CVT25

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. CVT25 has adopted a large number of new technologies to further realize energy conservation and emission reduction:

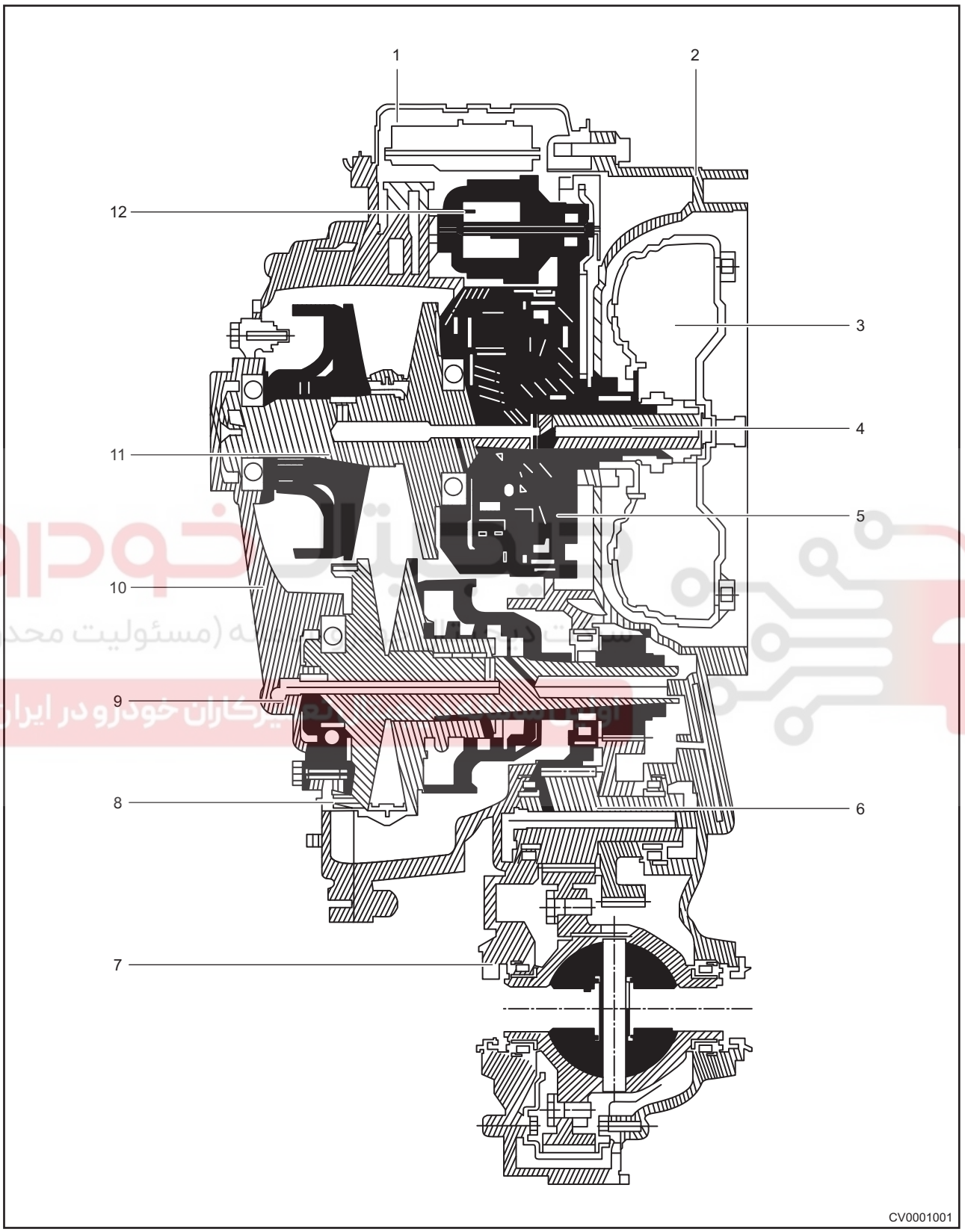
1. It adapts advanced double-acting vane pump with high volumetric efficiency and low leakage, which is built in flow control valve, reducing power loss.
2. Independent hydraulic circuit control is adopted to provide accurate operating pressure for each system, greatly improving system efficiency.
3. 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 lock 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 plates 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

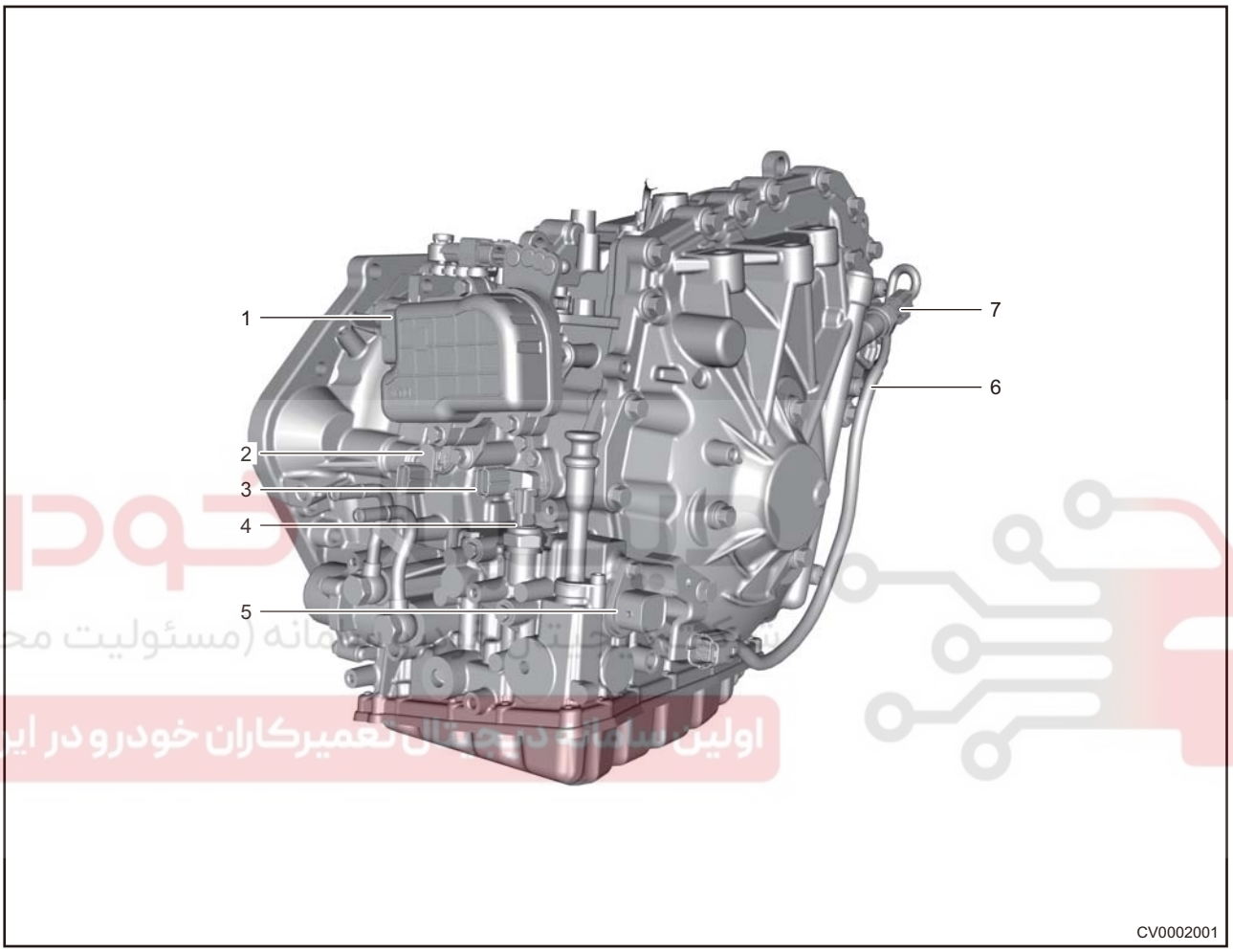


1 - Transmission Case Assembly	**2- Torque Converter Case Assembly**
3 - Hydraulic Torque Converter Assembly	4 - Input Shaft Assembly
5 - Forward Clutch Assembly	6 - Output Shaft Assembly

1 - Transmission Case Assembly	2- Torque Converter Case 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

Sensor Actuator Position

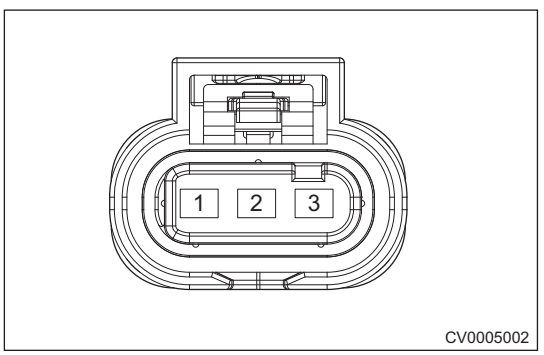


1 - Electronic Shift Mechanism	2 - Speed Sensor (Input Shaft)
3 - Speed Sensor (Input Pulley Shaft)	4 - Oil Pressure Sensor (Primary Shaft)
5 - Wire Harness Connector	6 - Speed Sensor (Output Shaft)
7 - Oil Pressure Sensor (Second Shaft)	

Speed Sensor

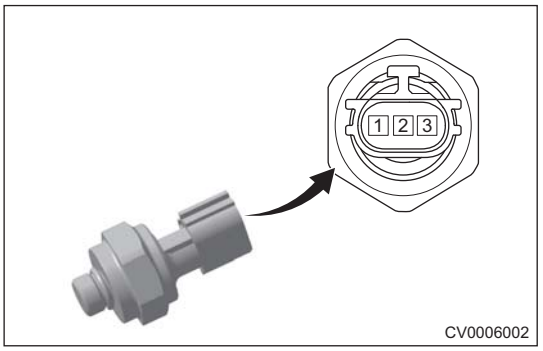
PIN	Definition
1	Ground
2	Signal
3	Power Supply

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

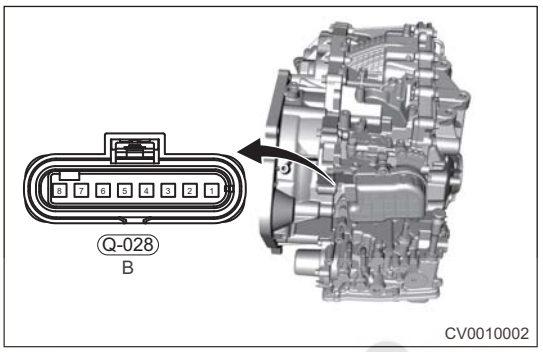


CVT25 continuously variable transmission uses two oil pressure sensors (input shaft, output shaft); at 20°C, measure pin 2 and pin 3 and the resistance should be 10 KΩ.

Gear Switch

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

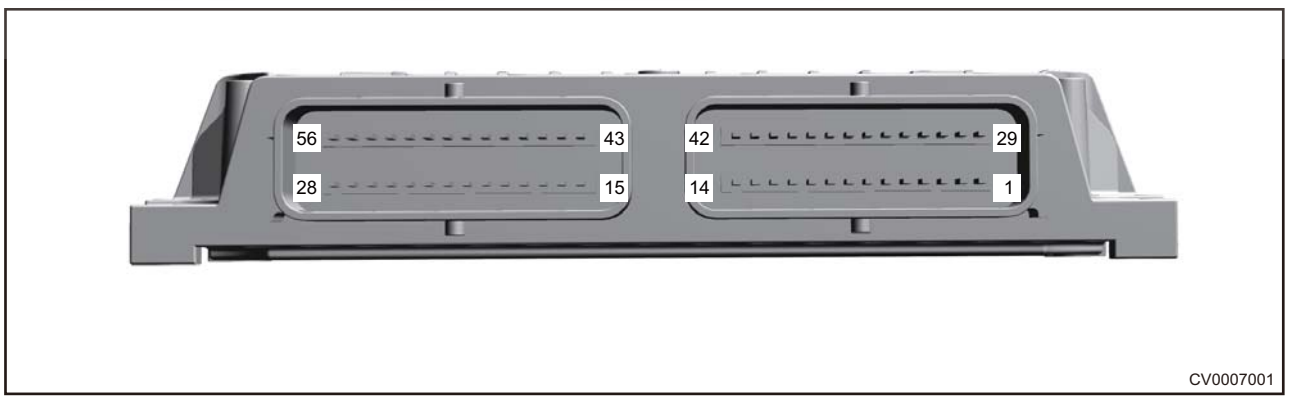
PIN	Definition
1	Constant Power Supply
2	/
3	Private CAN Low
4	Private CAN High
5	Signal
6	/
7	IG Power Supply
8	Ground



Module Terminal Definition

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 shift 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 Gear 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 Gear 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

PIN	Definition	PIN	Definition
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	Turbine/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	Turbine/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 shifting transmission from stop gear to driving gear (D or R), set engine to idling status, depress brake pedal and apply parking brake, and release brake pedal and parking brake after gear shifting completes, then vehicle enters driving status.
2. When engine speed exceeds idling speed, do not shift transmission from stop gear (N or P) to driving gear (D or R).
3. After the vehicle stops completely, shift the shift lever to P, apply parking brake and turn off engine.
4. If accelerator pedal is depressed suddenly 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 shift to low gear, engine speed and power will increase.
6. Vehicles equipped with automatic transmission cannot be started by traction (or pushing). If the battery is depleted, it is necessary to use a jumper cable to charge the battery to start the vehicle.
7. Transmission self-learning should be performed in following conditions, failure to do so may cause unsmooth gear shifting and starting:
   (a) For the first driving of a new vehicle.
   (b) Replace TCU with a new one.
   (c) Replace valve body assembly, hydraulic torque converter, forward and reverse clutch set and transmission.
8. Self-learning conditions:
   (a) Before self-learning, the self-learning value should be cleared with diagnostic tester;
   (b) After the vehicle power is turned off and then on again, when the transmission malfunction light is flashing, perform self-learning according to the self-learning steps of hydraulic torque converter lock clutch, forward clutch and reverse clutch;
   (c) Transmission malfunction light will turn off automatically after all the self-learning operations are completed.
9. Self-learning steps of lock clutch:
   (a) Start the engine and shift to D;
   (b) Accelerate the vehicle to 50 Kph;
   (c) Release the accelerator pedal and do not depress the brake pedal. The vehicle will slide to below 10 kph;
   (d) Repeat steps 2 and 3 for three times;
   (e) Turn off the ignition key and self-learning is completed after waiting for 10 seconds.

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.

10. Self-learning steps of forward clutch:
    (a) Release the electrical parking brake after starting the engine;
    (b) Depress the brake pedal and shift to N, shift to D after waiting for 2 seconds, release brake pedal after waiting for 10 seconds in D, and to creep speed;
    (c) Repeat step 2 for more than five times;
    (d) Turn off the ignition key and self-learning is completed after waiting for 10 seconds.
11. Self-learning steps of reverse clutch:
    (a) Release the electrical parking brake after starting the engine;
    (b) Depress the brake pedal and shift to N, shift to R after waiting for 2 seconds, release brake pedal after waiting for 10 seconds in R, and to creep speed;
    (c) Repeat step 2 for more than five times;
    (d) Turn off the ignition key and self-learning is completed after waiting for 10 seconds.

12. Self-learning steps of electronic shift actuator:
    (a) Vehicle power is turned on without starting;
    (b) First shift to P, then to N;
    (c) Perform self-learning with diagnostic tester;
    (d) Vehicle power is turned off normally and self-learning is completed.

Caution:
If the diagnostic tester prompts failure of self-learning, press the connecting rod button of the electronic shift actuator, pull up to separate the connecting rod from the rocker arm, shift to N and then to P, reinstall the connecting rod, and then follow the above steps to re-learn.

13. Gear position introduction
    (a) P (Parking) gear: Lock the transmission output shaft to prevent the drive wheel from rotating and cooperate with the parking 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 equipped 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 parking brake, and only after the vehicle is completely stopped, pull the parking 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 drive wheel and the transmission are in free and idling state, which is suitable for the vehicle to stop for a short time.
        (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 parking brake is not pulled or the brake pedal is not depressed in N gear, the vehicle can roll on slope, which may cause 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 engine stalling, otherwise the transmission may be damaged.
    (d) D (Driving) gear: In normal forward mode of transmission, stepless speed change can be realized, when in this gear, the transmission will automatically select the appropriate speed ratio according to driver's intention.
        (1) Confirm that the vehicle is completely stopped before shifting to D.
        (2) Before reversing, confirm the surrounding environment and personnel safety.
    (e) M (Manual mode) gear: There are "+" and "-" gears on the upper and lower sides of M gear on shift mechanism, also known as "M+" gear and "M-" gear.
        (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 running. Unlike the manual transmission, gear shifting is allowed when the accelerator pedal is depressed.
Caution:
- In manual mode, the driver must perform gear shifting under appropriate working conditions to prevent the engine speed from approaching the red line and running under high load for a long time.
- Shifting in manual mode needs to meet 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, which can be used for engine braking when driving downhill or on long-distance ramps.

(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 2nd gear to prevent the vehicle from slipping.
(2) When the vehicle is equipped with 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.

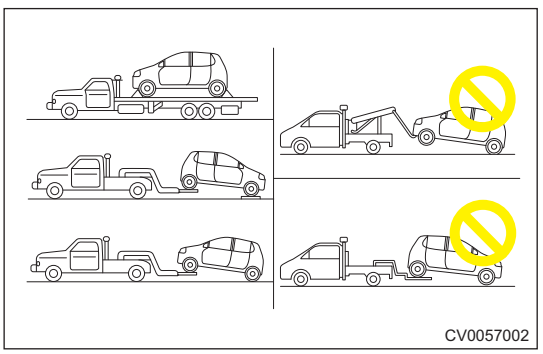
Transmission Oil Standard

1. Transmission oil selection standard

Transmission Oil Type	Standard Capacity
CVTF WCF-1	7.3 ± 0.2 L

Vehicle Towing

1. Towing using the correct method can avoid unnecessary secondary damage to the vehicle
   (a) Use a flatbed truck or a large flatbed cart to lift the vehicle completely and then transport it
   (b) Use hard traction to lift the non-drive wheel while using a small flatbed (ground wheel) to lift the drive wheel and transport it
   (c) Use hard traction to lift the drive wheel and transport it

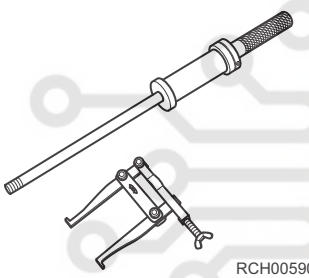
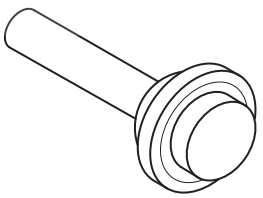
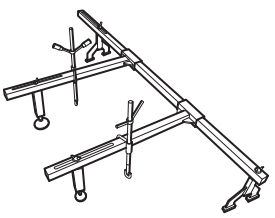


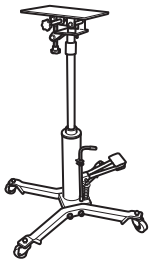
Basic Parameters

Item	Parameter	
Model	025CHC	
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	
Central 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	
Fluid Type	CVTF WCF-1 (CVTF for short)	
Transmission Fluid Capacity	7.3 ± 0.2 L	

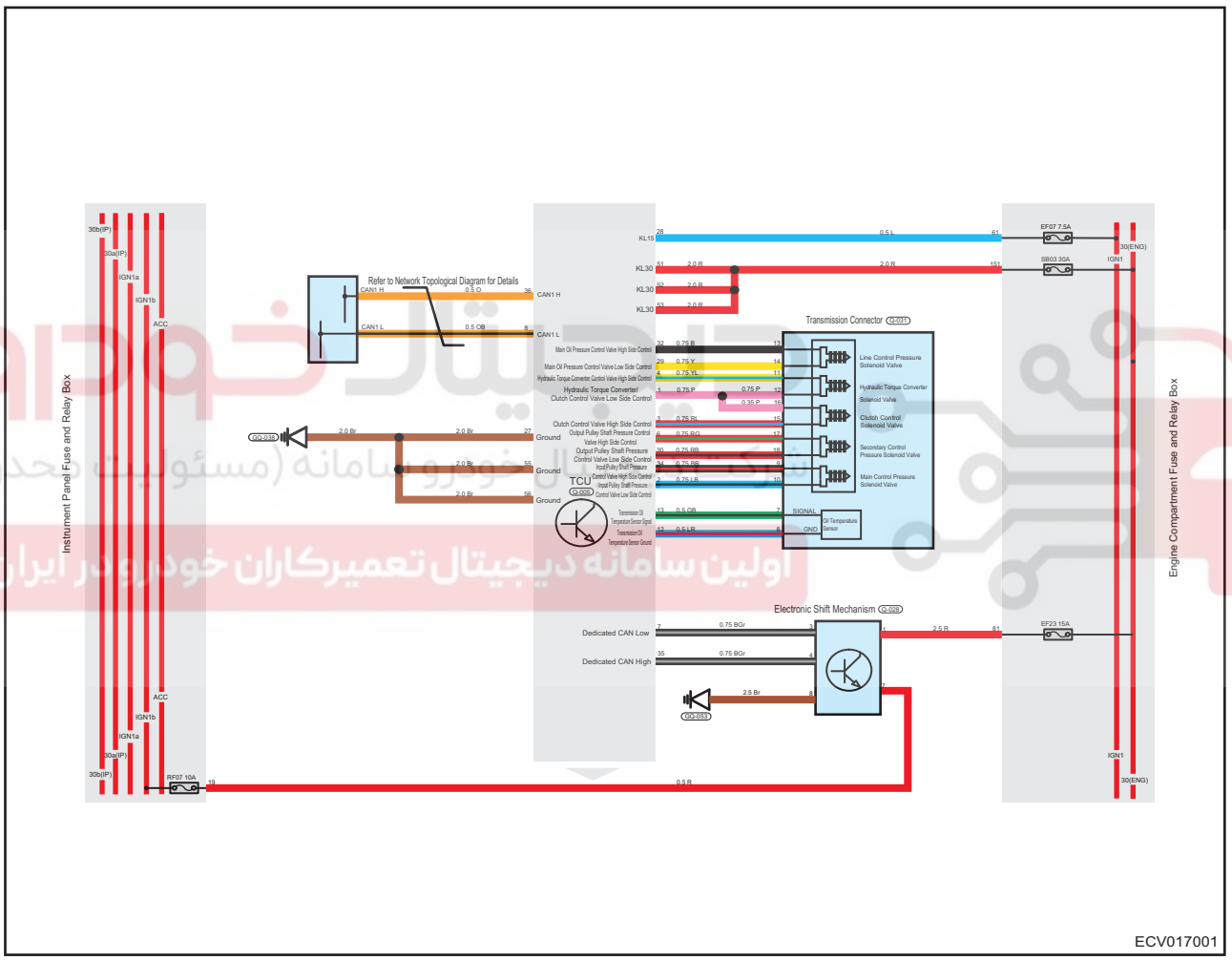
Tools

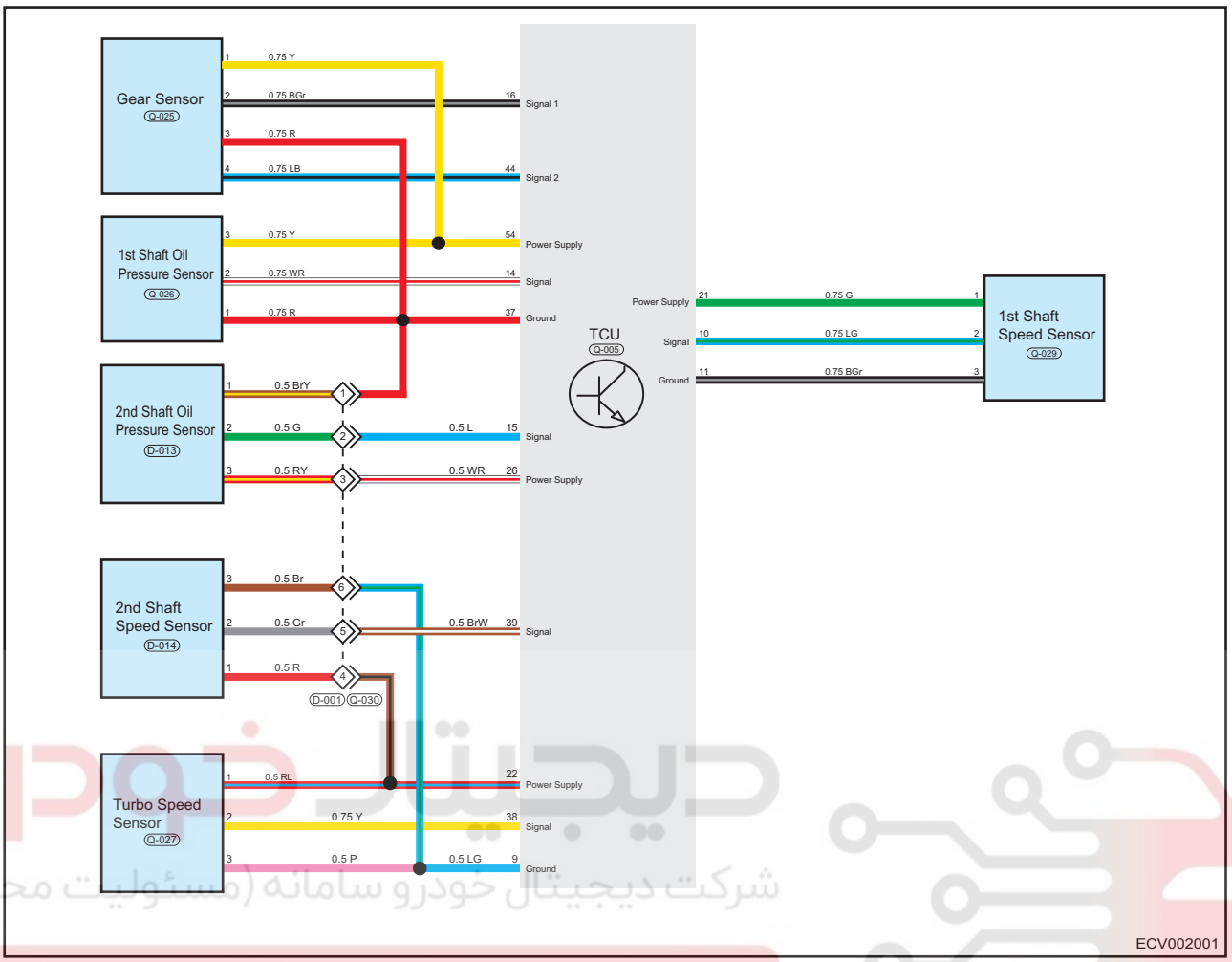
Special Tools

Tool Name	Tool Drawing
Bearing Puller	 RCH0059006
Differential Oil Seal Installer	 RCH0009006
Engine Hoist	 RCH0026006

Tool Name	Tool Drawing
Transmission Carrier	 RCH000506

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 Diagnosis Procedure to perform troubleshooting steps.
- Clear DTCs.
- Disconnect the diagnostic tester.

Problem Symptoms Table

P074811	Line Solenoid Short to GND
P074812	Line Solenoid Short to BAT
P074813	Line Solenoid Open Load
P074815	Line Solenoid Short to BAT or Open
P077811	Primary Solenoid Short to GND
P077812	Primary Solenoid Short to BAT
P077813	Primary Solenoid Open Load
P077815	Primary Solenoid Short to BAT or Open
P079811	Secondary Solenoid Short to GND
P079812	Secondary Solenoid Short to BAT
P079813	Secondary Solenoid Open Load
P079815	Secondary Solenoid Short to BAT or Open
P271611	Clutch Solenoid Short to GND
P271612	Clutch Solenoid Short to BAT
P271613	Clutch Solenoid Open Load
P271615	Clutch Solenoid Short to BAT or Open
P272511	TCC Solenoid Short to GND
P272512	TCC Solenoid Short to BAT
P272513	TCC Solenoid Open Load
P272515	TCC Solenoid Short to BAT or Open
P092811	Shiftlock Solenoid Short to GND
P092812	Shiftlock Solenoid Short to BAT
P092813	Shiftlock Solenoid Open Load
P092815	Shiftlock Solenoid Short to BAT or Open
P084012	Primary Pressure Sensor Short to BAT
P084014	Primary Pressure Sensor Short to GND
P084512	Secondary Pressure Sensor Short to BAT
P084514	Secondary Pressure Sensor Short to GND
P17041C	Primary Pressure Sensor Supply Abnormal
P17051C	Secondary Pressure Sensor Supply Abnormal
P079229	Primary Speed Sensor Fault
P072129	Secondary Speed Sensor Fault
P071629	Turbine Speed Sensor Fault
P093715	Oil Temperature Sensor Short to BAT/OL

P093711	Oil Temperature Sensor Short to GND
P07061C	Range Switch Signal Out of Range
P073094	Ratio Error
P279794	Primary Pressure Control Issue
P279894	Secondary Pressure Control Issue
P081E74	Clutch (Reverse) Slip
P081174	Clutch (Drive) Slip
P089474	TCC Slip
P021898	Trans Oil Temperature Out of Range
P176798	Trans Oil Temperature Critical
P088017	TCU System Over Voltage
P088016	TCU System Under Voltage
P171900	Without PEPS
P172000	Authorization failure with IMMO
P061308	Solenoid Driver Communication Failure
U007388	TCU Bus Off
P060341	NVM Broken
P060344	NVM Save Failure
P060444	RAM Fault
P060544	ROM Fault
P061309	PLL Fault
P061302	AD Fault
P061304	Time Slice Fault
P061347	Monitor Unit Fault
P061301	VDD Out of Range
P061300	Safety Other Fault
P061397	Safety Cut Off Test Failure
U014087	Lost Communication with BCM
U010087	Lost Communication with ECM
U012987	Lost communication with BSM
U012687	Lost Communication with SAM
U042281	Invalid Data from BCM
U040181	Invalid Data from ECM
U041881	Invalid Data from BSM
U042881	Invalid Data from SAM
P175081	Invalid Engine Speed Signal
P175181	Invalid Engine Actual Torque Signal
P175281	Invalid Brake Pedal Signal
P175381	Invalid Gas Pedal Signal
P175481	Invalid Vehicle Speed Signal
P175581	Invalid Front Left Speed Signal
P175681	Invalid Front Right Speed Signal
P175781	Invalid Rear Left Speed Signal
P175881	Invalid Rear Right Speed Signal
P175981	Invalid Engine Coolant Signal
P176081	Invalid Odormeter Signal
P176181	ABS Invalid
P095629	Manual Mode Fault
P176281	Invalid Master Cylinder Pressure Signal

P061348	Watchdog Failure

Diagnosis Procedure

Hint

Use following procedures to troubleshoot the brake control system.

1	**Vehicle brought to workshop**

Result

Go 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 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

NEXT → **Go to step 7**

6	Troubleshoot according to Diagnostic Trouble Code (DTC) chart

Result

Go to
NEXT

NEXT → **Go to step 7**

7	Troubleshoot according to Problem Symptoms Table

Result

Go to
NEXT

NEXT

8	Conduct test and confirm malfunction has been repaired

Result

Go to
NEXT

NEXT → **End**

DTC Confirmation Procedure

Confirm that battery voltage is not 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

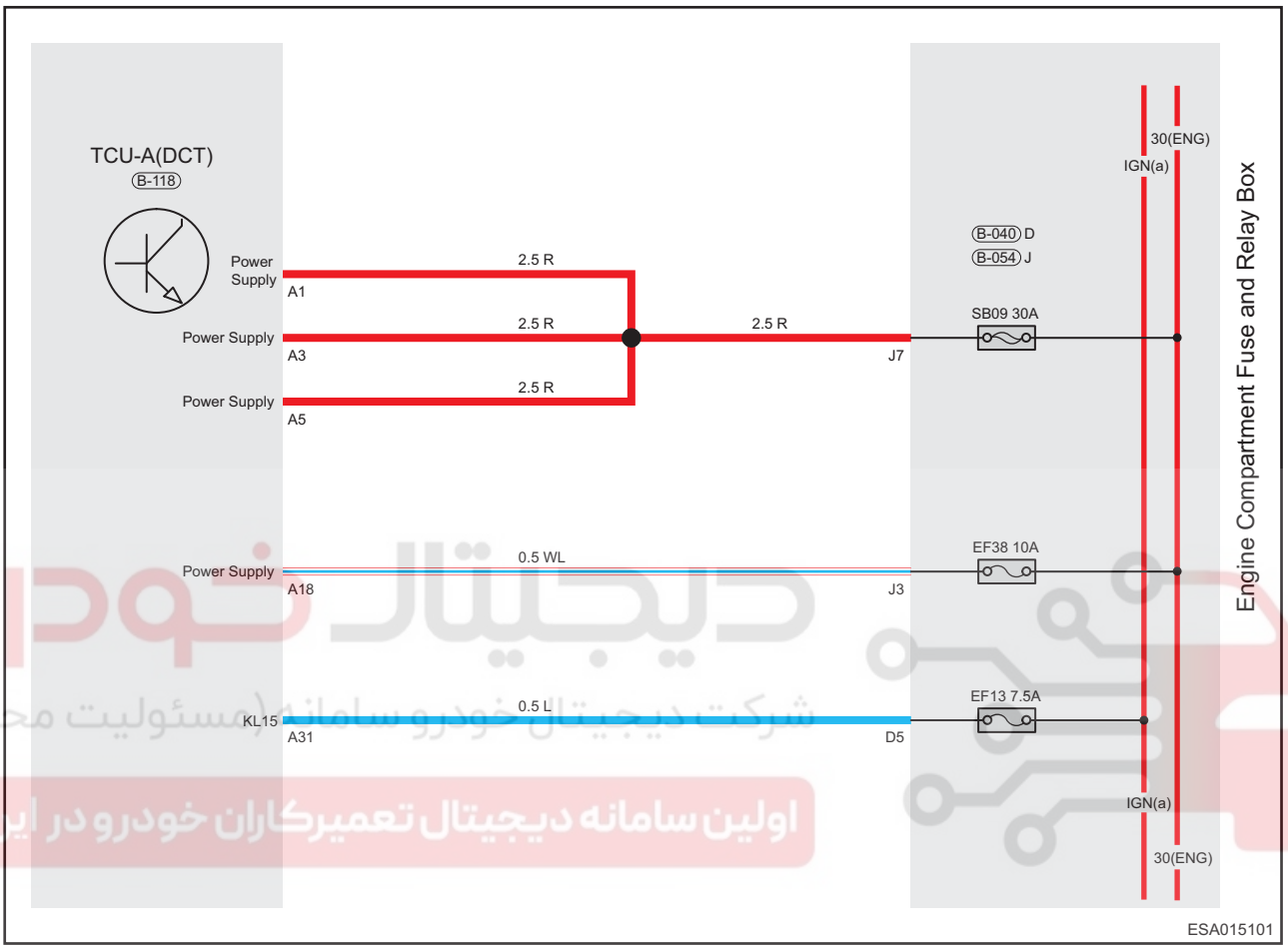
Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit works. Circuits are very sensitive to proper grounding. 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 contact 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	P088017	TCU System Over Voltage

DTC	P088016	TCU System Under Voltage

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P088017	TCU System Over Voltage	• Voltage is too high: Circuit voltage is higher than 16 V	• TCU resets • Solenoid valve operates abnormally • Sensor operates abnormally • CAN bus is abnormal	1. Check wire harness and connector 2. Check battery 3. Replace battery 4. Replace TCU
P088016	TCU System Under Voltage	• Voltage is too low: Circuit voltage is lower than 9 V		

Confirmation Procedure

Confirm that battery voltage is not 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 fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find TCU fuses EF07 (7.5 A) and SB03 (30 A) on engine compartment fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace TCU fuse**

OK →

2	**Check battery**

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

OK

Voltage between positive and negative battery terminals is normal

Result

Go to
OK
NG

NG → **Replace battery**

OK →

3	**Check TCU power supply circuit voltage**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the TCU connector Q-005.

Voltage inspection (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
Q-005 (51, 52, 53) - Body ground	Always	Not less than 12 V

OK

Voltage between terminal Q-005 of TCU connector and body ground is normal

Result

Go 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 Q-005.
Check voltage between terminal 28 of TCU connector Q-005 and body ground (using a digital multimeter or 21 W test light).
Voltage Inspection

Multimeter Connection	Condition	Specified Condition
Q-005 (28) - Body ground	Always	Not less than 12 V

OK

Voltage between terminal Q-005 of TCU connector and body ground is normal

Result

Go 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 wire harness side connector and instrument panel fuse and relay box terminal.
Check for Open

Multimeter Connection	Specified Condition
Q-005 (28) - Engine compartment fuse and relay box (61)	Resistance ⩽ 1 Ω

Check for Short

Multimeter Connection	Specified Condition
Q -005 (28) or engine compartment fuse and relay box (61) - Body ground	Resistance ∞

Multimeter Connection	Specified Condition
Q-005 (28) or engine compartment fuse and relay box (61) - Battery positive	Resistance ∞

OK

Wire harness between wire harness side connector terminals is normal

Result

Go 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
Q-005 (27, 55, 56) - Body ground	Resistance ⩽ 1 Ω

OK

Ground point and ground wire harness are normal

Result

Go 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

Go to
OK
NG

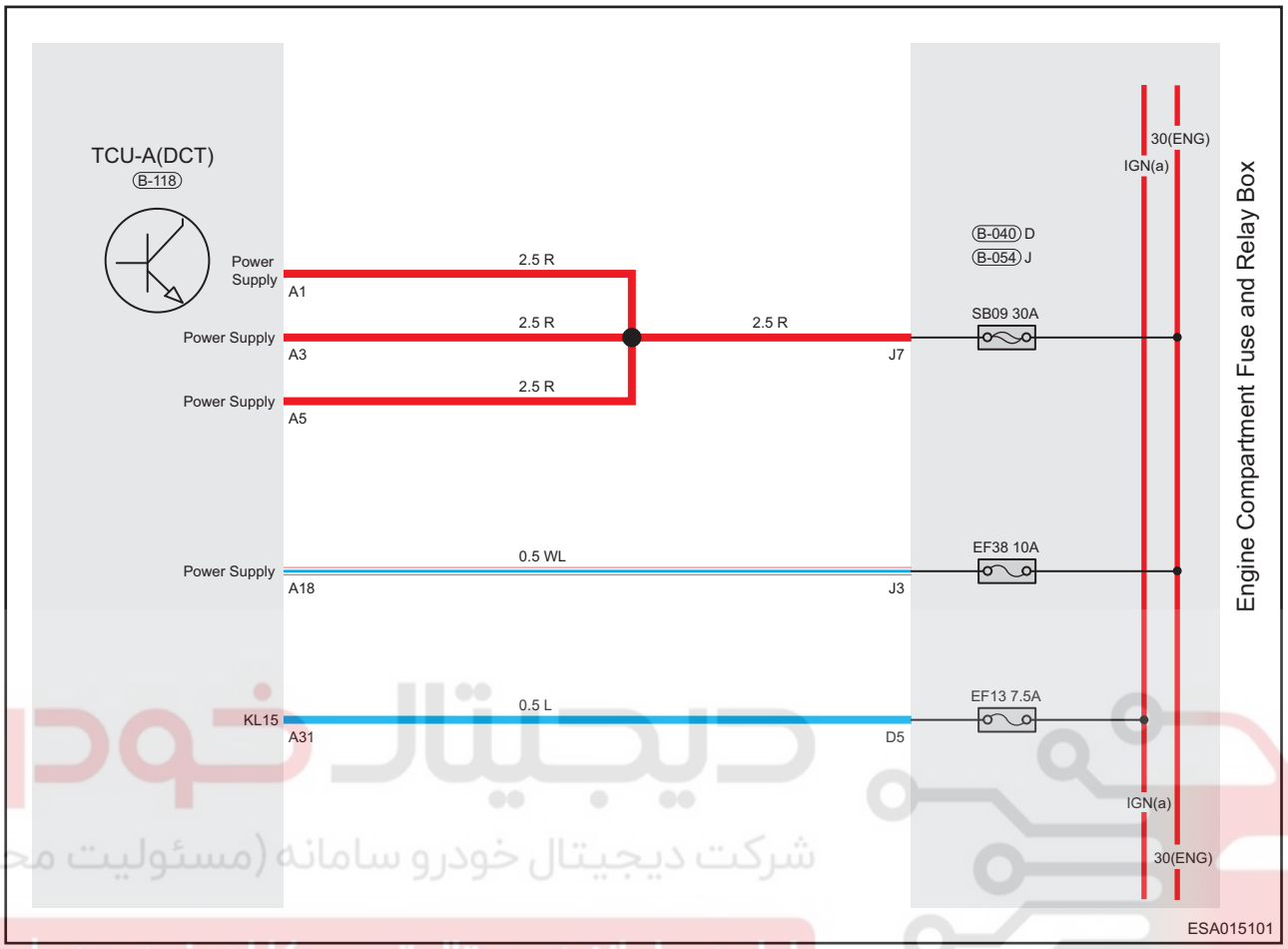
OK → **System operates normally**

NG → Replace TCU control module assembly

DTC	P061308	Solenoid Driver Communication Failure
DTC	P060341	NVM Broken
DTC	P060344	NVM Save Failure
DTC	P060444	RAM Broken
DTC	P060544	ROM Broken
DTC	P061309	PLL Fault
DTC	P061302	AD Fault
DTC	P061304	Time Slice Fault
DTC	P061347	Monitor Unit Fault
DTC	P061301	VDD Out of Range
DTC	P061300	Safety Other Fault
DTC	P061397	Safety Cut Off Test Failure
DTC	P061348	Watchdog Failure

Circuit Diagram

Power supply circuit



Description

DTC No.	DTC Definition	Possible Impact of Fault	Maintenance Advice
P061308	Solenoid Driver Communication Failure	• TCU can not operate normally • Transmission warning light comes on	1. Check wire harness and connector 2. Replace TCU
P060341	NVM Broken		
P060344	NVM Save Failure		
P060444	RAM Fault		
P060544	ROM Fault		
P061309	PLL Fault		
P061302	AD Fault		
P061304	Time Slice Fault		
P061347	Monitor Unit Fault		
P061301	VDD Out of Range		
P061300	Safety Other Fault		
P061397	Safety Cut Off Test Failure		
P061348	Watchdog Failure		

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 not 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 if TCU connector Q-005 and engine compartment fuse and relay box are connected infirmly, damaged, cracked or installed improperly.

Result

Go 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 GQ-038.

OK

Ground point is normal

Result

Go 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

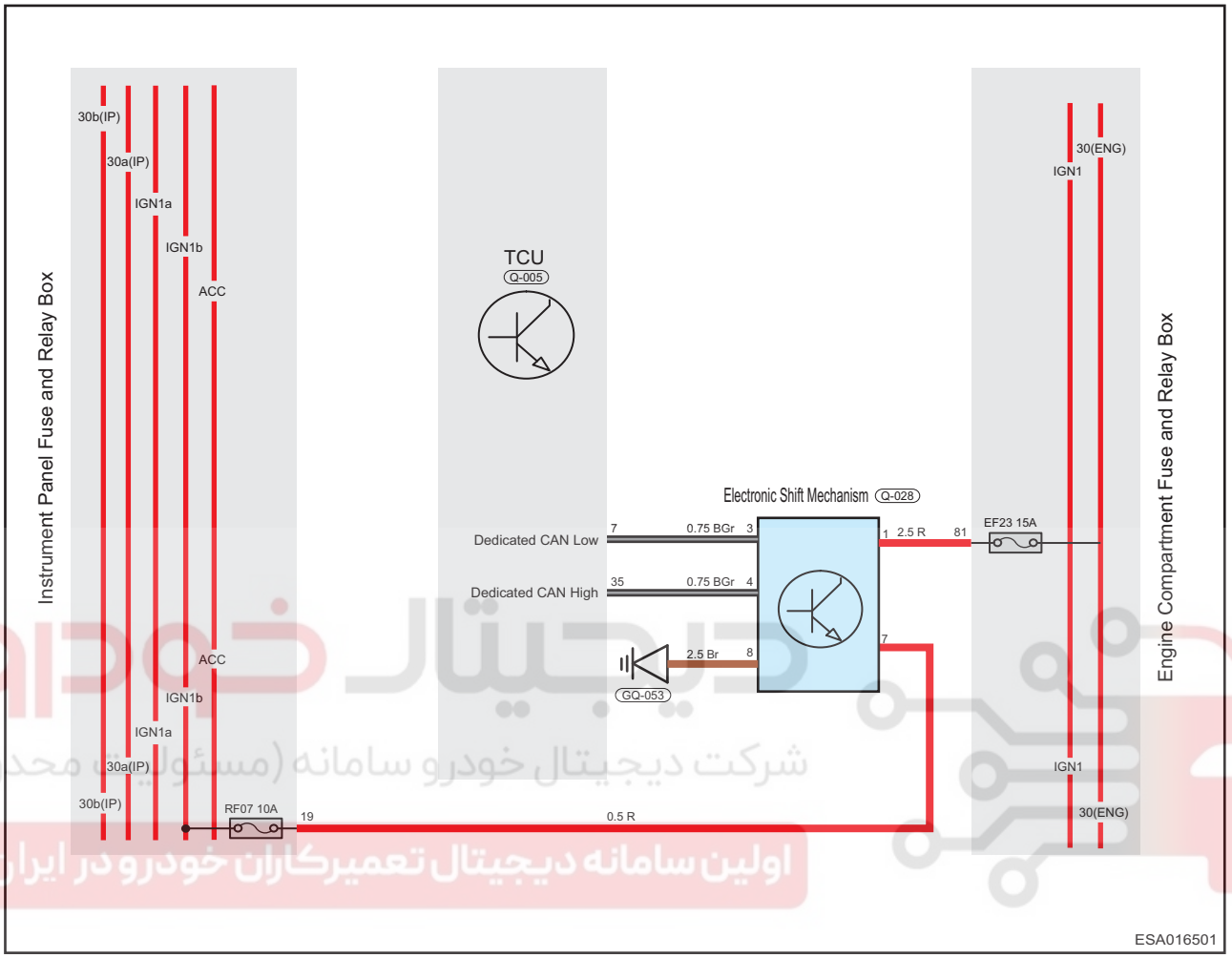
Result

Go to
OK
NG

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

DTC	P07061C	Range Switch Signal Out of Range

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P07061C	Range Switch Signal Out of Range	• Failure is established when P/R/N/D/L gear signals are read in and there are multiple or no gear signals simultaneously.	• Vehicle cannot be started • Large shift shock • Transmission warning light comes on	1. Check wire harness, connector or terminal for abnormal 2. Replace gear switch 3. Replace TCU

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuse EF23**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF23 (15 A) on engine compartment fuse box.
(d) Check the resistance of fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check electronic shift module**

(a) Turn ENGINE START STOP switch to OFF.
(b) Check if electronic shift module connector is loose.
(c) Remove the electronic shift module from malfunctioning vehicle and install it to a new vehicle to test if it is normal.

Result

Go to
OK
NG

NG → **Replace electronic shift module**

OK →

3	**Check wire harness**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the TCU connector Q-005.

Inspection

Multimeter Connection	Condition	Specified Condition
Q-005(7) – Q-028(3)	Always	Continuity
Q-005(35) – Q-028(4)		Continuity
Q-028(8) – Body ground		Continuity
Q-028 (1) – Engine compartment fuse and relay box (81)		Continuity
Q -028(7) – Instrument panel fuse and relay box (19)		Continuity

OK

Wire harness between wire harness side connector terminals is normal

Result

Go to
OK
NG

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

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

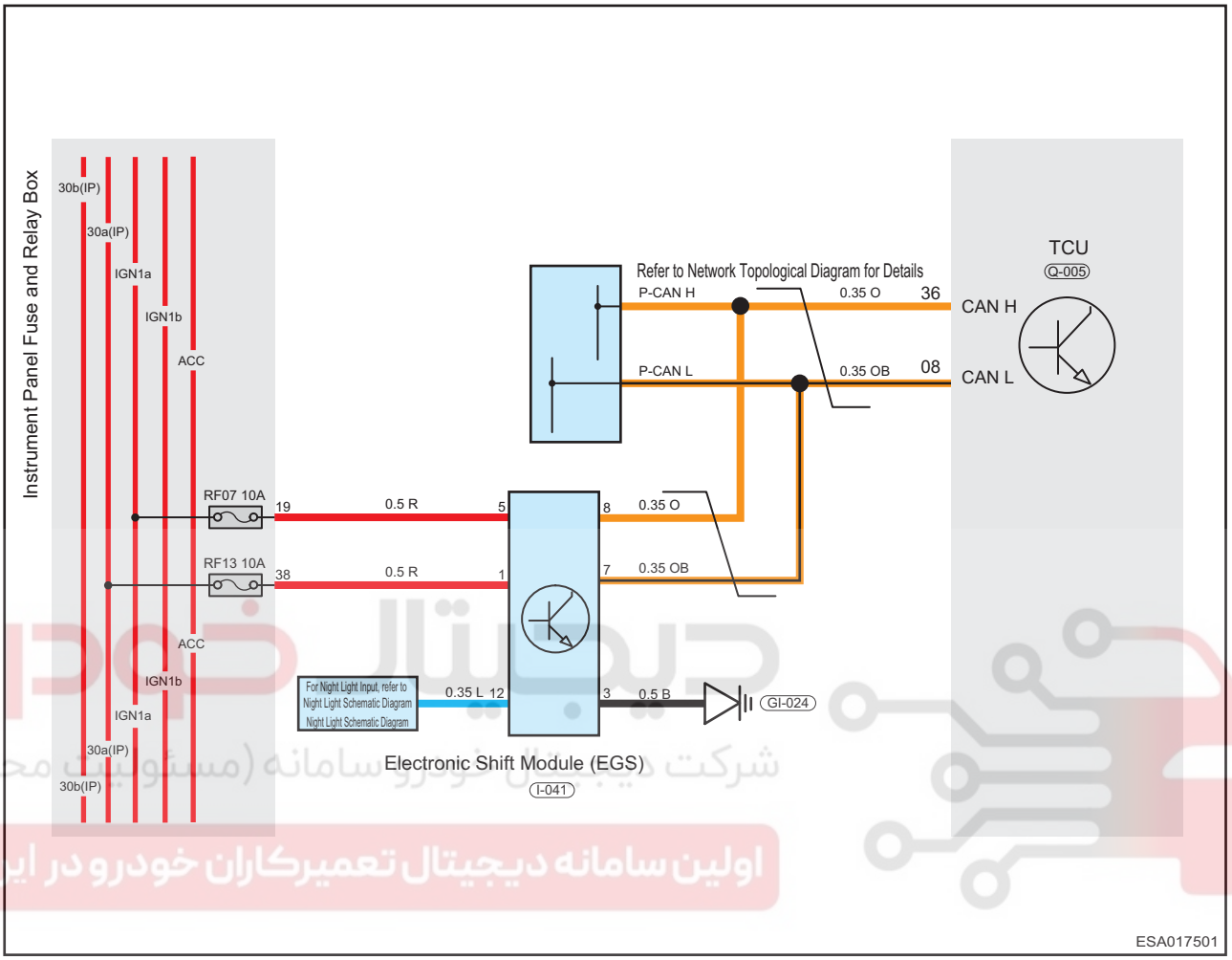
Go to
OK
NG

OK → **System operates normally**

NG → **Replace TCU control module assembly**

DTC	P095629	Manual Mode Fault

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P095629	Manual Mode Fault	• When three (M,M+,M-), two (M+,M-) signals exist in manual mode, or M/M+/M- is detected when it is not in D gear, the fault is established	• Vehicle cannot be started • Large shift shock • Transmission warning light comes on • Manual mode cannot respond	1. Check wire harness, connector or terminal for abnormal 2. Replace shift mechanism 3. Replace TCU

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses RF07 and RF13**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuses RF07(10A) and RF13 (10A) on instrument panel fuse box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the shift mechanism connector I-041.

Multimeter Connection	Condition	Specified Condition
I-041 (3) - Body ground	Always	Continuity
I-041 (5) - Body ground	Always	Voltage is always higher than 12 V
I-041 (1) - Body ground	Always	Voltage is always higher than 12 V
I-041 (8) - Q-005 (36)	Always	Voltage is always higher than 12 V
I-041 (7) - Q-005 (08)	Always	Voltage is always higher than 12 V

Result

Go to
OK
NG

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

OK

3	Check electronic shift module

(a) Turn ENGINE START STOP switch to OFF.
(b) Check if electronic shift module connector is loose.
(c) Remove the electronic shift module from malfunctioning vehicle and install it to a new vehicle to test if it is normal.

Result

Go to
OK
NG

NG → **Replace electronic shift module**

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

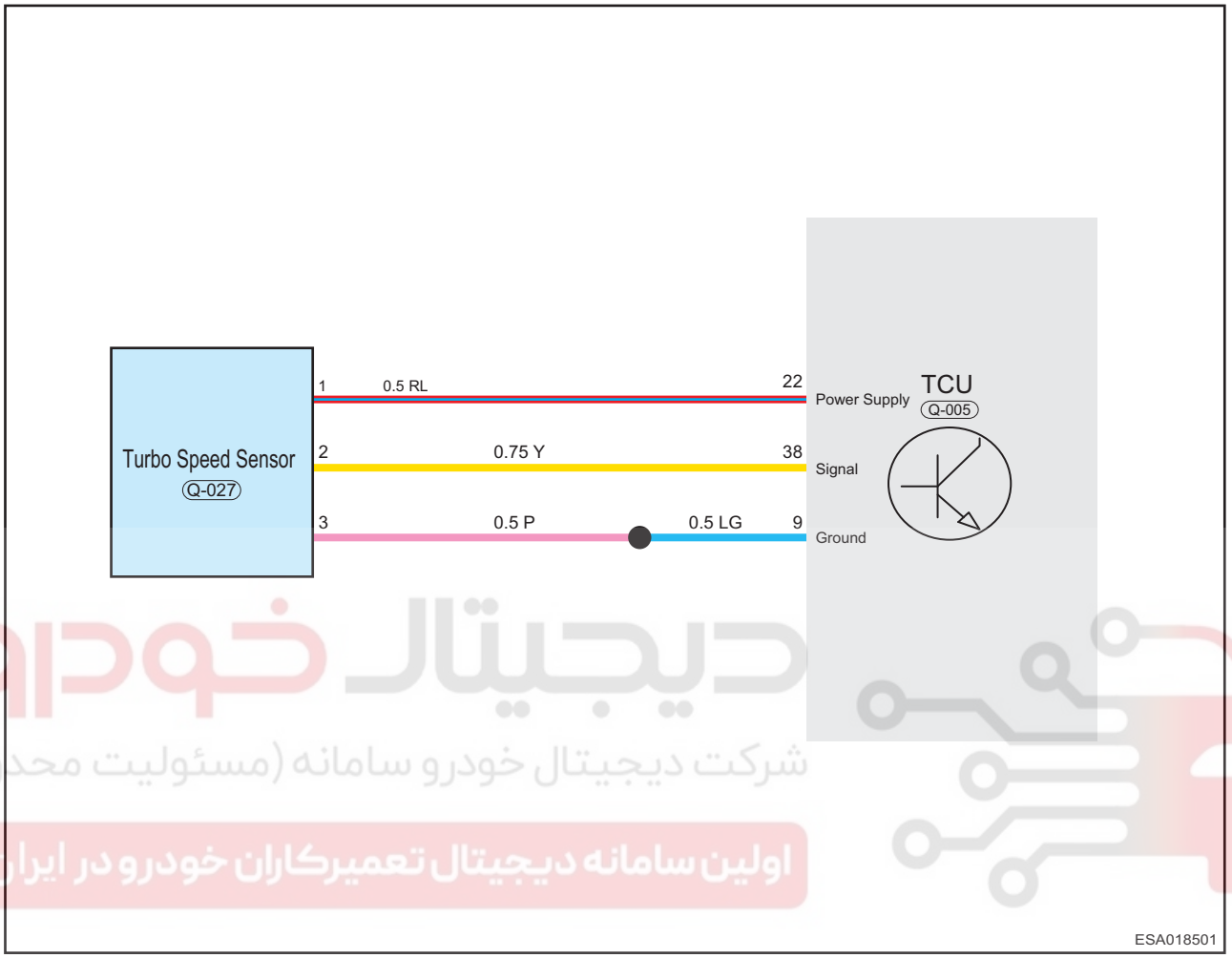
Go to
OK
NG

OK → **System operates normally**

NG → **Replace TCU control module assembly**

DTC	P071629	Turbine Speed Sensor Fault

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P071629	Turbine Speed Sensor Fault	• When the turbine speed is equal to 0 during driving, the fault is established.	• Large shift shock • Transmission warning light comes on • Lack of power when accelerating	1. Check wire harness, connector or terminal for abnormal 2. Replace turbine speed sensor 3. Replace TCU

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the turbine speed sensor connector Q-027.

Multimeter Connection	Condition	Specified Condition
Q-027 (1) - Q-005 (22)	Always	Continuity
Q-027 (2) - Q-005 (38)	Always	Continuity
Q-027 (3) - Q-005 (9)	Always	Continuity

Result

Go to
OK
NG

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

OK →

3	**Replace turbine speed sensor**

(a) Replace the turbine speed sensor.

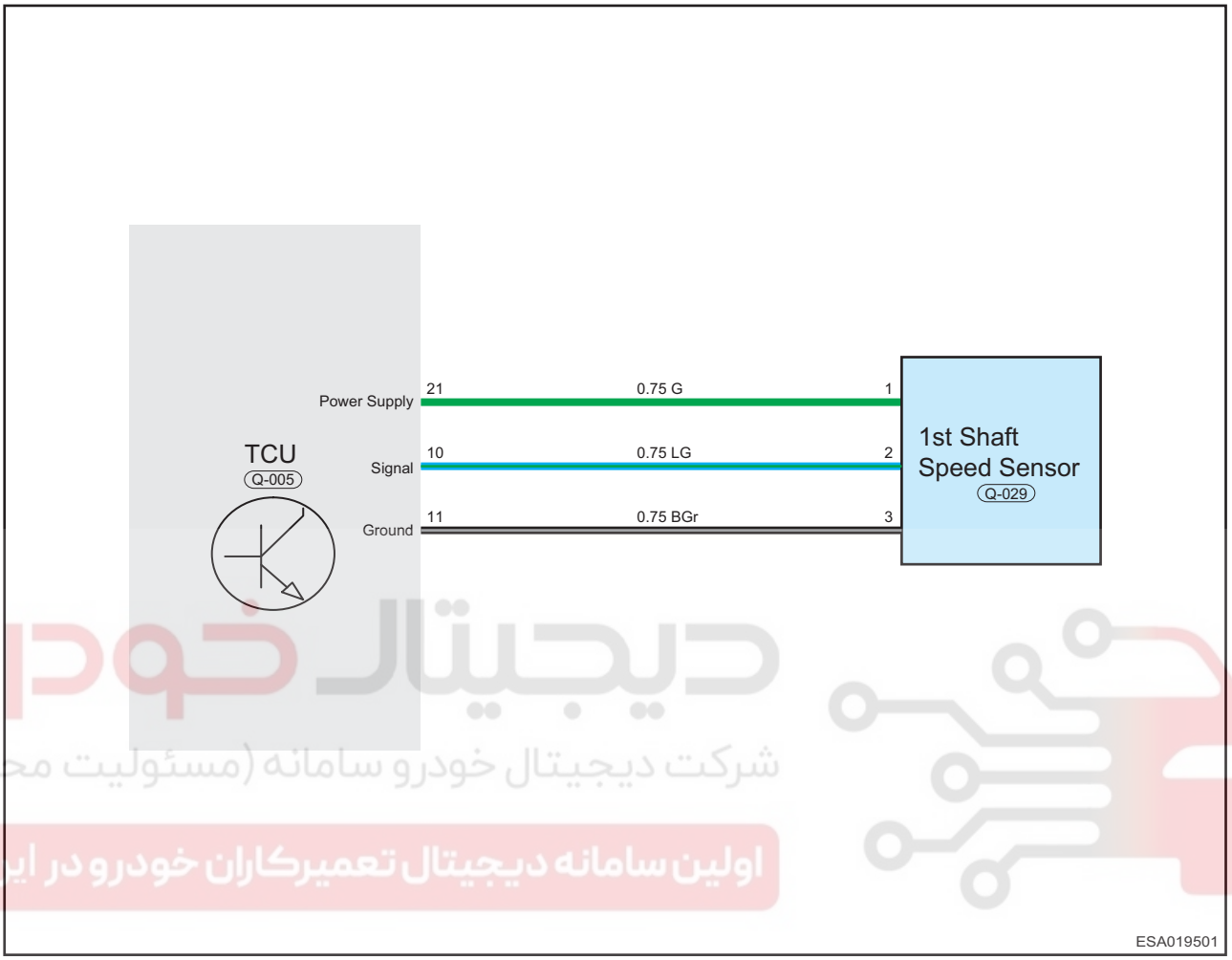
Result

Go to
OK
NG

OK	System operates normally
NG	Replace TCU control module assembly

DTC	P079229	Primary Speed Sensor Fault

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P079229	Primary Speed Sensor Fault	• When the input speed is equal to 0 during driving, the fault is established.	• Clutch, hydraulic torque converter slip • Transmission warning light comes on • Lack of power when accelerating	1. Check wire harness, connector or terminal for abnormal 2. Replace input pulley shaft speed sensor 3. Replace TCU

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the primary shaft speed sensor connector Q-029.

Multimeter Connection	Condition	Specified Condition
Q-029 (1) - Q-005 (21)	Always	Continuity
Q-029 (2) - Q-005 (10)	Always	Continuity
Q-029 (3) - Q-005 (11)	Always	Continuity

Result

Go 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.

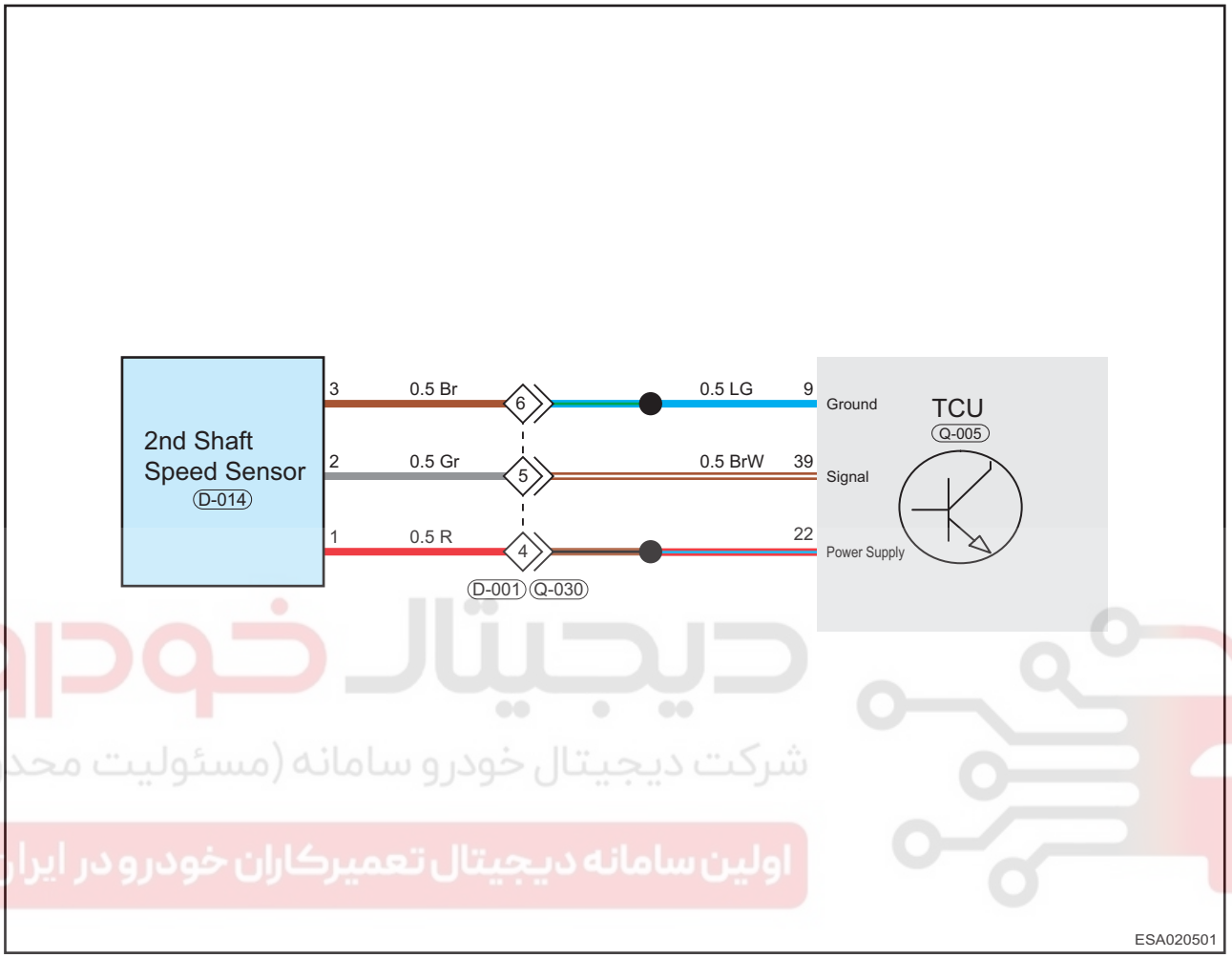
Result

Go to
OK
NG

OK	System operates normally
NG	Replace TCU control module assembly

DTC	P072129	Secondary Speed Sensor Fault

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P072129	Secondary Speed Sensor Fault	• When the output speed is equal to 0 during driving, the fault is established.	• Transmission warning light comes on • Lack of power when accelerating	1. Check wire harness, connector or terminal for abnormal 2. Replace output pulley shaft speed sensor 3. Replace TCU

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the second shaft speed sensor connector D-014.

Multimeter Connection	Condition	Specified Condition
D-014 (3) - Q-005(9)	Always	Continuity
D-002 (2) - Q-005(39)	Always	Continuity
D-002 (1) - Q-005(22)	Always	Continuity

Result

Go 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

Go to
OK
NG

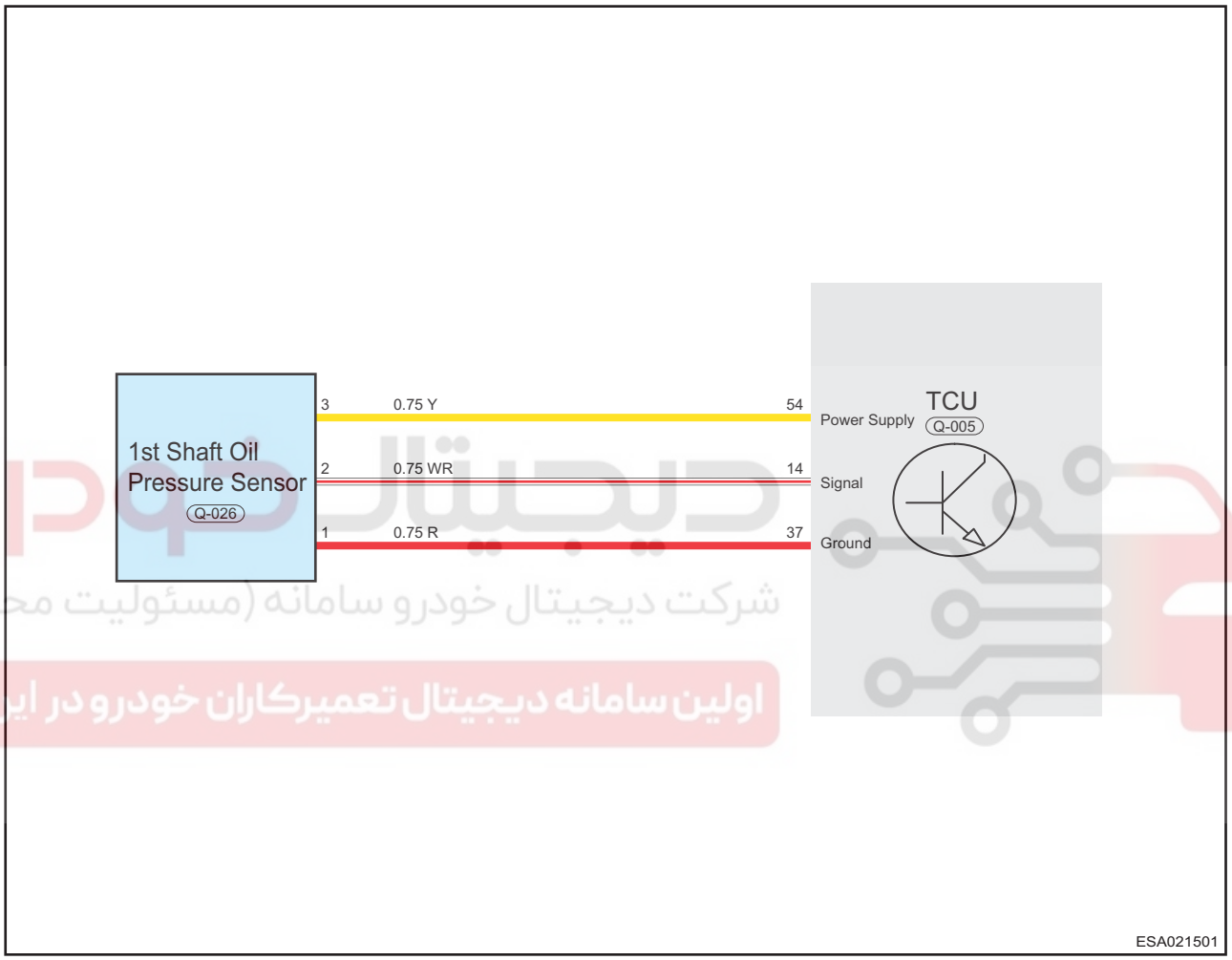
OK	System operates normally
NG	Replace TCU control module assembly

DTC	P17041C	Primary Pressure Sensor Supply Abnormal

DTC	P17051C	Primary Pressure Sensor Short to BAT

DTC	P084014	Primary Pressure Sensor Short to GND

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P17041C	Primary Pressure Sensor Supply Abnormal	When the transmission pressure sensor voltage is lower than or higher than the set threshold, the fault is established.	• Transmission warning light comes on • Lack of power when accelerating	1. Check wire harness, connector or terminal for abnormal 2. Replace oil pressure sensor 3. Replace TCU
P084012	Primary Pressure Sensor Short to BAT	When the transmission input pulley shaft pressure sensor oil pressure is lower than or higher than the set threshold, the fault is established.		
P084014	Primary Pressure Sensor Short to GND			

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	Check wire harness connector

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the primary shaft oil pressure sensor connector Q-026.

Multimeter Connection	Condition	Specified Condition
Q-026 (3) - Q-005 (54)	Always	Continuity
Q-026 (2) - Q-005 (14)	Always	Continuity
Q-026 (1) - Q-005 (37)	Always	Continuity

Result

Go to
OK

Go to
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

Go to
OK
NG

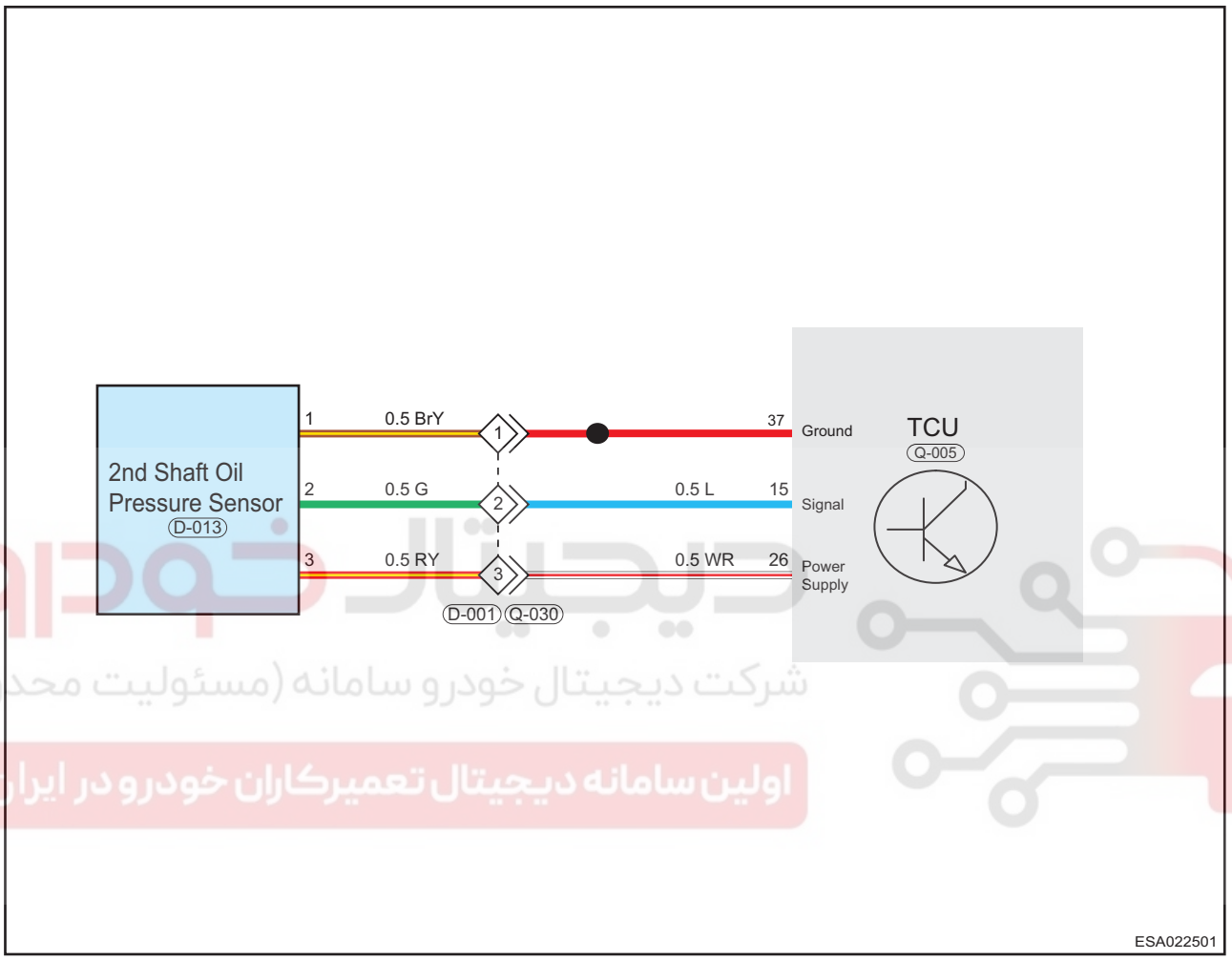
OK → **System operates normally**

NG → **Replace TCU control module assembly**

DTC	P084512	Secondary Pressure Sensor Short to BAT

DTC	P084514	Secondary Pressure Sensor Short to GND

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P084512	Secondary Pressure Sensor Short to BAT	• When the transmission output pulley shaft sensor oil pressure is lower than or higher than the set threshold, the fault is established.	• Transmission warning light comes on • Lack of power when accelerating	1. Check wire harness, connector or terminal for abnormal 2. Replace oil pressure sensor 3. Replace TCU
P084514	Secondary Pressure Sensor Short to GND			

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect second shaft oil pressure sensor connector D-013 and TCU connector Q-005.

Multimeter Connection	Condition	Specified Condition
D-013 (3) - Q-005(26)	Always	Continuity
D-013 (2) - Q-005(15)	Always	Continuity
D-013 (1) - Q-005(37)	Always	Continuity

Result

Go 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.

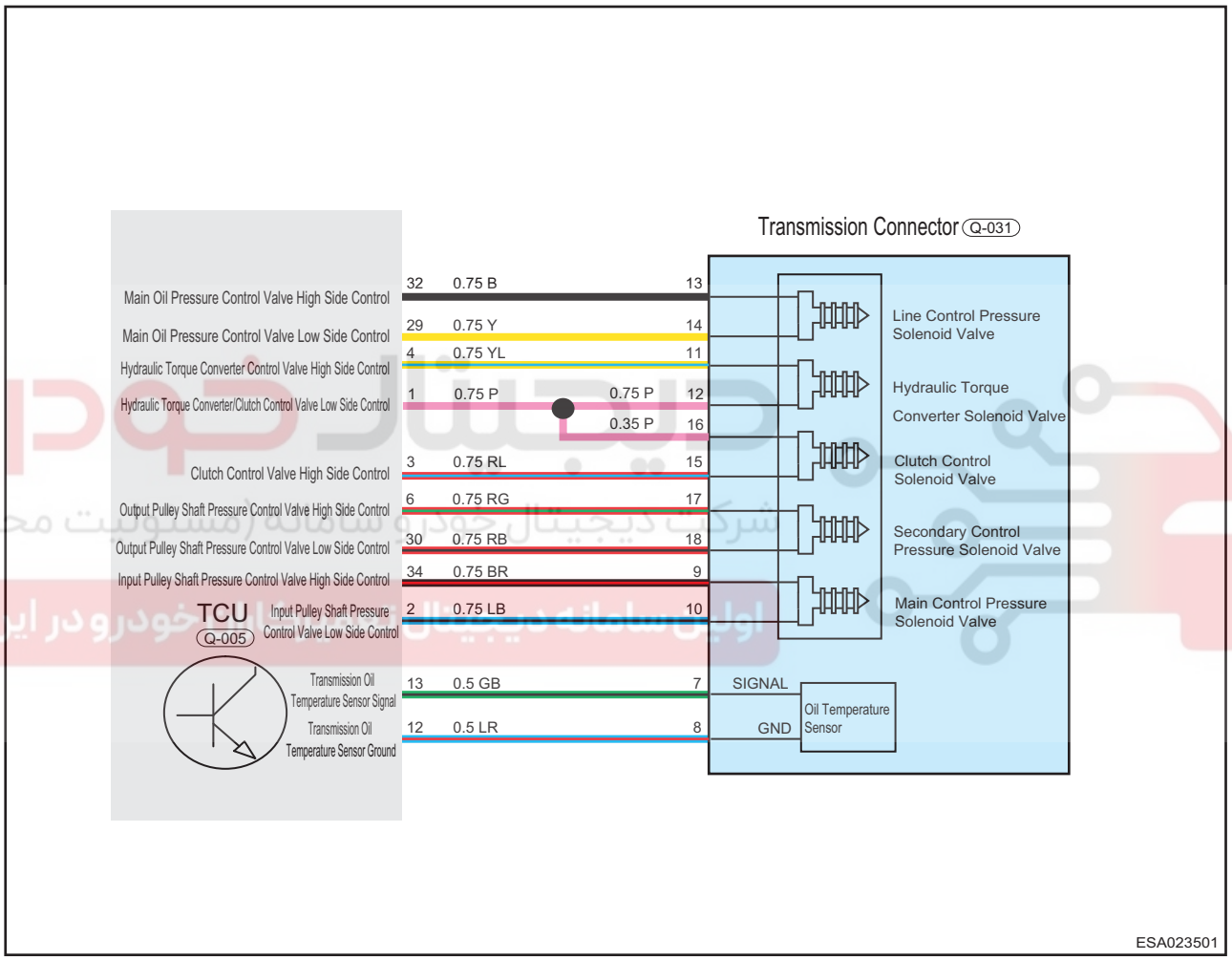
Result

Go to
OK
NG

OK	System operates normally
NG	Replace TCU control module assembly

DTC	P074811	Line Solenoid Short to GND
DTC	P074812	Line Solenoid Short to BAT
DTC	P074813	Line Solenoid Open Load
DTC	P074815	Line Solenoid Short to BAT or Open

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P074811	Line Solenoid Short to GND	• TCU detects that the solenoid valve is short to power supply, short to ground or open, the fault is established.	• Vehicle does not move even in gear • Transmission warning light comes on • Lack of power when accelerating	1. Check wire harness, connector or terminal for abnormal 2. Replace transmission
P074812	Line Solenoid Short to BAT			
P074813	Line Solenoid Open Load			
P074815	Line Solenoid Short to BAT or Open			

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the TCU connector Q-005 and transmission connector Q-031.

Multimeter Connection	Condition	Specified Condition
Q-031 (13) - Q-005 (32)	Always	Continuity
Q-031 (14) - Q-005 (29)	Always	Continuity

Result

Go to
OK
NG

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

OK

3	Check solenoid valve

(a) Connect the transmission connector Q-031.

Multimeter Connection	Condition	Specified Condition
Q-005 (29) - Q-005 (32)	Always	Resistance is 5.3 ± 0.3 Ω

Result

Go to
OK
NG

OK → **System operates normally**

NG → **Replace transmission assembly**

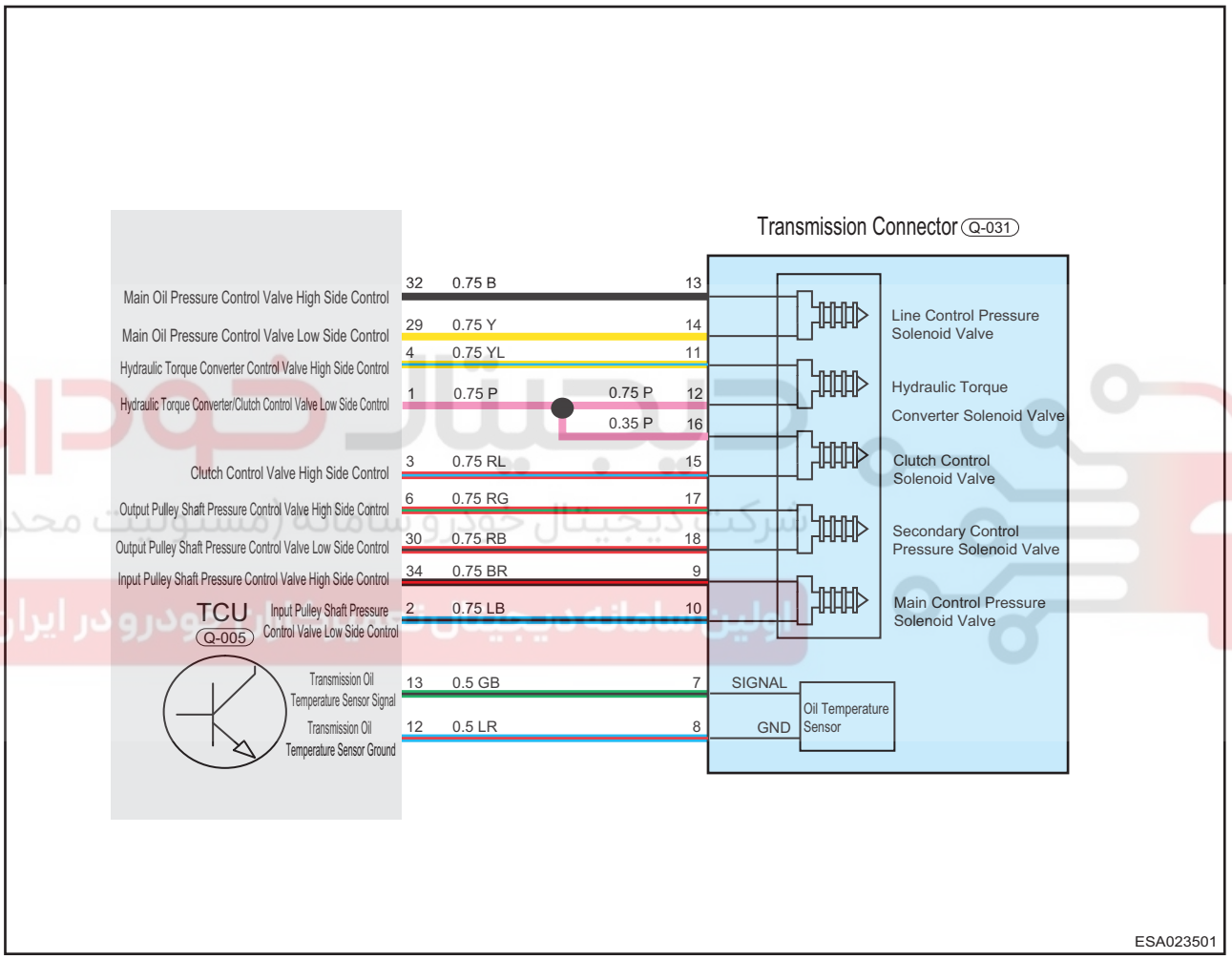
DTC	P077811	Primary Solenoid Short to GND

DTC	P077812	Primary Solenoid Short to BAT

DTC	P077813	Primary Solenoid Open Load

DTC	P077815	Primary Solenoid Short to BAT or Open

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P077811	Primary Solenoid Short to GND	• TCU detects that the solenoid valve is short to power supply, short to ground or open, the fault is established.	• Vehicle does not move even in gear • Transmission warning light comes on • Lack of power when accelerating	1. Check wire harness, connector or terminal for abnormal 2. Replace transmission
P077812	Primary Solenoid Short to BAT			
P077813	Primary Solenoid Open Load			
P077815	Primary Solenoid Short to BAT or Open			

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Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the TCU connector Q-005 and transmission connector Q-031.

Multimeter Connection	Condition	Specified Condition
Q-031 (9) - Q-005 (34)	Always	Continuity
Q-031 (10) - Q-005 (2)	Always	Continuity

Result

Go to
OK
NG

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

OK

3	Check solenoid valve

(a) Connect the transmission connector B-090.

Multimeter Connection	Condition	Specified Condition
Q-005 (2) - Q-005 (34)	Always	Resistance is 5.3 ± 0.3 Ω

Result

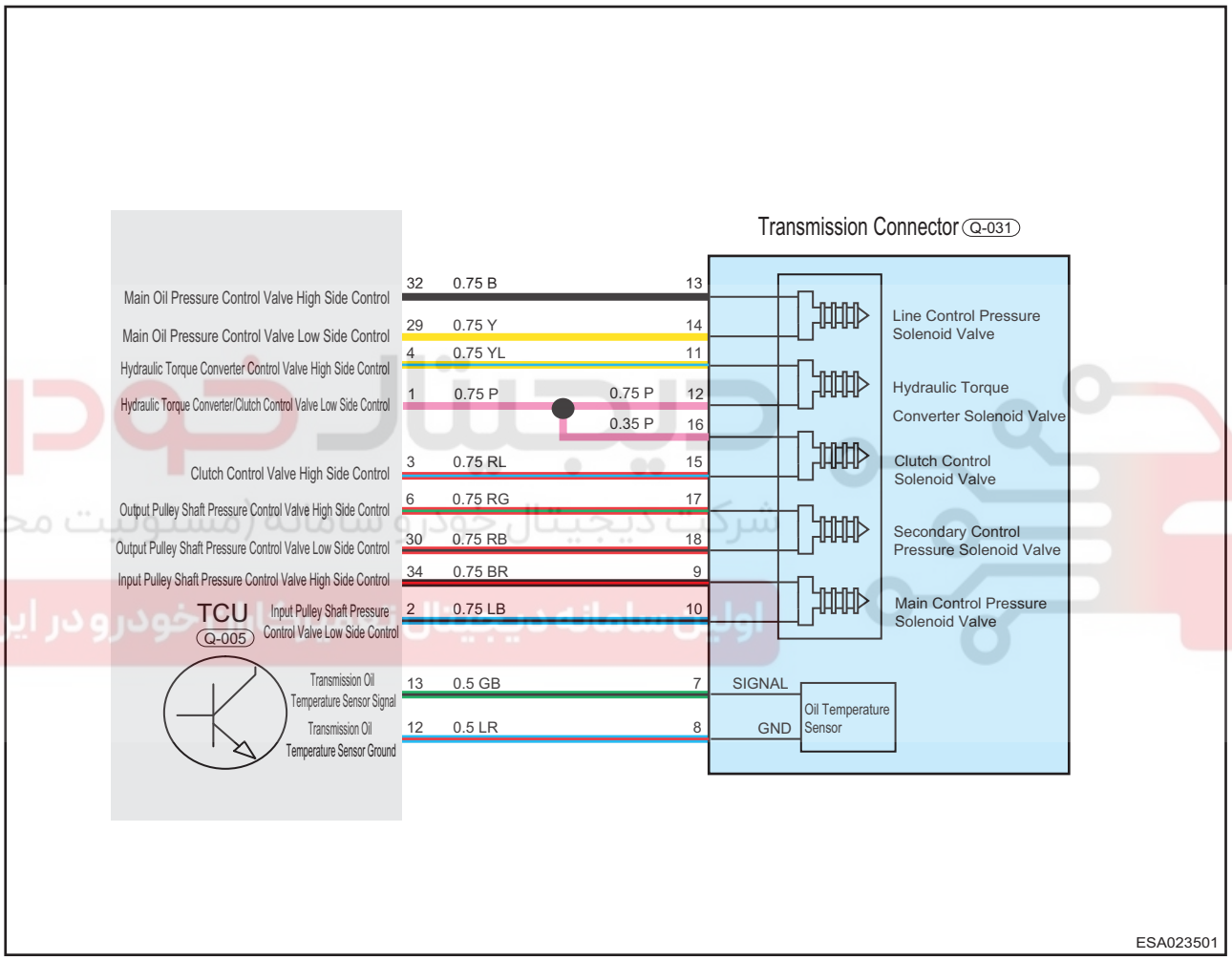
Go to
OK
NG

OK → **System operates normally**

NG → **Replace transmission assembly**

DTC	P079811	Secondary Solenoid Short to GND
DTC	P079812	Secondary Solenoid Short to BAT
DTC	P079813	Secondary Solenoid Open Load
DTC	P079815	Secondary Solenoid Short to BAT or Open

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P079811	Secondary Solenoid Short to GND	• TCU detects that the solenoid valve is short to power supply, short to ground or open, the fault is established.	• Vehicle does not move even in gear • Transmission warning light comes on • Lack of power when accelerating	1. Check wire harness, connector or terminal for abnormal 2. Replace transmission
P079812	Secondary Solenoid Short to BAT			
P079813	Secondary Solenoid Open Load			
P079815	Secondary Solenoid Short to BAT or Open			

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the TCU connector Q-005 and transmission connector Q-031.

Multimeter Connection	Condition	Specified Condition
Q-031 (17) - Q-005 (6)	Always	Continuity
Q-031 (18) - Q-005 (30)	Always	Continuity

Result

Go to
OK
NG

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

OK

3	Check solenoid valve

(a) Connect the transmission connector Q-031.

Multimeter Connection	Condition	Specified Condition
Q-005 (30) - Q-005 (6)	Always	Resistance is 5.3 ± 0.3 Ω

Result

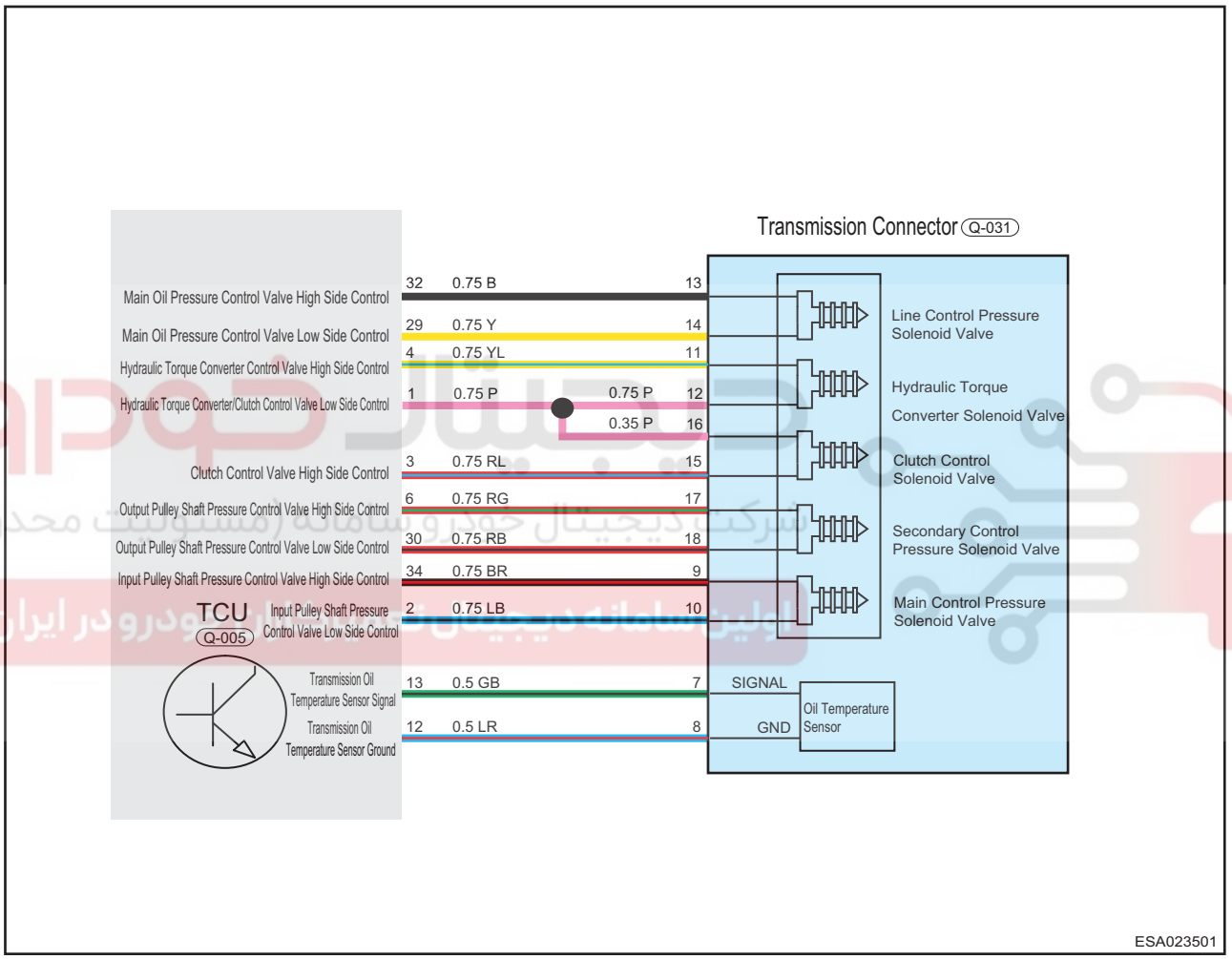
Go to
OK
NG

OK → **System operates normally**

NG → **Replace transmission assembly**

DTC	P272511	TCC Solenoid Short to GND
DTC	P272512	TCC Solenoid Short to BAT
DTC	P272513	TCC Solenoid Open Load
DTC	P272515	TCC Solenoid Short to BAT or Open

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P272511	TCC Solenoid Short to GND	• TCU detects that the solenoid valve is short to power supply, short to ground or open, the fault is established.	• Hydraulic torque converter clutch slips • Transmission warning light comes on	1. Check wire harness, connector or terminal for abnormal 2. Replace transmission
P272512	TCC Solenoid Short to BAT			
P272513	TCC Solenoid Open Load			
P272515	TCC Solenoid Short to BAT or Open			

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Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the TCU connector Q-005 and transmission connector B-090.

Multimeter Connection	Condition	Specified Condition
B-090 (11) - Q-005 (4)	Always	Continuity
B-090 (12) - Q-005 (1)	Always	Continuity

Result

Go to
OK
NG

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

OK

3	Check solenoid valve

(a) Connect the transmission connector B-090.

Multimeter Connection	Condition	Specified Condition
Q-005 (1) - Q-005 (4)	Always	Resistance is 5.3 ± 0.3 Ω

Result

Go to
OK
NG

OK → **System operates normally**

NG → **Replace transmission assembly**

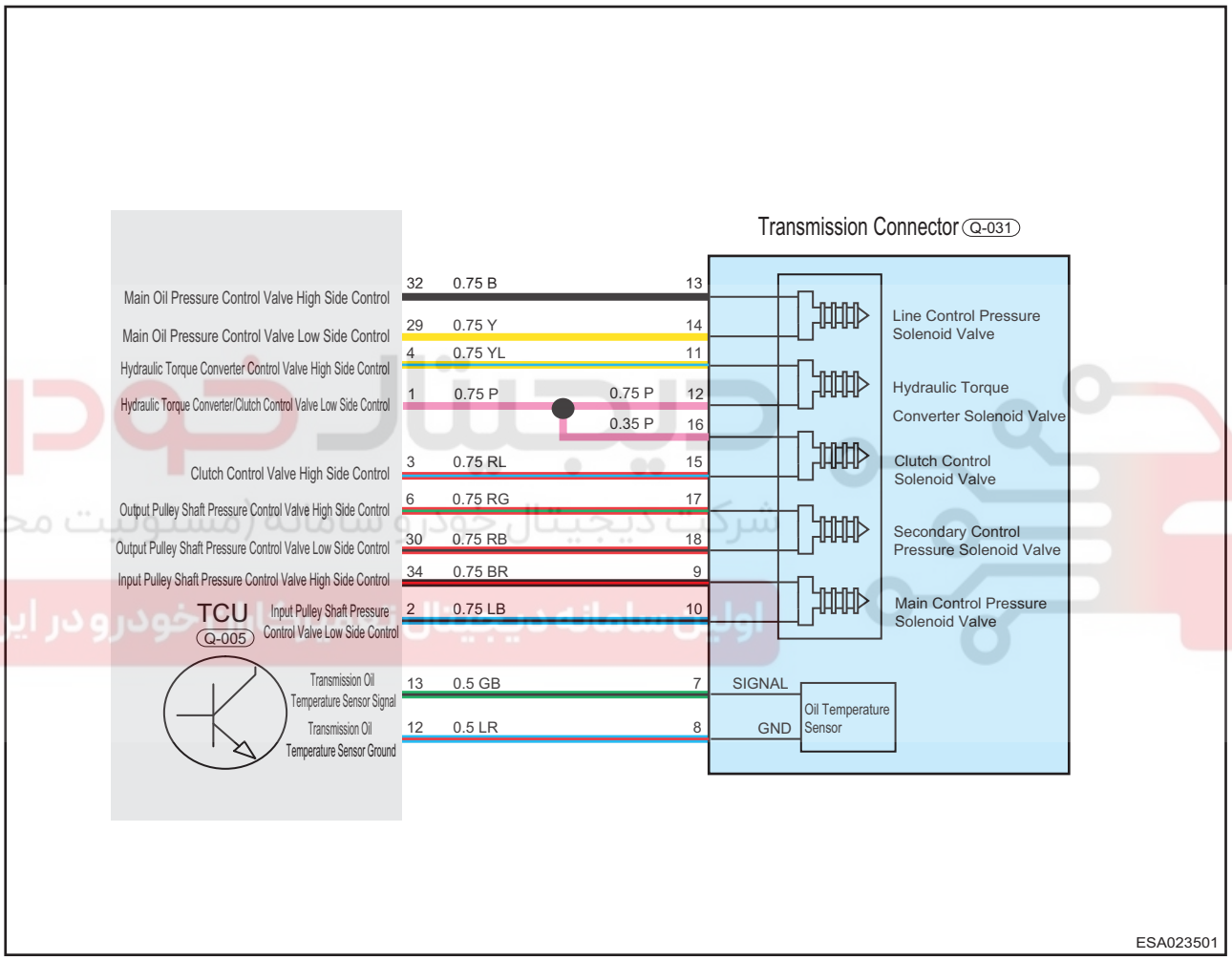
DTC	P271611	Clutch Solenoid Short to GND

DTC	P271612	Clutch Solenoid Short to BAT

DTC	P271613	Clutch Solenoid Open Load

DTC	P271615	Clutch Solenoid Short to BAT or Open

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P271611	Clutch Solenoid Short to GND	• TCU detects that the solenoid valve is short to power supply, short to ground or open, the fault is established.	• Large shift shock • Transmission warning light comes on	1. Check wire harness, connector or terminal for abnormal 2. Replace transmission
P271612	Clutch Solenoid Short to BAT			
P271613	Clutch Solenoid Open Load			
P271615	Clutch Solenoid Short to BAT or Open			

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the TCU connector Q-005 and transmission connector Q-031.

Multimeter Connection	Condition	Specified Condition
Q-031 (15) - Q-005 (3)	Always	Continuity
Q-031 (16) - Q-005 (1)	Always	Continuity

Result

Go to
OK
NG

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

OK

3	Check solenoid valve

(a) Connect the transmission connector B-090.

Multimeter Connection	Condition	Specified Condition
Q-005 (1) - Q-005 (3)	Always	Resistance is 5.3 ± 0.3 Ω

Result

Go to
OK
NG

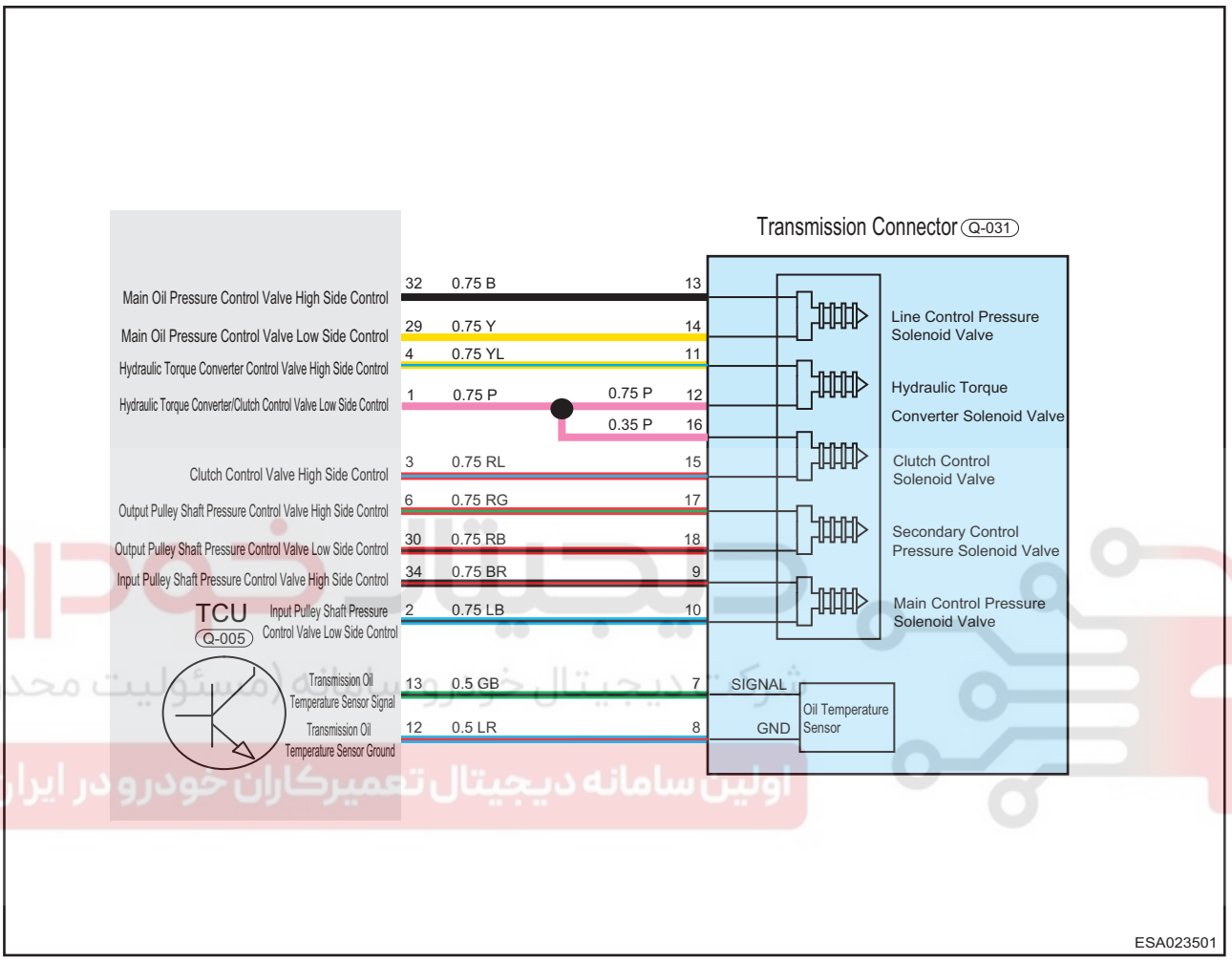
OK → **System operates normally**

NG → **Replace transmission assembly**

DTC	P093715	Oil Temperature Sensor Short to BAT/OL

DTC	P093711	Oil Temperature Sensor Short to GND

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P093715	Oil Temperature Sensor Short to BAT/OL	• When the CVT oil temperature sensor voltage exceeds the threshold, failure is established.	• Lack of power when accelerating • Transmission warning light comes on	1. Check wire harness, connector or terminal for abnormal 2. Replace transmission assembly
P093711	Oil Temperature Sensor Short to GND			

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the TCU connector Q-005, measure resistance between Q-005(12) and Q-005(13), refers 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

Temperature (℃)	Resistance (KΩ)
100	0.4527
110	0.3509
120	0.2753

Hint:
The resistance error is about 10%

Result

Go to
OK
NG

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

OK

3	Check oil temperature sensor

(a) Disconnect the oil temperature sensor wire harness connector, observe whether the oil temperature sensor is normal.

Result

Go to
OK
NG

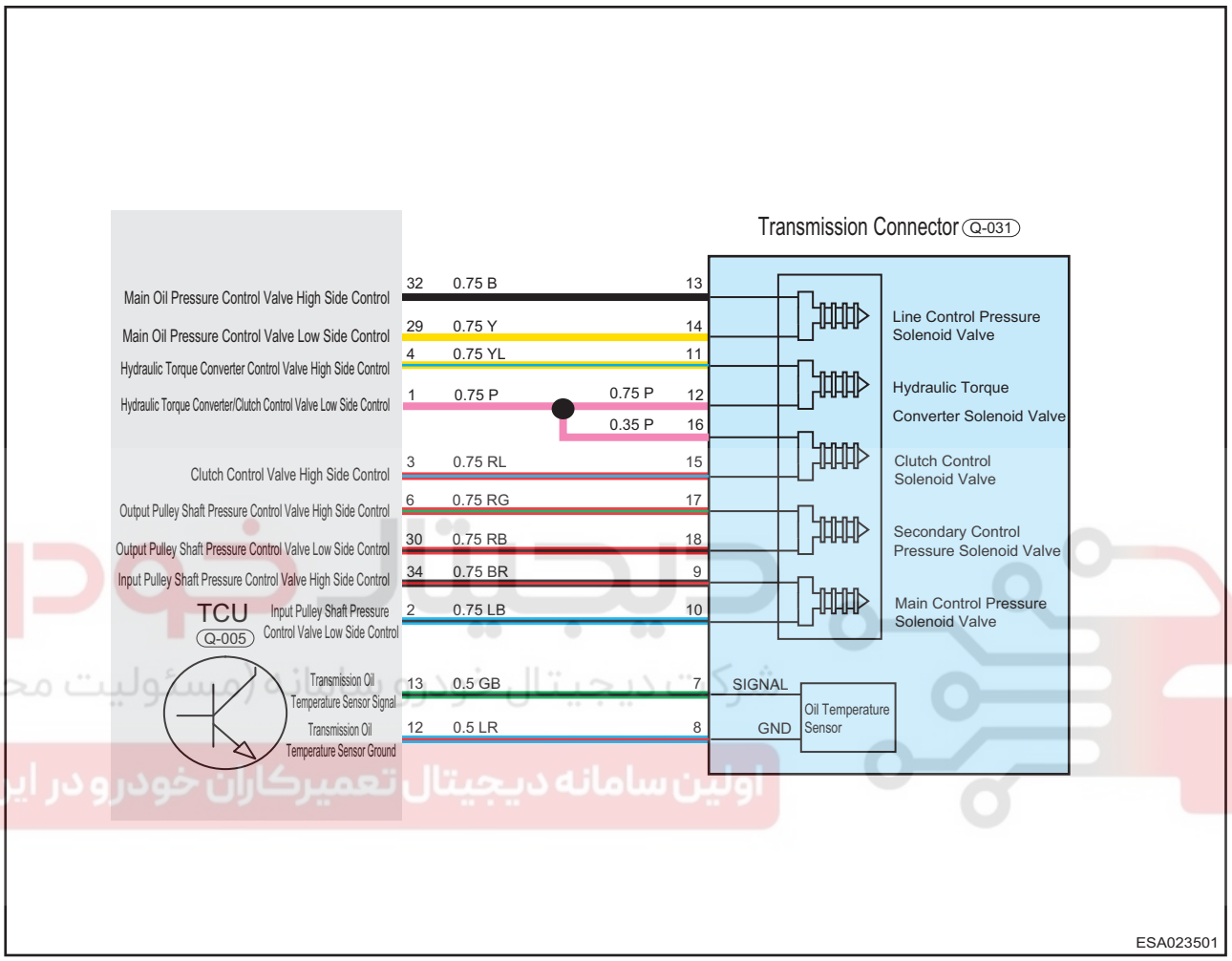
OK → **System operates normally**

NG → **Replace transmission assembly**

DTC	P021898	Trans Oil Temperature Out of Range

DTC	P176798	Trans Oil Temperature Critical

Circuit Diagram



Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P021898	Trans Oil Temperature Out of Range	• When the oil temperature is higher than 128 ℃ or 135 ℃ , failure is established.	• Lack of power when accelerating • Transmission warning light comes on	1. Replace transmission assembly
P176798	Trans Oil Temperature Critical			

Confirmation Procedure

Confirm that battery voltage is not 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 engine compartment fuse and relay box fuses EF07 and SB03**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Find fuse EF07 (7.5 A) on engine compartment fuse and relay box.
Find fuse SB03 (30 A) on instrument panel fuse and relay box.
(d) Check the resistance of fuses.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK →

2	**Check wire harness connector**

(a) Check connector for looseness, poor connection and damaged appearance etc.
(b) Disconnect the TCU connector Q-005, measure resistance between Q-005(12) and Q-005(13), refers to the table below.

Temperature (℃)	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 (℃)	Resistance (KΩ)
110	0.3509
120	0.2753

Hint:
The resistance error is around 10%

Result

Go to
OK
NG

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

OK

3	Check transmission oil cooler position and line

(a) Check if transmission oil cooler position and line are normal.
Check if vehicle fan operates normally.

Result

Go to
OK
NG

OK → **System operates normally**

NG → **Replace transmission assembly**

DTC	P176181	ABS Invalid
DTC	U014087	Lost Communication with BCM
DTC	U010087	Lost Communication with ECM
DTC	U012987	Lost communication with BSM
DTC	U012687	Lost Communication with SAM
DTC	U042281	Invalid Data from BCM
DTC	U040181	Invalid Data from ECM
DTC	U041881	Invalid Data from BSM
DTC	U042881	Invalid Data from SAM
DTC	P175081	Invalid Engine Speed Signal
DTC	P175181	Invalid Engine Actual Torque Signal
DTC	P175281	Invalid Brake Pedal Signal
DTC	P175381	Invalid Gas Pedal Signal
DTC	P175481	Invalid Vehicle Speed Signal
DTC	P175581	Invalid Front Left Speed Signal
DTC	P175681	Invalid Front Right Speed Signal
DTC	P175781	Invalid Rear Left Speed Signal
DTC	P175881	Invalid Rear Right Speed Signal
DTC	P175981	Invalid Engine Coolant Signal
DTC	P176081	Invalid Odormeter Signal
DTC	P176281	Invalid Master Cylinder Pressure Signal

Description

DTC No.	DTC Definition	Fault Mature Condition	Possible Impact of Fault	Maintenance Advice
P176181	ABS Invalid	• TCU cannot obtain or receive the signal on CAN network.	• Lack of power when accelerating • Abnormal shifting • Brake and stall • Vehicle LimpHome • Abnormal vehicle CAN network • TCU operates abnormally	1. Relevant controller sensor failes 2. Abnormal vehicle CAN network
U014087	Lost Communication with BCM			
U010087	Lost Communication with ECM			
U012987	Lost communication with BSM			
U012687	Lost Communication with SAM			
U042281	Invalid Data from BCM			
U040181	Invalid Data from ECM			
U041881	Invalid Data from BSM			
U042881	Invalid Data from SAM			
P175081	Invalid Engine Speed Signal			
P175181	Invalid Engine Actual Torque Signal			
P175281	Invalid Brake Pedal Signal			
P175381	Invalid Gas Pedal Signal			
P175481	Invalid Vehicle Speed Signal			
P175581	Invalid Front Left Speed Signal			
P175681	Invalid Front Right Speed Signal			
P175781	Invalid Rear Left Speed Signal			
P175881	Invalid Rear Right Speed Signal			
P175981	Invalid Engine Coolant Signal			
P176081	Invalid Odormeter Signal			
P176281	Invalid Master Cylinder Pressure Signal			

Confirmation Procedure

Confirm that battery voltage is not 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 the resistance of corresponding fuse.

Standard Resistance

Less than 1 Ω

OK

Fuse is not burned out

Result

Go to
OK
NG

NG → **Replace fuse**

OK

2	**Check sensor**

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

Result

Go to
OK
NG

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

OK

3	**Check CAN network**

(a) Check if vehicle CAN network is abnormal.

Result

Go to
OK
NG

OK → **System operates normally**

NG → **Check and repair CAN network**

ON-VEHICLE SERVICE

Transmission Oil

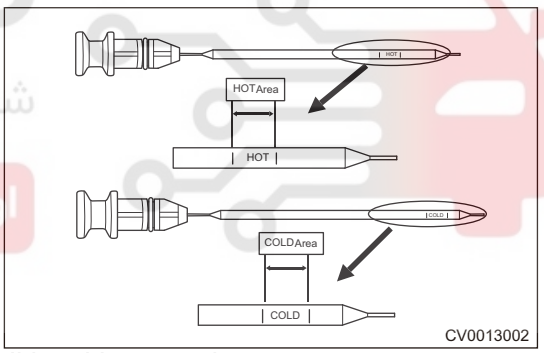
Automatic transmission oil is a very important component that provides hydraulic transmission, lubrication, cooling and other functions during the operation of automatic transmission.

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 and hold 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.

Oil Status Inspection

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 checked and repaired.

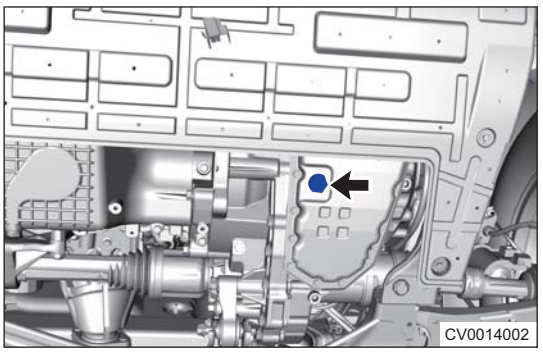
Transmission Oil Draining/Refilling

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.

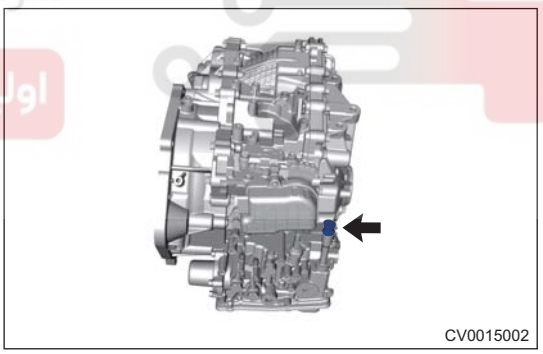


Tightening torque
42 – 50 N·m

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 it is a new transmission, it is not necessary to drain the oil. Add 5.8 ± 0.1 L of oil directly.

Differential Oil Seal

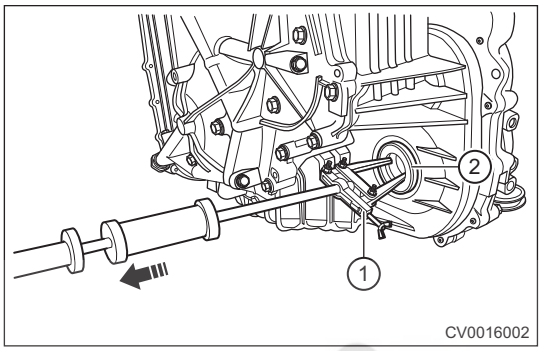
Removal

Warning/Caution/Hint:

Caution:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

1. Drain the transmission oil.
2. Remove the front left wheel.
3. Remove the left drive shaft.
4. Use a special tool to remove left drive shaft oil seal from transmission assembly.



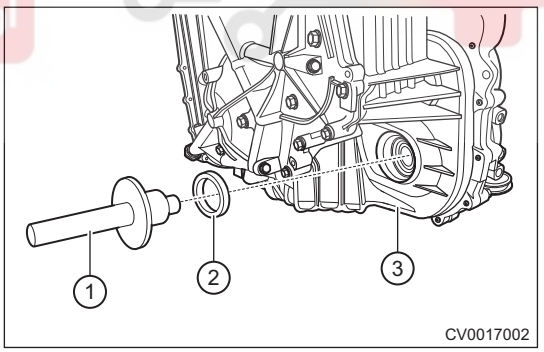
Caution:

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

5. Removal is completed.

Installation

1. Installation is in the reverse 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.

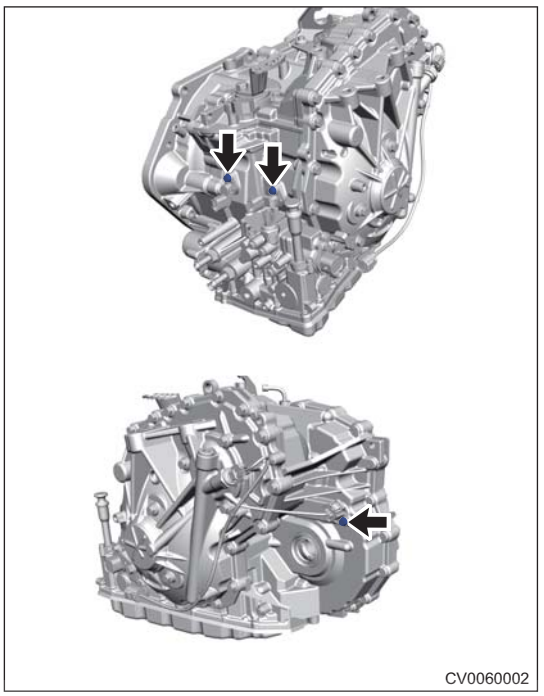
Speed Sensor

Removal

1. Turn off electrical equipments and engine switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly.
4. Removal the battery tray assembly.
5. Disconnect the speed sensor connector.
6. Remove fixing bolts and speed sensor.

Installation

1. Install speed sensor and tighten bolts in place.

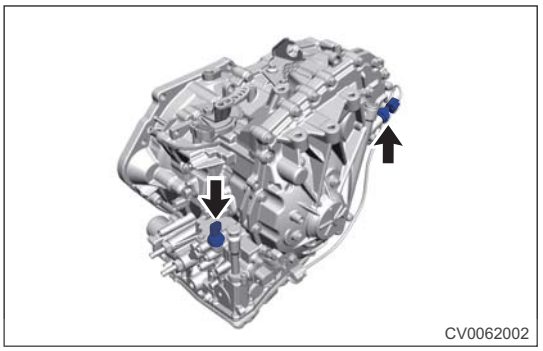


Tightening torque
8 –10 N·m
Caution:
- Apply proper amount of automatic transmission oil to sensor O-ring.

Oil Pressure Sensor

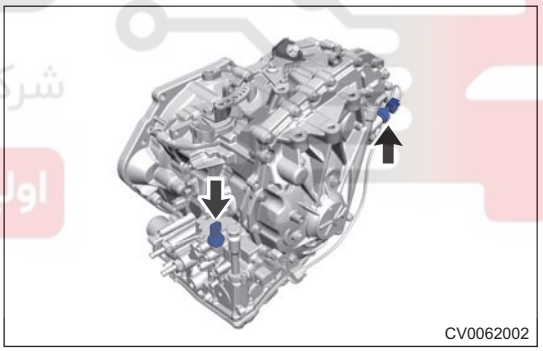
Removal

1. Turn off electrical equipments and engine switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly.
4. Removal the battery tray assembly.
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.

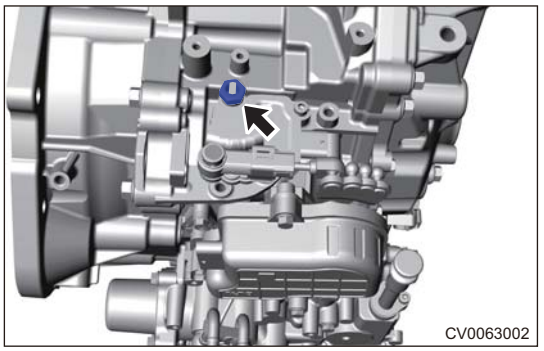


Tightening torque
15 – 22 N·m
Caution:
- Apply proper amount of automatic transmission oil to sensor O-ring.

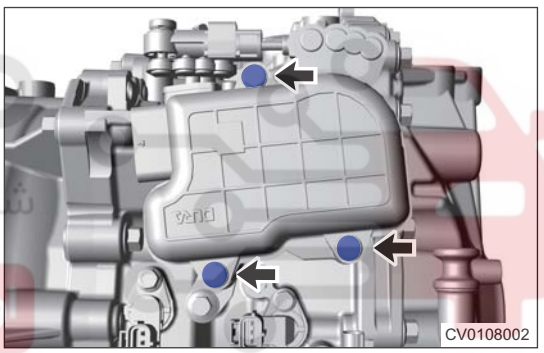
Electronic Shift Module

Removal

1. Turn off electrical equipments and engine switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly.
4. Disconnect the electronic shift module connector.
5. Remove the electronic shift module coupling nut (arrow).



6. Remove 3 fixing bolts (arrow) from electronic shift module.



7. Remove the electronic shift module.

Installation

Warning/Caution/Hint:

- When the gear sensor is installed and the wire harness connector is inserted into place, please be sure to push the gray locking mechanism on the connector into place to lock the installation position of the connector and the gear sensor.
- Make sure the connector is inserted into place while installing: When the insert it into place, it will emit a "click" sound.
- In the process of disassembly and assembly, alignment is required to avoid the occurrence of bending of pins.

1. Installation is in the reverse order of removal.

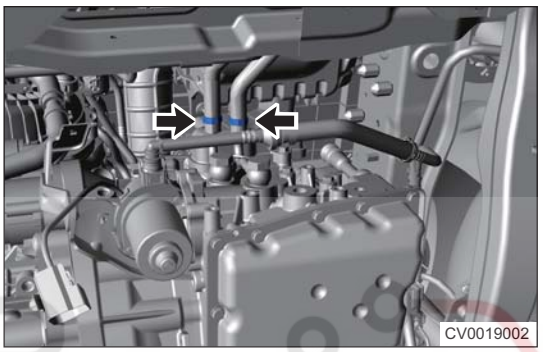
Cooling Pipe Assembly

Removal

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.

1. Drain the transmission oil.
2. Remove the water tank lower protector assembly.
3. Using a suitable clamp pliers, loosen the clamp and remove the cooling oil inlet pipe and return pipe assembly.



Installation

Warning/Caution/Hint:

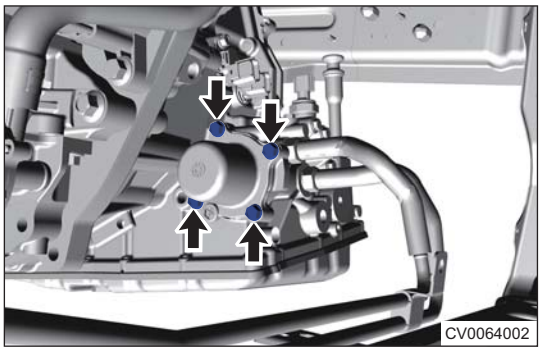
- The clamp must be clamped in the correct position during installation.

1. Installation is in the reverse order of removal.

External Filter

Removal

1. Drain the transmission oil.
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 reverse order of removal.

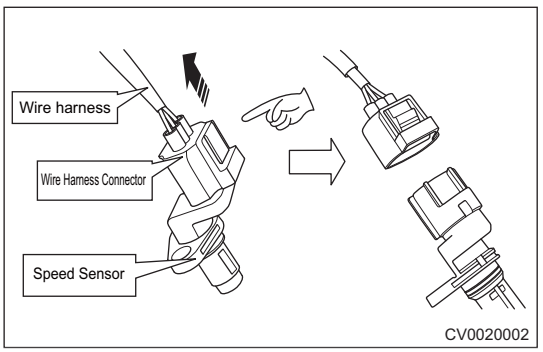
Speed Sensor Connector

Removal

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 open circuit.
- Make sure that the connector is inserted into place while installing: When it is inserted in place, it will make a "click" sound.

1. Press the connector lock mechanism (arrow).



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

Installation

1. Installation is in the reverse order of removal.

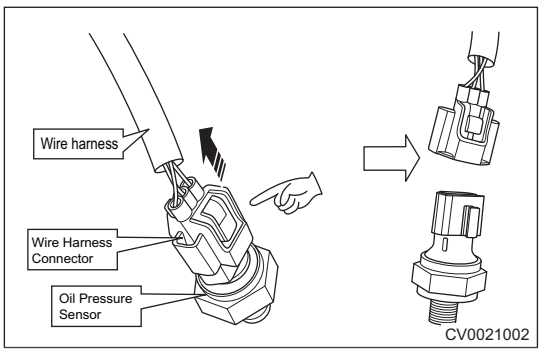
Oil Pressure Sensor connector

Removal

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 open circuit.
- Make sure that the connector is inserted into place while installing: When it is inserted in place, it will make a "click" sound.

1. Press the connector lock mechanism (arrow).



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

Installation

1. Installation is in the reverse order of removal.

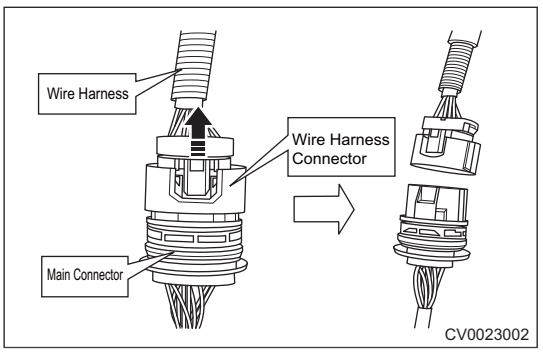
Wire Harness Main Connector

Removal

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 open circuit.
- Make sure that the connector is inserted into place while installing: When it is inserted in place, it will make a "click" sound.

1. Press the connector lock mechanism (arrow).



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

Installation

1. Installation is in the reverse order of removal.

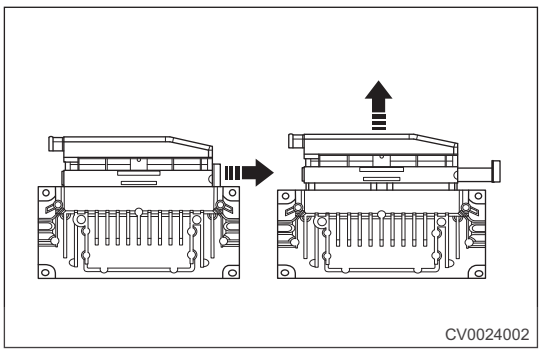
Transmission Control Module Connector

Removal

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 open circuit.
- Make sure that the connector is inserted into place while installing: When it is inserted in place, it will make a "click" sound.

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.

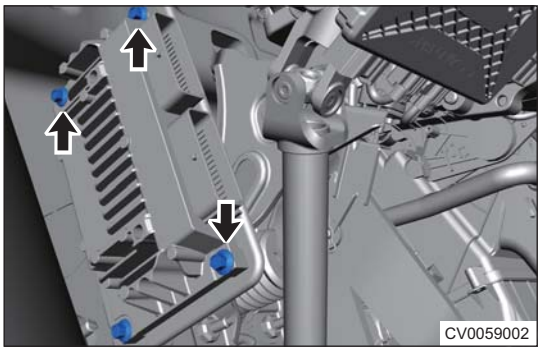
Installation

1. Installation is in the reverse order of removal.

Transmission Control Module

Removal

1. Turn off electrical equipments and engine 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.

Installation

1. Installation is in the reverse order of removal.

Transmission Assembly

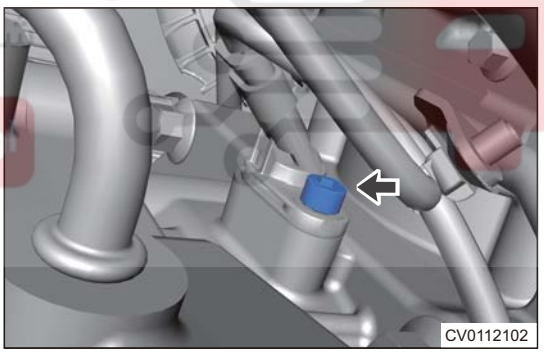
Removal

Warning/Caution/Hint:

Caution:

- Before removal of power assembly, first drain transmission oil.
- When disassembling the transmission, make sure that the coupling bolt between the hydraulic torque converter and the flexible disc is removed first. The hydraulic torque converter is separated together with the transmission from the engine, 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 with a new one.
- As separating engine and transmission, pay attention to not damage transmission external accessories, such as cooling hose, pressure sensor, etc. If there is any damage, it is necessary to replace it according to requirements.

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

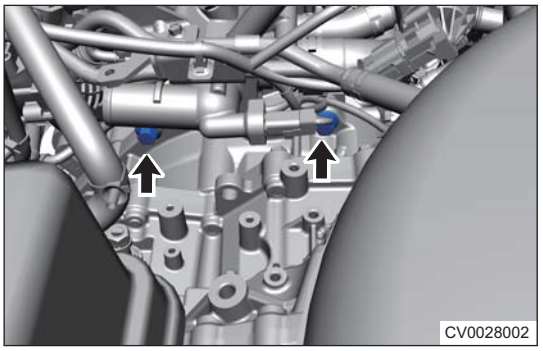


   (c) Remove the crankshaft position sensor.
7. Remove the front tire.
8. Remove the water tank lower protector.
9. Drain the transmission oil.
10. Drain the coolant.
11. Remove the drive shaft.
12. Remove the transmission ground wire, disconnect the speed sensor connector and the oil pressure sensor connector, and move away 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.
17. Remove the left mounting.
18. Remove the rear mounting.
19. Remove the drive shaft guide plate.

20. Remove the transmission.

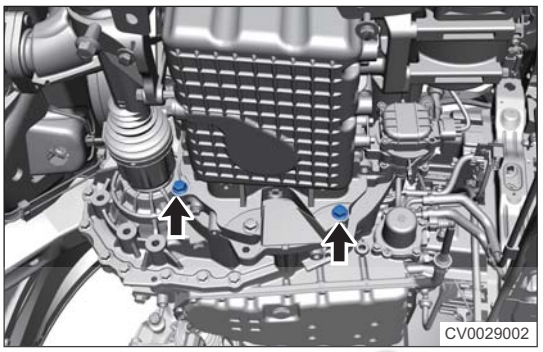
(a) Remove 2 fixing bolts between upper part of transmission and engine.

Tightening torque
60 ± 5 N·m



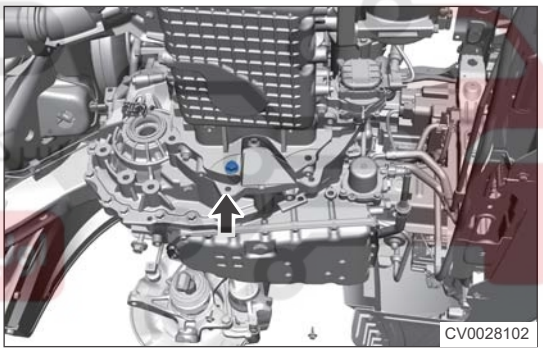
(b) Remove 2 fixing bolts between engine and transmission, and remove the dust plate.

Tightening torque
60 ± 5 N·m

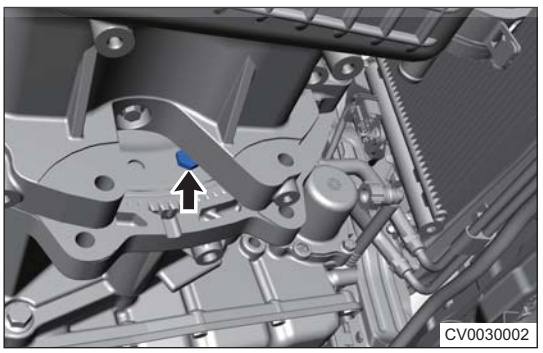


(c) Remove 1 fixing bolt (arrow) from transmission dust plate.

Tightening torque
50 ± 5 N·m



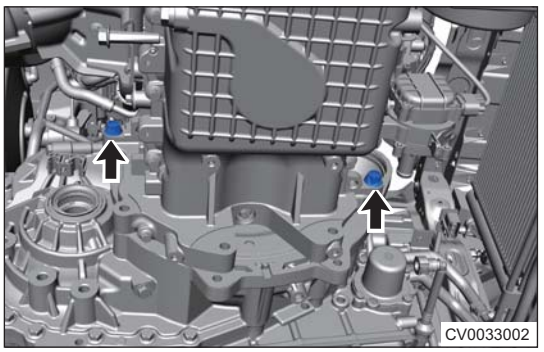
(d) Remove the hydraulic torque converter fixing bolts (4 in total, evenly distributed in the circumference).



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

(f) Remove 2 fixing bolts between transmission and engine.

Tightening torque
60 ± 5 N·m



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

Installation

Warning/Caution/Hint:
Caution:

- During assembly, attention should be paid to ensure that the hydraulic torque converter does not come out.
  (a) If the hydraulic torque converter accidentally falls off, it 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 with a new one.
  (c) A 1.5 mm thick dust gasket is also designed between transmission and engine for some vehicles, install it in place.

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

- MEMO -