly nozzle.
- The transmission cooling hose is connected to the internal oil passage of the transmission, so it is necessary to ensure that the inside of hose is clean.

Removal

1. Drain the transmission oil (See page 11-9).
2. Remove the water tank lower protector assembly.
3. Using a suitable clamp plier, loosen the clamp and remove the cooling oil inlet pipe and return pipe assembly.

   Tightening torque
   40 - 45 N·m



Warning/Caution/Hint:

- Be sure to fasten the clamp to correct position during installation.

Installation

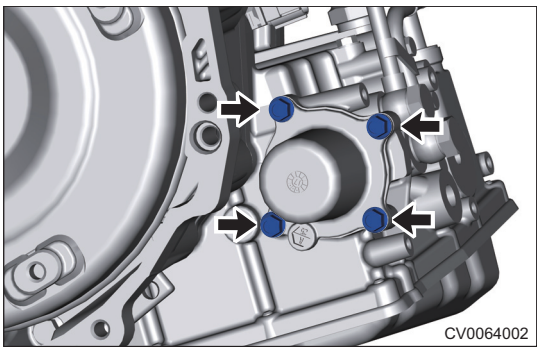
1. Installation is in the reversed order of removal.

External Filter

Removal

1. Drain the transmission oil (See page 15-82).
2. Remove the water tank lower protector assembly.
3. Remove 4 fixing bolts between external filter case and transmission.

   Tightening torque
   8 - 10 N·m



4. Remove the external filter case.
5. Remove the external filter assembly.
6. Remove the gasket.

Installation

1. Installation is in the reversed order of removal.

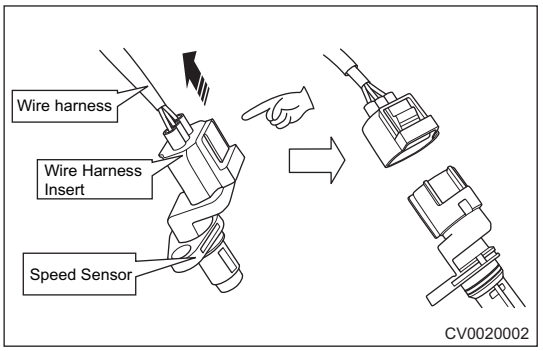
Speed Sensor Connector

Warning/Caution/Hint:

- The connection of connectors mostly uses injection-molded clip structure. Do not pull it strongly to avoid the sensor breaking, clip loosening/breaking and wire harness breaking.
- Make sure the connector is inserted in place during installation: when it is inserted, it will make a "click" sound.

Removal

1. Press the connector lock mechanism (arrow).



2. Remove the wire harness connector.
3. Removal is completed.

Installation

1. Installation is in the reversed order of removal.

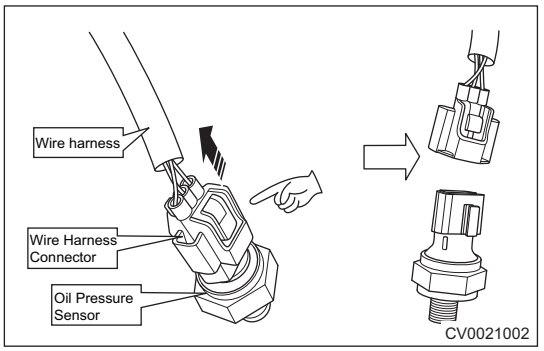
Oil Pressure Sensor Connector

Warning/Caution/Hint:

- The connection of the connectors is mostly an injection-molded buckle structure. Do not pull it strongly to avoid the sensor breaking, buckle loosening / breaking and wire harness breaking.
- Make sure the connector is inserted in place during installation: when it is inserted, it will make a "click" sound.

Removal

1. Press the connector lock mechanism (arrow).



2. Remove the wire harness connector.
3. Removal is completed.

Installation

1. Installation is in the reversed order of removal.

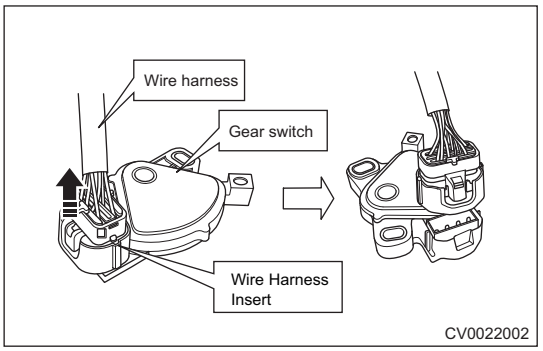
Gear Switch Connector

Warning/Caution/Hint:

- The connection of connectors mostly uses injection-molded clip structure. Do not pull it strongly to avoid the sensor breaking, clip loosening/breaking and wire harness breaking.
- Make sure the connector is inserted in place during installation: when it is inserted, it will make a "click" sound.

Removal

1. Press the connector lock mechanism (arrow).



2. Remove the wire harness connector.
3. Removal is completed.

Installation

1. Installation is in the reversed order of removal.

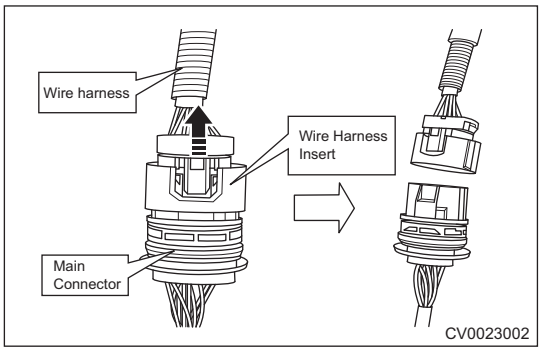
Wire Harness Main Connector

Warning/Caution/Hint:

- The connection of connectors mostly uses injection-molded clip structure. Do not pull it strongly to avoid the sensor breaking, clip loosening/breaking and wire harness breaking.
- Make sure the connector is inserted in place during installation: when it is inserted, it will make a "click" sound.

Removal

1. Press the connector lock mechanism (arrow).



2. Remove the wire harness connector.
3. Removal is completed.

Installation

1. Installation is in the reversed order of removal.

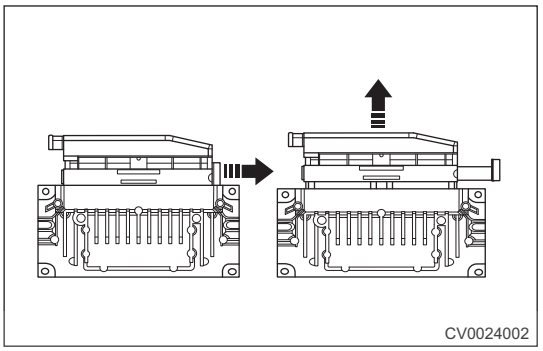
Transmission Control Module Connector

Warning/Caution/Hint:

- The connection of connectors mostly uses injection-molded clip structure. Do not pull it strongly to avoid the sensor breaking, clip loosening/breaking and wire harness breaking.
- Make sure the connector is inserted in place during installation: when it is inserted, it will make a "click" sound.

Removal

1. Pull the connector to the right (arrow).
2. Then lift up the connector (arrow).



3. Remove the wire harness connector.
4. Removal is completed.

Installation

1. Installation is in the reversed order of removal.

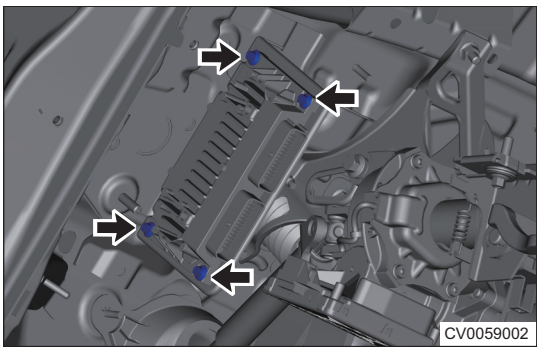
Transmission Control Module

Removal

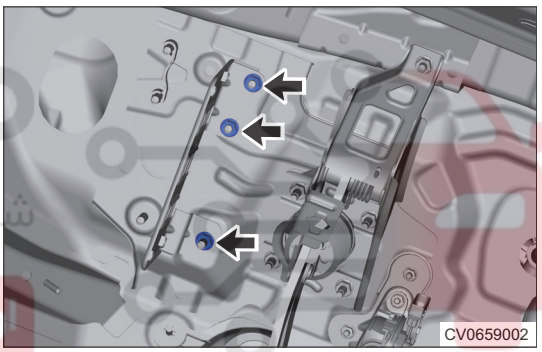
1. Turn off electrical equipments and ignition switch.
2. Disconnect the negative battery cable.
3. Disconnect the transmission control module connector.
4. Remove 4 fixing bolts (arrow) from transmission control module.

   Tightening torque

   6 ± 1 N·m



5. Removal is completed.
6. Remove 3 fixing nuts (arrow) from transmission control module bracket.



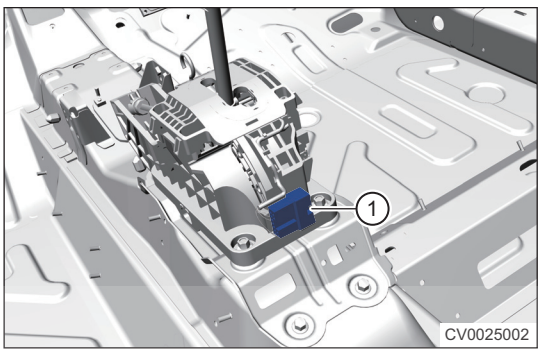
Installation

1. Installation is in the reversed order of removal.

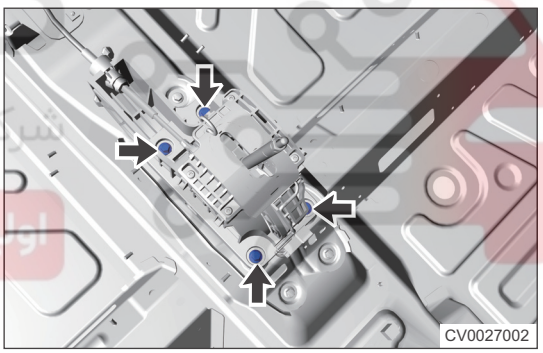
Gear Shift Mechanism Controller

Removal

1. Pull up the parking brake.
2. Shift to N position.
3. Turn ignition switch to OFF.
4. Disconnect the negative battery cable.
5. Remove the auxiliary fascia console assembly (See page 42-6).
6. Disconnect connection between shift cable and gear shift controller.
7. Disconnect the gear shift mechanism controller wire harness connector (1).



8. Remove fixing bolts (arrow) from gear shift mechanism controller.



9. Removal is completed.

Installation

1. Installation is in the reversed order of removal.

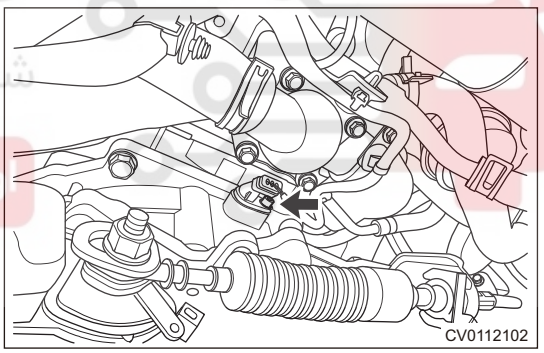
Transmission Assembly

Warning/Caution/Hint:
Caution:

- The transmission oil should be drained before powertrain is removed.
- When disassembling the transmission, make sure that the bolt connecting the hydraulic torque converter and the flexible disc is removed first. The hydraulic torque converter is separated from the engine together with the transmission, and engine and transmission are kept as coaxial as possible to avoid the hydraulic torque converter from detaching or falling off.
  (a) If the hydraulic torque converter accidentally falls off and needs to be reinstalled, do not forcibly install it to avoid damaging the internal components of transmission.
  (b) The hydraulic torque converter is a high-precision component with high requirements for moment of inertia. If it is accidentally bumped and deformed, it needs to be replaced.
- While separating engine and transmission, be careful not to damage the accessories of transmission, such as cooling hoses, pressure sensors, etc. If damaged, replace them as required.

Removal

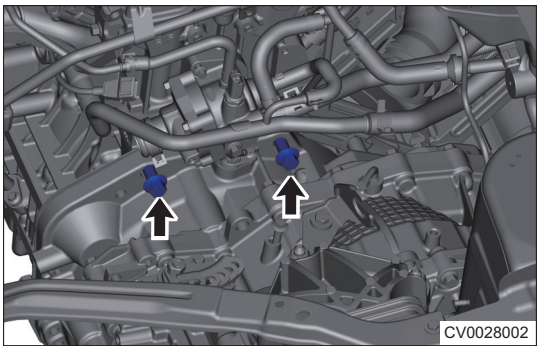
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery (See page 14-8).
4. Remove the battery tray (See page 14-10).
5. Remove the air filter assembly (See page 08-9).
6. Remove the crankshaft position sensor.
   (a) Disconnect the crankshaft position sensor connector.
   (b) Remove fixing bolt (arrow) from crankshaft position sensor.



   (c) Remove the crankshaft position sensor.
7. Remove front tire.
8. Remove the tank lower protector.
9. Drain the transmission oil (See page 15-82).
10. Drain the coolant (See page 10-8).
11. Remove the drive shaft (See page 16-5).
12. Remove the transmission ground wire, disconnect the speed sensor connector and the oil pressure sensor connector and remove the wire harness.
13. Remove fixing nut between shift cable and gear switch.
14. Remove the cooling oil pipe assembly.
15. Use an engine equalizer to hang the engine.
16. Remove the starter (See page 13-8).
17. Remove the left mounting (See page 05-51).
18. Remove the rear mounting (See page 05-52).
19. Remove the drive shaft guide plate.
20. Remove the transmission.

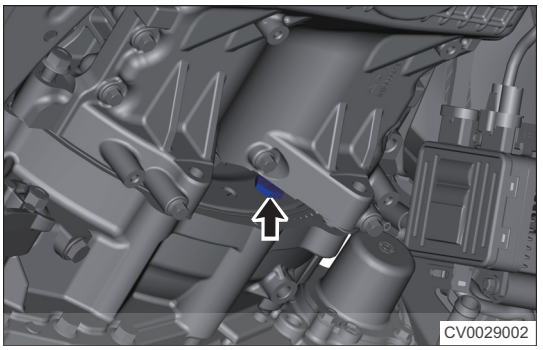
(a) Remove 2 fixing bolts between upper part of transmission and engine.

Tightening torque
60 ± 5 N·m

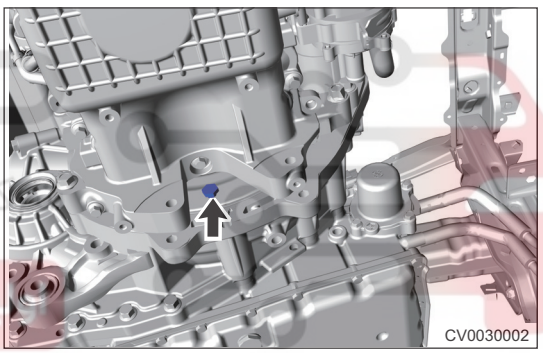


(b) Remove 2 fixing bolts between dust shield and transmission, remove the dust shield.

Tightening torque
50 ± 5 N·m



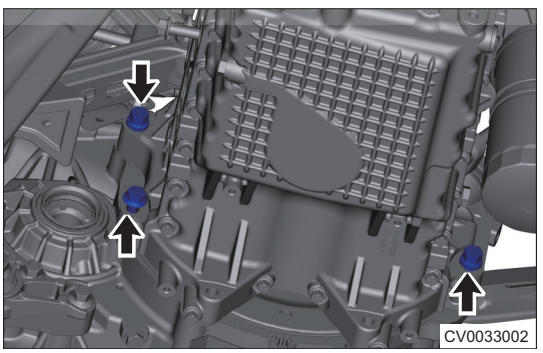
(c) Remove the hydraulic torque converter fixing bolts (4 in total, evenly distributed in the circumference).



(d) Use a transmission bracket to support the transmission assembly.

(e) Remove 3 fixing bolts between transmission and engine.

Tightening torque
60 ± 5 N·m



(f) Separate engine and transmission with a pry bar.
(g) Pull transmission to separate it from engine.

Warning/Caution/Hint:
Caution:

- During assembly, attention should be paid to ensure that the torque converter does not come out.
  (a) If the hydraulic torque converter accidentally falls off and needs to be reinstalled under the guidance of relevant technicians, do not forcibly install it to avoid damaging the internal components of transmission.
  (b) The hydraulic torque converter is a high-precision component with high requirements for moment of inertia. If it is accidentally bumped and deformed, it needs to be replaced.

(c) A 1.5 mm thick dust gasket is also designed between transmission and engine for some vehicles, install it in place.

Installation

1. Installation is in the reversed order of removal.
2. Add specified transmission oil.

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